AGENDA
NELSON COUNTY BROADBAND AUTHORITY
OCTOBER 6, 2016

THE CONTINUED MEETING CONVENES AT 4:00 P.M. IN THE OLD BOARD OF SUPERVISORS ROOM #420 OF THE COURTHOUSE IN LOVINGSTON, VIRGINIA

I. Call to Order

II. Work Session – Broadband Planning Project, Design Nine, Inc.

- **A.** Overview of Proposed Buildout Plan
- **B.** Proposed Wholesale Rate Structure Changes & Pro Forma Financials
- **C.** Network Operator & Outside Plant Services
- **D.** Network Incentives- Discounts, Amortization of NRCs & Neighborhood Builds
- **E.** Network Marketing
- **F.** Central Virginia Electric Cooperative Broadband RFI

III. Other Business (As May Be Presented)

IV. Adjournment

Executive Overview of Broadband Study

Prioritized Build out Plan

The existing fiber network (the original fiber build and the recent extensions) give the Nelson County Broadband Authority an opportunity to provide improved broadband to much larger areas of the county. Our recommendations are:

- Make any minor changes needed on existing county towers and adjust pricing to make tower access more affordable for wireless ISPs. This approach can quickly bring improved broadband to many areas of the county currently suffering from poor service. It may be desirable for NCBA/County to add new towers in areas of the county with very poor coverage. Any new tower expenditures should be closely coordinated with public safety tower needs to avoid duplication of tower assets.
- Use a market demand-based approach to accelerate fiber service to more areas of the county more quickly. NCBA should use an enhanced version of the current Web-based survey (demand based build out) to identify new fiber extension areas, coupled with increased marketing and awareness campaign. NCBA should use minimum threshold take rates in identified areas of demand to guarantee revenue prior to funding construction.
- Continue to use the one time construction fees to help finance the build out, coupled with increased marketing/awareness of the ability for new customers to pay this fee over time.
- Re-negotiate or re-bid the current operations contract to remove the conflict of interest with the operator also an ISP on the network (and competing with other providers).

Rate Structure adjustments

The current rate structure should be adjusted for both fiber services and tower access. NCBA's path to financial sustainability must be based on attracting more residential and business customers to the network. Providers are asking for more competitive rates, and lower wholesale rates should translate into more customers and higher revenue overall.

- Make adjustments to the fiber rate structure to focus on residential Gigabit wholesale service to give providers a "premium" service to market and to help highlight the higher quality of fiber-delivered services. Providers would continue to have the option to offer lower speed options (e.g. 25 Meg down, 5 meg up).
- Provide two types of "business class" (e.g. Tier Two) services that provide both higher speeds and more attractive pricing.
- Reduce the cost of Wide Area Network (WAN) services to make them more attractive options.
- Offer provider discounts based on total monthly volume to provide incentives for ISPs to market their services more vigorously.
- Offer a second tier of Tower Access prices that make WISP use of county towers more affordable (base pricing on antenna/radio weight to avoid provider discrimination).

	NCBA Proposed Service Types			
	Service Class	**Service Type**	**Recommended Wholesale Cost**	Comment
Tier One	Residential GPON 1Gbps	1000/10 Mbps	$27	Best Effort (maximum 32:1 split)
	Residential GPON 1Gbps	1000/10 Mbps	$29	Best Effort, rate limited (e.g. 25/5)
	Residential GPON 1Gbps	1000/1000 Mbps	$37	Best Effort, symmetric
Tier Two	Business GPON 100Mbps	100/50 Mbps	$95	higher priority than Best Effort (maximum 16:1 split)
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Tier Three	Wide Area LAN Service 250 Mbps	250/250 Mbps	$325	Active Ethernet, highest priority, supports QinQ (two connections may be needed)
	Wide Area LAN Service 500 Mbps	500/500 Mbps	$550	Active Ethernet, highest priority, supports QinQ (two connections may be needed)
	Wide Area LAN Service 1Gbps	1000/1000 Mbps	$895	Active Ethernet, highest priority, supports QinQ (two connections may be needed)
Dark Fiber	Dark fiber pair	Two dedicated fibers	$50/month/ strand	Minimum distance charge and splicing charges apply.

Network Operations and Outside Plant Services

The current network operator is also a service provider, which creates a built in conflict of interest: the operator knows the status and service type of every competitor's customers. This creates a disincentive for other providers to market vigorously. The kind and type of reporting currently provided by the operator does not give NCBA the right kind of information needed to track customers properly and to properly evaluate monthly revenue (amounts, type of customers, circuit types).

- Network operations should be re-bid at the expiration of the current contract. The operations Scope of Work should be re-written to ensure that the network operator is accountable for providing better detail on revenue, subscribers, outages, and other routine operations-related information.
- The new RFP should preclude selecting an on-network provider also serving as the network operator. The dual role (operator and provider) creates a conflict of interest that discourages

other providers from coming on the network. That is, the operator is also a competitor who knows every single customer of every competing provider.

Last Mile Installation Recommendations

The Nelson County Broadband Authority currently provides discounts, amortization of costs and sharing of costs for both individual service connections and/or neighborhood builds that entail expansion of the middle mile network to serve the neighborhood. NCBA is already relatively sophisticated in this area. The continuous Web-based survey collects new customer prospects and is passed on to providers. NCBA is also providing a monthly payment option to new connections to make it easier for residents and businesses to pay the one time connection fee.

- The one time connection fee "payment over time" should be expanded with more marketing/ awareness, especially as the new network extensions come online. Use the one time connection fee approach to develop an expanded line of credit with a local bank.
- Expand and market the current construction fee financing to make getting connected more affordable.
- Create and sustain a modest but steady awareness campaign about the availability of the network, using the Wild and Wired logo and brand name to encourage subscriber growth.
- NCBA should adopt a demand aggregation based expansion program that incentivizes whole neighborhoods to work together to bring fiber into a rural road area or a rural subdivision. NCBA can set take rates targets by neighborhood/rural road and tell residents that as soon as the target of 50% (as an example) of residents agree to the connection fee and to buy service, NCBA will expand the fiber network.
- The initial focus for last mile expansion should be the "easy" areas that are close to the existing fiber. But rural parts of the county farther from the fiber can be included by using a hybrid fiber-wireless design, with fiber in the local neighborhood/rural road and a wireless backhaul connection to a county tower.
- NCBA should continue to meet with CVEC (electric coop) to determine conditions of use for using CVEC's "no charge annual pole attachment fees) offer. Large areas of the county are in CVEC territory, and fiber could be deployed in some of those areas at lower initial cost and lower ongoing expense by using an aerial design on CVEC poles.

Availability of CAF2 Funding

To qualify for CAF funds, NCBA would have to request classification by the Virginia SCC (State Corporation Commission) as an ETC (Eligible Telecommunications Carrier). The requirements and paperwork will require the assistance of a qualified telecom attorney.

To date, all CAF funds have been distributed to typically incumbent telco providers. Even "innovative" new CAF programs like the Rural Broadband Experiment make it difficult for efforts like NCBA to qualify (e.g. must be able to provide three to five years of audited financial statements).

The recent announcement by CVEC to provide no-fee pole attachments to any broadband provider is a more attractive option.

Other Federal programs like the USDA Community Connect were also evaluated and found to be problematic; grant conditions made it nearly impossible to identify an area of Nelson County that would qualify.

ISP and WISP Attraction

SCS, a local WISP, has joined the network and begun marketing fiber services. The company is also interested in affordable access to county tower space to offer their wireless broadband services over a larger area. Rockbridge Global Village, located in Lexington, has expressed interest in joining the network.

- Signing new providers will be easier if network operations are decoupled from the current service provider conflict.
- Providers are also interested in being able to offer a Gigabit residential service; adoption of a revised rate structure will be important in this regard. Ting has expressed a strong interest in offering a Gigabit residential service.

NCBA Staffing and Operations

The Authority is managed with a significant contribution from County staff, with some services outsourced to the private sector firms (e.g. break-fix, drop construction). The Authority is relatively well-managed but County staff are concerned that if the network begins to see significant customer growth (new providers and new fiber extensions bringing more customers on the network), they will not be able to keep up.

- A detailed ten year financial pro forma was developed with the proposed changes in rate structure. Multiple changes and revisions were made to the pro forma based on suggestions and comments received from County staff and NCBA. The pro forma does show a path to financial sustainability over time if NCBA is able to increase the rate of new customer connections.
- Separating the network operator function from the existing provider (Ting) and developing a revised Scope of Work for the network operator should provide significant relief to County staff.

Review of Priority Actions

Create a business model & plan for broadband service

The recommended changes to the current NCBA business model include an updated rate structure, decoupling the network operator and service provider function, and using a demand aggregation-based build out strategy to accelerate network expansion. The ten year pro forma developed as part of this work does show a path to financial sustainability over time, but increased customer acquisition is critical.

Consider county run operations and privatization of operations

An updated Scope of Work for network operations with a re-bid for a network operator would address many of the time and management issues currently creating a challenging workload for County staff.

While privatization of operations is possible (e.g. NCBA leases out the entire network to a single private entity), it would present some challenges.

The current cash flow and negative revenue situation would make it difficult to find a firm willing to take on the network.

The lease agreement would have to be written very carefully to ensure that the private firm continues to operate the network as a community asset. This would be difficult to achieve in the contract itself and difficult to enforce in practice.

Promote and market customer recruitment

An improved (e.g. Gigabit residential service) and simplified set of service offerings combined with the demand aggregation approach to identifying new service and expansion areas has to happen before any increased marketing and awareness.

A modest but consistent and regular marketing and awareness campaign will be needed. NCBA brand recognition and marketing has to be coupled with clearly described options for citizens, residents, and businesses to learn how they can get service.

Increase service area as economic development tool

Four changes are key to making NCBA an improved economic development tool:

- Improved and simplified rate structure that offers a residential/small business Gigabit service at an affordable price.
- Increased number of providers on the network which will lead to a wider variety of service options and increased competition.
- A well-defined build out strategy that is marketed clearly and plainly to citizens and businesses.
- Continued County financial support of NCBA until revenue exceeds costs (achievable by adding customers).

Nelson County: Network Build Out Strategy

AUGUST, 2016

NELSON COUNTY
WILD & WIRED
BROADBAND INTERNET IS HERE

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Pricing for Growth

The Nelson County Broadband Authority Network currently has 145 customers, with an estimated 29 more pending installation. The slow growth of the network can be attributed to several factors:

- The limited reach of the network. The current network passes only a small percentage of the estimated 6,381 homes and 378 businesses in Nelson County.
- The cost of getting connected. The Authority has reported than both providers and potential customers have indicated the cost of getting a fiber drop from the road right of way to the customer premises is an obstacle. The Authority is providing a financing plan to pay for the cost of the connection over time, which has helped increase the take rate.
- The limited number of service providers. This problems has two potential explanations. Some prospective providers may be deterred from joining the network because Ting (formerly BRI) is both the network operator and a service provider. As the network operator, Ting would have precise knowledge of every customer and the type/cost of the circuit being provided. Some providers do not want a competitor knowing that much detail about their customers. The second problem is that the limited number of customers on the network means that there is limited growth and revenue possibilities for new providers. Note: SCS, a local provider, has recently become a provider on the network.

Take Rate Increase Strategies

To meet demand from residents and businesses, and to increase revenue to the point where some income (revenue after expenses) is available to fund expansion, NCBA should consider the following strategies.

Market Demand Growth Model

In a market demand growth model, NCBA would identify areas of demand and run a survey within that area (using a Web-based form) to assess the willingness of property owners to pay a one time construction fee (similar to what NCBA is doing now) and to agree to pay for a minimum of three years of service on the newly constructed network.

In each market study area, once a high enough percentage of property owners express an interest in considering making a one time fee and three year service fee commitment, NCBA would follow up with those that responded positively to the survey with a binding Connection Agreement and a minimum take rate for minimum number of completed Agreements (e.g. 40% to 60% might be typical).

Using the capital commitment from the one time construction fees and the three years of guaranteed revenue, NCBA could borrow the balance from a local bank using a long term low interest line of credit, or alternatively, could bond for an amount sufficient to fund several years of expansion (still relying on the guarantees from one time fees and recurring revenue charges).

This approach minimizes financial risk for the Authority because it would only bill in market areas where there is a known and guaranteed take rate of at least 40% or higher--ensuring that the Authority has a long term revenue stream to repay commercial loans or bond loans.

Flat Rate Residential Service

Nationally, Gigabit fiber service for residential customers has become the accepted minimum standard service. If NCBA increases the number of customers on the network, some adjustments to the current rate structure will be required to enable providers to offer a wide range of attractively priced services.

In the current NCBA pricing model, providers are charged on a per circuit basis, with each customer typically getting a single circuit (with a package of Internet) from the provider.

A weakness of this model of selling network capacity on a per circuit basis is that NCBA must rely entirely for revenue on the quality and quantity of sales efforts of the service providers. The quality of provider marketing efforts can vary widely.

One solution is to uncouple the network capacity (i.e. the Gigabit of bandwidth) from the service package (e.g. Internet, voice telephone, computer backup, etc.). One way to do this is to shift the cost of basic network operations and maintenance from the providers to the connected customers via a monthly Connection Fee, set to cover all basic costs (e.g. $30/month).

With this approach, NCBA would recover most costs from the end users of the network, and in turn, would be able to give providers unlimited access to network capacity at very low fees that are not based on circuit size. These fees could be based on a single flat monthly Network Access Fee (e.g. $1000/month for unlimited customers) or a small per subscriber fee (e.g. $2/subscriber/month, with a minimum monthly amount).

Business subscribers, who can have a widely varying requirement for service quality and type, would continue to pay on a per circuit basis via the current wholesale charges to the provider.

Advantages of the flat residential Connection Fee include:

- The monthly Connection Fee, paid directly to the Authority via pre-authorized credit card charges, gives the Authority predictable and stable revenue that does not rely on the marketing efforts of service providers. This works best when coupled with the market demand growth model.
- Service providers can provide more competitive pricing because their cost of network access has been drastically lowered. With two or three providers on the network, the providers will lower their prices for service packages by removing what they were paying NCBA for per circuit access (for residential customers).

Service Descriptions

These service descriptions would provide four different levels of circuit quality and performance that would enable NCBA (and service providers) to differentiate between the offerings both on a price and quality of service basis.

Residential GPON – Gigabit transport service from the service provider's port in the data center to a single customer location. Traffic is untagged at the customer. Circuit is typically asymmetric and priority is set at Best Effort across the core network. NCBA will observe a maximum 32:1 split.

Business GPON - Gigabit transport service from the carrier or provider's port in the data center to a single customer location. Traffic is untagged at the customer. Circuit is typically asymmetric and the priority is set higher than Residential for better performance across the core network. An example of this is a package of Internet access for a business with regular use of videoconferencing, heavy cloud-based service use, and large file uploads. NCBA will observe a maximum 16:1 split on this service tier.

Dedicated Business - Transport service from the carrier or provider's port in the data center to a single customer location. Traffic is untagged at the customer. Circuit is asymmetric and the priority is set higher than Business PON for better performance across the core network. An example of this is a package of Internet access for a business which views dedicated and symmetric bandwidth a requirement with regular use of videoconferencing, heavy cloud-based service use, and large file uploads.

Wide Area LAN Service – Transport service between the carrier or provider's port in the colo as well as between multiple customer locations (fee applies for each end-point outside of provider's NNI). Passed traffic can be tagged or untagged as well as supporting Q-in-Q. The circuit is symmetric and the bandwidth is dedicated via soft reservation across the core network. An example of this would be a transparent LAN service to link two customer locations.

Dark Fiber Leasing - $50/mile per month per strand, with a minimum of 15 miles per strand. Five year minimum contract and $250 application fee. Splicing will be billed at cost plus 20%. NCBA will make a maximum of 20% of strands in any given cable available for dark fiber leases. No provider may lease more than 15% of the dark fiber strands allocated in any cable.

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Financing the Build Out

It is important to note that the bulk of Nelson County's investment in broadband infrastructure will be in passive infrastructure that will have a conservative life span of thirty years or more (i.e. fiber cable). These types of infrastructure investments create hard assets that have tangible value and can then be leveraged for additional borrowing. The demand for services and the associated fees paid for those services will provide the revenue that will pay back loans over time. There is ample time for the Authority to recoup not only the initial capital investment, but also to receive regular income from the project and eventually make contributions to the County general fund.

The financing of community-owned telecommunications infrastructure faces several challenges with respect to funding.

- Not all local governments are willing to commit to making loan guarantees from other funding sources like property taxes, because the idea of community-owned telecom infrastructure has a limited track record and therefore a higher perceived risk.
- Similarly, citizens are not always willing to commit to the possibility of higher taxes that may be needed to support a telecom infrastructure initiative, for many of the same reasons that local governments are still reluctant to make such commitments: perceived risk and a lack of history for such projects.
- Finally, banks and investors are also more skeptical of community telecom projects because of the relative newness of the phenomenon. By comparison, there are decades of data on the financial performance of water and sewer systems, so the perceived risk is lower. We do see this beginning to change, and projects both in Montana (Bozeman) and New Hampshire have received some financing from local banks.

Somewhat paradoxically, the cost of such a community digital road system is lower when there is a day one commitment to build to any residence or business that requests service. This maximizes the potential marketplace of buyers and attracts more sellers to offer services because of the larger potential market. This is so because:

- Service providers are reluctant to make a commitment to offer services on a network without knowing the total size of the market. A larger market, even if it takes several years to develop, is more attractive.
- Funding agencies and investors that may provide loans and grants to a community network project want to know how the funds will be repaid and/or that grants will contribute to a financially sustainable project. Knowing that the size of the customer base is the maximum possible for a service area helps reduce the perceived risk for providing loans and grants.

There are a wide variety of financing options available, and we believe the Authority will end up using at least four or five different sources of funding, depending on project needs, where in the project timeline the funds are needed, and local opportunities that may arise. There are two general categories of funding strategies:

User/customer funding approaches – Sources of revenue and equity that come from directly or indirectly charging users (e.g. businesses, residents, and institutions) fees that represent one time equity contributions and/or recurring fees.

General funding strategies – There are a variety of sources that may be used to provide loans, grants, guarantees, tax credits, and other types of equity and loans.

User/Customer Funding

Funding Source	Description	Notes
Revenue Share	Service providers pay a share of per customer monthly revenue directly to the network owner. This is the current model used by NCBA.	Network owner has only a small number of monthly bills--one for each provider. Revenue is somewhat unpredictable, particularly in the first year or two.
Construction Fee	Business and residential customers pay the network owner a one time construction fee (either in a lump sum or monthly payment over several years). NCBA is doing this now.	Not all customers may be willing to pay a full construction fee. The amount of the fee may have to vary depending upon how recurring charges are collected (i.e. monthly use fee or revenue share).
Use Fee	Business and residential customers pay the network owner a flat monthly use fee instead of an indirectly paid revenue share.	Service providers pay nothing or a very small fee for transport, and in this model, their prices are correspondingly lower. The network owner must bill each connected customer monthly. The use fee provides the network owner with a predictable revenue stream that will improve bonding potential.
Purchase Commitments	Customers make a binding or non-binding commitment to buy one or more services (or spend a certain minimum amount for services) from providers on the network.	Very useful for determining where to build first. Binding commitments can help strengthen bond offerings and can assist with local bank financing.
Take or Pay	Business and residential customers in a community agree to buy services from providers on the network or pay a fee.	If voter approval can be obtained, helps get high take rates and provides predictable funding to help support revenue bonding efforts.

Revenue Share Model

The "revenue share" model is currently employed by the Authority. In this model, any provider that chooses to use the community network infrastructure for commerce pays a share of revenue that reflects a fair value for access to that infrastructure. This percentage of revenue

varies with the anticipated operating costs, debt load, and type of service being delivered, but typically ranges between 10% and 35%. Numerous projects in Europe and the United States have implemented this model, and attracting service providers has not been an issue since the providers benefit by having little or no capital costs to acquire new customers.

All existing telecom providers, including incumbents, are invited to use the system to sell services both to existing customers and also to reach new customers with new services that were not possible to deliver using older, copper-based technology. Incumbents indicate that they cannot offer higher performance services in some business areas and neighborhoods because of the high cost of infrastructure upgrades. This is true, because the current telecom business model of each company building, maintaining, and managing its own infrastructure (called overbuilding) is expensive–much more expensive than building a single common digital road system that is shared by many companies.

Construction and Connection Fees

Tap fees, pass by fees, and construction fees are already commonly used by local governments for utilities like water and sewer. The revenue share model can be strengthened from additional sources of revenue, including one time pass by fees, connection fees and sweat equity contributions.

- Pass By Fees – Pass by fees could be assessed once the fiber passes by the property, just as some communities assess a pass by fee when municipal water or sewer is placed in the road or street–and the fee is assessed whether or not the premise is connected, on the basis that the value of the property has been increased when municipal water or sewer service passes by. Several studies have indicated that properties with fiber connections have a higher value by $5,000 to $7,000 that similar properties without fiber access. In Nelson County, real estate agents are anecdotally relating that it is becoming more difficult to sell properties without fiber access, especially in the Wintergreen area of the county.
- One Time Construction Fees – A one time connection fee can also be assessed to property owners (e.g. residents and businesses) when the fiber drop from the street to the premise is installed, or when the fiber passes the property (or both). Nelson County is currently assessing a "drop construction fee" for new customers, and is offering a financing option so that property owners do not have to pay the entire amount up front. This is similar to the kinds of fees that are typically charged when a property is connected to a municipal water or sewer system. The fee is used to offset the cost of the fiber and the Customer Premise Equipment (CPE) needed to provide the operational access to the network. The fee can be modest (e.g. $100) or it can be a larger percentage of the actual cost of the connection. Fiber CPE may range from $100 to $200 and a fiber drop may cost from $200 for a premise very close to the distribution fiber passing along the property to $1,000 or more if the premise is hundreds of feet from the road. One variant would be to charge a minimum connection fee for up to some distance from the road (e.g. $100 for up to 75' and $2 for each additional foot).

- Sweat Equity Contributions – The cost of the drop fiber (from the road to the residence) can be substantial if the house is some distance from the road, and a significant portion of the higher cost of fiber in rural areas can be attributed to these longer distances. NCBA can offer a program to residents that allows them to install their own duct between the premise and a demarcation point on the road right of way (this might work better in more rural parts of the county). This has been successfully done in other rural areas and can be a valuable source of construction funding.

Danville, Virginia, which began operating its community open access network in late 2007, recently made the decision to use monthly connections fees ($8.80/month per premise) to help offset the cost of network equipment needed to accelerate their build out to more homes and businesses. This approach also enabled them to lower the fees charged to service providers using the network, which should attract more providers and enable nDanville to offer a wider range of services to customers.

There is already some data that indicates that residential property values increase by as much as $5,000 to $7,000 if fiber broadband services are available, so pass by fees can be justified on the basis of increased property values accruing to the property owner. Given the novelty of this approach, pass by fees may need more time to become an accepted finance approach, but tap fees (for installing the fiber cable from the street or pedestal to the side of the home or business) may be easier to use, especially for businesses that may need improved broadband access. Tap fees have the potential of reducing the take rate in the early phases of deployment, but as the value of the network becomes established, it is likely that there will be much less resistance to paying a connection fee.

The Utopia project in Utah (an open access, open services community-owned network) reports that in one community, they were successful getting 1,600 residents to pay $3,000 each to get connected to the network. In other words, users financed $4,800,000 of network build. Brigham City, Utah is building a $5.5 million network with a $700,000 investment by charging residents for connections. They are financing the payments–residents pay $25/month for up to 20 years ($6,000). So if residents choose the long term payment plan, they pay a portion of the interest incurred on the funds borrowed by the project. Brigham City apparently has enough interest that they are telling residents if you don't sign up to pay for a connection, you go to the bottom of the list and will be hooked up last.

The Wired Road project is also having some success using pass by and tap fees to finance network connections. Some businesses are paying as much as $3,000 to get a fiber connection to their place of business because the pay back is less than ten months–in other words, their Internet costs drop by more than $300/month when using a Wired Road service provider.

Use Fee Model

The use fee is a monthly (recurring) fee charged directly to connected users by the network owner as an alternative to the revenue share, which is an indirect charge (the rev-

enue share is paid to providers by customers, and the provider, in turn, pays the network owner).

The primary advantage of the monthly use fee is that it provides the Authority with a predictable stream of revenue that does not depend on the less predictable ability of service providers to attract and retain customers.

The connected user pays the use fee as long as any service from any provider is being used. Use fee customers will pay lower rates to providers for the actual service because the provider does not have to mark up the service costs to cover the revenue share portion.

Comparison of Revenue Share and Connection/Use Fees	
Revenue Share Customers	**Connection/Use Fee Customers**
Services are purchased directly from providers.	Services are purchased directly from providers.
Providers bill their own customers directly.	Providers bill their own customers directly, but at a lower rate because providers do NOT pay a revenue share to the network owner.
The network owner bills providers for the appropriate revenue share for each customer monthly.	The network owner bills customers for the appropriate connection fee and monthly use fee.
Providers pay the network owner the revenue share fee.	Providers pay very modest or no per customer fees to the network owner.
Customers of services pay nothing to the network owner.	Customers pay providers for the cost of subscribed services and pay the network owner the appropriate fees.

As an example, if NCBA set the one time connection fee at $3,000, and 50% of potential subscribers in a neighborhood of 100 homes (which could be a section of rural road) committed to that form of payment, that would represent 50 subscribers contributing approximately $150,000 in equity funding to the project.

Purchase Commitments

While purchase commitments (intent to buy services from providers on the network) are not a direct source of funds, communities that are able to achieve high levels of purchase commitments can use them to strengthen the attractiveness of a revenue bond offering, which could help reduce the interest rate charged for bonds. These purchase commitments can be binding or non-binding. Binding commitments would contractually obligate the property owner to buy some minimum amount of services (e.g. $25, $40) from one or more providers on the network. Non-binding commitments would simply provide an indicator that the property owner intends to buy some amount of services from providers on the network. The former–binding commitments–are much

more valuable from a funding perspective, since lenders can more easily predict what kind of revenue is going to be generated from customers.

Purchase commitments can also be used for another, though related, purpose, which is to identify where to build first. For example, in a multi-town network, the project leadership might indicate that the first areas to get infrastructure will be those that can obtain a minimum of 25% purchase commitments. By using this market-driven approach, the project leadership has a good indication that the capital expense it is undertaking in the community will generate enough revenue to cover operating costs and debt payments. If an area of the county can only get a 5% or 10% purchase commitment from residents and businesses, that area would be placed lower on the build out list.

Take or Pay Model

The "take or pay" model has been used by local governments to help finance infrastructure projects like water and sewer. In this approach, property owners agree to buy the service (e.g. water, sewer, fiber services) or pay a monthly or annual fee in lieu of service. The monthly fee in lieu of service is used to help pay for the cost of the infrastructure. Take or pay is based on the principle that the new infrastructure provides both a common good for the community and increases property values. It is not a tax, since it is not assessed on property owners that use the services delivered by the community infrastructure.

Take or pay could be a vehicle for raising equity for construction as well as a means for supporting the issuance of revenue bonds. If a round of bond funding is to be spent in communities that have approved the take or pay approach, investors will view the bonds favorably because they know that there will be two reliable streams of revenue: revenue from those customers that buy services on the network, and all other households and businesses will be paying an established and predictable fee.

Take or pay may be difficult to implement in Nelson County.

General Funding Strategies

Revenue Bonds

Revenue bonds are repaid based on the expectation of receiving revenue from the network, and do not obligate the local government or taxpayers if financial targets are not met. In that respect, they are very different from general obligation bonds. Many kinds of regional projects (water, sewer, solid waste, etc.) are routinely financed with revenue bonds. We believe some community projects will finance a significant portion of the effort with revenue bonds once more community broadband projects are underway. The Roanoke Valley Broadband Authority recently financed a 40 mile fiber build with bonding support from VRA.

Obtaining funding using revenue bonds requires an excellent municipal credit rating and an investment quality financial plan for the operation and management of the network.

Revenue bonds must be used carefully, and a well-designed financial model is required to show investors that sufficient cash flow exists to pay back the loans. Some issues to consider are:

- Revenue bonds are paid back solely from system revenue.
- A very solid business plan is needed.
- Management, marketing, and operations of the network must be professional and with careful attention to meeting operational and financial targets.
- Market conditions at the time the initial bonding is attempted can affect the cost of the bonds and the success in selling those bonds.

General Obligation Bonds

General obligation bonds are routinely used by local governments to finance municipal projects of all kinds. G.O. bonds are guaranteed by the good faith and credit of the local government, and are not tied to revenue generated by the project being funded (i.e. revenue bonds). G.O. bonds obligate the issuing government and the taxpayers directly, and in some cases could lead to increased local taxes to cover the interest and principal payments.

Even though G.O. bonds are quite common for more traditional community infrastructure, local leaders and taxpayers have typically been resistant to using them to finance community telecom projects. G.O. bonds often require a voter referendum, which raises the bar even higher, but some community telecom projects, notably the City of Lafayette, Louisiana, prevailed in a voter referendum to build a city fiber network despite heavy advertising against the referendum by incumbent providers.

Revenue Bond Guarantees

Revenue bond guarantees are not a direct source of funds but can be extremely valuable as part of a revenue bond offering. A bond guarantee could come from local governments that are involved in the network development, a state financing authority that helps underwrite municipal bond

offerings, or as a special authorization from the state legislature. Some community network project bond offerings have been guaranteed by tax revenues from the local communities (e.g. the Utopia project in Utah). The guarantee could be for just a first round of financing, and additional guarantees could be contingent upon the network meeting certain financial targets.

RUS Loans

The USDA Rural Utilities Service agency has been making low cost loans for telecommunications for decades. Those funds have traditionally been supplied primarily to rural telephone companies and coops, but the agency has recently begun looking at assisting community broadband projects. However, RUS has historically favored rural coops when making loans and grants. The RUS application process can be expensive and time-consuming, and it may take six months to a year and some fundraising to develop a competitive application.

The USDA has begun to make it easier for community projects to apply for USDA funds, but many RUS programs require showing a significant percentage of unserved and underserved areas. Some areas of the County may meet those criteria. The County recently considered applying for a Community Connect grant, but the requirement to staff a computing center within the designated service area was deemed too difficult to support.

New Markets Tax Credit

New markets tax credits are a form of private sector financing supported by tax credits supplied by the Federal government. The New Markets Tax Credit (NMTC) Program permits taxpayers to receive a credit against Federal income taxes for making qualified equity investments in designated Community Development Entities (CDEs). The CDEs apply to the Federal government for an allotment of tax credits, which can then be used by private investors who supply funds for qualifying community projects. Substantially all of the qualified equity investment must in turn be used by the CDE to provide investments in low-income communities.

The credit provided to the investor totals 39 percent of the cost of the investment and is claimed over a seven-year credit allowance period. In each of the first three years, the investor receives a credit equal to five percent of the total amount paid for the stock or capital interest at the time of purchase. For the final four years, the value of the credit is six percent annually. Investors may not redeem their investments in CDEs prior to the conclusion of the seven-year period.

Throughout the life of the NMTC Program, the Fund is authorized to allocate to CDEs the authority to issue to their investors up to the aggregate amount of $19.5 billion in equity as to which NMTCs can be claimed.

These tax credits can be quite useful, and there may be some areas of Nelson County that qualify. However, it can take up to a year or more to apply and then finally receive NMTC-related cash. This can be a useful long term source of funds.

State Funds

Many local broadband projects are receiving help from state sources of funding, particularly for early stage planning, but some funds are often available for pilot projects and specific expansion projects that meet certain kinds of public safety or economic development criteria. The Authority has already received some state-level funding to support broadband planning.

State agencies may also be able to assist with applying for Federal funds. Community Development Block Grants (CDBG) are now being provided for some kinds of local broadband efforts, and DHCD has been instrumental is helping Virginia communities obtain CDBG funds for broadband efforts. CDBG grants have to meet eligibility requirements (e.g. Low and Moderate Income areas, distressed downtown areas, etc.). Some community broadband projects have also successfully received direct grants from the state legislature.

Federal Funds

Several different Federal agencies provide some support for community or regional broadband efforts. Federal funding awards can be difficult to obtain and often require lengthy approval times. The FCC recently distributed $400 million for community and regional telehealth and telemedicine projects across the U.S.

One option for funding is the USDA Community Connect grant program, which makes grants of up to $1 million for rural broadband infrastructure. Community Connect generally requires a rural unserved/ underserved area, and there may be some areas of the County that could qualify.

Earmarks can be a valuable source of funding, albeit a highly unpredictable one. The Eastern Shore of Virginia Broadband Authority was able to obtain several million dollars in earmarks funds to help build its 80 mile fiber backbone, but it took more than two years to get the funds approved and allocated. Earmark funds can be approved but not allocated, which has sometimes caused problems–approval by Congress for the earmark does not automatically ensure that the Federal agency serving as the administrator of the funds receives a budget allocation. In some cases, earmark funds that have been allocated can be re-allocated by the receiving agency for a related purpose. Strong Congressional support is needed for earmarks, and in the current Federal budget environment, earmarks should be regarded as a low priority effort.

Federal funds usually require long lead times to obtain (12 to 18 months is typical) and are best used for specific opportunities where the funding guidelines match well with a specific local need or opportunity.

Municipal Leasing

Communities routinely use municipal leasing to fund a wide variety of needs, including water and sewer projects, buildings, equipment, and vehicles like police cars, fire trucks, and public works equipment. Municipal leases can take the form of a straight loan, but for telecom projects, one option called a "moral obligation" lease may be more appropriate. In a moral obligation lease, the network itself is used as collateral to guarantee the loan, rather than requiring the use of general

funds to pay back the loan if the network does not perform as expected. Obtaining approval for a moral obligation loan requires an excellent municipal credit rating and an investment quality financial plan for the operation and management of the network.

In the past couple of years, several U.S. and international finance firms have begun offering communities a leasing program for community broadband. These programs are typically structured as a twenty-five or thirty year lease-buy vehicle: after twenty-five years of lease payments, the local government owns the network.

The primary benefit of this approach as opposed to using bonds is that the requirement for a referendum (public vote) can be avoided if the local government can negotiate the lease directly. However, these financing vehicles usually require a guarantee from the local government to cover the lease payments if the network does not meet financial targets.

Commercial Loans

Commercial loans from local banks are an option that could provide funds for large portions of the build out and/or small, urgent short term opportunities (e.g. building a short fiber run to reach a business that needs improved connectivity to add jobs). If a business case can be developed that shows how the improvements or extensions will increase revenue to repay the loan, this form of financing should be easy to obtain.

The City of Bozeman, Montana recently obtained a $3.8 million loan from a consortium of local banks to finance the first phase of a planned city-wide network. The first phase includes connecting all of the schools in the City with Gigabit fiber, most city facilities and buildings, and passing more than 200 businesses in the downtown core area of the City.

With the right business plan, we believe that the Authority could support a long term expansion using a combination of one time construction fees paid by property owners coupled with a long term payment plan that is financed by a local bank. Note that the financing could also be provided to the Authority directly by the County, with a promise of repayment, but using a negotiated line of credit from a local bank provided directly to the Authority may have the advantage of giving the Authority more autonomy.

Business Contributions

Some businesses recognize the value of having community fiber at their premises because they may be able to obtain previously unaffordable services and/or lower the cost of existing services. If the savings are substantial, some businesses may be very willing to pay pass by and connection fees to obtain access to the community fiber, and we have spoken to businesses in other communities that have expressed willingness to make no strings attached contributions to the local effort. However, such contributions are usually linked to specific plans to pass the businesses with fiber within a reasonable time frame.

Grants and Donations

Grants and donations can provide funds for planning and for targeted construction projects (e.g. fiber to a local hospital, a community institution, etc.). Community foundations will often contribute funds to local technology projects. Sometimes the expenditures have to be tied to specific foundation goals (e.g. improved K12 education), but often local foundations will accept grant applications for a wide variety of local projects. Some community efforts have also received private donations, although these are usually modest, and have also usually been provided to support a specific need or project.

Sales Tax

The Arrowhead Electric Coop in rural Minnesota is paying for a full fiber build out to all homes and businesses by working with the local county government (Cook County) to collect a special 1% sales tax. The tax is actually used for a variety of infrastructure improvements, with the broadband build out using about 48% of the funds collected. The broadband portion of the sales tax is used to underwrite the cost of the CPE (Customer Premise Equipment), which is the box installed at the residence or business. This approach lowers the overall capital cost and reduces the financial risk for the electric coop. The Utopia project in Utah has been financed in large part by using loan guarantees backed by existing local sales tax revenue. This approach does not require changes in how existing sales tax revenue is used unless the fiber project runs into financial difficulties; in that case, the localities collecting sales taxes would be obligated to use some of the sales tax collected to make loan payments.

Special Assessment Tax

The town of Leverett, Massachusetts recently funded the entire cost of a 100% fiber build out to all homes and businesses by passing a one time special assessment tax on every property in the community. This measure was passed with a citizen vote in Leverett's annual town hall meeting. Leverett is an underserved community with very limited current broadband offerings, so there was strong support for the measure. It is not likely to be an attractive or feasible option in some other communities, but it does show that under the right conditions, a community can self-fund the entire cost of a fiber build out.

New Hampshire recently passed (summer 2015) a state statute that allows municipalities to levy a special assessment for broadband infrastructure without a referendum or town meeting vote, and several towns are already moving forward with plans to build fiber networks.

Business Case

A long term expansion of the fiber network in Nelson County would provide new fiber options to buildings and locations throughout the County, with fiber in some areas and high performance wireless in other portions of the County.

As funding becomes available, additional network segments could be added on a regular basis.

By year four, projected revenue would be enough to support a modest but steady expansion to additional business and commercial areas of the County.

There are four major sections in the pro forma developed for the effort.

- Financials
- Market Information
- Opex (Operating Expenditures)
- Capex Summary (Capital Expenditures)

Expenses represent the operational costs of maintaining the network. SG&A (Staff, General, and Administration) costs tend to be somewhat independent of the size of the network (although some costs do increase as the network grows). Opex (Operational Expenses) tend to increase somewhat more proportionately to network growth.

EBITDA (Earnings Before Interest, Taxes, Depreciation, Amortization) represents the net income before certain other expenses are accrued. For more detail on the finances of the network, the Financials section provides the standard Income Statement, Balance Sheet, Cash Flow Statement, and Financial Assumptions.

Cash Reserves represents funds set aside to support long term maintenance and equipment replacement. Fiber network equipment typically has a seven to ten year life span, and so funds must be held in reserve to fund equipment replacement.

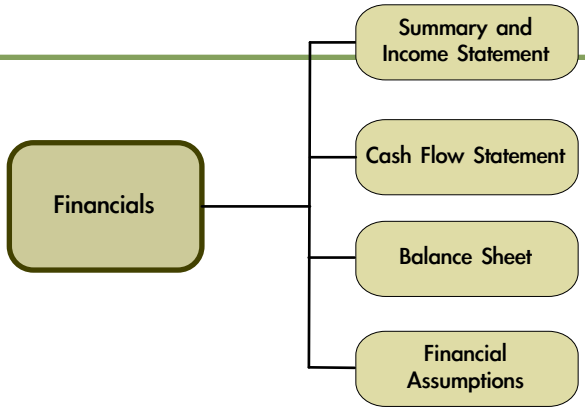
Cash At Year End is one of the most important values. A network may lost money for a year or two, but as long as the Year End Cash retains an adequate positive balance, the network can continue to grow and expand.

NCBA Financial Summary/Income Statement

Summary of Project Revenue (Gross)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Fiber Network										
Residential	$65,663	$120,753	$171,495	$226,130	$308,170	$413,287	$516,958	$589,037	$628,295	$628,295
Business	$51,071	$120,169	$181,725	$242,137	$311,120	$382,396	$440,732	$470,257	$527,888	$527,888
Government/Institutional	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Services	$89,965	$106,355	$120,649	$135,975	$157,314	$184,382	$212,313	$232,823	$242,979	$242,979
Total Fiber Network Revenue	***$206,699***	***$347,277***	***$473,870***	***$604,242***	***$776,604***	***$980,065***	***$1,170,003***	***$1,292,117***	***$1,399,162***	***$1,399,162***
TOTAL PROJECT REVENUE	**$206,699**	**$347,277**	**$473,870**	**$604,242**	**$776,604**	**$980,065**	**$1,170,003**	**$1,292,117**	**$1,399,162**	**$1,399,162**
EXPENSES:										
Salary, General & Administrative Expenses (SG&A)	$208,702	$203,469	$206,702	$223,998	$234,763	$255,833	$262,118	$245,039	$217,754	$219,283
Operational Expenses (OPEX)	$72,498	$102,325	$127,797	$128,468	$137,020	$172,262	$159,073	$169,253	$198,770	$199,855
Interest Expense	$23,625	$57,750	$84,000	$110,250	$111,519	$107,550	$103,381	$99,005	$94,409	$89,584
Total Expenses	**$304,825**	**$363,544**	**$418,499**	**$462,716**	**$483,302**	**$535,644**	**$524,572**	**$513,297**	**$510,933**	**$508,722**
Income After Expenses	**-$98,127**	**-$16,267**	**$55,371**	**$141,526**	**$293,302**	**$444,421**	**$645,431**	**$778,820**	**$888,229**	**$890,440**
Interest Income	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Earnings Before Taxes	**-$98,127**	**-$16,267**	**$55,371**	**$141,526**	**$293,302**	**$444,421**	**$645,431**	**$778,820**	**$888,229**	**$890,440**
Taxes	0	0	0	0	0	0	0	0	0	0
Depreciation	$0	$40,417	$67,788	$95,570	$123,713	$151,938	$183,811	$217,471	$243,706	$243,706
Amortization	$0	$0	$168	$345	$535	$756	$1,040	$1,187	$1,201	$1,011
Net Income	**-$98,127**	**-$56,684**	**-$12,585**	**$45,611**	**$169,054**	**$291,727**	**$460,580**	**$560,162**	**$643,321**	**$645,723**
Debt Service Coverage	**-3.15**	**0.72**	**1.66**	**1.35**	**2.12**	**2.89**	**3.92**	**4.60**	**5.15**	**5.13**
Distribution to County General Fund	$0	$0	$0	$15,964	$59,169	$102,104	$161,203	$196,057	$225,162	$226,003
Cumulative Distribution to County	$0	$0	$0	$15,964	$75,133	$177,237	$338,440	$534,497	$759,659	$985,662
Cash-On-Hand at Year End	**$156,557**	**$319,554**	**$397,427**	**$480,907**	**$307,770**	**$157,615**	**$149,119**	**$230,843**	**$797,591**	**$1,360,915**
Capital Expenditures (CAPEX)	$897,500	$723,985	$731,090	$738,065	$718,935	$791,950	$827,615	$676,605	$0	$0
Accumulated CAPEX	$897,500	$1,621,485	$2,352,575	$3,090,640	$3,809,575	$4,601,525	$5,429,140	$6,105,745	$6,105,745	$6,105,745

Summary of Funding and Borrowing	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Sources of Funds										
Equity	$300,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Construction Contribution	$356,250	$218,700	$226,200	$245,100	$288,450	$378,150	$423,000	$268,050	$0	$0
Long-Term Debt	$472,500	$682,500	$525,000	$525,000	$101,000	$0	$0	$0	$0	$0
Total Funding	**$772,500**	**$682,500**	**$525,000**	**$525,000**	**$101,000**	**$0**	**$0**	**$0**	**$0**	**$0**
Cost of Debt	**$23,625**	**$57,750**	**$84,000**	**$110,250**	**$111,519**	**$107,550**	**$103,381**	**$99,005**	**$94,409**	**$89,584**

Financials



The Financials section provides a high level overview of the entire set of financial projections, including a one page summary (the Income Statement) that shows key projections for revenue, expenses, interest payments, and capital expenses over a ten year period.

The Cash Flow Statement and Balance Sheet are designed to provide financial information in a standard accounting format similar to any other business financial statement.

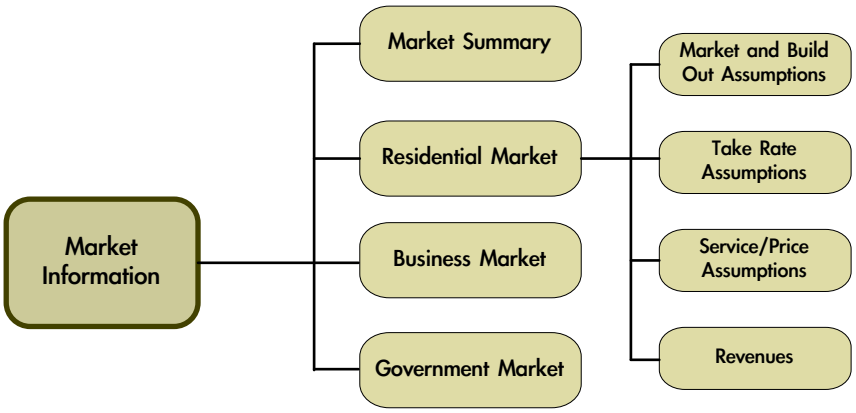
The Financial Assumptions table is an important area of the pro forma because key assumptions are made here that have large effects on the overall projections. These assumptions include:

- The amount of debt vs. equity that the project takes on, year by year.
- Interest paid on cash on hand
- Calculations on up to five loans, including interest, principal, and loan balances, and the option to make interest only payments for a period of years.

The Financial section has the ability to calculate the carrying costs of up to five separate loans, including fees and closing costs, interest payments, principal payments, and deferred interest (e.g. no interest for the first two years).

Market Information

This section forecasts revenue, market size, take rates, services, and service prices for three separate market segments: residential, business, and government. Each market segment tends to have different service and pricing requirements, and breaking services and projections out by market provides a more accurate and more detailed projection of revenue.



Each market segment is organized similarly, with four key sections.

Market Assumptions includes the projected size of the market, year by year growth in the size of the market, and the take rate assumptions for that market. The term "available market" refers to the actual number of connected customers that could purchase a service. "Homes Passed" refers to homes that have been passed by fiber and could buy service. The "Take Rate" is the percentage of Homes Passed that actually get connected and do buy services from the network. The term "addressable market" refers to the locations that actually purchase a service as a percentage of the entire market.

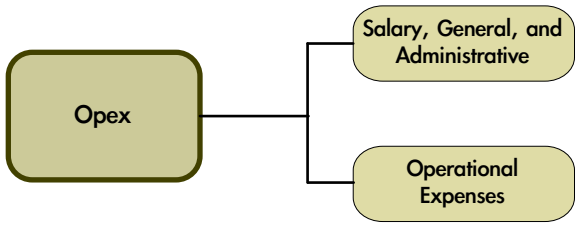
Monthly Cost of Service is the fee paid by connected homes in the Residential market.

In the Business and Govt/Institutional markets, Services (Monthly) are the services offered to those users and the projected prices for those services. Note that these are projections, and that once the network is built, service providers will set their own prices. These pro forma prices are a projection based on markets and prices from other networks and from data collected locally.

The Annual Revenue provides projections of revenue by service, by year.

OPEX

The Operational Expenses section has two parts. Salary, General, and Administrative (SG&A) projects expenses that are relatively independent of the size of the network, although this is only a rough rule of thumb. Costs like staff and marketing do tend to grow over time as the network expands. The Operational Expense table projects expenses that are more tightly linked to the growth of the network.



Some of the SG&A costs tracked include:

- Staff costs, including salary, benefits, and staff-related expenses like travel, phone/Internet access, and miscellaneous overhead.
- General office expenses, including office supplies, computer supplies (e.g. ink, paper, toner), and shipping and postage.
- Marketing expenses, which are typically calculated based on the growth in customers.
- Other expenses, including legal counsel, consultants, insurance, and miscellaneous costs.

Operating expenses include:

- Support Fees, which are related to the cost of extended warranties for equipment and allocations for space parts, as well as software license fees.
- Network Operations Costs, which include any OSS/BSS software per subscriber fees, the cost of contracted network operations, and other infrastructure-related expenses.

- Outside Plant Maintenance, which budgets maintenance costs for fiber and wireless assets (e.g. fiber cable, handholes, cabinets, wireless towers, etc.).

Note that at the bottom of the Operating Expenses table, there is a row that calculates the operational costs on a per subscriber basis. In the early years of a project, it is likely that this projected amount is higher than the ARPU amount. But if the two projected figures do not converge in later years, then more customers need to be added to the network, the pricing needs to be adjusted, and/or costs need to be reduced.

Capital Expenditures

This section models the cost of construction of the network.

The Capital Expenditure Summary (Capex) table provides a summary of the costs associated with the construction of the network. A summary of the depreciation and amortization costs are also included. Most fiber and outside plant assets can be depreciated over thirty years. Most equipment is depreciated on a much shorter time schedule of five to seven years, and a few items like software are typically amortized over a three to five year time frame.

Depreciation and Amortization Schedule

The depreciation schedules allow for separate depreciation of active and passive assets, including adjusting the term of each schedule in years. Passive assets are typically depreciated for at least twenty years, and active assets like network electronics are depreciated for a much shorter time (e.g. five years). An amortization schedule allows for a write down of "soft" assets like software licenses.

Network Design

Modern Networks Overview

The diagram below provides an overview of a modern broadband network, with both fiber and wireless components. For the Nelson County Broadband Authority, conduit and fiber can be deployed in phases (along with network electronics) to create a very high performance network capable of delivering affordable Gigabit and 10 Gigabit connections in a series of fiber extensions reaching the schools, and passing through major commercial and tourism areas in the County. Eventually, even higher capacity circuits, including 40 Gigabit, 100 Gigabit, and dark fiber or wavelength services can be utilized to maximize the existing fiber strands to add even more capacity to the backbone portion of the network.

Core Network

The core network is often referred to as the "backbone" network. It is a high capacity route or set of routes throughout a community or region that provides transport between towns, neighborhoods, business districts, and other major facilities.

Ideally, the core network is designed as a redundant fiber ring, which provides both capacity and gives the network the ability to continue operating even if the fiber is cut or damaged in one location. A fully redundant ring can be expensive to construct, so the "ring" feature may be a long term design goal. In Nelson County, the initial fiber backbone follows a north-south route primarily along Rt. 151 and Rt. 29. As growth continues, fiber rings can be completed to create a highly resilient local network. As part of this study, Design Nine has planned and estimated costs for the completion of that ring on a route south of Nellysford, along Rt. 56 and closing the ring in Colleen, south of Lovingston.

Distribution Network

Distribution networks are connected to the core network, and provide primary network paths through a county, city, neighborhood or business district. Distribution networks are generally part of what is called "middle mile." Fiber-based distribution networks generally are built along most streets and roads, and can be aerial fiber (mounted on utility poles) or underground fiber (installed in underground duct or fiber cable that is buried directly without duct).

The distribution network connects the core network (the network backbone) with the individual connections within a neighborhood or business district that connect to home and businesses. This portion of the network can be fiber-based or wireless, but fiber will be required over the long term to support video services and other kinds of high bandwidth applications like telemedicine, IP TV, business videoconferencing, and other emerging services.

Designed as a Middle Mile network, the NCBA network serves backbone and distribution roles in the County. As the network grows, laterals can be extended off the backbone to reach additional businesses, towers, and residential build-outs. In the network expansion estimates we

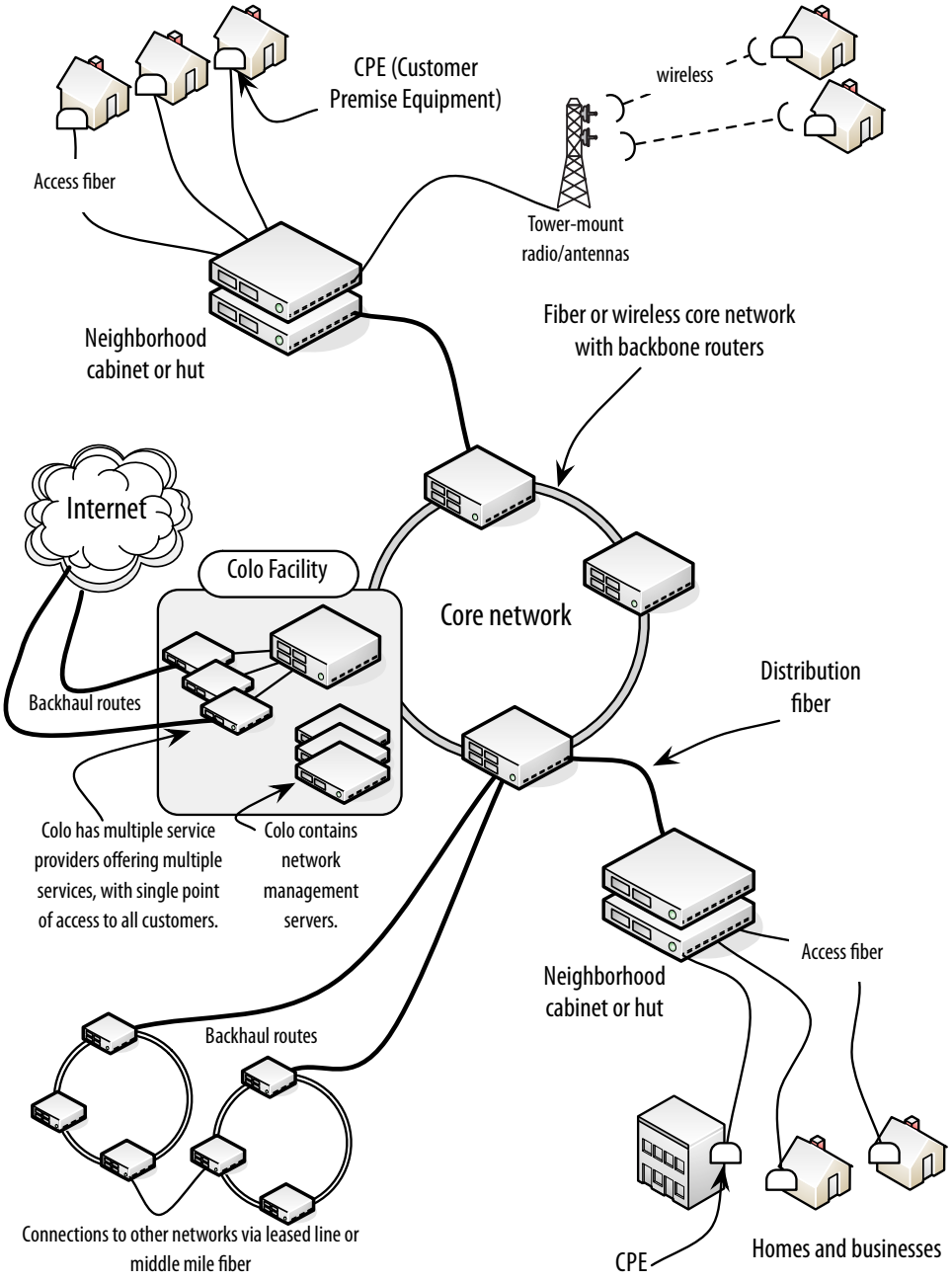
have focused on Nelson County's 50 largest employers to prioritize estimating for network expansions.

Access Network

The access network is what is commonly called "the last mile," although "the first mile" might be more appropriate, since customers should be a primary consideration when designing a network.

The access network is a direct fiber link between a fiber switch located within a neighborhood or business district, or it may also be a direct point to point wireless link from a wireless access point on a tower or building and the home or business. Network subscribers have to have an Optical Network Terminal (ONT) to get a network connection, and this is simply a small box that looks like a hub or switch.

The NCBA is currently considering fiber to the home (FTTH) pilot projects in Wintergreen and in other areas of the County. As part of the buildout strategy for FTTH projects, the Authority should consider market demand based planning to identify areas where take rates will be high. The market demand approach can be combined with partial or complete home-owner financing to provide a substantial funding source for network expansion.



Colocation and Network Facilities

A colocation facility is a controlled environment (i.e. secure, heated, and air-conditioned) room with Internet access through wired and/or wireless systems. The colocation facility is a place where fiber, wireless, and copper-based network facilities meet. It is equipped to house high-end network equipment, servers, and other electronic gear. A variety of middle layer network components and services can be located within the co-lo including, for example, directory services, replicated content servers, routing services, and other elements needed to deliver new multimedia services to the home and small office from multiple, competing providers.

In Nelson County, the NCBA should advertise the Co-lo as a major peering point where multiple providers can meet and connect to each other. The existing co-lo not only houses NCBA, but should also create a new wholesale environment, reducing transport costs out of the county.

Functions of the NCBA colocation facility includes:

- Hub for new broadband infrastructure development for the community.
- Location for a regional and community network exchange point for local service providers. Also called a peering point or inter-exchange point, this kind of facility can reduce costs and increase performance in a win-win-win scenario (because it helps keep local traffic local and reduces service provider costs, thereby reducing the price of services). In Nelson County, a modest co-lo facility would provide the meet point for private fiber and community/county owned duct/fiber.
- Insertion point for multimedia services from multiple competing providers to reach subscribers over single broadband medium (fiber, wireless, other).
- Community, campus, or building point of presence for new middle layer components required to implement next generation Internet (directory services, caching, routing).
- Focal point for technical resources and management of community infrastructure.
- Aggregation point for low cost access to gigabit scale network services.

Backhaul

Every community network requires one or more paths (routes) out of the community to carry voice, video, and data traffic (in both directions). Backhaul network connections can be purchased from a local incumbent telephone company. In some communities, there may be other backhaul providers available. Backhaul connections are usually terminated at the community-owned colocation facility, but sometimes the network may be extended to a provider in another location.

Network Segments and Cost Estimates

During our research we studied a Virginia Employment Commission LMI report (updated Jan. 2016) highlighting the business and tourism ecosystem in Nelson County. Taking this into consideration we have suggested expansion plans that focus on Nelson County's largest employers, and takes a design approach to offer the most impact for project dollars spent. The Authority's priorities should be addressed in a multi-phased approach, with completion of a fiber ring, construction of FTTH pilot projects, and long extensions to new business areas being the main goals. Additional detail can be found in the route maps and estimates at the end of this report.

The estimates are based upon the maps which have been a product of the planning project. During the course of the project Design Nine worked with the Authority to gain an understanding of the existing assets, and potential subscribers in the region. An additional

stand-alone estimate is included to illustrate the cost of a full fiber to the home project. The FTTH estimate was created specifically for Wintergreen, but the cost per home should be similar for other residential subdivisions in Nelson County.

Ring Fiber Completion

Two segments of new middle mile fiber would complete a ring architecture in Nelson County. It would take approximately 18 miles of new fiber construction to achieve this goal which could be done in a phased approach. A completed ring in Nelson County would allow the NCBA to market a higher tier of service to large customers, service providers, and other interests in the county.

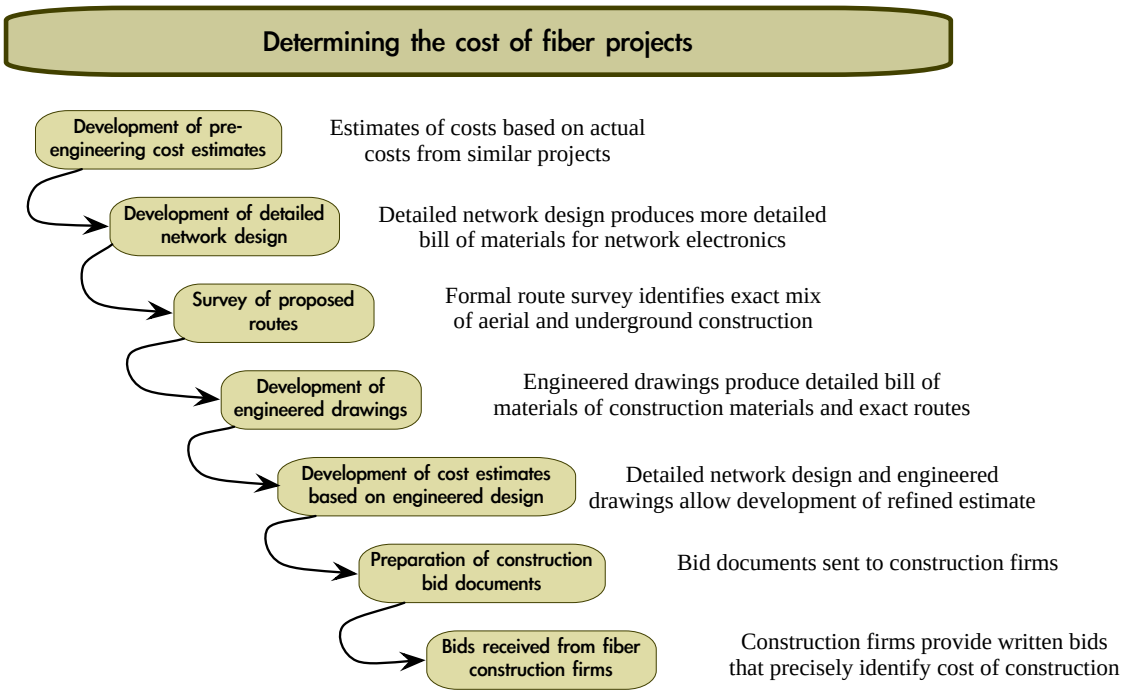
Network Extensions

Six network extensions have been estimated for this effort totaling 27 miles. Each network extension has been planned with Nelson County's large employers in mind, but the benefit will extend to small businesses and residents as well. The network extensions could be approached individually in phases, or all together as part of a large buildout. Each of the extensions is listed below:

- Afton Network Extension - 1.8 miles, approximately $222,000 build cost
- Faber Network Extension - 5.2 miles, approximately $506,000 build cost
- Shipman Network Extension - 5.9 miles, approximately $611,000 build cost
- Arrington Network Extension - 3.2 miles approximately $339,000 build cost
- Piney River Network Extension - 3.6 miles, approximately $570,00 build cost
- Tyro Network Extension - 7.6 miles, approximately $730,000 build cost

Network Buildout Costs

Pre-engineering cost estimates provide an early look at the cost of build out; these estimates do not include formal pole surveys or the significant expense of route engineering. Even after route surveys are performed, and engineered route blueprints are developed, the true cost of construction is not known until the construction bid documents are prepared and bids are received. The diagram below illustrates the process of establishing the exact cost of a fiber project.



It is important to note that the fiber construction costs in this report are estimates created for a near-term project in Nelson County. Cost savings for larger builds out and for completing multiple phases in one buildout could be substantial, outside plant materials (e.g. fiber cable), and construction labor, and drops.

When preparing cost estimates, it is good practice to use conservative cost estimates (i.e. higher cost estimates) to ensure that the funds are adequate to complete the project, as there is usually no additional funds if actual construction or materials costs turn out to be higher than the estimates. It is always more desirable to have the actual cost of the project be under the estimated cost rather than over the estimated cost.

The project summary breaks out costs by different buildout stages and identifies where each stage would have a higher cost when completing it on it's own. The estimates attached include a summary table and detailed estimate tables for the fiber construction, drop construction,

towers, shelters, and equipment. Mapping, in the appendix of this document corresponds with the estimates showing the locations of each of the areas with the proposed fiber routes shown.

The fiber construction cost estimate for installation for phases is based on primarily underground construction. The initial construction cost of this might be higher than aerial installation but it provides a lower cost for operation because there are no pole use fees or cable moving costs when a pole is replaced in the future. Additionally, the cost of underground construction can actually be lower than aerial installation depending on the amount of make ready needed in a certain area. This is particularly the case for areas with older utility poles where pole replacement may be charged to the newest lessee.

The detailed cost estimates include a range of costs based on previous purchases and past experience with equipment vendors and contractors. This range depicts the average cost of the service or equipment and the optimism factor picks out the estimated cost from the range. The optimism factor is a number that shows the approximation of which end of the range the actual cost will be, lower or higher.

The detailed cost estimates show the construction materials and equipment that usually is purchased by the construction contractor and is part of their overall bid price.

> *Some construction cost estimates include only the cost of construction labor and materials (e.g. fiber cable, attachment hardware, and splice enclosures). But a different cost estimate may include other necessary and essential costs, like project management, engineering, and network equipment. In other words, two cost estimates with the same aerial/ underground and make-ready assumptions could still vary widely if one includes all necessary costs needed to produce a functional, working network and the other estimate includes only the construction costs. The Design Nine cost estimates should be considered turn-key and all necessary and essential costs are included.*

The cost estimate show allowances for contingencies, engineering, project management, network integration, testing, and permitting fees. The cost estimate also include the cost of drops (the access fiber), based on estimated take rates for each segment. The take rate can be modified depending on the potential number of connections, and can have a pronounced effect on the cost per building connected.

> ***It is only correct to compare the costs of two estimates from two different sources if you can reliably determine that the underlying assumptions and costs are the same for both estimates.***

In other words, the percentage of aerial construction, the amount of make-ready, inclusion of engineering and equipment costs, and the inclusion of drops all must be the same. Two estimates of construction costs for the same area may appear to be widely divergent, but one estimate may include only direct labor and material costs, all aerial construction, no drops, no network equipment or design and engineering costs, and no make-ready fees.

Note that an estimate like this would be very low but would not be a functional network and no institutional, residences or businesses would actually be connected to the fiber. The other

estimate may include all the necessary costs needed to actually connect customers, including reasonable make-ready costs, some underground construction, network electronics, drop fiber cables to businesses or residents, and other costs like network design and engineering.

Estimates for construction materials and network equipment vary largely based on the amount of materials or equipment purchased. Small purchases of network electronics generally receive little or no price discount, but for larger purchases, discounts can be substantial (e.g. a range of 10% to 40% off list). Construction materials purchased in large lots also receive more discounts. Note that all costs are estimates based on current market prices for materials and construction costs are based on typical prices paid in past projects. Actual construction and materials costs may vary.

Both the estimates for fiber construction and wireless installation include a summary table with estimated costs for each area or wireless link, contingencies, engineering, project management, network integration, testing, and permitting fees. From all of these factors the estimated project total is calculated for each summary table.

Cost Estimate Categories

The Cost Estimate Spreadsheets are in the appendices of this document. They are organized into into phases that will allow the Authority to choose how and when it invests capital and what different options of investment may cost.

The approximate costs of materials and labor are included in the estimates. The values were sampled from rural Virginia projects including recent work in middle and southwest Virginia. These projects are very similar to the routes proposed in these estimates for Nelson County.

The initial pages are for a full investment and committing to build the entire network up front. There are some economies of scale to be gained when investing on a very large construction project. However, as the full capital amount may not be available, the estimates also include summary and detail pages for individual or targeted investment. If the Authority chooses to only build or commit to build some of the individual segments the economies of a large scale project will not be realized and the sum of the smaller projects could well be higher than a full committed up front buildout. This is due to various efficiencies such as project management, permitting, and engineering.

The "Project Total" estimates in this report include estimates of the costs in the categories described below. All of these activities and efforts are generally required to produce a working network, including network hardware and (1 year) maintenance and support. As noted in the previously, some firms may provide cost estimates that only include two categories: Outside Plant Construction Materials and Outside Plant Construction Labor. Also noted previously, even two estimates of just direct construction costs (materials and labor) may vary widely if one estimate includes drops and one estimate does not (these estimates include a reasonable number of drops to businesses along the segment routes).

Network Construction (Item/Project)

The Project Summary table shows the estimated costs for each phase or segment of the proposed network. It includes not only the direct construction costs for burying conduit and cable and/or hanging aerial fiber on utility poles, but also includes the estimated costs for shelter/cabinet and network equipment for each route or portion of the network.

Construction costs for drops are estimated based on a take rate for each segment and will be performed during the network construction. While the initial number of drops is relatively small, the network will have the capability of serving many additional drops. Future drops will involve construction costs to be born by the network, the Service Providers, or the individual customers.

Project Management, Network Integration and Testing

Project management for a telecom build requires thorough and detailed planning, experience in procuring construction materials for a telecom project, and the ability to oversee and convey project information to contractors through the duration of the project, including construction inspection work (ensuring construction contractors have done their job properly).

Some configuring and testing will take place after the network is built and before it is ready for use. In a dark network this involves labeling and documenting the routes of individual fiber strands, and testing of any other features of the network such as generators, air conditioners, and locks. In an active network the testing and integration includes integration requirements for a dark fiber network plus the configuring and installation of switches, routers, and other network equipment. Work in this category requires a skilled professional who is familiar with the network architecture and the business model (e.g. open access).

Engineering, Construction Inspection, and Permitting

This work include a full design of the outside plant network, cabinet and shelter specifications, and extensive detail (blueprints) that specifies how all fiber cable, wireless towers, and network equipment is to be installed. These documents have to be completed prior to bidding out any construction work, and are usually included as part of a construction bid package. The detail includes fiber optic cable route determination and size determination, active and passive network equipment selection and placement planning, splicing layouts and documentation, network configuration planning, and all engineering necessary to complete construction.

Some costs will be incurred based on the permitting requirements of the project. If shelters/cabinets are able to be placed on some properties at no charge, the cost of leases will be lower. If cabinets or shelters have to be placed on private property, the cost of the land or long term leases will increase. Some property owners prefer to receive ten or twenty years of lease payments up front, which can make this cost unpredictable. The cost of permits needed for crossing wetlands, streams, other sensitive areas, and VDOT permits are also included in this category. Formal leases and negotiated lease payments are more desirable than providing some form of free access to services.

Miscellaneous Fees and Technical Services

Many projects routinely incur a variety of mostly small amounts for fees and services. Typical items might include railroad crossing fees, lease and title fees, notary fees, legal fees for lease agreements or other legal matters, fees for archeological studies, etc.

Bookkeeping and Administration

Network projects create substantial amounts of paperwork, invoices, and related bookkeeping requirements. Grant-funded projects typically incur additional state level and/or Federal reporting and bookkeeping.

Contingencies

The Contingency category is included and calculated as a percentage of the construction subtotal estimated cost (e.g. 10% of subtotal cost) to provide flexibility in managing the overall budget. Equipment costs can and do change between the time an estimate is made and construction commences. Labor costs can vary depending upon the time of year the work starts, the state of the local economy, national economy, and bidding environment. Some grant agencies do not permit contingency funding as an allowable cost.

Authority Roles

The Nelson County Broadband Authority (NCBA) broadband network is operated as an independent entity owned by the County. This provides the network with two important requirements:

- The NCBA Board must have the business and management flexibility needed to make decisions efficiently and effectively in the fast-moving broadband business environment.
- As a Broadband Authority, the network is vested in the community and is operated on behalf of the community and economic development needs of the community.

The network is operated as a single high performance fiber optic network available to any and all service providers, including incumbent providers who want access to the significant market opportunity represented by the NCBA network. This shared business model is fundamentally different from the twentieth century copper-based networks where each provider has to build and operated a completely duplicated network (i.e. two providers each build a separate and duplicated network to reach the same customers, which results in higher costs across the board for customers).

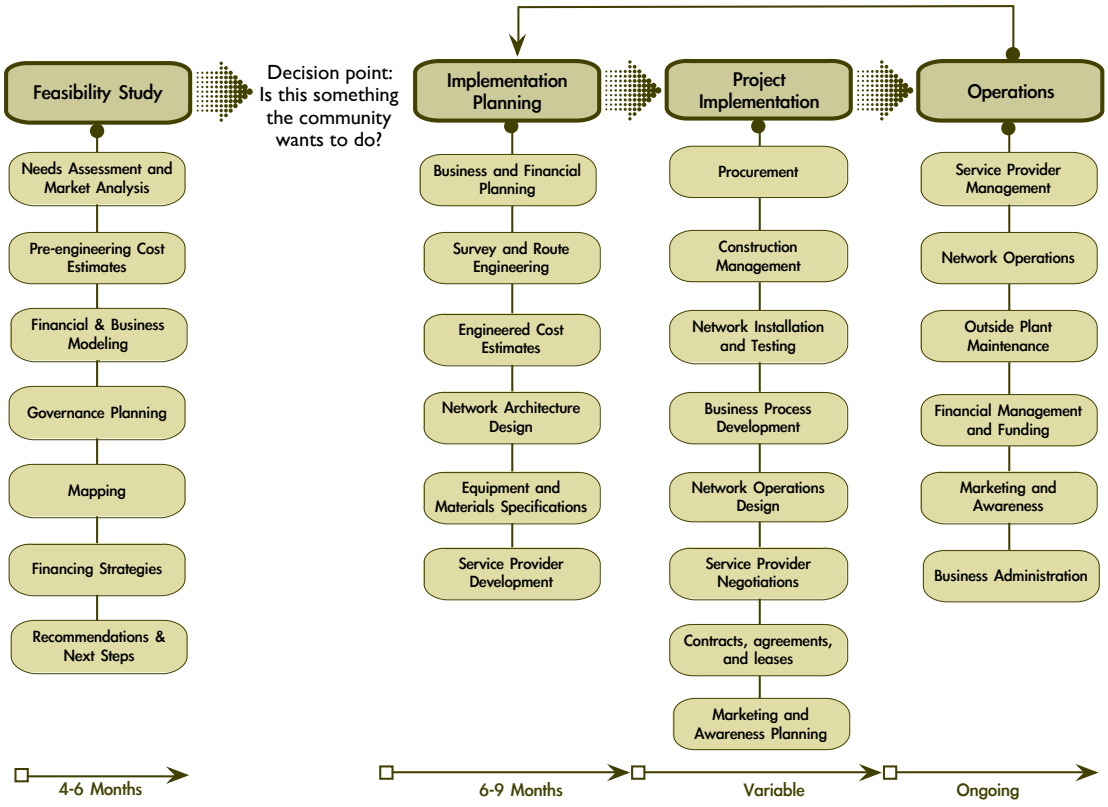
The Authority manages a limited number of essential roles:

- ***Contract and Staff Management*** - The Authority manages contracts for outsourced network operations, outsourced network repairs and maintenance, outsourced construction of network extensions, and service provider contracts for the services offered on the network. The Authority may in the future, find a need to have a small number of staff, but the limited scope of the network should minimize internal staff requirements. Where it is efficient and effective, the Authority would seek to use qualified private sector firms to handle the technical operations of the network to minimize the number of staff required by the NCBA.
- ***Financial Management*** - The Authority provides the financial oversight of the network. Most routine bookkeeping and accounting would not require full time staff and could be handled by part time staff, supported by the County, and/or outsourced to a local accounting firm.
- ***Public Awareness*** - The Authority should maintain a modest, ongoing public awareness campaign to ensure that residents and local businesses are aware of the opportunity to obtain higher performance, broadband services from local providers using the Authority infrastructure. While service providers would be responsible for their own sales, billing and customer management, the Authority would focus on name and brand awareness in the community.
- Project Development/Management - As funding sources are developed for individual network projects, the Authority would provide financial and project oversight of these projects during the implementation and construction phase.

Construction Phases and Operations

For the Authority, the development of a successful community-owned open access wholesale network requires attention in several areas including the technical (network equipment selection), engineering and construction, and business and financial planning. It is important to note that the business and financial planning are critical elements that in large part, determine the long term success of the effort. This section provides an overview of the key task areas and activities.

The illustration below shows the sequence of key phases and activities in the course of a network project. On the pages following this diagram is more detailed information about the individual tasks and activities that lead to successful completion of a fully operational network, including the business processes required.



A successful project requires a plan that ensures the right resources are available at the appropriate times during the various phases of development. Some resources must be identified and procured during the planning phase, some during the implementation and construction phases, and some during the operations phase.

- **Financial Planning** – Financial planning includes the development of short term and long term budget estimates and pro-formas. These materials form the basis of developing a funding plan, as well as providing a solid base for ongoing evaluation of the success of the enterprise.

- **Business Model** – The business model selected determines the kind and type of revenue that will be generated by the project, and also affects the kind and type of expenses that are incurred. For community-owned infrastructure, there are two basic model. A "retail" network has business and/or residential customers buying services directly from the local government, which creates direct competition with local private sector providers. The alternative is the "wholesale" model, in which the community-owned infrastructure is leased out to private sector providers on a wholesale basis--the local government sells no retail services and does not compete with the private sector.

- **Legal Counsel** – Whether the retail or wholesale business model is chosen, there is a short term and long term need for legal counsel familiar with telecom and broadband business agreements and contracts. Well written contracts with service providers protect the network and create a fair and equitable "level playing field" for competitive providers.

- **Engineering** – Whether fiber cable is hung on utility poles or placed underground in conduit, prior to construction, the routes must be surveyed and engineered drawings must be developed to meet DOT (Dept. of Transportation) requirements and to provide contractors with the information needed to construct the network to industry and state technical requirements.

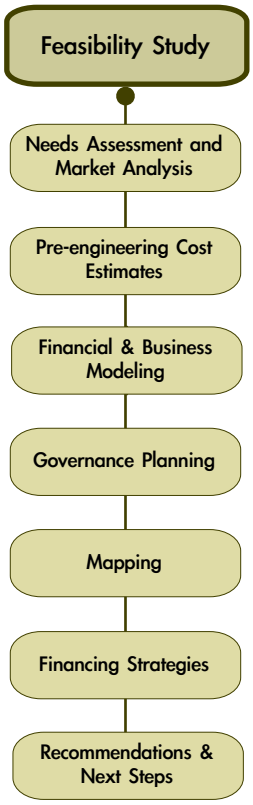
- **Network Design** – The logical design of the network must be matched to the business model, as the architecture of the network may vary according to a retail or wholesale model. The network design must also meet the requirements of large and small businesses, and for large businesses with extensive broadband and data needs, the network must be capable of meeting both current needs and future growth.

- **Equipment** – Once a network design is complete, an evaluation of equipment vendors must take place, ideally via a bidding process to ensure that the selected equipment will meet all of the business and technical requirements of the network, at the best possible price. A Total Cost of Ownership (TCO) evaluation should be completed to ensure that the right initial price is balanced with the longer term costs of extended warranties and technical support. The least expensive purchase price for equipment may be more expensive over time than equipment from a vendor with a higher initial equipment cost but lower support and warranty fees.

- **Build Out** – While fiber construction is generally much less expensive than other typical community projects like water and sewer development, care must be taken to select contractors with the appropriate experience installing fiber in both aerial and underground designs. The cost of construction can vary widely, so the development of very specific bid documents that include the right engineering information as well as a carefully structured proposal response on pricing is needed to ensure the community obtains the right contractor at the right price.

FEASIBILITY/EARLY PHASE PLANNING

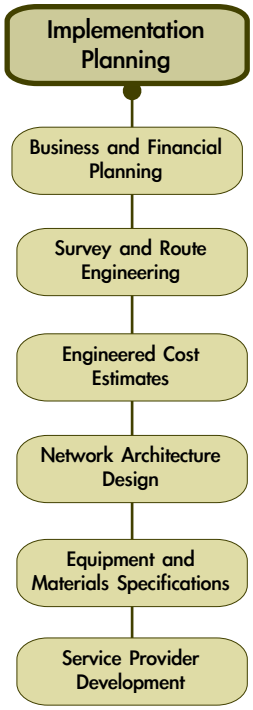
As the network continues to grow it is important for the Authority to occasionally revisit documents created early in the project and update information where it applies. During planning for new buildout many of the early phase activities apply for the development of implementation plans for each planned network extension or set of extensions (dependent upon available funding).



- **Needs Assessment and Market Analysis** – An evaluation of current assets and projections of future needs, based on local business and economic conditions.
- **Pre-engineering Cost Estimates** – Pre-engineering cost estimates of planned network extensions provide a baseline for understanding the costs of getting started, provide necessary inputs to the business case, and also inform funding strategies.
- **Financial and Business Modeling** – A ten year financial pro forma, using inputs from the business requirements analysis and the cost estimates, provides an early test of the financial sustainability of the project and provides a long term road map for financial management.
- **Governance Planning** (Management and Operations Overview) – Before making a commitment to move to implementation planning, it is necessary to have a basic understanding of the key operations and management tasks related to expansion of the network.
- **Mapping** – Mapping of current assets, areas and business locations of needs, economic growth areas, and key customers and stakeholders informs the development of the network architecture and the financial pro forma.
- **Funding Strategies** – Before moving to the next steps, it is vital to understand where the planning, engineering, and construction funds for new projects will come from. It is also important to evaluate the requirements of previously funded projects (NTIA, CDBG) before making major decisions regarding new network construction.
- **Next Steps** – Planning projects in all stages should include a set of next steps that the Authority can take to move the project forward.

Implementation Planning Phase

This phase produces the equipment and construction specifications needed to bid out the work of constructing the network.



- **Business and Financial Planning** – The Project Management firm and Network Integrator perform detailed business and financial planning, and develop the network architecture.
- **Survey and Route Engineering** – An on the ground survey is needed to complete a final route design. This work is performed by an engineering firm that also has the responsibility to produce the engineered design and obtain required permitting. The field survey confirms that the final route can be built to the necessary standards and regulations.
  - Construction Methodology selected (Design vs. Design/Build) - One method to shorten the design and build phases of a project are to award up front a "design build" contract where the engineering firm is also responsible for construction. While this may lead to some higher costs, it can shorten this part of the project significantly and is often recommended for projects where time is of the essence.
  - Engineering Drawings - After the survey work is completed, the engineering firm produces a complete set of engineered drawing that meet DOT and other local requirements.
- **Engineered Cost Estimates** – If the design/build option is not used, then the engineering firm will complete a full set of drawings which are attached to the construction bid documents and becomes the basis for the awarded construction contract.
  - Permitting - The Engineer will prepare all required permit forms and submit the permits with the plans. Some permits will require that the Authority pay a fee to the permitting entity. It is important to start the permitting process early to avoid delays.
- **Network Architecture Design** (Detailed) – Final analysis of vendor equipment is performed by the Project Management firm and selection is made.
- **Equipment and Materials Specifications** – The project management firm also completes a detailed list of all equipment required for the construction.

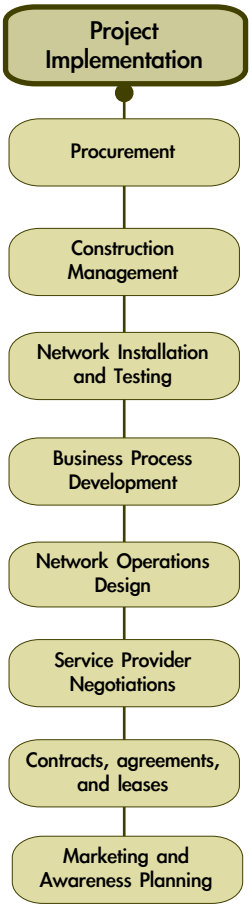
- Bill Of Materials is produced for fiber, conduit, handholes, fiber splice enclosures, and related hardware needed to install the fiber cable underground and/or on utility poles.

- **Service Provider Development** – In an open access network, service providers have to be recruited and formally signed to a contract to become a provider on the network. Providers usually need "coaching" because they are typically unfamiliar with open access networks and need help understanding the unique business opportunities they represent for private sector companies.

  - The Project Manager and Integrator will work with qualified providers to market the network and make sure that the providers have an understanding of how to prepare to interface with the network to provide services. This also includes all the base understanding of the contractual agreements between the network and the providers.

Network Construction & Extensions

The documents produced in the Implementation Phase are used to bid out the construction work and to procure the network equipment needed to produce an operational network.



- **Procurement** – At the beginning of the construction phase the Authority must bid out the project construction.
  - Construction Contracts - Multiple contractors may be involved depending on how the engineering and construction documents were planned in earlier phases.
  - Other Physical Materials - The project manager will also be responsible for procuring all physical assets not the responsibility of the construction contractors which may include shelters, cabinets, generators.
  - Network Equipment - All network equipment such as servers, switches, and routers must be purchased and tracked.
  - Operating Contracts - If outsourced business functions are to be used, the agreements have to be drafted and qualified outsourced firms need to be selected.
- **Construction Management** – The construction work is bid out and an award is made to a qualified contractor with the best price. It is common to negotiate the final cost of this work once a firm has been selected.
  - Engineering Inspection - Depending on how the construction contracts were awarded will determine if the engineering firm is responsible for inspecting the contractors work performed during construction.
- **Network Equipment Installation** – Network equipment is ordered from a vendor that meets the technical specifications. Equipment must be tested, installed in cabinets or shelters, powered up, and connected to the fiber cable. After installation and
  - Staging - The site(s) where equipment will be installed must be designed with the correct power circuits, racks, and grounding for equipment. Cable trays and other accessories will be installed to accommodate the physical connections to equipment.
  - Installation - Equipment must be configured which may involve staging in a laboratory or bench. Once on site equipment will be installed in the racks, and the

physical cable connections made. Equipment will then be powered up and can be configured.

- Configuration/Integration - Prior to installation equipment can be pre-configured in a lab or staging area. After installation the initial configuration is completed or confirmed and connections to other network equipment is tested. Adding one device can require modifications to the configuration throughout the network.
- Testing - When equipment is installed and configured, end to end network testing of the equipment must be completed. Testing will confirm that network elements are communicating properly. Testing is required not only when new network elements are installed, but also when new services or features are configured on the network.

- **Business Process Development** – During the construction phase, business and operational decisions must be made to produce a set of business processes that will guide the day to day operations of the network.
  - Business processes for essentially all recurring activities on the network, including new customer provisioning, service provider billing, utility locating, processing invoices, and so on.
  - Some functions can be outsourced to create local private sector jobs (e.g. field maintenance, utility locating).
  - Internal processes overlapping with the network configuration are created for new customers joining the network, and the definition of new services.
  - Legal contracts and other related business documents must be developed as part of this process.
- **Service Provider Negotiations** – Negotiations with qualified service providers continues.
  - Additional development and specification of the Master Agreements and Service Level Agreements (the contracts between the network and the Service Providers) are finalized
  - The network and the providers enter into contractual agreements.
  - Providers on the network determine what services they want to offer and work with the Network Operators to define services and configure the delivery of the service over the network.
- **Contracts, Agreements, and Leases** – The construction phase generates the need for a variety of legal documents. Some are related directly to the construction (e.g. an easement agreement to have conduit cross property)

- Typical documents include the development of the Master Network Agreement that is used to sign service providers to the network. Other contracts would include the development of a draft network operations agreement if network operations is outsourced, and a similar agreement for outside plant maintenance and repairs.

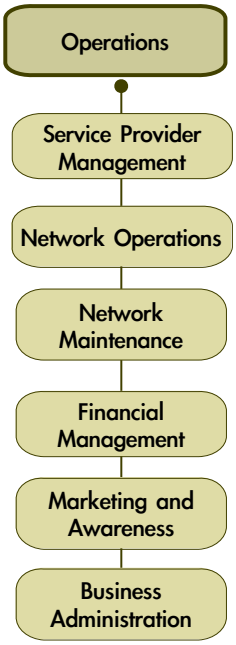
- **Marketing and Public Awareness** – As the network is constructed, a modest but ongoing public awareness and publicity effort is required to ensure that business customers, schools, local government agencies and other potential users of the network are aware of the project and the possibility of reducing costs and obtaining more and better services.

Operations Phase

The NCBA network is already in full operations and many of the activities discussed below are part of the day to day operation of the network. We include this section because operating the network is a major part of the networks success.

Service Provider Management

Service Providers are a vital part of any Open Access Network. In essence the Service Providers are the customers of the network. The actual network end users (institutions, businesses, and residents) are the Service Provider's customers. Service providers sell directly to the end users--their customers.



Provisioning - managing orders for service

Once they have obtained a new customer that is passed by distribution or access fiber, the Service Provider contacts the network operator to get either a physical fiber connection completed (e.g. from the curb to the building) and/or a logical connection across the network to deliver the service requested by the customer (e.g. Internet, phone, data backup, etc.). This process is initiated via a self service portal, an order ticket, or some other automated mechanism (e.g. a link between the SP's Customer Relationship Management (CRM) system and the ordering system) and flows through a defined process which may include external work orders to contractors and ultimately ends in a billing event when the Service Provider's customer is active and will be billed for services.

Billing

The Network Operator or Owner needs to bill for services provisioned on the network. Unlike the retail model, the bills created by the Network Operator are only created for the Service Providers. The Service Providers handle billing of their own customers. While the process of billing only the Service Providers is simpler when compared to retail billing, nevertheless this is a process that requires attention to detail on a daily and monthly basis as customers are added, dropped or changed. Bills need to include a level of detail such that an individual Service Providers can tie their own invoices to individual subscribers back to the Network invoice, potentially generate their own bills from the details in the Network invoice, audit their records against the Network bills, and work with the Network Operator in the event of inconsistencies. During the planning phase, the Network Operator needs to determine several items about billing of Service Providers such as partial month billing, credits for service outages, and credits for bad payers.

Customer Care

As the Service Providers are the customers of the Network a well designed network operations center (NOC), staffed with experienced personnel, must be in place to support the providers.

The NOC operators will be available during normal business hours (Monday-Friday, 8 AM to 5 PM) to deal with routine provider needs, and the NOC will provide 24/7/365 monitoring the network and connected customers for outages and follow up repairs.

Marketing Incentives

The NCBA has a role in marketing the network, even though the end users of the network are the customers of the Service Providers. Marketing incentives can be time based, geography based, or revenue based. Marketing incentives must be offered to all Service Providers on equal terms. Basing the incentives on number of customers, number of new customers, or revenue can be used to provide an incentive for the Service Providers to aggressively pursue additional customers or market share.

Service Provider Attraction

Even though the Network is operational with one or more Service Providers offering services, it is vital to the growth of the Network that the Operator/Owner continues to work to attract new Service Providers to the network. These can either be new "traditional" providers (Internet, VoIP, IPTV) or can be niche providers offering services like security (e.g. closed circuit video), healthcare, gaming or any other service which can be delivered over the network.

Quality Assurance

While the Service Providers are the customers of the Network, they also can have an impact on the overall impression of the network. If a Service Provider is not paying its bills to the Network or if there are many end user customer complaints the Network Owner may, in extreme circumstances, need to intervene. Such intervention may include canceling a Service Provider's contract with the Network (potentially switching end-users from one Service Provider to another), penalizing a Service Provider via increased costs on the Network, or other intermediate strategies to encourage good quality service.

Network Operations

Operations can be managed in-house, but start-up networks generally find it less expensive to out-source operations to a qualified firm. Operations must include 24/7/365 activities, and it is generally better in the first several years, when the network is small, to use a service rather than bear the expense of several dedicated technical staff that would be needed to cover nights, weekends, holidays, and vacations.

Network Operations Center (NOC)

Network Operations Center or NOC is a 24/7/365 staffed facility with many tools to manage, operate, debug and assist the NOC staff in identifying the root cause of issues reported, in monitoring network electronics, and to keep the network running smoothly. The NOC can be an outsourced remote center or can reside on the network.

Help Desk

Service providers are responsible for handling Tier 1 support to their customers--the network end users. However, when the Service Provider can not solve the problem or believes the problem is in the Open Access Network they need to be able to contact a help desk for assistance. This Help Desk is part of the NOC, and should be staffed to handle problems during both normal business hours and on nights and weekends.

Monitoring

One of the tools available to the NOC is software which monitors the active elements of the network. Some monitoring systems are available from the manufacturers of the network hardware, known as Element Management Systems (EMS), as well as systems which use standards-based software tools to monitor the network for problems. Monitoring takes a variety of forms, including a standard uptime monitor that periodically checks the status of the Network Elements as well as more sophisticated tools that monitor bandwidth, CPU cycles, temperature, fan speeds, etc.

Monitoring systems are useful not only during troubleshooting with a service provider or end user but as well as providing proactive capabilities to prevent problems or outages. As an example, a sophisticated monitoring system could provide NOC technicians with alarms when bandwidth exceeds a set threshold, allowing the technician to take proactive actions to prevent an outage.

Ticketing

Trouble Ticketing or just Ticketing is a system or process that uses software to manage and track reported troubles, outages, orders, or questions submitted online via Web forms or via email and phone calls. NOC staff are responsible for tracking all tickets and timestamps as well as allowing the providers visibility into the system to see what action is being taken or what is planned for an outage or other problem that arises on the network.

Ticketing systems include Web based portals, text messaging tools, and e-mail based responders, and can receive and respond to tickets in a variety of ways including phone calls, emails, SMS, or other means.

Outage Reporting

When an outage is discovered via monitoring or a call to the Help Desk, outage reports can be broadcast to Service Providers or end users. This type of proactive reporting can reduce the burden of calls to the NOC by notifying the service providers of pre-existing outages.

Provisioning

Provisioning is the act of setting up services on the network. Provisioning can be for service providers, end users, or can be required for core network requirements. Small networks often rely on a manual process for provisioning but can utilize manufacturer provided Element Management Systems (EMS) or even more sophisticated systems, known as Manager of Managers

(MoM). For service provider and end user provisioning, the end result is usually a billable event such as adding, changing, or terminating a end user service.

Order Management

While provisioning is the setting up of services on the actual network elements, Order Management is a higher level activity that can include dispatch of physical assets, estimating of network build costs, or processing a more complex order for Network changes. Order Management can be provided through a Ticketing system or can be a stand alone system in larger networks.

Performance Reporting and Metrics

To provide proactive feedback to network operators, owners, and service providers there can be systems dedicated specifically to reporting on the health and reliability of the network. Metrics can also be created out of the ticketing system, provisioning system, or order management. Overall the performance of not only the network, but also of contractors, outsourced providers, vendors, and even data on service providers can be reported on and used as a mechanism to view the health of the network and entities charged with providing services. As an example, a ticketing system report could indicate the average length of time before a ticket is addressed by NOC personnel, or the monitoring system can report on the total number and average length of time for outages in a given period.

Change Management

Any time there are changes made to the network via provisioning, repair, or otherwise, it is vital that those changes be managed and tracked. Simple methods of Change Management include keeping a record of every update in a spreadsheet, or keeping configuration files in a directory on a server. More complex methods involve using change tracking software to automatically capture network changes and provide capabilities for reversing changes in the event of an outage or interruption of services.

Network Maintenance

While routine maintenance (e.g. replacement of worn out equipment) may be limited in the first year or two of operations, non-routine/emergency maintenance support must be in place as soon as a network has customers.

Network Equipment Maintenance

Maintaining network equipment involves regular patching of firmware or software upgrades as well as performing physical maintenance if required. Network elements must be patched when critical security or performance updates are released from the manufacturer. Maintenance which can potentially cause an outage need to be scheduled with the NOC and these events often occur as scheduled maintenance windows during non critical times (typically on weekends at 2-5am). Examples of required physical maintenance can include keeping equipment in clean working conditions such as cleaning fans, testing UPS systems, or replacing batteries as needed.

Security

Security is both a physical and logical problem in keeping networks operational. Physical security includes protecting expensive or sensitive equipment with access controls or locks. Logical security can include required password rotation, keeping equipment on the latest security release of software, and protecting confidential information of end users and service providers. Firewalls are needed to protect the network not only from outside threats, but the network needs to be protected against internal attacks as well.

Outside Plant Maintenance

Fiber is occasionally damaged (e.g. tree limb falling on aerial fiber, backhoe damaging buried fiber), and a qualified firm must be available to make repairs within two to four hours. This service is almost always outsourced to a qualified private sector company and is referred to as "break-fix"

In addition to break-fix underground utilities often need to be "located" when new construction, street repairs, or other activities disturbing the earth occur near buried cable. The network should belong to the local dial-before-you-dig service and should respond to tickets originating from those systems. Utilizing an accurate inventory of the network if digging will occur in close proximity to owned plant, NOC staff will dispatch a locator to locate the fiber cable. This is often part of the break-fix contract, but can be outsourced to another entity specializing in such work. In small municipal networks, the Public Works department will often locate fiber optic cable as they are already locating water and sewer assets.

Backups and Configuration Management

NOC staff are responsible for keeping secure backups of all Network Element configurations, backups of critical systems mentioned in this chapter including ticketing, provisioning, and billing. Backups should be stored locally for a quick restoration in the event of a failure, but also should be kept offsite in a physically diverse location.

Inventory Management

Keeping track of all Network Elements and all network assets is key to keeping a Network reliable and operational. Inventory Systems should:

- Track equipment location, in-service dates, serials numbers, model numbers
- Link equipment with end-users or service providers
- Provide location reports for technicians and service providers
- Store logical information such as IP addresses, OS versions, etc.

Managing the physical assets is also required in a network. Tracking all Outside Plant (OSP) assets reduces the time needed to find and solve outages, and reduces the time required to provision new services, or create work orders for changes to the physical network. A network asset management system provides an overall view of the physical state of the network. Fiber Optic OSP management systems should:

- Track conduit, cables, buffer tubes, individual fiber, splices
- Generate reports and information for splice work

Business Administration

An open access network only has a small number of customers, which are usually just the connected service providers and perhaps a handful of local government agencies. Nonetheless, prudent and careful financial management is needed for accounts receivables and accounts payables, along with other normal bookkeeping activities--chart of accounts maintenance, bank deposits, check writing, and other related tasks. A part time bookkeeper may be an affordable solution in the early days of operations.

Accounting Budget Support

As the Open Network is a business enterprise, maintaining an operational budget is required. The network will have operational costs such as pole rentals, locate costs, annual equipment maintenance, electric bills, debt service, or other costs. Having an accounting office is often out of the reach of a small network so these functions can be completed by an outsourced company or even completed by NOC staff.

Service Provider Billing

Monthly bills need to be created and sent to the service providers. Tracking payment and handing billing disputes needs to be performed. Often the NOC staff are responsible for creating the bills and handing billing inquiries while an accounting office is responsible for sending invoices and tracking payments. In the event of billing disputes the NOC staff, the customer (in most cases a Service Provider), and the accountant are involved in developing a remedy for a billing dispute.

Marketing and Awareness

While service providers will be responsible for their own marketing and sales efforts, an ongoing modest awareness/marketing campaign is required to ensure that customer take rate targets are met.

Outreach

Outreach is often required to make sure that the local and regional community are aware of the network. Working with local economic developers, chambers of commerce, local technology companies is often required. Additionally the NCBA should promote the network so the project receives more local and regional awareness. Local, regional, and state officials need to be aware of the network, how it was funded, and how it is benefiting local constituents.

Incentives

As mentioned above in the Service Provider section, it may also become necessary for the network to offer incentives to acquire new connected businesses and residences or to attract businesses to the area. While the Network Operator/Owner will not offer services directly to end-

users there may be economic development reasons to offer to fund things like the initial cost of constructing a new drop, as one example.

Growing the Network

Often the network is built in stages. There may be a pilot phase or a small deployment followed by larger deployments. These deployments need to be planned and managed, but the Network Operator/Owner and board of directors should constantly be looking for new funding opportunities like state or federal grants. While the network is being expanded, the NOC staff will be responsible for bringing newly constructed segments of the network into operations.

Financial Management and Oversight

The Authority is responsible for day to day oversight and financial management. County staff are currently providing substantial support in this area.

Best Practice: Planning for Success

With more than a dozen years of operation for a variety of community-owned network infrastructure projects around the country, there is very little "experimentation" that is still necessary. With more than three hundred communities making investments in broadband infrastructure, there is now enough information about what works and what does not work to be able to identify best practice across nearly all areas of operations, planning, management, and finance.

Outsource Where Sensible and Economical

Overstaffing on start up networks has been a common source of early financial difficulties for some community broadband projects. Given the relatively small scope of the proposed initial projects, the Authority should seek to outsource most maintenance and operational tasks, and use contract services for other essential functions like bookkeeping and accounting.

Use grants as supplemental funding

Grants can be extremely important in the early stages of an effort to support planning activities and/or to fund a Phase One build out initiative. But grants rarely will allow spending on operational expenses. Grants should be used to supplement other sources of funding and as one time cash injections to support very specific goals. Communities that have relied too heavily on "the next grant" as a key source of expansion or operational funding usually experience severe financial problems.

Manage finances

Broadband infrastructure projects require hard-nosed financial oversight. Projects that have developed financial problems have usually over-estimated early revenue, under-estimated expenses, and/or simply spent too much without aligning expenses with revenue.

Use take rate targets as a key performance measure

The initial business plan should have a minimum three to ten year projection of connected premises (i.e. the take rate), including K12 schools, local government facilities, large and small businesses, health care facilities, and residential customers (if fiber to the home is part of the business plan). Take rates directly affect revenue: if take rate projections are not being met, revenue shortfalls are likely. Take rates (both raw numbers and month to month growth rates) should be analyzed at least quarterly (monthly would be preferable).

Plan for marketing and public awareness efforts

For the NCBA, it is necessary to have a modest but regular marketing and awareness campaign to ensure that area businesses know that the new network is available, that they know what service providers are available on the network, and they know how to order service. While service providers are responsible for sales (that is, selling their services and signing up their own customers), the network itself must continue to market general awareness of the network.

Plan for Expansion

Most community-funded efforts start small. This minimizes financial risk and gives the senior leadership the opportunity to learn on the job. But some projects tend to stall out after the first year or two. The underlying problem is twofold: even small networks have a certain amount of fixed operational costs regardless of size, and the network needs enough revenue to pay those expenses, as well as make principal and interest payments on any loans. The second problem is that network infrastructure wears out and needs routine maintenance. Lack of funding to keep the network in good condition will degrade service over time. The solution is to have an expansion plan (which could be modest) that contributes to revenue growth over time.

Budget for Customer Connections

If the network is going to achieve financial sustainability, new customers have to be added on a schedule that matches the financial projections. This means the project must have the funds to support adding customer "drops" from the distribution fiber on poles or underground in right of way at the edge of the street or road. This is where careful budgeting and adequate funding is a necessity. The worst possible outcome is to have business and residents requesting a connection to the network but having a lack of the funds to make that "last hundred feet" connection. There are a variety of charge back and fee-based strategies for raising the capital needed to complete drops, and a plan that supports funding of new customer connections is essential.

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NCBA Comprehensive Buildout Plan - Projects Summary

	ITEM/PROJECT	Project Cost
2	East - West Ring Segment	$752,965.58
3	Wintergreen FTTH	$6,136,589.86
4	All Laterals	$2,769,852.25
5	North-South Ring Segment (Closes Ring)	$981,460.22

If approached as a single project, constructing all laterals is estimated to cost $205,744.09 less.

Overall, the comprehensive project will consist of 75 miles of construction. The total cost of all projects shown is estimated to be $10,650,000.00

The construction materials and labor cost per mile for each of the segments averages approximately $78,800.00

This estimate assumes that the network construction will be 100% underground, with a high percentage of boring included. Boring is estimated to be 40% of the installation method.

The Wintergreen FTTH Pilot is calculated (by GIS) to pass 2,520 homes & businesses. MDU buildings were counted for each address shown in the building. The estimate accounts for a 60% take rate, 1,512 connections.

	ITEM/PROJECT	Project Cost
2	Afton Extension	$221,051.56
3	Faber Extension	$505,706.30
4	Shipman Extension	$610,627.60
5	Arrington Extension	$338,784.54
6	Piney River Extension	$569,585.29
7	Tyro Extension	$729,841.05
8	**Extensions Total (If approached independently)**	**$2,975,596.34**

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Stand Alone Project Summary: Comprehensive Network Laterals

	ITEM/PROJECT	ESTIMATED
2	Afton Construction	$164,813.09
3	Faber Construction	$378,162.05
4	Shipman Construction	$460,524.11
5	Arrington Construction	$252,686.61
6	Piney River Construction	$442,688.98
7	Tyro Construction	$547,926.25
8	Comprehensive Network Lateral Construction Subtotal	$2,246,801.08
9	Project Management, Network Engineering, Integration, and Testing	$269,616.13
10	Engineering, Construction Inspection, Permitting and Fees	$231,435.04
11	Misc. Fees, and Technical Services	$15,000.00
12	Bookkeeping, Administration, and Legal	$7,000.00
13	Contingency	$112,340.05
14	Other Costs Subtotal	$523,051.17
15	**Project Total**	**$2,769,852.25**

Total Linear Construction	27.23 miles
Total Underground Construction	143,762 feet
Total Aerial Construction	0 feet
Buildings Passed	883
Buildings Connected	47

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Afton Network Lateral Estimate Details

	VARIABLE	VALUE	NOTES
V2	Aerial Construction percentage	0.00%	Based upon mostly residential construction, will trench rather than plow a majority of the route. Aerial for tough spots and major road crossings
V3	Trenching percentage	0.00%	
V4	Boring percentage	40.00%	
V5	Vibratory Plow	60.00%	
V6	Linear construction length	9,489 feet	Length of segment in feet.
V7	Underground Construction	9,489 feet	
V8	Aerial Construction	0 feet	
V9	Conduit Exists	0 feet	
V10	Poles (for make ready)	0 poles	
V11	Handholes	16	Number of handholes for the segment.
V12	FOSCs	3	
V13	Optimism	5	0-10 scale used in Best Estimate column
V14	Buildings Passed	65	
V15	Take Rate	10.0%	
V16	Buildings Connected	7	

	ITEM	VALUE
S2	OSP	$42,781.21
S3	Contracting and Labor	$108,107.63
S4	Electronics and Equipment	$13,924.25
S5	OSP - Fiber Construction	$164,813.09
S6		
S7	Construction Cost Per Mile	$83,959.64

Cost per mile does not include equipment, PM, engineering, etc.

	ITEM/PROJECT	UNITS	COST(LOW)	COST(HIGH)	TOTAL (LOW)	TOTAL (HIGH)	BEST ESTIMATE (WEIGHTED AVERAGE)
2	Materials (OSP)						
3	Large Telecom Cabinet	1	$8,000.00	$12,000.00	$8000.00	$12000.00	$10,000
4	Generic 1.25" Conduit	2 9,489 feet	$0.40	$0.50	$7591.20	$9489.00	$8,540
5	Buried Fiber Marker Posts/Medallions	19	$6.00	$12.00	$114	$228.00	$171
6	288 Strand Fiber Optic Cable	9,489 feet	$1.40	$1.80	$13284.60	$17080.20	$15,182
7	Slack Fiber 288FOC (50' per handhole)	791	$1.40	$1.80	$1,107	$1,423.80	$1,266
8	Trace Wire - Insulated 12AWG or better	9,489 feet	$0.10	$0.15	$948.90	$1423.35	$1,186
9	Muletape 1250P (3000ft reel) or equivalent	4	$115.00	$230.00	$460	$920.00	$690
10	Handhole - 24x30x24 Concrete Polymer (incl. Lid)	16	$300.00	$350.00	$4,745	$5,535.25	$5,140
11	Handhole Installation Materials (Gravel, Straw, etc.)	16	$5.00	$10.00	$79	$158.15	$119
12	FOSC (Tyco Type B or equivalent)	3	$125.00	$250.00	$325.00	$650.00	$488
13	Labor and Special Permitting						
14	Large Cabinet Foundation and Installation	1	$2,500.00	$4,000.00	$2500.00	$4,000.00	$3,250
15	Aerial Cable Placement	0	$2.00	$5.00	$0	$0	$0
16	Make Ready Heavy	0	$450.00	$1,000.00	$0	$0.00	$0
17	Make Ready Light	0	$200.00	$450.00	$0	$0.00	$0
18	Pole Replacement	0	$7,000.00	$10,000.00	$0	$0.00	$0
19	Trenching	0	$8.00	$10.00	$0	$0.00	$0
20	Boring (Road Crossings)	3,796	$10.00	$15.00	$37,960	$56,940.00	$47,450
21	Direct Bury / Vibratory Plow	5,694	$4.00	$7.00	$22,776	$39,858.00	$31,317
22	Railroad Easement	0	$50,000.00	$75,000.00	$0	$0.00	$0
23	Handhole Installation	16	$250.00	$500.00	$3,954	$7,907.50	$5,931
24	FOSC Assembly and Installation	3	$300.00	$600.00	$780	$1,560.00	$1,170
25	Drop Construction (average cost per drop)	7	$1,250.00	$1,750.00	$8,125	$11,375.00	$9,750
26	Splicing (per splice estimate)	308	$25.00	$35.00	$7,700.00	$10,780.00	$9,240
27	Equipment						
28	Patch Panel	1	$3,000.00	$4,500.00	$3,000.00	$4,500.00	$3,750
29	New Power Service / Installation	1	$500.00	$1,250.00	$500.00	$1250.00	$875
30	Patch Cables (POP)	7	$14.00	$25.00	$91	$163	$127
31	Patch Cables (Customer Premise)	7	$20.00	$30.00	$130	$195.00	$163
32	Calix E7-2 Shelf	1	$600.00	$700.00	$600.00	$700.00	$650
33	Calix E7-2 GE24 (FTTx Line Card)	1	$3,800.00	$4,000.00	$3,800	$4,000.00	$3,900
34	Calix 10G Optics	2	$300.00	$350.00	$600	$700.00	$650
35	Calix CSFP (FTTx Optics)	4	$160.00	$180.00	$640	$720.00	$680
36	Calix 716 GE - 1	7	$200.00	$240.00	$1,300	$1,560	$1,430
37	Calix 48V DC System Retrofit Kit	1	$1,500.00	$1,900.00	$1500.00	$1900.00	$1,700
38	Total:				$120,449.43	$181,328.25	$164,813.09
39							
40	Notes/Assumptions: -Estimate includes funding for drop construction for 10.0% of the buildings passed.						

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Faber Network Lateral Estimate Details

	VARIABLE	VALUE	NOTES
V2	Aerial Construction percentage	0.00%	Based upon mostly residential construction, will trench rather than plow a majority of the route. Aerial for tough spots and major road crossings
V3	Trenching percentage	0.00%	
V4	Boring percentage	40.00%	
V5	Vibratory Plow	60.00%	
V6	Linear construction length	27,277 feet	Length of segment in feet.
V7	Underground Construction	27,277 feet	
V8	Aerial Construction	0 feet	
V9	Conduit Exists	0 feet	
V10	Poles (for make ready)	0 poles	
V11	Handholes	45	Number of handholes for the segment.
V12	FOSCs	2	
V13	Optimism	5	0-10 scale used in Best Estimate column
V14	Buildings Passed	80	
V15	Take Rate	5.0%	
V16	Buildings Connected	4	

	ITEM	VALUE
S2	OSP	$102,874.93
S3	Contracting and Labor	$262,364.13
S4	Electronics and Equipment	$12,923.00
S5	OSP - Fiber Construction	$378,162.05
S6		
S7	Construction Cost Per Mile	$70,699.20

Cost per mile does not include equipment, PM, engineering, etc.

	ITEM/PROJECT	UNITS	COST(LOW)	COST(HIGH)	TOTAL (LOW)	TOTAL (HIGH)	BEST ESTIMATE (WEIGHTED AVERAGE)
2	Materials (OSP)						
3	Large Telecom Cabinet	1	$8,000.00	$12,000.00	$8000.00	$12000.00	$10,000
4	Generic 1.25" Conduit	2 27,277 feet	$0.40	$0.50	$21821.60	$27277.00	$24,549
5	Buried Fiber Marker Posts/Medallions	55	$6.00	$12.00	$330	$660.00	$495
6	288 Strand Fiber Optic Cable	27,277 feet	$1.40	$1.80	$38187.80	$49098.60	$43,643
7	Slack Fiber 288FOC (50' per handhole)	2,273	$1.40	$1.80	$3,182	$4,091.40	$3,637
8	Trace Wire - Insulated 12AWG or better	27,277 feet	$0.10	$0.15	$2727.70	$4091.55	$3,410
9	Muletape 1250P (3000ft reel) or equivalent	10	$115.00	$230.00	$1,150	$2,300.00	$1,725
10	Handhole - 24x30x24 Concrete Polymer (incl. Lid)	45	$300.00	$350.00	$13,639	$15,911.58	$14,775
11	Handhole Installation Materials (Gravel, Straw, etc.)	45	$5.00	$10.00	$227.31	$454.62	$341
12	FOSC (Tyco Type B or equivalent)	2	$125.00	$250.00	$200	$400.00	$300
13	Labor and Special Permitting						
14	Large Cabinet Foundation and Installation	1	$2,500.00	$4,000.00	$2500.00	$4,000.00	$3,250
15	Aerial Cable Placement	0	$2.00	$5.00	$0	$0.00	$0
16	Make Ready Heavy	0	$450.00	$1,000.00	$0	$0	$0
17	Make Ready Light	0	$200.00	$450.00	$0	$0.00	$0
18	Pole Replacement	0	$7,000.00	$10,000.00	$0	$0.00	$0
19	Trenching	0	$8.00	$10.00	$0	$0.00	$0
20	Boring (Road Crossings)	10,911	$10.00	$15.00	$109,110	$163,665.00	$136,388
21	Direct Bury / Vibratory Plow	16,367	$4.00	$7.00	$65,468	$114,569.00	$90,019
22	Railroad Easement	0	$50,000.00	$75,000.00	$0	$0.00	$0
23	Handhole Installation	45	$250.00	$500.00	$11,365	$22,730.83	$17,048
24	FOSC Assembly and Installation	2	$300.00	$600.00	$480	$960.00	$720
25	Drop Construction (average cost per drop)	4	$1,250.00	$1,750.00	$5,000	$7,000	$6,000
26	Splicing (per splice estimate)	298	$25.00	$35.00	$7,450.00	$10,430.00	$8,940
27	Equipment						
28	Patch Panel	1	$3,000.00	$4,500.00	$3,000.00	$4,500.00	$3,750
29	New Power Service / Installation	1	$500.00	$1,250.00	$500.00	$1250.00	$875
30	Patch Cables (POP)	4	$14.00	$25.00	$56	$100	$78
31	Patch Cables (Customer Premise)	4	$20.00	$30.00	$80	$120	$100
32	Calix E7-2 Shelf	1	$600.00	$700.00	$600.00	$700.00	$650
33	Calix E7-2 GE24 (FTTx Line Card)	1	$3,800.00	$4,000.00	$3,800	$4,000.00	$3,900
34	Calix 10G Optics	2	$300.00	$350.00	$600	$700.00	$650
35	Calix CSFP (FTTx Optics)	2	$160.00	$180.00	$320	$360	$340
36	Calix 716 GE - 1	4	$200.00	$240.00	$800	$960.00	$880
37	Calix 48V DC System Retrofit Kit	1	$1,500.00	$1,900.00	$1500.00	$1900.00	$1,700
38	Total:				$290,838.53	$439,639.58	$378,162.05
39							
40	Notes/Assumptions: -Estimate includes funding for drop construction for 5.0% of the buildings passed.						

DESIGN NINE
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Shipman Network Lateral Estimate Details

	VARIABLE	VALUE	NOTES
V2	Aerial Construction percentage	0.00%	Based upon mostly residential construction, will trench rather than plow a majority of the route. Aerial for tough spots and major road crossings
V3	Trenching percentage	0.00%	
V4	Boring percentage	40.00%	
V5	Vibratory Plow	60.00%	
V6	Linear construction length	31,058 feet	Length of segment in feet.
V7	Underground Construction	31,058 feet	
V8	Aerial Construction	0 feet	
V9	Conduit Exists	0 feet	
V10	Poles (for make ready)	0 poles	
V11	Handholes	52	Number of handholes for the segment.
V12	FOSCs	7	
V13	Optimism	5	0-10 scale used in Best Estimate column
V14	Buildings Passed	340	
V15	Take Rate	5.0%	
V16	Buildings Connected	17	

	ITEM	VALUE
S2	OSP	$116,618.86
S3	Contracting and Labor	$318,853.75
S4	Electronics and Equipment	$25,051.50
S5	OSP - Fiber Construction	$460,524.11
S6		
S7	Construction Cost Per Mile	$74,032.31

Cost per mile does not include equipment, PM, engineering, etc.

	ITEM/PROJECT	UNITS	COST(LOW)	COST(HIGH)	TOTAL (LOW)	TOTAL (HIGH)	BEST ESTIMATE (WEIGHTED AVERAGE)
2	Materials (OSP)						
3	Large Telecom Cabinet	1	$8,000.00	$12,000.00	$8000.00	$12000.00	$10,000
4	Generic 1.25" Conduit	2 31,058 feet	$0.40	$0.50	$24846.40	$31058.00	$27,952
5	Buried Fiber Marker Posts/Medallions	63	$6.00	$12.00	$378	$756	$567
6	288 Strand Fiber Optic Cable	31,058 feet	$1.40	$1.80	$43481.20	$55904.40	$49,693
7	Slack Fiber 288FOC (50' per handhole)	2,588	$1.40	$1.80	$3,623	$4,658	$4,141
8	Trace Wire - Insulated 12AWG or better	31,058 feet	$0.10	$0.15	$3105.80	$4658.70	$3,882
9	Muletape 1250P (3000ft reel) or equivalent	11	$115.00	$230.00	$1,265	$2,530	$1,898
10	Handhole - 24x30x24 Concrete Polymer (incl. Lid)	52	$300.00	$350.00	$15,529	$18,117	$16,823
11	Handhole Installation Materials (Gravel, Straw, etc.)	52	$5.00	$10.00	$259	$518	$388
12	FOSC (Tyco Type B or equivalent)	7	$125.00	$250.00	$850	$1,700	$1,275
13	Labor and Special Permitting						
14	Large Cabinet Foundation and Installation	1	$2,500.00	$4,000.00	$2500.00	$4000.00	$3,250
15	Aerial Cable Placement	0	$2.00	$5.00	$0	$0	$0
16	Make Ready Heavy	0	$450.00	$1,000.00	$0	$0	$0
17	Make Ready Light	0	$200.00	$450.00	$0	$0	$0
18	Pole Replacement	0	$7,000.00	$10,000.00	$0	$0	$0
19	Trenching	0	$8.00	$10.00	$0	$0	$0
20	Boring (Road Crossings)	12,424	$10.00	$15.00	$124,240	$186,360	$155,300
21	Direct Bury / Vibratory Plow	18,635	$4.00	$7.00	$74,540	$130,445	$102,493
22	Railroad Easement	0	$50,000.00	$75,000.00	$0	$0	$0
23	Handhole Installation	52	$250.00	$500.00	$12,941	$25,882	$19,411
24	FOSC Assembly and Installation	7	$300.00	$600.00	$2,040	$4,080	$3,060
25	Drop Construction (average cost per drop)	17	$1,250.00	$1,750.00	$21,250	$29,750	$25,500
26	Splicing (per splice estimate)	328	$25.00	$35.00	$8,200.00	$11,480.00	$9,840
27	Equipment						
28	Patch Panel	3	$3,000.00	$4,500.00	$9,000.00	$13,500.00	$11,250
29	New Power Service / Installation	1	$500.00	$1,250.00	$500.00	$1250.00	$875
30	Patch Cables (POP)	17	$14.00	$25.00	$238	$425	$332
31	Patch Cables (Customer Premise)	17	$20.00	$30.00	$340	$510	$425
32	Calix E7-2 Shelf	1	$600.00	$700.00	$600.00	$700.00	$650
33	Calix E7-2 GE24 (FTTx Line Card)	1	$3,800.00	$4,000.00	$3,800	$4,000	$3,900
34	Calix 10G Optics	2	$300.00	$350.00	$600	$700	$650
35	Calix CSFP (FTTx Optics)	9	$160.00	$180.00	$1,440	$1,620	$1,530
36	Calix 716 GE - 1	17	$200.00	$240.00	$3,400	$4,080	$3,740
37	Calix 48V DC System Retrofit Kit	1	$1,500.00	$1,900.00	$1500.00	$1900.00	$1,700
38	Total:				$347,048.25	$523,896.97	$460,524.11
39							
40	Notes/Assumptions: -Estimate includes funding for drop construction for 5.0% of the buildings passed.						

DESIGN NINE
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Arrington Network Lateral Estimate Details

	VARIABLE	VALUE	NOTES
V2	Aerial Construction percentage	0.00%	Based upon mostly residential construction, will trench rather than plow a majority of the route. Aerial for tough spots and major road crossings
V3	Trenching percentage	0.00%	
V4	Boring percentage	40.00%	
V5	Vibratory Plow	60.00%	
V6	Linear construction length	17,120 feet	Length of segment in feet.
V7	Underground Construction	17,120 feet	
V8	Aerial Construction	0 feet	
V9	Conduit Exists	0 feet	
V10	Poles (for make ready)	0 poles	
V11	Handholes	29	Number of handholes for the segment.
V12	FOSCs	2	
V13	Optimism	5	0-10 scale used in Best Estimate column
V14	Buildings Passed	77	
V15	Take Rate	5.0%	
V16	Buildings Connected	4	

	ITEM	VALUE
S2	OSP	$68,349.28
S3	Contracting and Labor	$171,454.00
S4	Electronics and Equipment	$12,883.33
S5	OSP - Fiber Construction	$252,686.61
S6		
S7	Construction Cost Per Mile	$73,958.02

Cost per mile does not include equipment, PM, engineering, etc.

	ITEM/PROJECT	UNITS	COST(LOW)	COST(HIGH)	TOTAL (LOW)	TOTAL (HIGH)	BEST ESTIMATE (WEIGHTED AVERAGE)
2	Materials (OSP)						
3	Large Telecom Cabinet	1	$8,000.00	$12,000.00	$8000.00	$12000.00	$10,000
4	Generic 1.25" Conduit	2 17,120 feet	$0.40	$0.50	$13696.00	$17120.00	$15,408
5	Buried Fiber Marker Posts/Medallions	35	$6.00	$12.00	$210	$420	$315
6	288 Strand Fiber Optic Cable	17,120 feet	$1.40	$1.80	$23968.00	$30816.00	$27,392
7	Slack Fiber 288FOC (50' per handhole)	1,427	$1.40	$1.80	$1,998	$2,569	$2,283
8	Trace Wire - Insulated 12AWG or better	17,120 feet	$0.10	$0.15	$1712.00	$2568.00	$2,140
9	Muletape 1250P (3000ft reel) or equivalent	6	$115.00	$230.00	$690	$1,380	$1,035
10	Handhole - 24x30x24 Concrete Polymer (incl. Lid)	29	$300.00	$350.00	$8,560	$9,987	$9,273
11	Handhole Installation Materials (Gravel, Straw, etc.)	29	$5.00	$10.00	$143	$285	$214
12	FOSC (Tyco Type B or equivalent)	2	$125.00	$250.00	$193	$385	$289
13	Labor and Special Permitting						
14	Large Cabinet Foundation and Installation	1	$2,500.00	$4,000.00	$2500.00	$4000.00	$3,250
15	Aerial Cable Placement	0	$2.00	$5.00	$0	$0	$0
16	Make Ready Heavy	0	$450.00	$1,000.00	$0	$0	$0
17	Make Ready Light	0	$200.00	$450.00	$0	$0	$0
18	Pole Replacement	0	$7,000.00	$10,000.00	$0	$0	$0
19	Trenching	0	$8.00	$10.00	$0	$0	$0
20	Boring (Road Crossings)	6,848	$10.00	$15.00	$68,480	$102,720	$85,600
21	Direct Bury / Vibratory Plow	10,272	$4.00	$7.00	$41,088	$71,904.00	$56,496
22	Railroad Easement	0	$50,000.00	$75,000.00	$0	$0	$0
23	Handhole Installation	29	$250.00	$500.00	$7,133	$14,267	$10,700
24	FOSC Assembly and Installation	2	$300.00	$600.00	$462	$924	$693
25	Drop Construction (average cost per drop)	4	$1,250.00	$1,750.00	$4,813	$6,738	$5,775
26	Splicing (per splice estimate)	298	$25.00	$35.00	$7,450.00	$10,430.00	$8,940
27	Equipment						
28	Patch Panel	1	$3,000.00	$4,500.00	$3,000.00	$4,500.00	$3,750
29	New Power Service / Installation	1	$500.00	$1,250.00	$500.00	$1250.00	$875
30	Patch Cables (POP)	4	$14.00	$25.00	$54	$96	$75
31	Patch Cables (Customer Premise)	4	$20.00	$30.00	$77	$116	$96
32	Calix E7-2 Shelf	1	$600.00	$700.00	$600.00	$700.00	$650
33	Calix E7-2 GE24 (FTTx Line Card)	1	$3,800.00	$4,000.00	$3,800	$4,000	$3,900
34	Calix 10G Optics	2	$300.00	$350.00	$600	$700	$650
35	Calix CSFP (FTTx Optics)	2	$160.00	$180.00	$320	$360	$340
36	Calix 716 GE - 1	4	$200.00	$240.00	$770	$924	$847
37	Calix 48V DC System Retrofit Kit	1	$1,500.00	$1,900.00	$1500.00	$1900.00	$1,700
38	Total:				$191,094.80	$288,511.77	$252,686.61
39							
40	Notes/Assumptions: -Estimate includes funding for drop construction for 5.0% of the buildings passed.						

DESIGN NINE
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Piney River Network Lateral Estimate Details

	VARIABLE	VALUE	NOTES
V2	Aerial Construction percentage	0.00%	Based upon mostly residential construction, will trench rather than plow a majority of the route. Aerial for tough spots and major road crossings
V3	Trenching percentage	0.00%	
V4	Boring percentage	40.00%	
V5	Vibratory Plow	60.00%	
V6	Linear construction length	18,858 feet	Length of segment in feet.
V7	Underground Construction	18,858 feet	
V8	Aerial Construction	0 feet	
V9	Conduit Exists	0 feet	
V10	Poles (for make ready)	0 poles	
V11	Handholes	151	Number of handholes for the segment.
V12	FOSCs	3	
V13	Optimism	5	0-10 scale used in Best Estimate column
V14	Buildings Passed	151	
V15	Take Rate	5.0%	
V16	Buildings Connected	8	

	ITEM	VALUE
S2	OSP	$123,905.50
S3	Contracting and Labor	$300,831.50
S4	Electronics and Equipment	$17,951.98
S5	OSP - Fiber Construction	$442,688.98
S6		
S7	Construction Cost Per Mile	$118,920.95

The Piney River later has one known railroad crossing which significantly changes the cost per mile for the segment.

Cost per mile does not include equipment, PM, engineering, etc.

	ITEM/PROJECT	UNITS	COST(LOW)	COST(HIGH)	TOTAL (LOW)	TOTAL (HIGH)	BEST ESTIMATE (WEIGHTED AVERAGE)
2	Materials (OSP)						
3	Large Telecom Cabinet	1	$8,000.00	$12,000.00	$8000.00	$12,000.00	$10,000
4	Generic 1.25" Conduit	2 18,858 feet	$0.40	$0.50	$15086.40	$18858.00	$16,972
5	Buried Fiber Marker Posts/Medallions	38	$6.00	$12.00	$228	$456	$342
6	288 Strand Fiber Optic Cable	18,858 feet	$1.40	$1.80	$26401.20	$33944.40	$30,173
7	Slack Fiber 288FOC (50' per handhole)	7,550	$1.40	$1.80	$10,570	$13,590	$12,080
8	Trace Wire - Insulated 12AWG or better	18,858 feet	$0.10	$0.15	$1885.80	$2828.70	$2,357
9	Muletape 1250P (3000ft reel) or equivalent	7	$115.00	$230.00	$805	$1,610	$1,208
10	Handhole - 24x30x24 Concrete Polymer (incl. Lid)	151	$300.00	$350.00	$45,300	$52,850	$49,075
11	Handhole Installation Materials (Gravel, Straw, etc.)	151	$5.00	$10.00	$755	$1,510	$1,133
12	FOSC (Tyco Type B or equivalent)	3	$125.00	$250.00	$378	$755	$566
13	Labor and Special Permitting						
14	Large Cabinet Foundation and Installation	1	$2,500.00	$4,000.00	$2500.00	$4000.00	$3,250
15	Aerial Cable Placement	0	$2.00	$5.00	$0	$0	$0
16	Make Ready Heavy	0	$450.00	$1,000.00	$0	$0	$0
17	Make Ready Light	0	$200.00	$450.00	$0	$0	$0
18	Pole Replacement	0	$7,000.00	$10,000.00	$0	$0	$0
19	Trenching	0	$8.00	$10.00	$0	$0	$0
20	Boring (Road Crossings)	7,544	$10.00	$15.00	$75,440	$113,160	$94,300
21	Direct Bury / Vibratory Plow	11,315	$4.00	$7.00	$45,260	$79,205	$62,233
22	Railroad Easement	1	$50,000.00	$75,000.00	$50,000	$75,000	$62,500
23	Handhole Installation	151	$250.00	$500.00	$37,750	$75,500	$56,625
24	FOSC Assembly and Installation	3	$300.00	$600.00	$906	$1,812	$1,359
25	Drop Construction (average cost per drop)	8	$1,250.00	$1,750.00	$9,438	$13,213	$11,325
26	Splicing (per splice estimate)	308	$25.00	$35.00	$7,700.00	$10,780.00	$9,240
27	Equipment						
28	Patch Panel	2	$3,000.00	$4,500.00	$6,000.00	$9,000.00	$7,500
29	New Power Service / Installation	1	$500.00	$1,250.00	$500.00	$1250.00	$875
30	Patch Cables (POP)	8	$14.00	$25.00	$106	$189	$147
31	Patch Cables (Customer Premise)	8	$20.00	$30.00	$151	$227	$189
32	Calix E7-2 Shelf	1	$600.00	$700.00	$600.00	$700.00	$650
33	Calix E7-2 GE24 (FTTx Line Card)	1	$3,800.00	$4,000.00	$3,800	$4,000	$3,900
34	Calix 10G Optics	2	$300.00	$350.00	$600	$700	$650
35	Calix CSFP (FTTx Optics)	4	$160.00	$180.00	$640	$720	$680
36	Calix 716 GE - I	8	$200.00	$240.00	$1,510	$1,812	$1,661
37	Calix 48V DC System Retrofit Kit	1	$1,500.00	$1,900.00	$1500.00	$1900.00	$1,700
38	Total:				$338,402.40	$511,071.60	$442,688.98
39							
40	Notes/Assumptions: -Estimate includes funding for drop construction for 5.0% of the buildings passed.						

DESIGN NINE
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Tyro Network Lateral Estimate Details

	VARIABLE	VALUE	NOTES
V2	Aerial Construction percentage	0.00%	Based upon mostly residential construction, will trench rather than plow a majority of the route. Aerial for tough spots and major road crossings
V3	Trenching percentage	0.00%	
V4	Boring percentage	40.00%	
V5	Vibratory Plow	60.00%	
V6	Linear construction length	39,960 feet	Length of segment in feet.
V7	Underground Construction	39,960 feet	
V8	Aerial Construction	0 feet	
V9	Conduit Exists	0 feet	
V10	Poles (for make ready)	0 poles	
V11	Handholes	67	Number of handholes for the segment.
V12	FOSCs	3	
V13	Optimism	5	0-10 scale used in Best Estimate column
V14	Buildings Passed	170	
V15	Take Rate	5.0%	
V16	Buildings Connected	9	

	ITEM	VALUE
S2	OSP	$146,140.00
S3	Contracting and Labor	$383,413.00
S4	Electronics and Equipment	$18,373.25
S5	OSP - Fiber Construction	$547,926.25
S6		
S7	Construction Cost Per Mile	$69,970.97

Cost per mile does not include equipment, PM, engineering, etc.

1	ITEM/PROJECT	UNITS	COST(LOW)	COST(HIGH)	TOTAL (LOW)	TOTAL (HIGH)	BEST ESTIMATE (WEIGHTED AVERAGE)
2	Materials (OSP)						
3	Large Telecom Cabinet	1	$8,000.00	$12,000.00	$8000.00	$12000.00	$10,000
4	Generic 1.25" Conduit	2 39,960 feet	$0.40	$0.50	$31968.00	$39960.00	$35,964
5	Buried Fiber Marker Posts/Medallions	80	$6.00	$12.00	$480	$960	$720
6	288 Strand Fiber Optic Cable	39,960 feet	$1.40	$1.80	$55944.00	$71928.00	$63,936
7	Slack Fiber 288FOC (50' per handhole)	3,330	$1.40	$1.80	$4,662	$5,994	$5,328
8	Trace Wire - Insulated 12AWG or better	39,960 feet	$0.10	$0.15	$3996.00	$5994.00	$4,995
9	Muletape 1250P (3000ft reel) or equivalent	14	$115.00	$230.00	$1,610	$3,220	$2,415
10	Handhole - 24x30x24 Concrete Polymer (incl. Lid)	67	$300.00	$350.00	$19,980	$23,310	$21,645
11	Handhole Installation Materials (Gravel, Straw, etc.)	67	$5.00	$10.00	$333	$666	$500
12	FOSC (Tyco Type B or equivalent)	3	$125.00	$250.00	$425	$850	$638
13	Labor and Special Permitting						
14	Large Cabinet Foundation and Installation	1	$2,500.00	$4,000.00	$2500.00	$4000.00	$3,250
15	Aerial Cable Placement	0	$2.00	$5.00	$0	$0	$0
16	Make Ready Heavy	0	$450.00	$1,000.00	$0	$0	$0
17	Make Ready Light	0	$200.00	$450.00	$0	$0	$0
18	Pole Replacement	0	$7,000.00	$10,000.00	$0	$0	$0
19	Trenching	0	$8.00	$10.00	$0	$0	$0
20	Boring (Road Crossings)	15,984	$10.00	$15.00	$159,840	$239,760	$199,800
21	Direct Bury / Vibratory Plow	23,976	$4.00	$7.00	$95,904	$167,832	$131,868
22	Railroad Easement	0	$50,000.00	$75,000.00	$0	$0	$0
23	Handhole Installation	67	$250.00	$500.00	$16,650	$33,300	$24,975
24	FOSC Assembly and Installation	3	$300.00	$600.00	$1,020	$2,040	$1,530
25	Drop Construction (average cost per drop)	9	$1,250.00	$1,750.00	$10,625	$14,875	$12,750
26	Splicing (per splice estimate)	308	$25.00	$35.00	$7,700.00	$10,780.00	$9,240
27	Equipment						
28	Patch Panel	2	$3,000.00	$4,500.00	$6,000.00	$9,000.00	$7,500
29	New Power Service / Installation	1	$500.00	$1,250.00	$500.00	$1250.00	$875
30	Patch Cables (POP)	9	$14.00	$25.00	$119	$213	$166
31	Patch Cables (Customer Premise)	9	$20.00	$30.00	$170	$255	$213
32	Calix E7-2 Shelf	1	$600.00	$700.00	$600.00	$700.00	$650
33	Calix E7-2 GE24 (FTTx Line Card)	1	$3,800.00	$4,000.00	$3,800	$4,000	$3,900
34	Calix 10G Optics	2	$300.00	$350.00	$600	$700	$650
35	Calix CSFP (FTTx Optics)	5	$160.00	$180.00	$800	$900	$850
36	Calix 716 GE - 1	9	$200.00	$240.00	$1,700	$2,040	$1,870
37	Calix 48V DC System Retrofit Kit	1	$1,500.00	$1,900.00	$1500.00	$1900.00	$1,700
38	Total:				$421,637.00	$637,469.00	$547,926.25
39							
40	Notes/Assumptions: -Estimate includes funding for drop construction for 5.0% of the buildings passed.						

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Stand Alone Project Summary: Ring Segments

	ITEM/PROJECT	ESTIMATED
2	North-South Ring Segment - Materials	$197,140.15
3	North-South Ring Segment - Contracting and Labor	$526,804.63
4	North-South Ring Segment - Equipment	$20,593.80
5	Network Construction Subtotal	$744,538.57
6	Project Management, Network Engineering, Integration, and Testing	$89,344.63
7	Engineering, Construction Inspection, Permitting and Fees	$88,350.09
8	Misc. Fees, and Technical Services	$15,000.00
9	Bookkeeping, Administration, and Legal	$7,000.00
10	Contingency	$37,226.93
11	Other Costs Subtotal	$236,921.65
12	**Project Total**	**$981,460.22**

Total Linear Construction	10.39 miles
Total Underground Construction	93,663 feet
Total Aerial Construction	0 feet
Buildings Passed	387
Buildings Connected	39

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Stand Alone Project Summary: Ring Segments

	ITEM/PROJECT	ESTIMATED
2	East-West Ring Segment - Materials	$143,232.64
3	East-West Ring Segment - Contracting and Labor	$400,350.25
4	East-West Ring Segment - Equipment	$27,812.35
5	Network Construction Subtotal	$571,395.24
6	Project Management, Network Engineering, Integration, and Testing	$68,567.43
7	Engineering, Construction Inspection, Permitting and Fees	$62,433.14
8	Misc. Fees, and Technical Services	$15,000.00
9	Bookkeeping, Administration, and Legal	$7,000.00
10	Contingency	$28,569.76
11	Other Costs Subtotal	$181,570.34
12	**Project Total (No Contingency)**	**$752,965.58**

Total Linear Construction	7.35 miles
Total Underground Construction	93,663 feet
Total Aerial Construction	0 feet
Buildings Passed	387
Buildings Connected	39

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North-South Ring Segment - Estimate Details

	VARIABLE	VALUE	NOTES
V2	Aerial Construction percentage	0.00%	Based upon mostly urban construction, will bore rather than plow a majority of the route.
V3	Trenching percentage	0.00%	
V4	Boring percentage	40.00%	
V5	Vibratory Plow	60.00%	
V6	Linear construction length	54,881 feet	Length of segment in feet.
V7	Underground Construction	54,881 feet	
V8	Aerial Construction	0 feet	
V9	Conduit Exists	0 feet	
V10	Poles (for make ready)	0 poles	
V11	Handholes	91	Number of handholes for the segment.
V12	FOSCs	6	
V13	Optimism	5	0-10 scale used in Best Estimate column
V14	Buildings Passed	144	
V15	Take Rate	10.0%	
V16	Buildings Connected	14	

	ITEM	VALUE
S2	Materials	$197,140.15
S3	Contracting and Labor	$523,554.63
S4	Electronics and Equipment	$20,593.80
S5	OSP - Fiber Construction	$741,288.57
S6		
S7	Construction Cost Per Mile	$69,336.72

	ITEM/PROJECT	UNITS	COST(LOW)	COST(HIGH)	TOTAL (LOW)	TOTAL (HIGH)	BEST ESTIMATE (WEIGHTED AVERAGE)
2	Materials (OSP)						
3	Large Telecom Cabinet	1	$8,000.00	$12,000.00	$8,000.00	$12,000.00	$10,000
4	Generic 1.25" Conduit	2 54,881 feet	$0.40	$0.50	$43904.80	$54881.00	$49,393
5	Buried Fiber Marker Posts/Medallions	110	$6.00	$12.00	$660	$1,320.00	$990
6	288 Strand Fiber Optic Cable	54,881 feet	$1.40	$1.80	$76833.40	$98785.80	$87,810
7	Slack Fiber 288FOC (50' per handhole)	4,573	$1.40	$1.80	$6,402	$8,231.40	$7,317
8	Trace Wire - Insulated 12AWG or better	54,881 feet	$0.10	$0.15	$5488.10	$8232.15	$6,860
9	Muletape 1250P (3000ft reel) or equivalent	19	$115.00	$230.00	$2,185	$4,370.00	$3,278
10	Handhole - 24x30x24 Concrete Polymer (incl. Lid)	91	$300.00	$350.00	$27,440.50	$32,013.92	$29,727
11	Handhole Installation Materials (Gravel, Straw, etc.)	91	$5.00	$10.00	$457	$914.68	$686
12	FOSC (Tyco Type B or equivalent)	6	$125.00	$250.00	$720	$1,440.00	$1,080
13	Labor and Permitting						
14	Large Cabinet Foundation and Installation	1	$2,500.00	$4,000.00	$2500.00	$4,000.00	$3,250
15	Aerial Cable Placement	0	$2.00	$5.00	$0	$0.00	$0
16	Make Ready Heavy	0	$450.00	$1,000.00	$0	$0.00	$0
17	Make Ready Light	0	$200.00	$450.00	$0	$0.00	$0
18	Pole Replacement	0	$7,000.00	$10,000.00	$0	$0.00	$0
19	Trenching	0	$8.00	$10.00	$0	$0.00	$0
20	Boring (Road Crossings)	21,953	$10.00	$15.00	$219,530	$329,295.00	$274,413
21	Direct Bury / Vibratory Plow	32,929	$4.00	$7.00	$131,716	$230,503.00	$181,110
22	Railroad Easement	0	$50,000.00	$75,000.00	$0	$0.00	$0
23	Handhole Installation	91	$250.00	$500.00	$22,867	$45,734.17	$34,301
24	FOSC Assembly and Installation	6	$300.00	$600.00	$1,728	$3,456.00	$2,592
25	Drop Construction (average cost per drop)	14	$1,250.00	$1,750.00	$18,000	$25,200.00	$21,600
26	Splicing (per splice estimate)	318	$25.00	$35.00	$7,950.00	$11,130.00	$9,540
27	Equipment						
28	Patch Panel	1	$3,000.00	$4,500.00	$3,000.00	$4,500.00	$3,750
29	New Power Service / Installation	1	$500.00	$1,250.00	$500.00	$1,250.00	$875
30	Patch Cables (POP)	14	$14.00	$25.00	$202	$360.00	$281
31	Patch Cables (Customer Premise)	14	$20.00	$30.00	$288	$432	$360
32	Calix E7-2 Shelf	1	$600.00	$700.00	$600.00	$700.00	$650
33	Calix E7-2 GE24 (FTTx Line Card)	2	$3,800.00	$4,000.00	$7600.00	$8,000.00	$7,800
34	Calix 10G Optics	2	$300.00	$350.00	$600	$700	$650
35	Calix CSFP (FTTx Optics)	8	$160.00	$180.00	$1,280	$1,440.00	$1,360
36	Calix 716 GE - 1	14	$200.00	$240.00	$2,880	$3,456.00	$3,168
37	Calix 48V DC System Retrofit Kit	1	$1,500.00	$1,900.00	$1500.00	$1,900.00	$1,700
38	Total:				$576,382.43	$871,507.12	$744,538.57
39							
40	Notes/Assumptions: -Estimate includes funding for drop construction for 10.0% of the buildings passed.						

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East-West Ring Segment - Estimate Details

	VARIABLE	VALUE	NOTES
V2	Aerial Construction percentage	0.00%	Based upon mostly urban construction, will bore rather than plow a majority of the route.
V3	Trenching percentage	0.00%	
V4	Boring percentage	40.00%	
V5	Vibratory Plow	60.00%	
V6	Linear construction length	38,782 feet	Length of segment in feet.
V7	Underground Construction	38,782 feet	
V8	Aerial Construction	0 feet	
V9	Conduit Exists	0 feet	
V10	Poles (for make ready)	0 poles	
V11	Handholes	65	Number of handholes for the segment.
V12	FOSCs	10	
V13	Optimism	5	0-10 scale used in Best Estimate column
V14	Buildings Passed	243	
V15	Take Rate	10.0%	
V16	Buildings Connected	24	

	ITEM	VALUE
S2	Materials	$143,232.64
S3	Contracting and Labor	$397,100.25
S4	Electronics and Equipment	$27,812.35
S5	OSP - Fiber Construction	$568,145.24
S6		
S7	Construction Cost Per Mile	$73,563.96

	ITEM/PROJECT	UNITS	COST(LOW)	COST(HIGH)	TOTAL (LOW)	TOTAL (HIGH)	BEST ESTIMATE (WEIGHTED AVERAGE)
2	Materials (OSP)						
3	Large Telecom Cabinet	1	$8,000.00	$12,000.00	$8000.00	$12000.00	$10,000
4	Generic 1.25" Conduit	2 38,782 feet	$0.40	$0.50	$31025.60	$38782.00	$34,904
5	Buried Fiber Marker Posts/Medallions	78	$6.00	$12.00	$468	$936	$702
6	288 Strand Fiber Optic Cable	38,782 feet	$1.40	$1.80	$54294.80	$69807.60	$62,051
7	Slack Fiber 288FOC (50' per handhole)	3,232	$1.40	$1.80	$4,525	$5,818	$5,171
8	Trace Wire - Insulated 12AWG or better	38,782 feet	$0.10	$0.15	$3878.20	$5817.30	$4,848
9	Muletape 1250P (3000ft reel) or equivalent	13	$115.00	$230.00	$1,495	$2,990	$2,243
10	Handhole - 24x30x24 Concrete Polymer (incl. Lid)	65	$300.00	$350.00	$19,391	$22,623	$21,007
11	Handhole Installation Materials (Gravel, Straw, etc.)	65	$5.00	$10.00	$323	$646	$485
12	FOSC (Tyco Type B or equivalent)	10	$125.00	$250.00	$1,215	$2,430.00	$1,823
13	Labor and Permitting						
14	Large Cabinet Foundation and Installation	1	$2,500.00	$4,000.00	$2500.00	$4,000.00	$3,250
15	Aerial Cable Placement	0	$2.00	$5.00	$0	$0	$0
16	Make Ready Heavy	0	$450.00	$1,000.00	$0	$0.00	$0
17	Make Ready Light	0	$200.00	$450.00	$0	$0	$0
18	Pole Replacement	0	$7,000.00	$10,000.00	$0	$0	$0
19	Trenching	0	$8.00	$10.00	$0	$0	$0
20	Boring (Road Crossings)	15,513	$10.00	$15.00	$155,130	$232,695	$193,913
21	Direct Bury / Vibratory Plow	23,270	$4.00	$7.00	$93,080	$162,890	$127,985
22	Railroad Easement	0	$50,000.00	$75,000.00	$0	$0.00	$0
23	Handhole Installation	65	$250.00	$500.00	$16,159	$32,318	$24,239
24	FOSC Assembly and Installation	10	$300.00	$600.00	$2,916	$5,832.00	$4,374
25	Drop Construction (average cost per drop)	24	$1,250.00	$1,750.00	$30,375	$42,525.00	$36,450
26	Splicing (per splice estimate)	338	$25.00	$35.00	$8,450.00	$11,830.00	$10,140
27	Equipment						
28	Patch Panel	2	$3,000.00	$4,500.00	$6,000.00	$9,000.00	$7,500
29	New Power Service / Installation	1	$500.00	$1,250.00	$500.00	$1250.00	$875
30	Patch Cables (POP)	24	$14.00	$25.00	$340	$608	$474
31	Patch Cables (Customer Premise)	24	$20.00	$30.00	$486	$729.00	$608
32	Calix E7-2 Shelf	1	$600.00	$700.00	$600.00	$700.00	$650
33	Calix E7-2 GE24 (FTTx Line Card)	2	$3,800.00	$4,000.00	$7600.00	$8000.00	$7,800
34	Calix 10G Optics	2	$300.00	$350.00	$600	$700	$650
35	Calix CSFP (FTTx Optics)	13	$160.00	$180.00	$2,080	$2,340	$2,210
36	Calix 716 GE - 1	24	$200.00	$240.00	$4,860	$5,832	$5,346
37	Calix 48V DC System Retrofit Kit	1	$1,500.00	$1,900.00	$1500.00	$1900.00	$1,700
38	Total:				$433,225.75	$653,940.03	$571,395.24
39							
40	Notes/Assumptions: -Estimate includes funding for drop construction for 10.0% of the buildings passed.						

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Stand Alone Project Summary: Wintergreen Pilot Network

	ITEM/PROJECT	ESTIMATED
2	Wintergreen Pilot Network - Materials	$606,649.52
3	Wintergreen Pilot Network- Contracting and Labor	$3,520,001.75
4	Wintergreen Pilot Network- Electronics and Equipment	$885,819.00
5	Network Construction Subtotal	$5,012,470.27
6	Project Management, Network Engineering, Integration, and Testing	$751,870.54
7	Engineering, Construction Inspection, Permitting and Fees	$350,249.05
8	Misc. Fees, and Technical Services	$15,000.00
9	Bookkeeping, Administration, and Legal	$7,000.00
10	Contingency	$250,623.51
11	Other Costs Subtotal	$1,124,119.59
12	**Project Total**	**$6,136,589.86**

Total Linear Construction	30.46 miles
Total Underground Construction	160,810 feet
Total Aerial Construction	0 feet
Buildings Passed	2,520
Buildings Connected	1,512

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Wintergreen Pilot Network - Estimate Details

	VARIABLE	VALUE	NOTES
V2	Aerial Construction percentage	0.00%	Based upon mostly residential construction, will trench rather than plow a majority of the route. Aerial for tough spots and major road crossings
V3	Trenching percentage	0.00%	
V4	Boring percentage	40.00%	
V5	Vibratory Plow	60.00%	
V6	Linear construction length	160810	Length of segment in feet.
V7	Underground Construction	160,810 feet	
V8	Aerial Construction	0 feet	
V9	Conduit Exists	0 feet	
V10	Poles (for make ready)	0 poles	
V11	Handholes	268	Number of handholes for the segment.
V12	FOSCs	268	
V13	Optimism	5	0-10 scale used in Best Estimate column
V14	Buildings Passed	2,520	
V15	Take Rate	60.00%	
V16	Buildings Connected	1,512	

	ITEM	VALUE
S2	OSP	$606,649.52
S3	Contracting and Labor	$3,520,001.75
S4	Electronics and Equipment	$885,819.00
S5	OSP - Fiber Construction	$5,012,470.27
S6		
S7	Cost per home connected	$4,058.59
S8	Cost per mile (no equip., no drops)	$74,435.04

	ITEM/PROJECT	UNITS	COST(LOW)	COST(HIGH)	TOTAL (LOW)	TOTAL (HIGH)	BEST ESTIMATE (WEIGHTED AVERAGE)
2	Materials (OSP)						
3	Small Shelter	1	$9,000.00	$14,000.00	$9000.00	$14,000.00	$11,500
4	Generic 1.25" Conduit	2 160,810 feet	$0.40	$0.50	$128648.00	$160810.00	$144,729
5	Buried Fiber Marker Posts/Medallions	322	$6.00	$12.00	$1,932	$3,864	$2,898
6	288 Strand Fiber Optic Cable	160,810 feet	$1.40	$1.80	$225134.00	$289458.00	$257,296
7	Slack Fiber 288FOC (50' per handhole)	13,401 feet	$1.40	$1.80	$18761.40	$24121.80	$21,442
8	Trace Wire - Insulated 12AWG or better	160,810 feet	$0.10	$0.15	$16081.00	$24121.50	$20,101
9	Muletape 1250P (3000ft reel) or equivalent	54	$115.00	$230.00	$6,210	$12,420.00	$9,315
10	Handhole - 24x30x24 Concrete Polymer (incl. Lid)	268	$300.00	$350.00	$80,405	$93,806	$87,105
11	Handhole Installation Materials (Gravel, Straw, etc.)	268	$5.00	$10.00	$1,340	$2,680.17	$2,010
12	FOSC (Tyco Type B or equivalent)	268	$125.00	$250.00	$33,502	$67,004.17	$50,253
13	Labor and Permitting						
14	Shelter Installation	1	$4,000.00	$6,000.00	$4000.00	$6,000.00	$5,000
15	Aerial Cable Placement	0	$2.00	$5.00	$0	$0.00	$0
16	Make Ready Heavy	0	$450.00	$1,000.00	$0	$0.00	$0
17	Make Ready Light	0	$200.00	$450.00	$0	$0.00	$0
18	Pole Replacement	0	$7,000.00	$10,000.00	$0	$0.00	$0
19	Trenching	0	$8.00	$10.00	$0	$0.00	$0
20	Boring (Road Crossings)	64,324	$10.00	$15.00	$643,240	$964,860.00	$804,050
21	Direct Bury / Vibratory Plow	96,486	$4.00	$7.00	$385,944	$675,402.00	$530,673
22	Railroad Easement	0	$50,000.00	$75,000.00	$0	$0.00	$0
23	Handhole Installation	268	$250.00	$500.00	$67,004	$134,008.33	$100,506
24	FOSC Assembly and Installation	268	$300.00	$600.00	$80,405	$160,810.00	$120,608
25	MDU Drop (average cost per drop, per unit)	605	$650.00	$1,000.00	$393,250	$605,000	$499,125
26	Drop Construction (average cost per drop)	907	$1,250.00	$1,750.00	$1,133,750	$1,587,250	$1,360,500
27	Splicing (per splice estimate)	3,318	$25.00	$35.00	$82,950	$116,130	$99,540
28	Equipment						
29	Patch Panel	18	$3,000.00	$4,500.00	$54,000.00	$81,000.00	$67,500
30	New Power Service / Installation	1	$500.00	$1,250.00	$500.00	$1,250.00	$875
31	Patch Cables (POP)	1,512	$14.00	$25.00	$21,168	$37,800	$29,484
32	Patch Cables (Customer Premise)	1,512	$20.00	$30.00	$30,240	$45,360	$37,800
33	Calix E7-2 Shelf	32	$600.00	$700.00	$19,200	$22,400	$20,800
34	Calix E7-2 GE24 (FTTx Line Card)	63	$3,800.00	$4,000.00	$239,400	$252,000	$245,700
35	Calix 10G Optics	64	$300.00	$350.00	$19,200	$22,400	$20,800
36	Calix CSFP (FTTx Optics)	756	$160.00	$180.00	$120,960	$136,080	$128,520
37	Calix 716 GE - 1	1,512	$200.00	$240.00	$302,400	$362,880	$332,640
38	Calix 48V DC System Retrofit Kit	1	$1,500.00	$1,900.00	$1,500.00	$1,900.00	$1,700
39	Total:				$3,311,556.73	$4,941,745.80	$5,012,470.27
40							
41	Notes/Assumptions: -Estimate includes funding for drop construction for 60.00% of the buildings passed.						

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Project Summary: Network Lateral Break Down

	ITEM/PROJECT	ESTIMATED
2	**Afton**	
3	Afton Network Lateral - Materials	$42,781.21
4	Afton Network Lateral - Contracting and Labor	$108,107.63
5	Afton Network Lateral- Electronics and Equipment	$13,924.25
6	Afton Construction Subtotal	$164,813.09
7	Project Management, Network Engineering, Integration, and Testing	$24,721.96
8	Engineering, Construction Inspection, Permitting and Fees	$15,275.85
9	Misc. Fees, and Technical Services	$5,000.00
10	Bookkeeping, Administration, and Legal	$3,000.00
11	Contingency	$8,240.65
12	Other Costs Subtotal	$56,238.47
13	**Total**	**$221,051.56**
14	**Faber**	
15	Faber Network Lateral - Materials	$102,874.93
16	Faber Network Lateral - Contracting and Labor	$262,364.13
17	Faber Network Lateral- Electronics and Equipment	$12,923.00
18	Faber Construction Subtotal	$378,162.05
19	Project Management, Network Engineering, Integration, and Testing	$56,724.31
20	Engineering, Construction Inspection, Permitting and Fees	$43,911.84
21	Misc. Fees, and Technical Services	$5,000.00
22	Bookkeeping, Administration, and Legal	$3,000.00
23	Contingency	$18,908.10
24	Other Costs Subtotal	$127,544.25
25	**Total**	**$505,706.30**
26	**Shipman**	
27	Shipman Network Lateral - Materials	$116,618.86
28	Shipman Network Lateral - Contracting and Labor	$318,853.75
29	Shipman Network Lateral- Electronics and Equipment	$25,051.50

Total Linear Construction	27.23 miles
Total Underground Construction	143,762 feet
Total Aerial Construction	0 feet
Buildings Passed	883
Buildings Connected	47

30	Shipman Construction Subtotal	$460,524.11
31	Project Management, Network Engineering, Integration, and Testing	$69,078.62
32	Engineering, Construction Inspection, Permitting and Fees	$49,998.67
33	Misc. Fees, and Technical Services	$5,000.00
34	Bookkeeping, Administration, and Legal	$3,000.00
35	Contingency	$23,026.21
36	Other Costs Subtotal	$150,103.50
37	**Total**	**$610,627.60**
38	**Arrington**	
39	Arrington Network Lateral - Materials	$68,349.28
40	Arrington Network Lateral - Contracting and Labor	$171,454.00
41	Arrington Network Lateral- Electronics and Equipment	$12,883.33
42	Arrington Construction Subtotal	$252,686.61
43	Project Management, Network Engineering, Integration, and Testing	$37,902.99
44	Engineering, Construction Inspection, Permitting and Fees	$27,560.61
45	Misc. Fees, and Technical Services	$5,000.00
46	Bookkeeping, Administration, and Legal	$3,000.00
47	Contingency	$12,634.33
48	Other Costs Subtotal	$86,097.93
49	**Total**	**$338,784.54**
50	**Piney River**	
51	Piney River Network Lateral - Materials	$123,905.50
52	Pine River Network Lateral - Contracting and Labor	$300,831.50
53	Piney River Network Lateral- Electronics and Equipment	$17,951.98
54	Piney River Construction Subtotal	$442,688.98
55	Project Management, Network Engineering, Integration, and Testing	$66,403.35
56	Engineering, Construction Inspection, Permitting and Fees	$30,358.52
57	Misc. Fees, and Technical Services	$5,000.00
58	Bookkeeping, Administration, and Legal	$3,000.00
59	Contingency	$22,134.45
60	Other Costs Subtotal	$126,896.32
61	**Total**	**$569,585.29**
62	**Tyro**	

63	Tyro Network Lateral - Materials	$146,140.00
64	Tyro Network Lateral - Contracting and Labor	$383,413.00
65	Tyro Network Lateral - Electronics and Equipment	$18,373.25
66	Tyro Construction Subtotal	$547,926.25
67	Project Management, Network Engineering, Integration, and Testing	$82,188.94
68	Engineering, Construction Inspection, Permitting and Fees	$64,329.55
69	Misc. Fees, and Technical Services	$5,000.00
70	Bookkeeping, Administration, and Legal	$3,000.00
71	Contingency	$27,396.31
72	Other Costs Subtotal	$181,914.80
73	**Total**	**$729,841.05**

DESIGN NINE
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Project Summary: NCBA Expansion (Total build-out)

	ITEM/PROJECT	ESTIMATED
2	North-South Ring Segment - Materials	$197,140.15
3	North-South Ring Segment - Contracting and Labor	$526,804.63
4	North-South Ring Segment - Equipment	$20,593.80
5	East-West Ring Segment - Materials	$143,232.64
6	East-West Ring Segment - Contracting and Labor	$400,350.25
7	East-West Ring Segment - Equipment	$27,812.35
8		
9		
10		
11	Wintergreen Pilot Network - Materials	$606,649.52
12	Wintergreen Pilot Network- Contracting and Labor	$3,520,001.75
13	Wintergreen Pilot Network- Electronics and Equipment	$885,819.00
14	Network Construction Subtotal	$6,328,404.08
15	Project Management, Network Engineering, Integration, and Testing	$474,630.31
16	Engineering, Construction Inspection, Permitting and Fees	$641,098.01
17	Misc. Fees, and Technical Services	$32,000.00
18	Bookkeeping, Administration, and Legal	$50,000.00
19	Contingency (5%)	$316,420.20
20	Other Costs Subtotal	$1,514,148.52
21	**Project Total**	**$7,842,552.60**

Total Linear Construction	75.42 miles
Total Underground Construction	398,235 feet
Total Aerial Construction	0 feet
Buildings Passed	3,790
Buildings Connected	1,598

The total build-out cost estimate includes all new fiber identified on the Design Nine Maps. It includes 75.42 miles of fiber.

DESIGN NINE
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NCBA Wholesale Pricing

DRAFT
Do Not Distribute

August 15, 2016

NCBA Proposed Service Types			
Service Class	**Service Type**	**Recommended Wholesale Cost**	Comment
Residential GPON 1Gbps	1000/10 Mbps	$27	Best Effort (maximum 32:1 split)
Residential GPON 1Gbps	1000/10 Mbps	$29	Best Effort, rate limited (e.g. 25/5)
Residential GPON 1Gbps	1000/1000 Mbps	$37	Best Effort, symmetric
Business GPON 100Mbps	100/50 Mbps	$95	higher priority than Best Effort (maximum 16:1 split)
Business GPON 250Mbps	250/100 Mbps	$180	higher priority than Best Effort (maximum 16:1 split)
Business GPON 500Mbps	500/250 Mbps	$325	higher priority than Best Effort (maximum 16:1 split)
Dedicated Business 250 Mbps	250/250 Mbps	$275	Active Ethernet, higher priority than Best Effort
Dedicated Business 500 Mbps	500/500 Mbps	$425	Active Ethernet, higher priority than Best Effort
Wide Area LAN Service 250 Mbps	250/250 Mbps	$325	Active Ethernet, highest priority, supports QinQ (two connections may be needed)
Wide Area LAN Service 500 Mbps	500/500 Mbps	$550	Active Ethernet, highest priority, supports QinQ (two connections may be needed)
Wide Area LAN Service 1Gbps	1000/1000 Mbps	$895	Active Ethernet, highest priority, supports QinQ (two connections may be needed)
Dark fiber pair	Two dedicated fibers	$50/month/ strand	Minimum distance charge and splicing charges apply.

For residential class services, a $100 one time activation fee is recommended.
For business class services, a $250 one time activation fee is recommended.

Activation fees could be included in drop costs and/or waived, but it is useful to have the activation fee on the price list. It is easier to discount or waive the activation fee than it is to add one in later.

Service Types

- **Residential GPON** – Transport service from the service provider's port in the data center to a single customer location. Traffic is untagged at the customer. Circuit is typically asymmetric and priority is set at Best Effort across the core network. NCBA will observe a maximum 32:1 split.
- **Business GPON -** Transport service from the carrier or provider's port in the colo to a single customer location. Traffic is untagged at the customer. Circuit is typically asymmetric and the priority is set higher than Residential for better performance

across the core network. An example of this is a package of Internet access for a business with regular use of videoconferencing, heavy cloud-based service use, and large file uploads. NCBA will observe a maximum 16:1 split on this service tier.

- **Dedicated Business** - Transport service from the carrier or provider's port in the colo to a single customer location. Traffic is untagged at the customer. Circuit is asymmetric and the priority is set higher than Business PON for better performance across the core network. An example of this is a package of Internet access for a business which views dedicated and symmetric bandwidth a requirement with regular use of videoconferencing, heavy cloud-based service use, and large file uploads.
- **Wide Area LAN Service** – Transport service between the carrier or provider's port in the colo as well as between multiple customer locations (fee applies for each end-point outside of provider's NNI). Passed traffic can be tagged or untagged as well as supporting Q-in-Q. The circuit is symmetric and the bandwidth is dedicated via soft reservation across the core network. An example of this would be a transparent LAN service to link two customer locations.
- **Dark Fiber Leasing** - $50/mile per month per strand, with a minimum of 15 miles per strand. Five year minimum contract and $250 application fee. Splicing will be billed at cost plus 20%. NCBA will make a maximum of 20% of strands in any given cable available for dark fiber leases. No provider may lease more than 15% of the dark fiber strands allocated in any cable.

Provider Discounts

- 2% discount on total monthly invoice if revenue exceeds $1,000/month
- 4% discount on total monthly invoice if revenue exceeds $5,000/month

Other Services

- **Wireless tower access: -** Access to all county towers for $2000/month. For new providers, first six months free and second six months discounted 50%.
- 10Gig Business Class and 10Gig Wide Area LAN circuits are available upon request.
- NCBA will provision any reasonable service configuration and provide pricing upon request.

Design Nine
Ten Year Financial Projection
for
Nelson County Broadband Authority

Fiber to the Home Expansion Projections

August 15, 2016

NCBA Financial Summary/Income Statement

Summary of Project Revenue (Gross)	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**
Fiber Network										
Residential	$34,573	$82,980	$135,621	$192,273	$322,713	$443,640	$555,285	$634,240	$678,559	$678,559
Business	$51,071	$120,169	$181,725	$242,137	$311,120	$382,396	$440,732	$470,257	$527,888	$527,888
Government/Institutional	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Services	$97,500	$97,500	$97,500	$97,500	$97,500	$97,500	$97,500	$97,500	$97,500	$97,500
Total Fiber Network Revenue	***$183,144***	***$300,649***	***$414,846***	***$531,910***	***$731,333***	***$923,535***	***$1,093,517***	***$1,201,997***	***$1,303,947***	***$1,303,947***
TOTAL PROJECT REVENUE	**$183,144**	**$300,649**	**$414,846**	**$531,910**	**$731,333**	**$923,535**	**$1,093,517**	**$1,201,997**	**$1,303,947**	**$1,303,947**
EXPENSES:										
Salary, General & Administrative Expenses (SG&A)	$189,652	$201,819	$205,952	$222,948	$257,263	$255,833	$262,118	$245,039	$217,754	$219,283
Operational Expenses (OPEX)	$70,212	$97,555	$122,739	$123,194	$134,320	$172,262	$159,073	$169,253	$198,770	$199,855
Interest Expense	$26,250	$60,375	$86,625	$112,875	$114,043	$109,966	$105,686	$101,192	$96,473	$91,518
Total Expenses	**$286,114**	**$359,749**	**$415,316**	**$459,017**	**$505,626**	**$538,061**	**$526,877**	**$515,484**	**$512,997**	**$510,656**
Income After Expenses	**-$102,970**	**-$59,100**	**-$470**	**$72,893**	**$225,707**	**$385,475**	**$566,640**	**$686,513**	**$790,950**	**$793,291**
Interest Income	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Earnings Before Taxes	**-$102,970**	**-$59,100**	**-$470**	**$72,893**	**$225,707**	**$385,475**	**$566,640**	**$686,513**	**$790,950**	**$793,291**
Taxes	0	0	0	0	0	0	0	0	0	0
Depreciation	$0	$40,417	$67,311	$94,546	$122,254	$174,352	$206,225	$239,885	$266,120	$266,120
Amortization	$0	$0	$160	$328	$513	$884	$1,168	$1,323	$1,346	$1,161
Net Income	**-$102,970**	**-$99,517**	**-$67,941**	**-$21,981**	**$102,941**	**$210,239**	**$359,247**	**$445,305**	**$523,484**	**$526,010**
Debt Service Coverage	**-2.92**	**0.02**	**0.99**	**0.98**	**1.74**	**2.53**	**3.44**	**4.03**	**4.54**	**4.52**
Distribution to County General Fund	$0	$0	$0	$0	$36,029	$73,584	$125,736	$155,857	$183,219	$184,103
Cumulative Distribution to County	$0	$0	$0	$0	$36,029	$109,613	$235,349	$391,206	$574,425	$758,529
Cash-On-Hand at Year End	**$24,535**	**$140,173**	**$165,956**	**$189,753**	**-$448,001**	**-$632,471**	**-$686,643**	**-$659,496**	**-$150,677**	**$354,676**
Capital Expenditures (CAPEX)	$897,500	$714,305	$719,890	$733,555	$1,348,390	$791,950	$827,615	$676,605	$0	$0
Accumulated CAPEX	$897,500	$1,611,805	$2,331,695	$3,065,250	$4,413,640	$5,205,590	$6,033,205	$6,709,810	$6,709,810	$6,709,810

Summary of Funding and Borrowing	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Sources of Funds										
Equity	$300,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Construction Contribution	$178,350	$203,250	$218,700	$235,650	$497,700	$378,150	$423,000	$268,050	$0	$0
Long-Term Debt	$525,000	$682,500	$525,000	$525,000	$101,000	$0	$0	$0	$0	$0
Total Funding	**$825,000**	**$682,500**	**$525,000**	**$525,000**	**$101,000**	**$0**	**$0**	**$0**	**$0**	**$0**
Cost of Debt	**$26,250**	**$60,375**	**$86,625**	**$112,875**	**$114,043**	**$109,966**	**$105,686**	**$101,192**	**$96,473**	**$91,518**

NCBA Financial Summary/Income Statement

Balance Sheet

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Current Assets										
Cash	$24,535	$140,173	$165,956	$189,753	-$448,001	-$632,471	-$686,643	-$659,496	-$150,677	$354,676
Operating Reserve Fund	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Current Assets	$24,535	$140,173	$165,956	$189,753	-$448,001	-$632,471	-$686,643	-$659,496	-$150,677	$354,676
Non-Current Assets										
Long Term Investments	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Amortizable Asset (Net Amortization)	$0	$800	$1,480	$2,077	$3,419	$3,955	$4,362	$3,994	$2,648	$1,487
Plant in Service	$897,500	$1,611,005	$2,330,055	$3,062,685	$4,409,220	$5,199,750	$6,025,790	$6,701,440	$6,701,440	$6,701,440
Less: Accumulated Depreciation	$0	$40,417	$107,728	$202,274	$324,528	$498,880	$705,105	$944,990	$1,211,110	$1,477,230
Net Plant	$897,500	$1,570,588	$2,222,327	$2,860,411	$4,084,692	$4,700,870	$5,320,685	$5,756,451	$5,490,330	$5,224,210
Other										
Total Non Current Assets	$897,500	$1,571,388	$2,223,807	$2,862,488	$4,088,111	$4,704,825	$5,325,047	$5,760,445	$5,492,978	$5,225,697
Total Assets	$922,035	$1,711,561	$2,389,763	$3,052,241	$3,640,111	$4,072,354	$4,638,404	$5,100,949	$5,342,301	$5,580,372
Current Liabilities										
Accounts Payable	$21,655	$24,948	$27,391	$28,845	$32,632	$35,675	$35,099	$34,524	$34,710	$34,928
Current Portion of Long Term Debt	$0	$0	$77,646	$81,528	$85,605	$89,885	$94,379	$99,098	$104,053	$86,315
Other Current Liabilities	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Operating Reserve Fund	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Current Liabilities	$21,655	$24,948	$105,037	$110,373	$118,236	$125,559	$129,478	$133,622	$138,763	$121,243
Non-Current Liabilities and Equity										
Long Term Liabilities	$525,000	$1,207,500	$1,654,854	$2,098,326	$2,113,722	$2,023,837	$1,929,458	$1,830,360	$1,726,307	$1,639,992
Equity	$478,350	$681,600	$900,300	$1,135,950	$1,633,650	$2,011,800	$2,434,800	$2,702,850	$2,702,850	$2,702,850
Retained Earnings	-$102,970	-$202,487	-$270,428	-$292,409	-$189,468	$20,771	$380,017	$825,323	$1,348,806	$1,874,816
Investor Earnings	$0	$0	$0	$0	-$36,029	-$109,613	-$235,349	-$391,206	-$574,425	-$758,529
Total Non-Current Liabilities and Equity	$900,380	$1,686,613	$2,284,726	$2,941,867	$3,521,874	$3,946,795	$4,508,926	$4,967,326	$5,203,538	$5,459,129
Total Equity and Liabilities	$922,035	$1,711,561	$2,389,763	$3,052,241	$3,640,111	$4,072,354	$4,638,404	$5,100,949	$5,342,301	$5,580,372
Current Ratio (current assets/current liabilities)	1.13	5.62	1.58	1.72	-3.79	-5.04	-5.30	-4.94	-1.09	2.93

Cash Flow Statement (Indirect Method)

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Cash Flow from Operating Activities										
Net Income	-$102,970	-$99,517	-$67,941	-$21,981	$102,941	$210,239	$359,247	$445,305	$523,484	$526,010
Depreciation	$0	$40,417	$67,311	$94,546	$122,254	$174,352	$206,225	$239,885	$266,120	$266,120
Amortization	$0	$0	$160	$328	$513	$884	$1,168	$1,323	$1,346	$1,161
Other Current Liabilities	$21,655	$3,292	$2,443	$1,454	$3,787	$3,043	-$575	-$575	$186	$218
Net Cash Flow from Operating Activities	**-$81,315**	**-$55,807**	**$1,973**	**$74,348**	**$229,494**	**$388,517**	**$566,065**	**$685,938**	**$791,136**	**$793,509**
Cash Flow from Investing Activities										
Capital Expenditures	-$897,500	-$714,305	-$719,890	-$733,555	-$1,348,390	-$791,950	-$827,615	-$676,605	$0	$0
Net Cash Flow from Investing Activities	**-$897,500**	**-$714,305**	**-$719,890**	**-$733,555**	**-$1,348,390**	**-$791,950**	**-$827,615**	**-$676,605**	**$0**	**$0**
Cash Flow from Financing Activities										
Increase in Operational Reserve	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Issuance of New Long-Term Debt	$525,000	$682,500	$525,000	$525,000	$101,000	$0	$0	$0	$0	$0
Repayment of Long-Term Debt	$0	$0	$0	-$77,646	-$81,528	-$85,605	-$89,885	-$94,379	-$99,098	-$104,053
Homeowner Equity	$178,350	$203,250	$218,700	$235,650	$497,700	$378,150	$423,000	$268,050	$0	$0
Other Equity	$300,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Investor Dividend	$0	$0	$0	$0	-$36,029	-$73,584	-$125,736	-$155,857	-$183,219	-$184,103
Net Cash Flow from Financing Activities	**$1,003,350**	**$885,750**	**$743,700**	**$683,004**	**$481,143**	**$218,962**	**$207,379**	**$17,814**	**-$282,317**	**-$288,156**
Total Cash Flow at Year-End	**$24,535**	**$115,638**	**$25,783**	**$23,797**	**-$637,754**	**-$184,471**	**-$54,172**	**$27,147**	**$508,819**	**$505,353**
Cash-On-Hand at Year End	$24,535	$140,173	$165,956	$189,753	-$448,001	-$632,471	-$686,643	-$659,496	-$150,677	$354,676

Funding, Equity, and Loan Costs

Financing		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Long-Term Debt		$500,000	$650,000	$500,000	$500,000	$100,000					
Homeowner Construction Fee	$1,500	$172,500	$196,500	$211,500	$228,000	$481,500	$366,000	$409,500	$259,500	$0	$0
MDU (per unit) Construction Fee	$450	$5,850	$6,750	$7,200	$7,650	$16,200	$12,150	$13,500	$8,550	$0	$0
Other Equity (cash, in-kind)		$300,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
- Long Term Debt (overall)	45%										
- Income interests	0%										
Telecom Cost Savings		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
		1	2	3	4	5	6	7	8	9	10
Cash Injections		$500,000	$650,000	$500,000	$500,000	$100,000	$0	$0	$0	$0	$0
Stockholder equity											
-Capex payments		$478,350	$203,250	$218,700	$235,650	$497,700	$378,150	$423,000	$268,050	$0	$0
-Face amount value		$478,350	$203,250	$218,700	$235,650	$497,700	$378,150	$423,000	$268,050	$0	$0
-Extra Payments											
Accumulated Loan Unpaid Balance		$525,000	$1,207,500	$1,732,500	$2,179,854	$2,199,326	$2,113,722	$2,023,837	$1,929,458	$1,830,360	$1,726,307
Amortization		$0	$0	$0	$77,646	$81,528	$85,605	$89,885	$94,379	$99,098	$104,053
Dividend		$0	$0	$0	$0	$36,029	$73,584	$125,736	$155,857	$183,219	$184,103
Operating Reserve		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Interest Expenses		$26,250	$60,375	$86,625	$112,875	$114,043	$109,966	$105,686	$101,192	$96,473	$91,518
Loan Maturity (years)	20										
Length of Interest Only	3										
Loan Cost of Capital (%)	5.0%										
Fees and Closing Costs	$25,000										
External Funding Year 1											
- Initial Loan Balance		$525,000	$525,000	$525,000	$525,000	$504,683	$483,350	$460,951	$437,431	$412,735	$386,805
- Interest Charge		$26,250	$26,250	$26,250	$26,250	$25,234	$24,168	$23,048	$21,872	$20,637	$19,340
- Total Loan Payments		$0	$0	$0	-$46,567	-$46,567	-$46,567	-$46,567	-$46,567	-$46,567	-$46,567
- Principal Payment		$0	$0	$0	-$20,317	-$21,333	-$22,400	-$23,520	-$24,696	-$25,930	-$27,227
- Interest Payment		-$26,250	-$26,250	-$26,250	-$26,250	-$25,234	-$24,168	-$23,048	-$21,872	-$20,637	-$19,340

Funding, Equity, and Loan Costs

- Ending Loan Balance		$525,000	$525,000	$525,000	$504,683	$483,350	$460,951	$437,431	$412,735	$386,805	$359,578
Loan Maturity (years)	20										
Length of Interest Only	2										
Loan Cost of Capital (%)	5.0%										
Fees and Closing Costs	$32,500										
External Funding Year 2											
- Initial Loan Balance			$682,500	$682,500	$682,500	$658,240	$632,766	$606,019	$577,935	$548,447	$517,484
- Interest Charge			$34,125	$34,125	$34,125	$32,912	$31,638	$30,301	$28,897	$27,422	$25,874
- Total Loan Payments			$0	$0	-$58,385	-$58,385	-$58,385	-$58,385	-$58,385	-$58,385	-$58,385
- Principal Payment			$0	$0	-$24,260	-$25,473	-$26,747	-$28,084	-$29,489	-$30,963	-$32,511
- Interest Payment			-$34,125	-$34,125	-$34,125	-$32,912	-$31,638	-$30,301	-$28,897	-$27,422	-$25,874
- Ending Loan Balance			$682,500	$682,500	$658,240	$632,766	$606,019	$577,935	$548,447	$517,484	$484,972
Loan Maturity (years)	20										
Length of Interest Only	1										
Loan Cost of Capital (%)	5.0%										
Fees and Closing Costs	$25,000										
External Funding Year 3											
- Initial Loan Balance				$525,000	$525,000	$507,809	$489,758	$470,805	$450,904	$430,008	$408,067
- Interest Charge				$26,250	$26,250	$25,390	$24,488	$23,540	$22,545	$21,500	$20,403
- Total Loan Payments				$0	-$43,441	-$43,441	-$43,441	-$43,441	-$43,441	-$43,441	-$43,441
- Principal Payment				$0	-$17,191	-$18,051	-$18,953	-$19,901	-$20,896	-$21,941	-$23,038
- Interest Payment				-$26,250	-$26,250	-$25,390	-$24,488	-$23,540	-$22,545	-$21,500	-$20,403
- Ending Loan Balance				$525,000	$507,809	$489,758	$470,805	$450,904	$430,008	$408,067	$385,030
Loan Maturity (years)	20										
Length of Interest Only	0										
Loan Cost of Capital (%)	5.0%										
Fees and Closing Costs	$25,000										
External Funding Year 4											
- Initial Loan Balance					$525,000	$509,123	$492,451	$474,947	$456,567	$437,268	$417,004
- Interest Charge					$26,250	$25,456	$24,623	$23,747	$22,828	$21,863	$20,850
- Total Loan Payments					-$42,127	-$42,127	-$42,127	-$42,127	-$42,127	-$42,127	-$42,127
- Principal Payment					-$15,877	-$16,671	-$17,505	-$18,380	-$19,299	-$20,264	-$21,277
- Interest Payment					-$26,250	-$25,456	-$24,623	-$23,747	-$22,828	-$21,863	-$20,850
- Ending Loan Balance					$509,123	$492,451	$474,947	$456,567	$437,268	$417,004	$395,726
Loan Maturity (years)	0										
Length of Interest Only	1										
Loan Cost of Capital (%)	5.0%										
Fees and Closing Costs	$1,000										
External Funding Year 5											
- Initial Loan Balance						$101,000	$101,000	$101,000	$101,000	$101,000	$101,000

Funding, Equity, and Loan Costs

- Interest Charge					$5,050	$5,050	$5,050	$5,050	$5,050	$5,050
- Total Loan Payments					$0	$0	$0	$0	$0	$0
- Principal Payment					$0	$0	$0	$0	$0	$0
- Interest Payment					-$5,050	-$5,050	-$5,050	-$5,050	-$5,050	-$5,050
- Ending Loan Balance					$101,000	$101,000	$101,000	$101,000	$101,000	$101,000
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
New Long Term Debt	$525,000	$682,500	$525,000	$525,000	$101,000					
Accumulated Init. Loan Bal.	$525,000	$1,207,500	$1,732,500	$2,257,500	$2,280,854	$2,199,326	$2,113,722	$2,023,837	$1,929,458	$1,830,360
Accumulated Loan Pmts	$0	$0	$0	-$190,521	-$190,521	-$190,521	-$190,521	-$190,521	-$190,521	-$190,521
Accumulated Princ. Pmts.	$0	$0	$0	-$77,646	-$81,528	-$85,605	-$89,885	-$94,379	-$99,098	-$104,053
Accumulated Interest Exp.	-$26,250	-$60,375	-$86,625	-$112,875	-$114,043	-$109,966	-$105,686	-$101,192	-$96,473	-$91,518
Acc. Ending Loan Bal.	$525,000	$1,207,500	$1,732,500	$2,179,854	$2,199,326	$2,113,722	$2,023,837	$1,929,458	$1,830,360	$1,726,307
Acc. Interest Charges	$26,250	$60,375	$86,625	$112,875	$114,043	$109,966	$105,686	$101,192	$96,473	$91,518
Interest Income	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Working Capital and Tax

Working Capital

	Days	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Receivables	30	15,262	25,054	34,570	44,326	60,944	76,961	91,126	100,166	108,662	108,662
Payables Estimate	30	21,655	24,948	27,391	28,845	32,632	35,675	35,099	34,524	34,710	34,928
Working Capital		-6,393	106	7,180	15,481	28,312	41,287	56,027	65,642	73,952	73,734
Change in Working Capital		-6,393	6,500	7,073	8,301	12,832	12,974	14,740	9,615	8,310	217.8

Tax Calculations

Tax %	0.00%

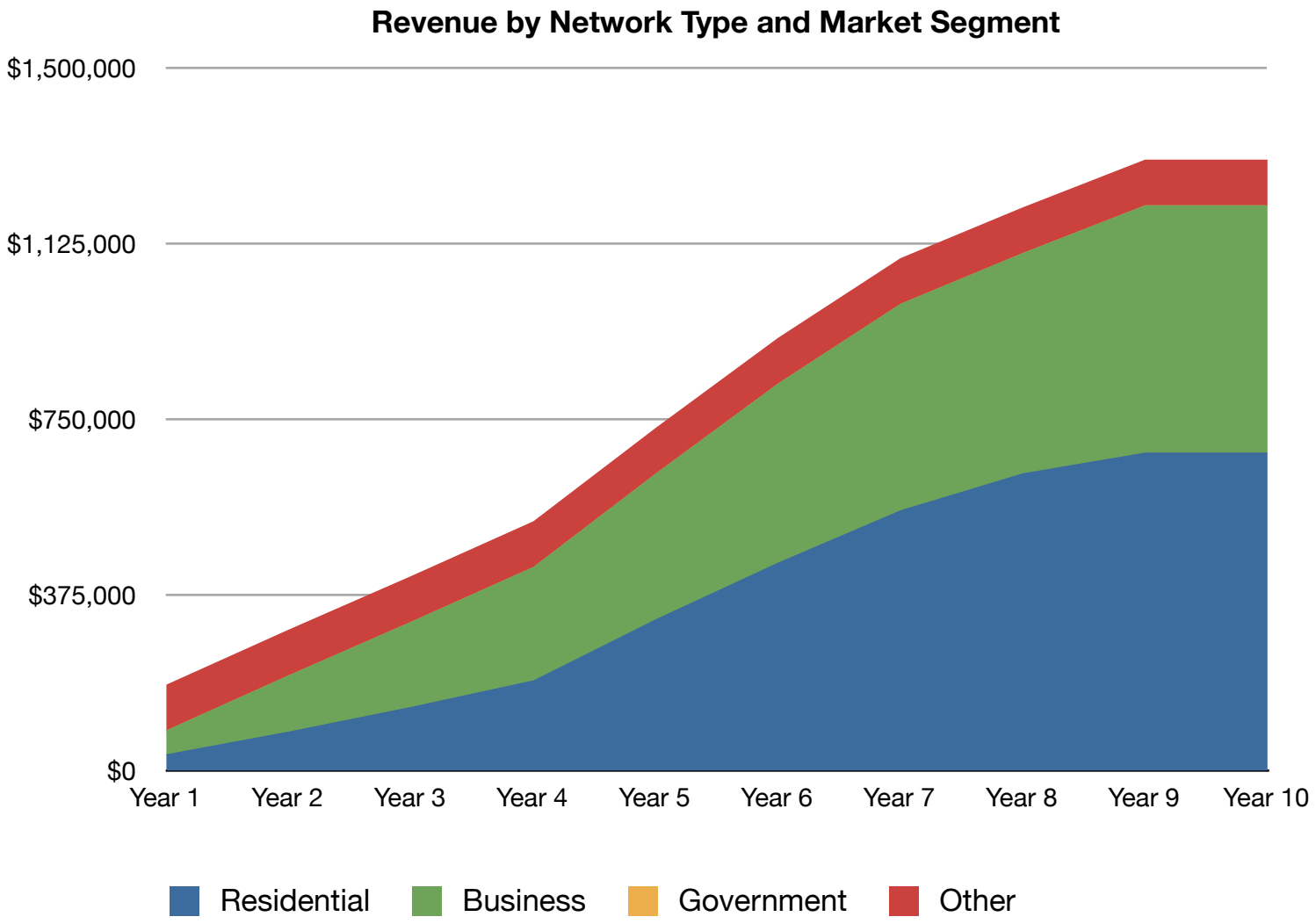
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Earnings Before Taxes	-102,970	-59,100	-470	72,893	225,707	385,475	566,640	686,513	790,950	793,291
Accumulated Earnings Before Taxes	-102,970	-162,070	-162,540	-89,646	136,061	521,535	1,088,175	1,774,688	2,565,638	3,358,929
Actual Tax	0	0	0	0	0	0	0	0	0	0

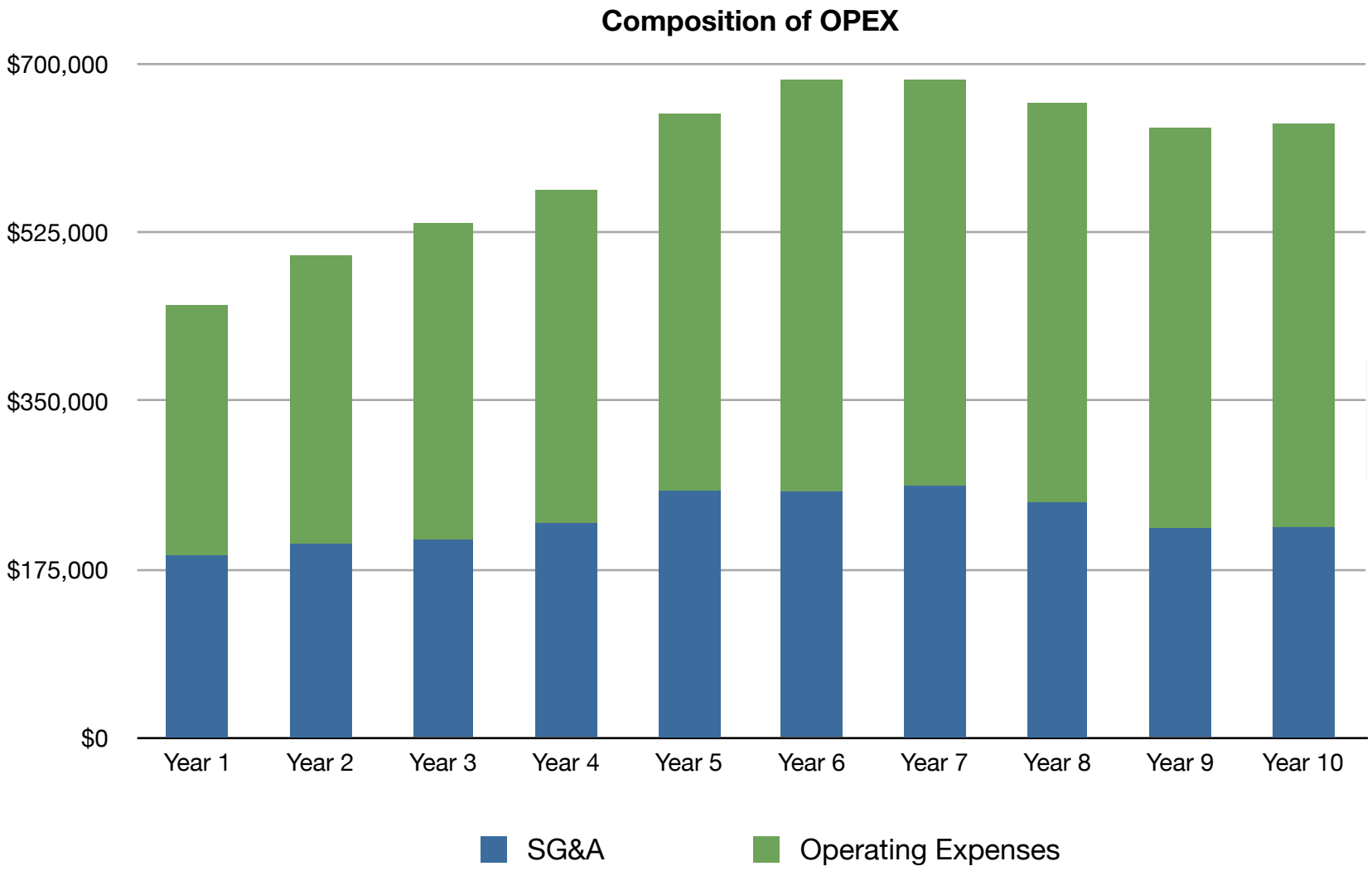
Partner Share Distribution

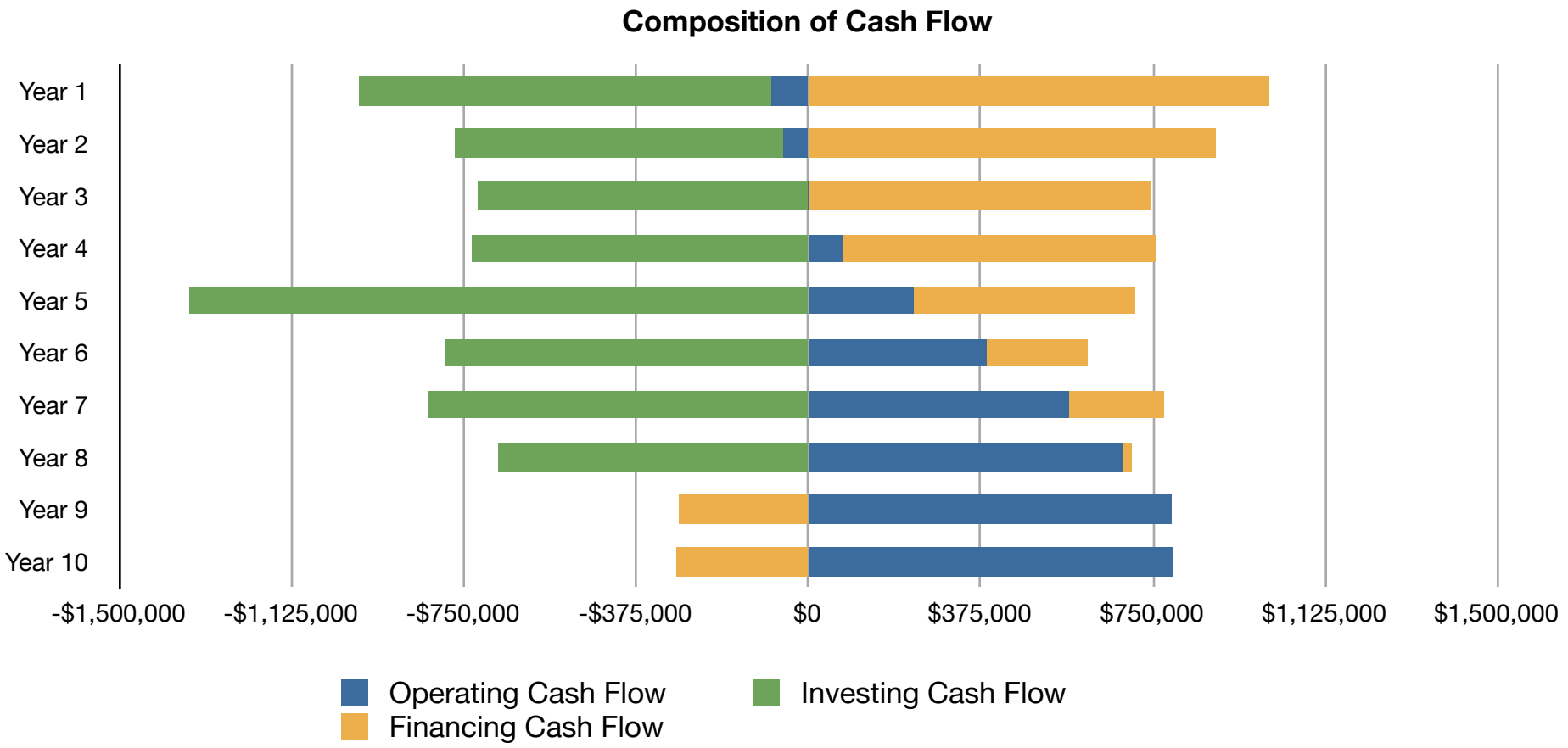
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Net Income		-$102,970	-$99,517	-$67,941	-$21,981	$102,941	$210,239	$359,247	$445,305	$523,484	$526,010
Partner 1	0.00%	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Partner 2	0.00%	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Partner 3	0.00%	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Partner 4	0.00%	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Partner 5	0.00%	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Partner Share		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Accumulated Share		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

Investor Tables

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Investor Financing		-$300,000	$0	$0	$0	$36,029	$73,584	$125,736	$155,857	$183,219	$184,103







Fiber Market Summary

Total Market											
Residential	6,381										
Business	378										
Govt/Institutional	0										
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Premises Passed											
Residential		319	638	957	1,276	1,914	2,233	2,552	2,871	2,871	2,871
Business		227	238	246	257	257	257	257	257	257	257
Govt/Institutional		0	0	0	0	0	0	0	0	0	0
New Customers											
Residential		128	146	157	169	357	271	303	192	0	0
Business		23	13	13	15	13	13	13	0	0	0
Govt/Institutional		0	0	0	0	0	0	0	0	0	0
Total Year End Customers											
Residential	6,381	128	274	431	600	957	1,228	1,531	1,723	1,723	1,723
Business	378	23	36	49	64	77	90	103	103	103	103
Govt/Institutional	0	0	0	0	0	0	0	0	0	0	0
Revenue per market segment											
Residential		$34,573	$82,980	$135,621	$192,273	$322,713	$443,640	$555,285	$634,240	$678,559	$678,559
Business		$51,071	$120,169	$181,725	$242,137	$311,120	$382,396	$440,732	$470,257	$527,888	$527,888
Govt/Institutional		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
ARPU per market (monthly)											
Residential		$45.02	$34.40	$32.06	$31.08	$34.54	$33.84	$33.54	$32.49	$32.82	$32.82
Business		$370.08	$339.46	$356.32	$357.13	$367.75	$381.63	$380.60	$380.47	$427.09	$427.09
Govt/Institutional		0	0	0	0	0	0	0	0	0	0

Residential Market and Build Out Assumptions

Market Assumptions		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Total Available Market	6,381	5%	10%	15%	20%	30%	35%	40%	45%	45%	45%
Homes Passed		319	638	957	1,276	1,914	2,233	2,552	2,871	2,871	2,871
Take Rate		40%	43%	45%	47%	50%	55%	60%	60%	60%	60%
Homes that purchase service(s)		128	274	431	600	957	1,228	1,531	1,723	1,723	1,723
Addressable Market %		2%	4%	7%	9%	15%	19%	24%	27%	27%	27%
Fiber Optic Build Out											
New customers		128	146	157	169	357	271	303	192	0	0
Average customers this year		64	201	352.5	515.5	778.5	1,092.5	1,379.5	1,627	1,723	1,723
Year end		128	274	431	600	957	1,228	1,531	1,723	1,723	1,723
Detached & Single House (SDU)		90%									
Apartments (MDU)		10%									
Network Activation Fee		$100.00	$100.00	$100.00	$100.00	$125.00	$125.00	$125.00	$125.00	$125.00	$125.00
			0%	0	0	5%	5%	0%	0%	5%	0%
Average Monthly Residential Revenue		27	$27	$27	$27	$28	$30	$30	$30	$31	$31
Activation Fee Revenue		$12,800	$14,600	$15,700	$16,900	$44,625	$33,875	$37,875	$24,000	$0	$0
Annual Revenue											
Annual Revenue (monthly service)		20,736	65,124	114,210	167,022	264,846	390,252	492,771	581,181	646,246	646,246
Growth in Advanced Services	5%	1,037	3,256	5,711	8,351	13,242	19,513	24,639	29,059	32,312	32,312
Total yearly fees residential		21,773	68,380	119,921	175,373	278,088	409,765	517,410	610,240	678,559	678,559
Access Revenue Before Expenses		**$34,573**	**$82,980**	**$135,621**	**$192,273**	**$322,713**	**$443,640**	**$555,285**	**$634,240**	**$678,559**	**$678,559**

Business Market and Build Out Assumptions

Market Assumptions		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Total Available Market	378	60%	63%	65%	68%	68%	68%	68%	68%	68%	68%
Businesses Passed		227	238	246	257	257	257	257	257	257	257
Take Rate		10%	15%	20%	25%	30%	35%	40%	40%	40%	40%
Businesses Serviced		23	36	49	64	77	90	103	103	103	103
Total Market %		6%	9%	13%	17%	20%	24%	27%	27%	27%	27%
Fiber Optic Build Out											
New fiber customers		23	13	13	15	13	13	13	0	0	0
Average customers per year		11	29	42	57	71	84	96	103	103	103
Year end		23	36	49	64	77	90	103	103	103	103
Network Activation Fee		$250.00	$250.00	$250.00	$250.00	$250.00	$250.00	$250.00	$250.00	$250.00	$250.00
Services (Monthly)											
Rate Increase			0%	5%	0	0%	5%	0%	0%	5%	0%
Business GPON 100Mbps		$95	$95	$100	$100	$100	$105	$105	$105	$110	$110
Business GPON 250Mbps		$180	$180	$189	$189	$189	$198	$198	$198	$208	$208
Business GPON 500Mbps		$325	$325	$341	$341	$341	$358	$358	$358	$376	$376
Dedicated Business 250 Mbps		$275	$275	$289	$289	$289	$303	$303	$303	$318	$318
Dedicated Business 500 Mbps		$425	$425	$446	$446	$446	$469	$469	$469	$492	$492
Wide Area LAN Service 250 Mbps		$325	$325	$341	$341	$341	$358	$358	$358	$376	$376
Wide Area LAN Service 500 Mbps		$550	$550	$578	$578	$578	$606	$606	$606	$637	$637
Wide Area LAN Service 1Gbps		$895	$895	$940	$940	$940	$987	$987	$987	$1,036	$1,036
Take Rate Per Service											
Business GPON 100Mbps		10%	10%	10%	10%	5%	5%	5%	5%	0%	0%
Business GPON 250Mbps		20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Business GPON 500Mbps		30%	30%	30%	30%	35%	30%	30%	30%	30%	30%
Dedicated Business 250 Mbps		10%	10%	10%	10%	10%	15%	15%	10%	10%	10%
Dedicated Business 500 Mbps		10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Wide Area LAN Service 250 Mbps		10%	10%	10%	10%	10%	10%	10%	15%	15%	15%
Wide Area LAN Service 500 Mbps		5%	5%	5%	5%	5%	5%	5%	5%	10%	10%
Wide Area LAN Service 1Gbps		5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Market Total		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Activation Fee Revenue		$5,670	$3,260	$3,355	$3,780	$3,213	$3,213	$3,213	$0	$0	$0
Annual Revenue (monthly service)		$45,401	$116,909	$178,371	$238,357	$307,907	$379,183	$437,519	$470,257	$527,888	$527,888

Business Rev. Before Expenses	**$51,071**	**$120,169**	**$181,725**	**$242,137**	**$311,120**	**$382,396**	**$440,732**	**$470,257**	**$527,888**	**$527,888**

Govt/K12/Institutional Market and Build Out Assumptions

Market Assumptions		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Total Available Market	0	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Govt Premises Passed		0	0	0	0	0	0	0	0	0	0
Take Rate		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Govt Premises Serviced		0	0	0	0	0	0	0	0	0	0
Addressable Market %		0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Fiber Optic Build Out											
New customers		0	0	0	0	0	0	0	0	0	0
Average customers per year		0	0	0	0	0	0	0	0	0	0
Year end		0	0	0	0	0	0	0	0	0	0
Network Activation Fee		$200.00	$200.00	$200.00	$200.00	$250.00	$250.00	$250.00	$250.00	$250.00	$250.00
Services (Monthly)											
Rate Increase			0%	5%	0	0%	5%	0%	0%	5%	0%
Tier 1 - 50/10		$50	$50	$53	$53	$53	$55	$55	$55	$58	$58
Tier 1 - 100/20		$100	$100	$105	$105	$105	$110	$110	$110	$116	$116
Tier 2 - 50/50		$75	$75	$79	$79	$79	$83	$83	$83	$87	$87
Tier 2 - 100/100		$150	$150	$158	$158	$158	$165	$165	$165	$174	$174
Tier 2 - 500/500		$300	$300	$315	$315	$315	$331	$331	$331	$347	$347
Tier 3 - 250/250		$500	$500	$525	$525	$525	$551	$551	$551	$579	$579
Tier 3 - 500/500		$850	$850	$893	$893	$893	$937	$937	$937	$984	$984
Tier 3 - 1000/1000		$1,200	$1,200	$1,260	$1,260	$1,260	$1,323	$1,323	$1,323	$1,389	$1,389
Take Rate Per Service											
Tier 1 - 50/10		10%	10%	10%	10%	5%	5%	5%	5%	0%	0%
Tier 1 - 100/20		20%	20%	20%	20%	20%	20%	20%	20%	20%	20%
Tier 2 - 50/50		30%	30%	30%	30%	35%	30%	30%	30%	30%	30%
Tier 2 - 100/100		10%	10%	10%	10%	10%	15%	15%	10%	10%	10%
Tier 2 - 500/500		10%	10%	10%	10%	10%	10%	10%	10%	10%	10%
Tier 3 - 250/250		10%	10%	10%	10%	10%	10%	10%	15%	15%	15%
Tier 3 - 500/500		5%	5%	5%	5%	5%	5%	5%	5%	10%	10%
Tier 3 - 1000/1000		5%	5%	5%	5%	5%	5%	5%	5%	5%	5%
Market Total		100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Activation Fee Revenue		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Annual Revenue (monthly service)		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Business Rev. Before Expenses		**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**

Revenue Other Services

Fiber Optic Cable Leases	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
TBD	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TBD	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
TBD	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other Services										
Wireless Tower Space Revenue	$24,000	$24,000	$24,000	$24,000	$24,000	$24,000	$24,000	$24,000	$24,000	$24,000
Current revenue (as of 2015)	$73,500	$73,500	$73,500	$73,500	$73,500	$73,500	$73,500	$73,500	$73,500	$73,500
TBD	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Other Services										
Other services total	$97,500	$97,500	$97,500	$97,500	$97,500	$97,500	$97,500	$97,500	$97,500	$97,500

Salary, General & Administrative (SG&A) Expenses

Fringe Benefits	25%		**Annual Salary Increase**	1%						
Staff		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
		0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Senior Manager	$85,000	$26,563	$26,828	$27,096	$27,367	$27,641	$27,917	$28,197	$28,479	$28,763	$29,051
		0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
Finance and Billing	$49,000	$15,313	$15,466	$15,620	$15,776	$15,934	$16,094	$16,255	$16,417	$16,581	$16,747
		0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
Marketing Manager	$85,000	$10,625	$10,731	$10,839	$10,947	$11,056	$11,167	$11,279	$11,391	$11,505	$11,620
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Service Provider Manager	$85,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Network Technician	$65,000	$81,250	$82,063	$82,883	$83,712	$84,549	$85,395	$86,249	$87,111	$87,982	$88,862
		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Other Staff	$42,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
		0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15	0.15
Administration	$40,000	$7,500	$7,575	$7,651	$7,727	$7,805	$7,883	$7,961	$8,041	$8,121	$8,203
Total Staff Expense		$141,250	$142,663	$144,089	$145,530	$146,985	$148,455	$149,940	$151,439	$152,954	$154,483
Total # of Employees		1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8	1.8
Staff and Office Expenses											
Travel Expenses	$1,500	$2,700	$2,700	$2,700	$2,700	$2,700	$2,700	$2,700	$2,700	$2,700	$2,700
Outsourcing	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Other costs	$500	$900	$900	$900	$900	$900	$900	$900	$900	$900	$900
Office and Expenses		$2,400	$2,400	$2,400	$2,400	$2,400	$2,400	$2,400	$2,400	$2,400	$2,400
Office Supplies		$1,800	$1,800	$1,800	$1,800	$1,800	$1,800	$1,800	$1,800	$1,800	$1,800
Computers and Office Equipment		$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500
Mailing & Delivery		$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
Total Staff and Office Expenses		$11,300	$11,300	$11,300	$11,300	$11,300	$11,300	$11,300	$11,300	$11,300	$11,300
Sales/Marketing Commissions	$150.00	$22,602	$23,856	$25,563	$27,618	$55,478	$42,578	$47,378	$28,800	$0	$0
Other External Expenses											
Law & Audit		$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
Financial & Technical Consulting		$2,500	$2,500	$2,500	$10,000	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000
Asset, Business, Liability Insurance		$1,500	$10,000	$10,000	$15,000	$15,000	$20,000	$20,000	$20,000	$20,000	$20,000
Miscellaneous		$5,500	$6,500	$7,500	$8,500	$8,500	$13,500	$13,500	$13,500	$13,500	$13,500
Total Other External Expenses		$14,500	$24,000	$25,000	$38,500	$43,500	$53,500	$53,500	$53,500	$53,500	$53,500
Total SG&A Expenses		$189,652	$201,819	$205,952	$222,948	$257,263	$255,833	$262,118	$245,039	$217,754	$219,283

Network Operations Expenses

		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Support and Equip. Replacement Fees											
Core Network Equipment		$0	$0	$12,500	$0	$0	$25,000	$0	$0	$25,000	$25,000
Distribution Network Equipment		$0	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
CPE		$0	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500	$2,500
Billing System & Consumer Portal		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Equipment Support Fees		**$0**	**$7,500**	**$20,000**	**$7,500**	**$7,500**	**$32,500**	**$7,500**	**$7,500**	**$32,500**	**$32,500**
Network Operations Costs											
Per Subscriber NOC/Support Fee	3	$2,712	$8,287	$14,217	$20,599	$30,571	$42,337	$53,132	$62,273	$65,729	$65,729
Network Operations		$38,400	$39,168	$39,951	$40,750	$41,565	$42,397	$43,245	$44,110	$44,992	$45,892
Network electric utility costs		$1,200	$2,400	$3,600	$3,600	$3,600	$3,600	$3,600	$3,600	$3,600	$3,600
Locates		$1,500	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000	$2,000
Pole Use Fees	$12	$0	$300	$420	$540	$720	$900	$900	$900	$900	$900
Conduit/Dark Fiber Lease		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Storage		$2,400	$2,400	$2,400	$2,400	$2,400	$2,400	$2,400	$2,400	$2,400	$2,400
Site Leases		$0	$5,000	$5,150	$5,305	$5,464	$5,628	$5,796	$5,970	$6,149	$6,334
Total Network Operational Costs		**$46,212**	**$59,555**	**$67,739**	**$75,194**	**$86,320**	**$99,262**	**$111,073**	**$121,253**	**$125,770**	**$126,855**
Outside Plant (OSP) Costs											
Outside Plant Maintenance		$24,000	$28,000	$32,000	$36,000	$36,000	$36,000	$36,000	$36,000	$36,000	$36,000
Buildings Maintenance		$0	$2,500	$3,000	$4,500	$4,500	$4,500	$4,500	$4,500	$4,500	$4,500
Total Outside Plant (OSP) Maintenance		**$24,000**	**$30,500**	**$35,000**	**$40,500**	**$40,500**	**$40,500**	**$40,500**	**$40,500**	**$40,500**	**$40,500**
Total Operational Expenses		**$70,212**	**$97,555**	**$122,739**	**$123,194**	**$134,320**	**$172,262**	**$159,073**	**$169,253**	**$198,770**	**$199,855**
Total SG&A and OPEX		**$259,864**	**$299,374**	**$328,691**	**$346,142**	**$391,583**	**$428,095**	**$421,191**	**$414,292**	**$416,524**	**$419,138**
Monthly Operational Cost per Sub		**$287**	**$108**	**$69**	**$50**	**$38**	**$30**	**$24**	**$20**	**$19**	**$19**

Capital Expenditure (CAPEX) Summary

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Outside Plant										
Buildings	$25,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution	$112,500	$484,420	$480,775	$473,835	$843,260	$424,055	$424,805	$422,055	$0	$0
Access	$300,000	$135,050	$142,250	$156,450	$306,050	$235,850	$261,050	$154,800	$0	$0
Subtotal	**$437,500**	**$619,470**	**$623,025**	**$630,285**	**$1,149,310**	**$659,905**	**$685,855**	**$576,855**	**$0**	**$0**
Equipment										
Core / Routing	$125,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Distribution / Switching	$0	$24,000	$25,200	$27,750	$55,650	$42,600	$47,250	$28,650	$0	$0
CPE	$0	$16,000	$16,800	$18,500	$37,100	$28,400	$31,500	$19,100	$0	$0
Other (servers, etc.)	$10,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
Subtotal	**$135,000**	**$40,000**	**$42,000**	**$46,250**	**$92,750**	**$71,000**	**$78,750**	**$47,750**	**$0**	**$0**
Other										
Professional Services	$200,000	$21,200	$21,250	$21,975	$42,350	$24,050	$24,900	$21,200	$0	$0
Engineering	$0	$30,000	$29,900	$30,850	$58,025	$32,000	$32,775	$28,700	$0	$0
Legal	$75,000	$0	$0	$0	$0	$0	$0	$0	$0	$0
OSS/BSS/Software	$0	$800	$840	$925	$1,855	$1,420	$1,575	$955	$0	$0
Other Upfront Costs	$50,000	$2,835	$2,875	$3,270	$4,100	$3,575	$3,760	$1,145	$0	$0
Subtotal	**$325,000**	**$54,835**	**$54,865**	**$57,020**	**$106,330**	**$61,045**	**$63,010**	**$52,000**	**$0**	**$0**
TOTAL CAPITAL EXPENDITURES	**$897,500**	**$714,305**	**$719,890**	**$733,555**	**$1,348,390**	**$791,950**	**$827,615**	**$676,605**	**$0**	**$0**
30 Year Depreciation Capex	$762,500	$673,505	$677,050	$686,380	$1,253,785	$719,530	$747,290	$627,900	$0	$0
5 Year Depreciation Capex	$135,000	$40,000	$42,000	$46,250	$92,750	$71,000	$78,750	$47,750	$0	$0
7 Year Amortization Capex	$0	$800	$840	$925	$1,855	$1,420	$1,575	$955	$0	$0

Depreciation Schedule

	Depreciation (Yrs)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
- Passive	30		$25,417	$25,417	$25,417	$25,417	$25,417	$25,417	$25,417	$25,417	$25,417
				$22,450	$22,450	$22,450	$22,450	$22,450	$22,450	$22,450	$22,450
					$22,568	$22,568	$22,568	$22,568	$22,568	$22,568	$22,568
						$22,568	$22,568	$22,568	$22,568	$22,568	$22,568
							$41,793	$41,793	$41,793	$41,793	$41,793
								$23,984	$23,984	$23,984	$23,984
									$24,910	$24,910	$24,910
										$20,930	$20,930
											$0
	Depreciation/ Yr	$0	$25,417	$47,867	$70,435	$93,004	$134,796	$158,781	$183,690	$204,620	$204,620
	Accumulated	$0	$25,417	$73,284	$143,719	$236,722	$371,519	$530,299	$713,990	$918,610	$1,123,230
	Depreciation (Yrs)										
- Active	9		$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000	$15,000
				$4,444	$4,444	$4,444	$4,444	$4,444	$4,444	$4,444	$4,444
					$4,667	$4,667	$4,667	$4,667	$4,667	$4,667	$4,667
						$5,139	$5,139	$5,139	$5,139	$5,139	$5,139
							$10,306	$10,306	$10,306	$10,306	$10,306
								$7,889	$7,889	$7,889	$7,889
									$8,750	$8,750	$8,750
										$5,306	$5,306
											$0
	Depreciation/ Yr	$0	$15,000	$19,444	$24,111	$29,250	$39,556	$47,444	$56,194	$61,500	$61,500
	Accumulated	$0	$15,000	$34,444	$58,556	$87,806	$127,361	$174,806	$231,000	$292,500	$354,000
- Amortization	5		$0	$0	$0	$0	$0	$0	$0	$0	$0
				$160	$160	$160	$160	$160	$0	$0	$0
					$168	$168	$168	$168	$168	$0	$0
						$185	$185	$185	$185	$185	$0
							$371	$371	$371	$371	$371
								$284	$284	$284	$284
									$315	$315	$315
										$191	$191
											$0
	Amortization/ Yr	$0	$0	$160	$328	$513	$884	$1,168	$1,323	$1,346	$1,161
	Accumulated	$0	$0	$160	$488	$1,001	$1,885	$3,053	$4,376	$5,722	$6,883
Assets											
Yearly Costs		$897,500	$714,305	$719,890	$733,555	$1,348,390	$791,950	$827,615	$676,605	$0	$0
- Passive		$437,500	$619,470	$623,025	$630,285	$1,149,310	$659,905	$685,855	$576,855	$0	$0
- Equipment		$135,000	$40,000	$42,000	$46,250	$92,750	$71,000	$78,750	$47,750	$0	$0

Depreciation Schedule

- Software & PS	$325,000	$54,835	$54,865	$57,020	$106,330	$61,045	$63,010	$52,000	$0	$0
Accumulated Costs	$897,500	$1,611,805	$2,331,695	$3,065,250	$4,413,640	$5,205,590	$6,033,205	$6,709,810	$6,709,810	$6,709,810
Amortization	$0	$0	$160	$328	$513	$884	$1,168	$1,323	$1,346	$1,161
Depreciation	$0	$40,417	$67,311	$94,546	$122,254	$174,352	$206,225	$239,885	$266,120	$266,120
Intangible Asset Value	$0	$800	$1,480	$2,077	$3,419	$3,955	$4,362	$3,994	$2,648	$1,487
Book Value	$572,500	$1,191,553	$1,789,267	$2,371,256	$3,491,062	$4,047,615	$4,605,995	$4,990,716	$4,724,595	$4,458,475
Book Value / CAPEX	64%	74%	77%	77%	79%	78%	76%	74%	70%	66%
80% of Book Value	$458,000	$953,243	$1,431,414	$1,897,005	$2,792,850	$3,238,092	$3,684,796	$3,992,572	$3,779,676	$3,566,780

CURRENT NCBA RATES
PER RESOLUTION R2013-13 ADOPTED OCTOBER 24, 2013

Local Access Rates (Rates for Providers to Utilize the Network for Transport to an End User):

Class of Service		Speed (Mbps)	MRC
Tier 1 Last Mile (E7 to ONT)		25x5	$ 25
		50x10	$ 50
Tier 2 Last Mile or Service Provider Middle Mile (OLT to ONT/OLT)		25x25	$ 75
		50x50	$ 150
		100x100	$ 300
		250x250	$ 700
		500x500	$ 850
		1,000x1,000	$ 1,000
Tier 3 Private WAN	Two Site WAN "P2P" (ONT to ONT)	25	$ 250
		100	$ 800
		500	$ 1,280
		1,000	$ 1,660
	Three or More Site WAN "Cloud" (per node)	100	$ 500
		500	$ 800
		1,000	$ 1,040

Non-recurring charges (NRC) are those costs incurred in connection with the installation of the fiber drop and ONT. The customer will be responsible for the payment of these cost on the following terms.

NRC not exceeding $1500 will be discounted as follows:

Term of Contract	Discount
12 months	none
24 months	10%
36 months	20%
48 months	35%
60 or more months	50%

The undiscounted balance of NRC together with any NRC in excess of $1500 may be amortized over the term of the original contract.

Colocation Charges for Providers within NCBA shelters:

Quantity	Monthly Cost
2 RU	$75.
One-half rack	$200.
Full Rack	$350.

All rentals are based on a space available basis. Rental will include access to one 20 amp, 120 volt circuit. Redundant CC power (-48 volt) will be available as well. The Colocation charges include up to 20 amps of DC power. Additional DC power, subject to availability, will be priced at $6.25 per amp in 10 amp increments.

Tower Access:

Location on Tower	Price per Month per Customer
Top thirty feet in 10 feet sections	$275 per antenna for first three antennas (includes cables and ancillary equipment such as tower mounted amplifiers) $150 per additional antenna installed by the same lessee.
Next thirty feet in 10 foot sections	$175 per antenna for first three antennas (includes cables and ancillary equipment such as tower mounted amplifiers) $90 per additional antenna installed by the same lessee.
Remaining access in 10 foot sections	$50 per antenna (includes cables and ancillary equipment such as tower mounted amplifiers)

All tower access charges are in addition to a site access fee of $200 per month. Site access fee entitles lessee access to electric power (contracted for by lessee) and ground space for cabinet (10 square feet). Shelter colocation charges and local transport charges are additional as are lease space for placing shelters, generators or other equipment. Items not specifically addressed will be priced on an individual basis.

Preference will be given to providers wishing space higher on the towers. The NCBA may limit the size of antennas or duration of leases for antennas located below the top 80 feet.

Tower leases will be accepted based on maximum allowable loading of a tower. If, in the sole discretion of the NCBA, an analysis of the structural integrity of the tower is deemed necessary, then the costs of the analysis will be borne by the lessee.

The tower access charges for wireless internet service providers, also known as fixed wireless broadband services, shall be one-half of the tower access charges set forth in the chart above but in any event, not less than $50.00 per antenna. This reduced rate shall apply for no more than three years from the date of the initial structural lease agreement with each such provider.

These rates apply to towers operated by the NCBA. Rates for towers leased by the NCBA may be subject to approval by the lessor.

Dark Fiber Leases:
The NCBA will have a limited number of fibers available for dark fiber leasing at an annual rate of $1250 per leased fiber per mile for durations longer than 60 months. Leases for 60 months or less will be priced at an annual rate of $1550 per leased fiber per mile. Fiber will not be leased for periods of less than 24 months. These leases will be subject to prior allocation for other uses and are made at the discretion of the NCBA board.

Increase in Rates:
Rates are firm for a contract or lease term which does not exceed five years.

For contract and lease terms exceeding five years, payments shall be adjusted every year commencing with the first annual anniversary of the lease Commencement Date and thereafter on the subsequent anniversaries of that date (the Adjustment Date). Such adjustments shall be for the purpose of reflecting the increase, if any, in the cost of living. The adjustment, if any, shall be calculated based upon the United States Department of Labor, Bureau of Labor Statistics Consumer Price Index for All Urban Consumers (CPI-U) for the South, Size D-Nonmetropolitan (less than 50,000) (the "Index").

The Index published as of the most recent month prior to the Adjustment Date shall be compared with the Index twelve (12) months immediately preceding. On the Adjustment Date the annual payment shall be increased by the percentage equal to the change, if any, in the Index between the two specified months. The Adjusted payment shall then become the new Base payment for the following twelve month period and be used to calculate the next annual payment adjustment.

Penalty and Interest:

Any sum due NCBA and unpaid by the due date shall be assessed a 10% penalty and carry interest at the rate of 12% *per annum.*

Nelson County Broadband Authority
Network Operator Agreement

THIS NETWORK OPERATOR AGREEMENT ("Agreement"), made and entered into on the 1ST day of December, 2012, by and between the Nelson County Broadband Authority, a public authority of the County of Nelson, Virginia (the "Authority") and Blue Ridge Websoft, LLC dba Blue Ridge InternetWorks ("Operator") a Virginia limited liability company located at 321 East Main St., Suite 200, Charlottesville, VA 22902, provides:

DEFINED TERMS

The following terms shall have the following meanings in this Agreement:

"Authority" means the Nelson County Broadband Authority.
"Dark Fiber Lessee" means an entity which contracts with the Authority to use dark fiber resources of the Network.
"DSA" means a Direct Served Account, which are End-Users where the Authority acts as their Service Provider.
"End-User" means the Entity who receives service through the Network from a Network Customer.
"Network" means the Nelson County Middle Mile Fiber network.
"Network Customer" means a customer of the Authority who uses the Network. These include DSAs, Service Providers and Dark Fiber Lessees.
"Network Equipment" means the electronics, owned by the Authority, which allow the Operator to provide services to Network Customers.
"Network Operator" or "Operator" means the entity contracted to operate the Network.
"OSP" means the Outside Plant, which is the physical fiber optic plant outside of the NOC.
"OSP Contractor" means a direct vendor of the Authority approved to perform work on the OSP.
"Service Provider" means an entity that contracts with the Authority to utilize the Network to provide services to End-Users.

AGREEMENT DOCUMENTS

The Agreement Documents shall consist of the following, all of which are incorporated herein:

A. This Agreement and all written amendments to the Agreement agreed to and executed by the parties

B. The Network Management Plan attached hereto as Exhibit A
C. The Network Policies and Procedures Manual upon approval and acceptance by the parties.

1 ARTICLE I

RELATIONSHIP OF THE PARTIES

1.1 NETWORK DEVELOPMENT

The Authority is currently deploying a broadband Network throughout the County of Nelson. The development, design and installation of the Network shall be the sole responsibility of the Authority. Any undertaking to install additional phases of the Network shall be at the sole discretion of the Authority, taking into consideration the input of the Operator and the Network Customers.

1.2 NETWORK OWNERSHIP

The assets of the Network shall be held by the Authority.

1.3 INDEPENDENT CONTRACTOR

The relationship of the Operator to the Authority shall be that of an independent contractor. Neither the Authority nor any of its employees shall be held or deemed in any way to be an agent, employee, or official of the Operator. The Operator shall be responsible for, and hold the Authority harmless from any liability for, unemployment taxes or contributions, payroll taxes or other federal or state employment taxes, and worker's compensation insurance coverage as may be required by law.

1.4 NETWORK ADMINISTRATION

The Authority shall be responsible for administrative and financial management of the Network, including:

I. The development, approval and administration of the Network Management Plan
II. The development, execution, and administration of any such contractual agreements necessary for conducting the Authority's business
III. The development of the Network's operational policies and procedures to be applied to the Operator, OSP Contractor and Network Customers
IV. The development the Network's annual budget and long-range planning
V. The oversight of the Operator's performance of its duties and responsibilities

1.5 NETWORK OPERATION

The Operator shall be responsible for providing sufficient manpower, material resources, and technical expertise necessary to perform the operational and maintenance duties and responsibilities in accordance with the Network Management Plan. The role of the Operator shall be to ensure continuous, quality operation of the Network in support of the Network Customers' access to the Network and the End-Users being served over the Network.

1.6 TERM OF AGREEMENT

Unless sooner terminated as provided in Article VIII of this Agreement, this Agreement shall have an initial term of one year and shall renew automatically each succeeding year

up to a maximum of five years, unless, 120 days prior to the end of a term, a party gives written notice of its intent not to renew the Agreement.

1.7 Federal Interest

Notwithstanding anything to the contrary herein, this Agreement is made subject and subordinate to the following Federal Interest. The County of Nelson (the "County") submitted an application to the National Telecommunications and Information Administration, U.S. Department of Commerce ("NTIA") for financial assistance under the Broadband Technology Opportunities Program pursuant to the American Recovery and Reinvestment Act of 2009, Pub. L. No. 111-5, 123 Stat. 115 (Feb. 17, 2009). By Offer of Award, dated March 26, 2010, NTIA offered to the County a financial assistance award designated as Award No. NT10BIX5570049 (the "Award") to assist in financing the Nelson County Virginia Broadband Project. The County or the Nelson County Broadband Authority, as the case may be, holds all real and personal property, whether tangible or intangible, acquired or improved in whole or in part with Award funds, in trust for the public purpose of the Award. This trust relationship exists throughout the estimated useful life, as determined by NTIA, of such property, during which time NTIA retains an 80% undivided equitable reversionary interest in such property together with a first priority unsubordinated position pursuant to any other lien or security interest now existing or hereafter created or recorded securing NTIA.

2 ARTICLE II

NETWORK

2.1 Network Design

The Authority, at its cost and expense, shall be solely responsible for the design of the Network. The Network shall be designed to deliver Content Services in accordance with the Network Customer Service Level Agreement ("SLA"). The Authority will provide one or more Network Demarcation Points where Network Customers may enter the Network.

2.2 Installation of Network

The Authority, at its cost and expense, shall be solely responsible for the installation of the Network, including, without limitation, the procurement of any necessary rights-of-way or easements, and the purchase and installation of all facilities and equipment required to activate and operate the Network. The Authority has already commenced installation of the Network.

2.3 Initial Network Testing and Maintenance

The Authority, at its cost and expense, shall test the Network following installation to assure operation of the Network in accordance with the standards specified by the Network Equipment manufacturer. If requested, the Authority shall provide a copy of the test results to the Operator. Following a satisfactory test of the Network demonstrating that the Network meets the aforementioned standards, the Authority shall send written notice to the Operator. After the successful completion of the tests, the Operator shall be solely responsible for the operation and maintenance, in accordance with the standards.

The Operator shall be responsible for the installation and application of any new releases, software patches, remedies, or fixes for the Network Equipment, as recommended by the manufacturer, the Authority or the Operator and approved by the Authority. The Operator shall provide the Authority with test results of any such new releases, software patches, remedies, or fixes indicating their successful installation and application.

2.4 NETWORK EXTENSIONS

The Authority shall be responsible for approving any extension to the Network, as recommended by the Operator, Network Customers, or the Authority itself. The Authority shall be responsible, at its cost and expense, for the design, installation, and initial testing of any such new extension, prior to its release to the Operator for operation and maintenance thereof.

2.5 NETWORK OPERATIONAL BOUNDARIES

The Operator shall be responsible for performing its operational and maintenance duties and functions for ensuring the quality and integrity of the Network's broadband service transmissions within prescribed points of demarcation on the Network, based upon the Authority's contractual service relationship with the Network Customers. The Operator's responsibility shall begin at the Network upstream demarcation point for a particular entity and shall continue across the Network to one or more downstream demarcation points. At these designated demarcation points, the Operator shall "hand-off" its responsibility for the quality and integrity of the broadband service transmission that it manages within the Network's boundaries to the entity having responsibility for the broadband service transmission quality and integrity outside of the Network's boundary. These Network demarcation points are described as the following:

2.5.1 Network Operations Center (NOC)

The Network Operations Center (NOC) shall be the demarcation point for ingress and egress to the Network by Network Customers whose facilities make their initial upstream interconnection to the Network in the NOC. The specific demarcation point in the NOC shall be the patch panel port to which any of these entities make their initial connection. The Operator shall have responsibility for operating and maintaining the Network Equipment within the NOC.

2.5.2 Tower Access Point

The Tower site shelter(s) or cabinet(s) could be a Network demarcation point for Network Customers whose facilities make their downstream interconnection to their retail customers or extensions to their networks. The specific demarcation point will be a network backbone access point within the structure. The Network Customers shall house and secure their electronics within this structure.

2.5.3 Network Backbone Access Point

The Network Backbone Access Point shall be the demarcation point for Network Customers whose facilities make their initial ingress/egress on the Network backbone and/or their termination ingress/egress on the Network backbone. The specific demarcation point shall

be the splice enclosure on the Network. The Operator shall be responsible for maintaining the operational integrity of the Network and any connections thereto.

2.5.4 Optical Network Terminal (ONT)

The Optical Network Terminal shall be the demarcation point for Network Customers via a fiber optic service drop that terminates at an ONT. For a Network Customer using an ONT, the specific demarcation point shall be the output voice, video or data ports on the ONT. The Operator shall be responsible for the operational integrity of the fiber drop and the ONT.

2.5.5 Customer Premise Equipment

For those Network Customers with whom the Authority may have a direct-served account relationship, such as county offices, public safety organizations, and community anchor institutions, and are served via a fiber service drop and ONT, the point of demarcation shall extend beyond the building exterior to any ONT mounted within the Customer's electrical or telecommunications closet at the router. The Operator shall only be responsible for the operational integrity of the fiber drop, the ONT, and any entry wiring that it has installed.

3 ARTICLE III

NETWORK OPERATIONS

3.1 NETWORK CONTROL

A. The Operator shall have the responsibility of day-to-day operation of the Network, including managing the Network Equipment and the functionalities available over the Network in accordance with the Network Policies and Procedures Manual. The Operator shall provide continuous primary Network management, monitoring, and control for the Network. The Operator shall distribute network fault alarms to appropriate Operator and Authority personnel. The Operator shall coordinate the integration and interconnection of new Network Customers on the Network and oversee the collocation of any Network Customer equipment in the Authority's NOC. The Operator shall cooperate with Network Customers to coordinate fiber drop installations and service turn-ups for Network Customers' retail Customers. The Operator shall meet the standards and Service Metrics contained in the Network Policies and Procedures Manual which if not met, a Service Credit will apply.

B. The Authority shall, at its expense, provide the Operator with remote access to the network via the internet.

C. The Operator shall perform installation and initial configuration of equipment to comply with the Authority's service policies and equipment manufacturer's best practices. The configuration will secure the network and provide traffic separation in order to provide open access to multiple Network Customers. The Operator will:

   I. Provision circuits by configuring NOC equipment (OLT) and Customer Premise Equipment (ONT) in accordance with assigned service levels.

   II. Periodically perform equipment software updates as recommended by the manufacturer and deemed urgent or necessary by the Operator or the Authority.

III. Provide a monthly network performance report to the Authority to include details of Network status and incidents during the reporting period.
IV. Provide monthly traffic reports of monitorable ingress and egress points on the network.
V. Create and maintain network documentation

3.2 Maintenance Responsibilities

During the term of this Agreement, and any extension thereof, the Operator shall be responsible for maintaining the Network in good working order and repair in safe condition, and in accordance with the Network Policies and Procedures Manual and all applicable laws and regulations.

3.3 Trouble-Shooting

The Operator shall respond to Network issues in accordance with the procedures and timeframes detailed in the Network Policies and Procedures Manual.

3.4 Call Center

The Operator shall maintain a call center, including a phone number dedicated to the Authority routed to a live operator, capable of accepting calls from Network Customers according to its published service hours, regarding service repair issues, billing inquiries, or general information. Additionally, the Operator shall provide the capability of receiving and responding to calls from Network Customers for emergency repair service 24 hours a day, 7 days a week.

3.5 Repair Response Timing

The Operator shall promptly restore damaged or malfunctioning portions of the Network in accordance with the Network Policies and Procedures Manual. The Operator acknowledges the importance of uninterrupted operation of the Network and shall arrive at repair sites with necessary personnel, equipment, and materials and restore Network services to meet the proper operating specifications referenced in this section. To the extent that repairs are required to the Network to fix damage caused by any event other than Acts of God or rodents, then that entity causing the damage shall pay all repair costs, to the Authority.

3.6 Network Customer Integration to Network

The Operator shall assist the Network Customer with the collocation of its equipment in the Authority's NOC and/or tower site location(s).

3.7 Customer Connection to Network

The Operator, to the best of its ability and within the scope of its duties, shall provision network access to new or existing End-Users as requested by a Network Customer in accordance with agreements between Authority and the Network Customer.

3.8 Billing

The Operator shall provide billing services as follows:

I. Send monthly invoices and/or statements to Network Customer
II. Maintain an accounts receivable ledger
III. Receive and deposit payments to the deposit account provided by the Authority.
IV. Provide monthly income and accounts receivable reports to the Authority.

3.9 Incident Tracking

The Operator shall use its Salesforce.com-based trouble ticket system for tracking network incidents from initial notification through resolution. The Operator shall provide a user license to the Authority for access to the system.

3.10 Outside Plant Contractor Coordination

A. The Operator shall coordinate work to be performed by the Authority's Outside Plant Contractor. The Operator shall not directly perform outside plant work including construction, new fiber drops and outside plant repairs and maintenance.

B. The Operator shall receive all invoices from the Outside Plant Contractor and forward to the Authority, along with approval of the completed work, for payment.

C. The Authority shall be solely responsible for paying all invoices from the Outside Plant Contrator.

3.11 Virginia Utility Protection Service Coordination

The Operator shall provide to the Virginia Utility Protection Service (VUPS) and the Authority drawings detailing all new fiber installations as provided by the Authority's Outside Plant Contractor and ensure that the corresponding update is correctly reflected in the VUPS system.

3.12 Fiber Management

The Operator shall, using either a Fiber Management System in use by the Operator or a system provided by the Authority, manage the assignment of fiber strands throughout the Authority's network.

3.13 Meeting Attendance

A. A designated Officer of the Operator shall attend all regular and special meetings of the Nelson County Broadband Authority. The Operator shall provide a report of network activity at each regularly scheduled meeting that details activity since the previous regularly scheduled meeting.

B. A designated Officer of the Operator shall also be available to meet periodically with County and Authority staff for the purpose of discussing Network Operations and Strategic Planning.

4 ARTICLE IV

PRICING AND PAYMENTS

4.1 Network Operator Services Pricing

In consideration of the Operator's provision of its services to operate and maintain the Network, the Authority shall pay the Operator the prices and charges set forth in the following pricing schedule.

General Network Operation	$6,300 per month
Provision New Customer (after first customer of the month)	$140.00 per hour

Network Engineer for NOC & Co-location Setup	$140.00 per hour
Field Technician On-Site Support for Incidents	$75.00 per hour
Billing and Reporting Per Account	$20.00 per billing period

The hourly rate for On-Site Support for Incidents will include service time from Operator portal to Authority portal.

The Operator shall invoice the Authority no sooner than the first day of each month for the services it provided in the previous month. The Authority shall make payment no later than 30 days after the invoice date for all undisputed charges received from the Operator. If the Authority fails to make any payments for undisputed charges when due, interest on unpaid amounts will accrue at the rate of one and one-half percent (1.5%) per month until the Authority is current on all payments for undisputed charges.

4.2 Disputed Charges

In the event that the Authority disputes any or all of the charges invoiced by the Operator, the Authority shall pay all undisputed portions of the invoiced charges as due, and within fifteen (15) days of the invoice date shall provide the Operator with written notice of the dispute with an explanation of the issue in dispute. The Operator shall respond within fifteen (15) days to the Authority with a detailed explanation supporting the charges in dispute or providing an adjusted invoice amount for the disputed charges. If the Authority accepts the revised charges, it shall pay those revised charges within ten (10) days of the receipt of the Operator's written response, plus any interest accrued upon the delinquent amount. If the Authority rejects the Operator's revised charges, both Parties will agree to cooperate in good faith to resolve the disputed charges within thirty (30) days. If the Parties cannot resolve the dispute within thirty (30) days, either Party may request an independent audit from a company approved by both Parties. The Party that does not prevail in the finding of the independent audit shall bear the cost of the audit. The Authority shall pay the amount of the disputed charges as determined by the audit within ten (10) days, plus any accrued interest.

4.3 Credit for Non-Performance

Inasmuch as the Authority shall be liable to the Network Customer for credit against invoiced Network Access charges in the event of non-performance of guarantees provided to the Network Customer by the Authority, then the Operator shall be held liable for those credits to the extent that the performance of those guarantees was within the control of the Operator with the total liability accrued by the Operator in a month not to exceed the General Network Operation Fee for that month. If the Authority issues an invoice credit to a Network Customer for a valid claim of non-performance as determined by the Authority and the Network Customer, then the Authority may apply the amount of that credit against the amount of the Operator's

next invoice. The Operator may dispute the application of the non-performance credit following the procedures outlined in Section 4.2 above.

5 ARTICLE V

COVENANTS

5.1 CONDUCT OF BUSINESS

The Operator will safely operate and maintain the Network in accordance with the Network service specifications required by this Agreement and will comply in all material respects with laws, regulations, government orders and third-party contracts that are applicable to the Network or its operation. Further, the Operator acknowledges the importance of fair and equal treatment of all Network Customers, including the Authority, using the Network to provide services to End Users, and agrees to abide by the Authority's Competitive Practices Policy included in the Network Management Plan. Network Customers shall have recourse with the Authority to file a complaint if they believe that the Operator has violated the Competitive Practices Policy.

5.2 CONFIDENTIALITY AND OPEN RECORDS COMPLIANCE

A. The Operator agrees that all information pertaining to the Network, its operations, and its financial performance shall be kept confidential.

B. Operator acknowledges the laws of the State of Virginia in regard to open records under the Virginia Freedom of Information Act, and that certain information normally treated as confidential may be open for public inspection. Accordingly, Operator information which the Operator wishes to keep confidential must be clearly designated as confidential. The Authority shall endeavor to honor such a designation subject to the disclosure requirements of the Virginia Freedom of Information Act. The Network may only be used in the manner and for the purposes described in this Agreement, as authorized by the Authority.

5.3 PRIVACY OF CUSTOMER INFORMATION

The Authority and the Operator shall comply with all applicable federal, state, and local laws, regulations and ordinances regarding the protection and use of End User information.

5.4 ELECTRONIC SURVEILLANCE IN SUPPORT OF LAW

The Operator acknowledges that it from time to time may be required to provide a Law Enforcement Agency (LEA) with the capability to conduct electronic surveillances on the End Users. The Operator shall cooperate fully with the LEA in accordance with all rules, regulations, and procedures, including any notification or non-disclosure requirements that may accompany such a request as specified in The Network Policies and Procedures Manual.

5.5 INSURANCE

A. The Operator shall, during the performance of this Agreement, keep in force at least the following minimum limits of insurance. Worker's compensation insurance shall comply

with the requirements of the laws of the Commonwealth of Virginia. Additional Umbrella would be required for the Operator if they are directly providing maintenance and repair of the Network. If the Operator subcontracts the Network maintenance and repair the insurance would be required by the subcontractor.

Class of Insurance	*Each Occurrence*	*Aggregate*
Worker's Compensation	Statutory	Statutory
Commercial General Liability	$2,000,000	$2,000,000
Automobile Liability, Combined Single Limit	$1,000,000	$1,000,000

B. The Operator shall furnish an original Certificate of Insurance, naming, with the exception of Worker's Compensation and Professional Liability, the Nelson County Broadband Authority as an additional insured. The Certificate of Insurance must provide that the Authority shall be given 45 days advance notice of cancellation, non-renewal, or material change in coverage.

6 ARTICLE VI
INDEMNIFICATION

6.1 OPERATOR INDEMNITY

The Operator shall indemnify, defend, and hold harmless the Authority, its officers, agents and employees of and from any claim, demand, lawsuit, or action of any kind (including, but not limited to, injury to or death of persons, including, but not limited to, Customers, employees of the Operator or the Authority, and damage or destruction of property, including, but not limited to, property of Customers, the Operator, or the Authority) arising out of:

I. negligent or willful acts or omissions of the Operator, its agents, officers, directors, employees or contractors;
II. the exercise by the Operator of the privileges or rights given herein; and
III. Operator shall indemnify, defend, and hold harmless the Authority, its officers, agents, and all employees and volunteers, from any and all claims for bodily injury, personal injury, or property damage or loss, of whatever nature, including damages for the interruption of services of those using the Authority system, and including the cost of investigation, all expenses of litigation and the costs of appeals, including reasonable attorney fees, arising out of or resulting from any error, omission, negligent act, or intentional tort of, or the failure to perform any of its obligations under this Agreement by, Operator, its sub-contractors, and their agents and employees. The provisions of this section shall survive the termination of this Agreement.

7 ARTICLE VII
FORCE MAJEURE

Force Majeure shall be considered to include circumstances, events, or occurrences beyond the control of a party, or if foreseeable, cannot be avoided by the exercise of efforts, and shall include acts of civil or military authority, an act of God, acts of war, acts of government, riot, insurrection, blockage, embargoes, sabotage, epidemics, unusually severe weather for the location in which the Work is to be performed, flood, famine, acts of terrorism, public disorder or civil disobedience, acts of judicial authority (including, but not limited to, injunctions), fire, or explosion occurring after the Effective Date hereunder that, due to its consequences, threatens to delay the timely performance of the affected party's obligations hereunder. Force Majeure shall also include any suspension, termination, interruption, denial or failure to issue or renew, by a governmental authority or other party having approval rights, of any approval required for construction, installation or operation of the Network or for either party to perform its obligations. Whenever either Party has knowledge of any event of Force Majeure or other situation that is delaying or threatens to delay the timely performance of any obligation called for by this Agreement, that Party shall immediately give written notice thereof, including all relevant information with respect thereto, to the other party.

B. Neither party to this Agreement shall be liable for delay or failure to perform pursuant to the terms of this Agreement if and to the extent such delay or failure is due to the event of Force Majeure as defined above provided that neither Party may claim the benefit of this section unless the delay or failure to perform is due to causes beyond its control and without its fault or negligence.
C. Upon the occurrence of any event of Force Majeure, the affected Party shall notify the other party in writing and continue to perform the balance of the requirements of this Agreement to the extent possible.

8 ARTICLE VIII
8.1 TERMINATION AND SUSPENSION
8.1.1 Delay, Termination and Default

A. In the event either the Authority or the Operator shall materially violate any of the provisions of this Agreement, or the quality or quantity of the Work is not in accordance with either the requirements or standards of this Agreement, then the aggrieved Party shall provide written notice to the other Party of such default. If the defaulting Party fails to cure such default within thirty (30) days after receipt of notice from the aggrieved Party, or begin to cure if such default cannot be reasonably cured within thirty (30) days, then the aggrieved Party shall have the right to terminate this Agreement upon issuance of a written termination notice. It shall be grounds for termination by the Authority if the Operator should commit three or more events of default within a twelve month period even if cure has been effected.

B. Termination for Non-Appropriation
While it is the intent of the NCBA and the Board of Supervisors of Nelson County that the Network shall be successful and self-sustaining, in those instances where funding by the County is necessary, then all obligations under this Agreement shall be subject to the availability of appropriations for this purpose. In the event of non-appropriation of funds for the undertakings in this Agreement, NCBA may terminate, in whole or in part, this Agreement. Written notice will be provided to Operator as soon as possible after legislative action is taken

9 ARTICLE IX
MISCELLANEOUS

9.1 AMENDMENTS
Neither this Agreement nor any provisions hereof may be changed, waived, discharged, or terminated orally, but may only be modified or amended by an instrument in writing, signed by both the Authority and the Operator.

9.2 INTERPRETATION
A. No rule of construction requiring interpretation against the drafter of this Agreement shall apply in the interpretation of this Agreement
B. The article, section and paragraph heading contained in this Agreement are for purposes of reference only and shall not limit, expand, or otherwise affect the construction of any provisions hereof. All references in this Agreement to articles, sections, and paragraphs, unless expressly noted otherwise, are to articles, sections, and paragraphs contained in this Agreement.

9.3 GOVERNING LAW AND FORUM
This Agreement shall be governed by the laws of the Commonwealth of Virginia. Venue of any legal action shall be, and the Operator agrees to the jurisdiction in, the Circuit Court for Nelson County, Virginia.

9.4 WAIVERS
The failure by the Authority or the Operator at any time or times hereafter to require strict performance by the other of any of the undertakings, agreements, or covenants contained in this Agreement shall not waive, affect or diminish any right of the Authority or the Operator hereunder to demand strict compliance and performance therewith. None of the undertakings, agreements, or covenants of the Authority or the Operator under this Agreement shall be deemed to have been waived unless such waiver is evidenced by an instrument in writing assigned by the Party to be charged specifying such waiver.

9.5 NOTICES
Unless otherwise specifically provided in this Agreement, any notice or other communication herein required or permitted to be given shall be in writing and may be personally served, or sent by courier or United States certified mail, and shall be deemed to

have been given when delivered in person or by courier service, or five (5) days after deposit in the United States mail, with postage prepaid and properly addressed, as follows:

If to the Authority, to:

Chairman
Nelson County Broadband Authority
84 Courthouse Square
P.O. Box 336
Lovingston, VA 22949
434.263.7000

If to the Operator, to:
Mr. William B. Fooks
President
Blue Ridge Internetworks
321 E. Main St., Suite 200
Charlottesville, VA 22902
434.817.0707

9.6 SEVERABILITY

If any term or provision of this Agreement shall, to any extent, be determined by a court of competent jurisdiction to be void, voidable or unenforceable, such void, voidable or unenforceable term or provision shall not affect any other term or provision of this Agreement.

9.7 COUNTERPARTS

This Agreement may be executed in any number of counterparts, each of which when so executed and delivered, shall be deemed an original, but all such counterparts taken together shall constitute only one instrument.

9.8 ENTIRE AGREEMENT

This Agreement contains the only agreement between the Parties. There are no other agreements, verbal or written, between the Parties.

9.9 ASSIGNMENT

The Operator may not assign this Agreement or any part thereof without the prior written consent of the Authority.

IN WITNESS WHEREOF, the Parties have executed this Agreement as of the date first above-written.

Nelson County Broadband Authority	Blue Ridge Websoft, LLC dba Blue Ridge InternetWorks
By: _____	By: _____
Name	Name
Chairman, Nelson County Broadband Authority	
Title	Title
ATTEST:	ATTEST:
By: _____	By: _____
Name	Name
_____	_____
Title	Title

EXHIBIT A
NETWORK MANAGEMENT PLAN

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EXHIBIT B

THE NETWORK POLICIES AND PROCEDURES MANUAL

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II C

AGREEMENT

BETWEEN

COMPUTER CABLING AND TECHNOLOGY SERVICES

AND

NELSON COUNTY BROADBAND AUTHORITY

FOR

OUTSIDE PLANT DROP(S), REPAIR AND INSPECTION

CONTENTS

AGREEMENT

THIS AGREEMENT, made and entered this 12th day of December, 2012, by and between the Nelson County Broadband Authority (the "NCBA") and Computer Cabling and Technology Services, Inc.(the "Contractor") provides:

1. UNDERTAKING

The Contractor will furnish materials and perform the work to provide outside plant ("OSP") new service drops, emergency repair, and inspection of the NCBA broadband network (the "Work") in accordance with this Agreement, the General Conditions, and the specifications listed in The Nelson County Broadband Authority OSP Drop(s), Repair and Inspection Request for Quotation #2012-NCBA-SC14OSPDR&I issued August 1, 2012, marked as Exhibit A, and the Contract Pricing, marked as Exhibit B, all of which are attached hereto and made a part hereof (collectively, the "Contract Documents").

2. CONTRACT PRICE

The NCBA will pay in consideration of the Work the sums set forth in Exhibit B.

3. TERM

The Term of this Agreement is one year beginning December 12, 2012 and shall renew automatically upon the same terms and conditions in this Agreement on a month-to-month basis, unless and until either party provides the other with ninety (90) days prior written notice of its desire to terminate.

4. NOTICES

All notices required or permitted under this Agreement shall be in writing and shall be deemed delivered in person or deposited in the United States mail, postage prepaid addressed as follows. Either party may change such address from time to time by providing written notice to the other in the manner set forth above.

If to the NCBA:

Stephen A. Carter
NCBA
Post Office Box 336
Lovingston, Virginia 22949

If to the Contractor:

Daniel M. Beam, President
Computer Cabling and
Technology Services
3445 Lake Point Drive
Harrisonburg, VA 22801

IN WITNESS WHEREOF, the parties hereto have executed this Agreement as of the date first above-written.

NELSON COUNTY BROADBAND AUTHORITY

By: Thomas H. Bruguiere, Jr.

Its Chairman

COMPUTER CABLING AND TECHNOLOGY SERVICES

By: David M Bean, Pres.

Its President

GENERAL CONDITIONS

The following provisions are made a part of the Agreement:

1. Performance of Work

Contractor shall perform all services hereunder:

a. expeditiously and within the required response times;
b. in accordance with the standard of care and skill existing as of the date such services are provided; in accordance with all applicable laws, codes and regulations;
c. in accordance with current standard technology for similar project systems accepted within the industry as of the time the Work is performed.

2. Inspection of Work

All materials and workmanship will be subject to inspection, examination, and testing by the NCBA, or the NCBA's representative, who will have the right either to reject defective material and workmanship or to require its correction.

3. Guarantee

The Contractor warrants and guarantees that completed Work is free from all defects due to faulty materials or workmanship and that the Contractor shall promptly make such corrections as may be necessary by reason of such defects including the repairs of any damage to other parts of the Work resulting from such defects. The NCBA will give notice of observed defects with reasonable promptness. In the event that the Contractor shall fail to make such repairs, adjustments, or other corrective action that may be made necessary by such defects, the NCBA may do so and charge the Contractor the cost thereby incurred. In addition, Contractor shall provide the NCBA with all warranty materials issued by a manufacturer for components of the Work and shall take all steps necessary to activate, document, and maintain in force such warranties. Nothing herein shall be construed to establish a period of limitation with respect to any other obligation under the Agreement.

4. Late Payment Fee

All invoices issued under this Agreement shall be submitted to the NCBA net 45 days. A 1.5% service charge shall be assessed on all invoices not paid within 45 calendar days from date of invoice.

5. Expense Reimbursement

The Contract Price includes all fees and ordinary expenses including reasonable travel, lodging, meals, telephone expense, office overhead and clerical support. Contractor shall pay all such "out-of-pocket" expenses and shall not be entitled to reimbursement from the NCBA except by mutual prior agreement.

6. Termination for Convenience

The NCBA upon written notice to the Contractor may terminate this Agreement. The Contractor will be paid for the negotiated and agreed upon cost of the Work performed as of the termination date.

If any work or service hereunder is in progress, but not completed as of the date of termination, then the Agreement may be extended upon written approval of the NCBA until the work or services are completed and accepted.

7. Termination for Cause

If Contractor should refuse or fail to fulfill in a timely manner its obligations under this Agreement, or if the Contractor should fail to observe any of the covenants or stipulations of this contract, then the NCBA shall have the right to terminate specifying the effective date thereof. In such event, the Contractor's shall be entitled to receive just compensation for any satisfactory Work completed. The right of the Contractor to proceed will not be terminated because of delays in the performance of the Work due to unforeseeable causes beyond the Contractor's control and without Contractor's fault or negligence.

8. Relationship of Parties

The Contractor's relationship with the NCBA shall at all times be that of an independent contractor. The Contract Documents shall not be construed to designate the Contractor, or any of its officers, employees, as either employees or agents of the NCBA. The Contractor shall accept full and exclusive responsibility for the payment of any and all contributions or taxes, or both, for any unemployment insurance, medical and old age retirement benefits, pensions, and annuities now or hereinafter imposed under any law of the United States or any State, which are measured by the wages, salaries, or other remuneration paid to persons employed by the Contractor on the work to be performed under the contract or in any way connected therewith. The Contractor shall comply with all administrative regulations and rulings thereunder with respect to any of the matters. The Contractor shall reimburse the NCBA for any of the contributions or taxes, or both, or any part thereof, if by law the NCBA may be required to pay the same or any part thereof.

9. Disclosure

During the term of this Agreement, the Contractor shall not, without the prior written permission of the NCBA, accept from other clients any assignment or tasks which substantially conflict with the objectives of this Agreement. The Contractor shall give written notice to the NCBA with respect to any such assignments or tasks. The notice shall set forth in reasonable detail the services the Contractor would undertake to perform in connection with such assignments or tasks. The NCBA agrees to grant or deny its consent to the Contractor's acceptance of the assignments or tasks described in the notice within ten days after the notice is given. The NCBA shall be deemed to have granted its consent if no action is taken by the NCBA within said ten-day period.

10. Employees

Contractor's employees and agents, if any, who perform services for the NCBA under this Agreement, shall also be bound by the provisions of this Agreement.

11. Injuries

Contractor waives any rights to recover damages from the NCBA for any injuries that Contractor, its employees, or both, may sustain while performing services under this Agreement and that are a

result of the negligence of Contractor or its employees or agents. The Contractor shall take precautions for the safety of, and provide reasonable protection to prevent injury, loss, or damage to, its employees, and other persons who may be affected by the Work and to property at the site of the Work or adjacent thereto.

12. INDEMNIFICATION

The Contractor shall indemnify and hold harmless the NCBA, its officers, agents and all employees and volunteers, from any and all claims of bodily injury, personal injury or property damage, including the cost of investigation, all expenses of litigation, including reasonable attorney fees, and the cost of appeals arising out of any claims or suits which result from error, omissions, or negligent acts of the Contractor or its sub-contractors and their agents and employees. Contractor shall indemnify and hold harmless the NCBA against and from all liability, claims, damages and costs, including attorney's fees of every kind and nature attributable to bodily injury, sickness, disease, or death or to damage or destruction of property resulting from or in any manner arising out of or in connection with the performance of the Work under this Agreement. The provisions of this section shall survive the termination or other conclusion of this Agreement.

13. ACCEPTANCE

Neither payment nor use, occupancy, or acceptance of the Work by the NCBA shall operate as an acceptance of any products or services not in accordance with this Agreement, nor shall same relieve Contractor of any responsibility for negligence, errors, or omissions in connection with the Work or operate to release the Contractor from any obligation under the Agreement.

14. INSURANCE

The Contractor shall, during the performance of the Agreement, keep in force at least the minimum limits of insurance as listed below.

Class of Insurance		***Each Occurrence***	***Aggregate***
Worker's Compensation		Statutory	Statutory
Commercial General Liability		$1,000,000	$2,000,000
Automobile Liability, Combined Single Limit		$1,000,000	$1,000,000

The Contractor shall furnish an original Certificate of Insurance, naming, with the exception of Worker's Compensation, NCBA as an additional insured. The Certificate of Insurance must provide that the NCBA shall be given 45 days advance notice of cancellation, non-renewal or material change in coverage.

15. Records Retention and Availability

Contractor agrees that the NCBA, the State Auditor, or any of their duly authorized representatives at any time during normal business hours and as often as they may reasonably deem necessary, shall have access to and the right to examine, audit, excerpt, and transcribe any books, documents, papers, records, etc., which are pertinent to the accounting practices and procedures of Contractor and involve transactions relating to this Agreement. Contractor agrees to maintain these records for a period of three (3) years from the date of termination of this Agreement.

16. Nondiscrimination

During the performance of this Agreement, Contractor agrees as follows (Code of Virginia, Section 2:2-4311):

a. Contractor shall not discriminate against any employee or applicant for employment because of race, religion, color, sex, national origin, age, disability or other basis prohibited by state law relating to discrimination in employment except where there is a bona fide occupational qualification, reasonably necessary to the normal operation of the Contractor. Contractor agrees to post in conspicuous places, available to employees and applicants for employment, notices setting forth the provisions of this nondiscrimination clause.

b. Contractor in all solicitations or advertisements for employees placed by or on behalf of Contractor, shall state that such Contractor is an equal opportunity employer.

c. Notices, advertisements and solicitations placed in accordance with Federal law, rule or regulation shall be deemed sufficient for the purpose of meeting the requirements of this section.

Contractor shall include the provisions of the foregoing paragraphs of this section in every subcontract or purchase order of over $10,000.00, so that the provisions will be binding upon each subcontractor or vendor.

17. Drug-Free Workplace to be Maintained by the Contractor

During the performance of this Agreement, Contractor agrees as follows (Code of Virginia, Section 2:2-4312):

a. Contractor shall provide a drug-free workplace for all of its employees. Contractor agrees to post in conspicuous places, available to employees and applicants for employment, a statement notifying employees that the unlawful manufacture, sale, distribution, dispensation, possession or use of a controlled substance or marijuana is prohibited in the workplace and specify the

actions that will be taken against employees for violations of this prohibition.

b. Contractor, in all solicitations or advertisements for employees placed by or on behalf of Contractor shall state that such Contractor maintains a drug-free workplace.

c. Notices, advertisements and solicitations placed in accordance with federal law, rule of regulation shall be deemed sufficient for the purpose of meeting the requirements of this section.

Contractor shall include the provisions of the foregoing paragraphs of this section in every subcontract or purchase order of over $10,000.00 so that the provisions will be binding upon each subcontractor or vendor.

18. FAITH BASED ORGANIZATIONS

The NCBA does not discriminate against faith-based organizations.

19. IMMIGRATION LAW

Contractor covenants that it does not, and shall not during the performance of this Agreement for goods and services in the Commonwealth, knowingly employ an unauthorized alien as defined in the federal Immigration Reform and Control Act of 1986.

20. CONTRACTUAL CLAIM

Contractual claims, whether for money or for other relief, shall be submitted, in writing, no later than sixty (60) days after receipt of final payment; however, written notice of the Contractor's intention to file such claim must be given at the time of the occurrence or beginning of the work upon which the claim is based. Such notice is a condition precedent to the assertion of any such claim by the Contractor. A written decision upon any such claims will be made by the NCBA Administrator or his designee within thirty (30) days after submittal of the claim and any practically available additional supporting evidence required by the NCBA Administrator. The Contractor may not institute legal action prior to receipt of the NCBA's decision on the claim unless the NCBA Administrator fails to render such decision within 120 days from submittal of its claim. The decision of the NCBA Administrator shall be final and conclusive unless the Contractor within six (6) months of the date of the final decision on a claim or from expiration of the 120 day time limit, whichever occurs first, initiates legal action as provided in Section 2.2-4364, of the Virginia Code. Failure of the NCBA to render a decision within said 120 days shall not result in the Contractor being awarded the relief claimed nor shall it result in any other relief or penalty. The sole result of the NCBA's failure to render a decision within said 120 days shall be Contractor's right to immediately institute legal action. No administrative appeals procedure pursuant to Section 2.2-4365, of the Virginia Code, has been established for contractual claims under this Agreement.

21. Confidentiality

Except as provided by law, specifically including the Virginia Freedom of Information Act, or as necessary to fulfill the terms and obligations set forth herein, or in obtaining the assistance of their respective attorneys, accountants, auditors, regulators, or to comply with a court order, the parties agree that they shall not publish, communicate, disclose or cause to be published, communicated, or disclosed in any manner whatsoever or to any person whatsoever, information acquired or generated in connection with this Agreement. This provision shall survive the termination or expiration of this Agreement.

22. Assignment

Contractor's obligations under this Agreement may not be assigned or transferred to any other person, firm, or corporation without the prior written consent of the NCBA.

23. Waiver of Contractual Right

The failure of either party to enforce any provision of this Agreement shall not be construed as a waiver or limitation of that party's right to subsequently enforce and compel strict compliance with every provision of this Agreement.

24. Applicable Law

The laws of the Commonwealth of Virginia shall apply in the construction and enforcement of this Agreement. The sole venue for any proceeding between the parties regarding this Agreement shall lie in the Circuit Court of Nelson County, Virginia.

25. Severability

If any provision of this Agreement shall be held to be invalid or unenforceable for any reason, the remaining provisions shall continue to be valid and enforceable. If a court should find that any provision of this Agreement is invalid or unenforceable, but that by limiting such provision it becomes valid and enforceable, then such provision shall be deemed to be written, construed, and enforced as so limited.

26. Amendment

This Agreement may not be modified or amended unless the amendment is made in writing and is signed by both parties.

27. Entire Agreement

This Agreement contains the entire agreement of the parties and there are no other promises or conditions in any other agreement whether oral or written. This Agreement supersedes any prior written or oral agreements between the parties. In the event of any conflict between provisions contained herein and those appearing in an exhibit, the provisions of the document deemed by the NCBA to be most favorable to the NCBA shall prevail.

EXHIBIT A

NCBA RFQ QUOTATION #2012-NCBA-SC14OSPDR&I

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Nelson County Broadband Authority OSP Drop(s), Repair and Inspection Request for Quotation # 2012- NCBA – SC014OSPDR&I

Issued:
August 1, 2012

Quotation Due Date:
August 16, 2012 @ 5:00 PM EDT
Faxed or Emailed Quotations Will Not Be Accepted

P.O. Box 336 • Lovingston, VA 22949 • 434-263-7000 • Fax 434-263-7004 • www.nelsoncounty.com

REQUEST FOR QUOTATION # 2012- SC014-OSPDR&I
Outside Plant (OSP) Drop(s), Repair and Inspection

Project: Nelson County Broadband Middle Mile Network

The Work: Perform service drops; emergency and routine repair to the underground outside plant; premise exterior equipment and drop(s); and semiannual OSP inspection.

QUOTATIONS WILL BE RECEIVED AT:
Nelson County Courthouse
Purchasing Department
P. O. Box 336
84 Courthouse Square
Lovingston, VA 22949
Faxed or electronic responses will not be accepted.

Until: Date: August 16, 2012
Time: 5:00 PM EDT

The box or envelope should be clearly labeled on the outside with the Quotation #, the respondent's name and the due date and time. The County makes no assurances that a quotation will be delivered to the Nelson County Administrator's Office on the same date that it is received at the post office. It shall be the sole responsibility of each contractor to assure that its quotation is delivered in compliance with the specified deadline. A proposal that is received in the Lovingston post office box, but not received in the Nelson County Administrator's Office by the date and time requested, for any reason whatsoever, will be rejected as untimely. **The quotations may be hand delivered to the Nelson County Courthouse 84 Courthouse Square, Lovingston, VA 22949 not later than 5:00 PM on August 16, 2012.**

The proposed work is to contract with the Nelson County Broadband Authority (NCBA) for performing fiber optic premise service drops; emergency and routine repairs, and inspection of the OSP.

All quotations must be in accordance with the Request for Quotation Documents on file and available for download and examination at: www.nelsoncounty.com or by email to Nelson@iconengineering.net.

The quotation should respond to this request for quotation (RFQ) with all information requested, including price by foot or each, and a guaranteed warranty period. Quotations shall remain subject to acceptance for **60 days** after the due date. Pricing should remain in effect for the original term of the contract (one year) after which contract renewals may be negotiated as allowed by procurement policy.

Each Quotation must state the respondent's qualifications to transact business in the Commonwealth of Virginia or covenant to obtain such qualifications prior to the award of the Contract. The respondent's corporate number from the Commonwealth of Virginia Secretary of State and principal place of business as filed with the Commonwealth must be included where applicable.

NCBA reserves the right to reject any or all quotations, including without limitation the right to reject any or all nonconforming, non-responsive, incomplete, unbalanced, or conditional quotations, to waive

informalities, and to reject the quotation of any respondent if NCBA believes it would not be in the best interest of NCBA to make an award to that respondent. NCBA further reserves the right to reject any one or more items within the quotation response and accept all other items. NCBA also reserves the right to negotiate for modification of the quotation with the selected respondent to such an extent as may be determined by NCBA. NCBA also reserves the right to adjust quantities and request a similar substitute product in lieu of the product bid to the extent as may be determined by NCBA. Also if, in NCBA's opinion, a particular contractor offers distinct advantages over other respondents, NCBA may award to a respondent that is deemed the most desirable and advantageous from the standpoint of overall value and services even though such quotation may not, on its face, appear to be the lowest price. Distinct advantages may include solution aspects that minimize maintenance, the overall work plan, specifications, schedule, standardization or overall economy.

I. Introduction

The Nelson County Broadband Authority (NCBA) is seeking qualified companies to submit proposals to provide outside plant (OSP) new service drop(s), emergency repair and inspection for the Nelson County Broadband network. The purpose of this RFQ is to offer prospective Applicant(s) the opportunity to demonstrate their ability to meet the day-to-day and long-term expansion, repair and inspection needs of this middle mile broadband network. The Authority is interested in exploring all reasonable and viable proposals for the operation, repair, and inspection of its broadband network to best serve the telecommunications needs of its citizens.

Outside Plant Customer Drop(s), Repair and Inspection (DR&I)

The selected firm will assume responsibility for all future service drop(s) and ONT deployment, turnup and testing. The OSP firm shall inspect and properly maintain the OSP and effect repairs as listed in later sections. The OSP shall include the tower backhaul network interconnectivity only. Although there are several towers included in this project, there is no inspection or repair to the tower structure included in this RFQ.

The fiber backbone will pass approximately 36 strategic community facilities, some of which (13) will be anchor institutions connected to the network with drop fiber and an active Optical Network Terminal (ONT) as part of the grant-funded network build. These anchor connections will be installed under the major construction contract and are not a part of this RFQ.

The NCBA has selected Calix electronics for ONT connections at each location. The Calix solution is a one fiber per customer drop.

Outside Plant Deployment and Locates:

The entire outside plant of the Nelson County network is deployed underground with vaults placed strategically for access to the fiber backbone. Because the deployment is all underground it is expected that emergency repairs to the network will be few and usually due to contractor cuts rather than weather or other more frequent occurrences. The plant includes marker post test stations that will facilitate very accurate locates in the expectation contractors will have excellent knowledge of the path of fiber. There are currently no aerial service drops. A contract has already been placed for locate services.

NEW SERVICE DROPS:

The outside plant and already placed service drops are deployed underground; however, there may be occasions where an aerial drop would be used. The number of drops will fluctuate and will be scheduled within a fourteen day window on most occasions. There should be no emergency for scheduled service drops.

II. OSP SERVICE DROP(S), REPAIR AND INSPECTION

OUTSIDE PLANT (OSP)

A. Perform periodic inspection (a minimum of once annually) of fiber optic outside plant to identify evidence of damage or deterioration. This would include, but is not limited to, visual examination of the vaults for missing bolts or other damage, assuring the Marker Posts and Marker Post Test Stations are intact and undamaged and there is no visible conduit along the route. At startup the outside plant will consist of approximately 31 miles of fiber.

B. Written documentation and reports of the findings are to be provided to the NCBA after each inspection

C. Install new fiber drop(s) and mount/energize Optical Network Terminal (ONT) for End-User premises service connected to the fiber plant. It is anticipated that most ONTs will be mounted outside the building adjacent the service entrance cable. Each outdoor ONT will have a separate battery backup and power supply (indoor)

D. Receive dispatch 24/7/365 from Network Operator and deploy personnel to repair, install, splice, turn up and test (assist NOC personnel) the network in emergency situations

E. Provide a four (4) hour site response for personnel to respond to outside plant disruptions

F. Repair/replace and test fiber optic outside plant and wireless tower connections to the OSP fiber as needed

G. Manage plant materials and spare equipment above re-order levels established for the network to include the following:
    1. Maintain an inventory of hardware and ONTs for the NCBA (materials purchased by NCBA)
    2. Provide reports to the Authority regarding inventory requirements for all critical components and regular use items
    3. Update re-order levels annually based upon anticipated delivery times
    4. Report inventory quantities to the Authority quarterly

H. Oversee and/or perform construction of future outside plant drops for the Network, and report fiber usage to the fiber management system operator

III. Section I—RFQ Response Instructions

A. RFQ Quotation Goal

This Request for Quotation (RFQ) seeks to receive quotes and information from interested OSP service drop(s), repair, and inspection resources. The Authority is interested in receiving quotations from any prospective organization meeting the qualifications outlined in this document and who is willing to work in partnership with the Authority. Questions should be in writing email to Nelson@iconengineering.net or faxed to 770-592-7363.

B. OSP Service Drop(s), Repair and Inspection Qualifications

The Authority is seeking a qualified company that can effectively repair, maintain and when necessary extend the Broadband Network. Key qualifications for candidates for the OSP—DR&I include but are not limited to:

- Experience in OSP construction, repair, splicing, turn up and testing of fiber optic networks
- Sufficient resources to perform the duties required
- Established project management, safety and training protocols

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IV. Exhibit A

OSP Drop(s), Repair and Inspection Pricing Sheets

If the respondent may use their own quote format, but all items on this table should be addressed. Additional items may be added as warranted by responder.

NCBA cannot engage in a cost plus pricing contract. Each price must be stated in units. Should other costs not listed here be necessary please complete them in the unused spaces of the table. All pricing shall be fully loaded.

For pricing purposes, a basic drop will consist of a six count armored drop cable buried 36 inches deep in VDOT right of way and 18 inches deep elsewhere. The cable may be installed using trenching or plowing techniques restored according to VDOT specifications in the ROW and in a workmanlike manner elsewhere. 1-1/2 inch PVC or other approved conduit will be used beneath roadways and as otherwise necessary. The installation will terminate with an ONT, power supply and battery (two hardened enclosures) attached to the building wall near the power entrance, grounded to the service entrance ground. A plug-in power supply will be installed inside the building at the nearest acceptable receptacle. The contractor will be responsible for coordinating with the network operator to turn up the ONT. The NCBA will purchase fiber, conduit, ONTs, splice closures and similar items. Contractor will provide typical truck items such as splicing hardware, fasteners and other similar items.

ACTIVITY	*UNIT*	*PRICE (USD)*
Underground Drop to House or Building—a) fusion splicing at ONT and vault, mounting of ONT and battery cabinets, installation of power supply through building exterior to receptacle, repair wall penetration, testing and turn-up to NOC, provide updates to fiber management system (by others)	Each	
b. Burial of Underground drop fiber and restoration	Per foot	
c. VDOT Roadway bore in conduit (36 inches) and install fiber	Per foot	
d. Bore in conduit driveway or sidewalk (18 inches), install fiber in conduit	Per foot	
OSP Emergency Repair (4 hour response) loaded including travel to and from closest facility, a. all items except splicing (excavation, photographs and measurements, restoration)	Each Occurrence	
b. OSP Emergency Repair, Splicing during emergency repairs	Per fiber	
Rock Adder, Removal and disposal during other work	Per cu. Ft.	
Repair/Replace Underground Fiber all conditions including emergency 4 hr.	Per Foot	
Properly inventory and re order materials including spare parts**	Per year	
Physical disconnect reconnect of services at ONT	Each	
Inspect fiber OSP to include visual inspection of vaults, tower connections, marker posts and marker post test stations. Report evidence of damage or deterioration to NCBA—minimum of twice yearly	Per Year	
Maintain damaged or deteriorating OSP as directed by NCBA	Each	
Update As Built drawings as required	Per Foot	

ACTIVITY	*UNIT*	*PRICE (USD)*
Repair/Replace ONT at customer premise	Each	
Remove/Replace concrete per inch of depth	Sq Foot	
Core Drill Building 2 inch diameter (provide details if any)	Per Inch of Wall	
Provide Estimate of Installation Cost for Potential Customer	Each	
NOTE: Commercial Installations requiring core drilling, concrete removal, and other building entry activities shall be quoted and approved by the NCBA on a case by case basis.		
**** Under normal conditions as detailed in Service drop includes mounting ONT and testing to NOC.***		

V. Federal Requirements

This project is funded by a grant from the Department of Commerce, Broadband Technology Opportunities Program as authorized by the American Recovery and Reinvestment Act (ARRA) of 2009 and with Virginia Community Development Block Grant funds. The purpose of the grant is to fund the construction of a middle mile network delivering broadband services to community anchor institutions, and providing access to private providers on an open access basis to enable broadband service delivery to unserved and underserved areas of Nelson County. By submitting a bid the respondent agrees to adhere to all applicable ARRA and CDBG funding requirements.

Requirements of the Federal ARRA grant state the Federal Law language beginning in the next paragraph is to be inserted into all bids, quotations, requests for proposals and contracts. The following may or may not apply to your particular quotation or RFQ. If you have any question about compliance please request information from the NTIA website at http://www.ntia.doc.gov/otiahome/otiahome.html.

The following referenced Federal Laws shall apply in the construction and enforcement of this Agreement, as applicable, with the same force and effect as if they were given in full text. Additional applicable Federal Laws may be contained in the following documents and are incorporated herein by reference: U.S. Department of Commerce Financial Assistance Standard Terms and Conditions, 15 CFR Part 14, Uniform Administrative Requirements for Grants and Agreements to States and Local Governments, OMB Circular A087, Cost Principles for State, Local, and Indian Tribal Governments, OMB Circular A-133, Audits of States, Local Governments, and Non-Profit Organizations, 74 FR 33104 July 9, 2009, 74 FR 41676 August 18, 2009, 74 FR 42644 August 24, 2009. American Recovery and Reinvestment Act of 2009-DOC Standard Terms and Conditions.

1. Compliance with Executive Order 11246 of September 24, 1965, entitled "Equal Employment Opportunity," as amended by Executive Order 11375 of October 13, 1967, and as supplemented in Department of Labor regulations (41CFR chapter 60). (All construction contracts awarded in excess of $10,000 by grantees and their contractors or subgrantees)
2. Compliance with the Copeland "Anti-Kickback" Act (18 U.S.C. 874) as supplemented in Department of Labor regulations (29 CFR Part 3). (All contracts and subgrants for construction or repair)

3. Compliance with the Davis-Bacon Act (40 U.S.C. 276a to 276a–7) as supplemented by Department of Labor regulations (29 CFR Part 5).
   Pursuant to Section 1606 of the Recovery Act, any project using Recovery Act funds requires the payment of not less than the prevailing wages "at rates not less than those prevailing on projects of a character similar in the locality as determined by the Secretary of Labor," in accordance with 40 U.S.C. 3142(b), for "all laborers and mechanics employed by contractors and subcontractors on projects funded directly by or assisted in whole or in part by and through the Federal Government." With respect to the labor standards specified in this section, the Secretary of Labor shall have the authority and functions set forth in Reorganization Plan Numbered 14 of 1950 (64 Stat. 1267; 5 U.S.C. App.) and Section 3145 of Title 40, United States Code.
4. Compliance with Sections 103 and 107 of the Contract Work Hours and Safety Standards Act (40 U.S.C. 327–330) as supplemented by Department of Labor regulations (29 CFR Part 5). (Construction contracts awarded by grantees and subgrantees in excess of $2000, and in excess of $2500 for other contracts which involve the employment of mechanics or laborers)
5. Compliance with Notice of Requirement for Affirmative Action to Ensure Equal Employment Opportunity (Executive Order 11246, as amended). (Applicable to all contracts and subcontracts exceeding $10,000.)
   a. The Offeror's or Bidder's attention is called to the "Equal Opportunity Clause" and the "Standard Federal Equal Employment Opportunity Construction Contract Specifications" set forth herein.
   b. The goals and timetables for minority and female participation, expressed in percentage terms for the Contractor's aggregate workforce in each trade on all construction work in the covered area, are as follows:

Timetables	**Goals for minority participation in each trade**	**Goals for female participation in each trade**
Nelson Construction Project (Less than one year)	*12%*	*06.9%*

These goals are applicable to all the Contractor's construction work (whether or not it is Federal or federally assisted) performed in the covered area. If the contractor performs construction work in a geographical area located outside of the covered area, it shall apply the goals established for such geographical area where the work is actually performed. With regard to this second area, the contractor also is subject to the goals for both its federally involved and non federally involved construction.

The Contractor's compliance with the Executive Order 11246, as amended, and the regulations in 41 CFR Part 60-4 shall be based on its implementation of the Equal Opportunity Clause, specific affirmative action obligations required by the specifications set forth in 41 CFR 60-4.3(a), and its efforts to meet the goals established for the geographical area where the contract resulting from this solicitation is to be performed. The hours of minority and female employment and training must be substantially uniform throughout the length of the contract,

and in each trade, and the contractor shall make a good faith effort to employ minorities and women evenly on each of its projects. The transfer of minority or female employees or trainees from Contractor to Contractor or from project to project for the sole purpose of meeting the Contractor's goals shall be a violation of the contract, the Executive Order and the regulations in 41 CFR Part 60-4. Compliance with the goals will be measured against the total work hours performed.

6. Compliance with U.S. Department of Commerce, National Telecommunications and Information Administration (NTIA) requirements and regulations pertaining to reporting.

   Recovery Act sec. 1512(c), 123 Stat. at 287; 2 CFR part 176; OMB, Interim Final Guidance for Federal Financial Assistance, 74 FR 18449 (Apr. 23, 2009); Implementing Guidance for Reports on Use of Funds Pursuant to the American Recovery and Reinvestment Act of 2009 (OMB M–09–21 June 22, 2009), available at: http://www.whitehouse.gov/omb/assets/memoranda_fy2009/m0921.pdf.

7. Compliance with U.S. Department of Commerce, National Telecommunications and Information Administration (NTIA) requirements and regulations pertaining to patent rights with respect to any discovery or invention which arises or is developed in the course of or under such contract.

   The specific requirements governing the development, reporting, and disposition of rights to inventions and patents resulting from financial assistance awards are described in more detail in 37 CFR Part 401 and in particular, in the standard patent rights clause in 37 CFR § 401.14, which is hereby incorporated by reference.

8. Compliance with U.S. Department of Commerce, National Telecommunications and Information Administration (NTIA) requirements and regulations pertaining to copyrights and rights in data.

   a. Data, Databases, and Software.
      The rights to any work produced or purchased under a DOC Federal financial assistance award are determined by 15 CFR § 24.34 and 15 CFR § 14.36. Such works may include data, databases or software. The recipient owns any work produced or purchased under a DOC Federal financial assistance award subject to DOC's right to obtain, reproduce, publish or otherwise use the work or authorize others to receive, reproduce, publish or otherwise use the data for Government purposes.
   b. Copyright.
      The recipient may copyright any work produced under a DOC Federal financial assistance award subject to DOC's royalty-free nonexclusive and irrevocable right to reproduce, publish or otherwise use the work or authorize others to do so for Government purposes. Works jointly authored by DOC and recipient employees may be copyrighted but only the part authored by the recipient is protected because, under 17 U.S.C. § 105, works produced by Government employees are not copyrightable in the United States. On occasion, DOC may ask the recipient to transfer to DOC its copyright in a particular work when DOC is undertaking the primary dissemination of the work. Ownership of copyright by the Government through assignment is permitted by 17 U.S.C. § 105.

9. Access by the grantee, the subgrantee, the Federal grantor agency, the Comptroller General of the United States, or any of their duly authorized representatives to any books, documents,

papers, and records of the contractor which are directly pertinent to that specific contract for the purpose of making audit, examination, excerpts, and transcriptions.

10. Retention of all required records for three years after grantees or subgrantees make final payments and all other pending matters are closed.
11. Compliance with all applicable standards, orders, or requirements issued under section 306 of the Clean Air Act (42 U.S.C. 1857(h)), section 508 of the Clean Water Act (33 U.S.C. 1368), Executive Order 11738, and Environmental Protection Agency regulations (40 CFR part 15). (Contracts, subcontracts, and subgrants of amounts in excess of $100,000).
12. Compliance with mandatory standards and policies relating to energy efficiency which are contained in the state energy conservation plan issued in compliance with the Energy Policy and Conservation Act (Pub. L. 94–163, 89 Stat. 871). [53 FR 8048, 8087, Mar. 11, 1988, as amended at 60 FR 19639, 19642, Apr. 19, 1995]
13. Compliance with the Whistleblower Protection requirements of the American Recovery and Reinvestment Act (Recovery Act), Section 553 of Division A, Title XV, Public Law 111-5.

VI. Davis Bacon Act

General Decision Number: VA120056 01/06/2012 VA56

Superseded General Decision Number: VA20100148

State: Virginia

Construction Types: Heavy (Heavy and Sewer and Water Line)

Counties: Fluvanna, Greene and Nelson Counties in Virginia.

HEAVY CONSTRUCTION PROJECTS (Including Sewer and Water Lines)

Modification Number Publication Date
0 01/06/2012

SUVA2010-046 09/02/2010

	Rates	Fringes
CARPENTER, Includes Form Work....	$ 12.31	0.41
CEMENT MASON/CONCRETE FINISHER...	$ 19.00	3.83
ELECTRICIAN.....	$ 22.08	6.30
IRONWORKER, REINFORCING.....	$ 22.45	11.85
IRONWORKER, STRUCTURAL.....	$ 20.55	8.25
LABORERS		

Common or General.....	$ 9.22	0.48
Flagger.....	$ 7.39	0.20
Landscape.....	$ 10.00	
Pipelayer.....	$ 12.93	2.84
POWER EQUIPMENT OPERATOR:		
Backhoe.....	$ 15.43	1.18
Bobcat/Skid Loader.....	$ 11.40	
Bulldozer.....	$ 20.63	7.28
Crane, All Types.....	$ 15.85	1.46
Excavator.....	$ 12.50	0.54
Loader.....	$ 11.71	2.11
Mechanic.....	$ 26.78	6.32
Trackhoe.....	$ 12.75	1.24
Tugboat.....	$ 19.00	
TRUCK DRIVER: All Dump Trucks....	$ 9.96	0.97

WELDERS - Receive rate prescribed for craft performing operation to which welding is incidental.

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Unlisted classifications needed for work not included within the scope of the classifications listed may be added after award only as provided in the labor standards contract clauses (29CFR 5.5 (a) (1) (ii)).

The body of each wage determination lists the classification and wage rates that have been found to be prevailing for the cited type(s) of construction in the area covered by the wage determination. The classifications are listed in alphabetical order of "identifiers" that indicate whether the particular rate is union or non-union.

Union Identifiers

An identifier enclosed in dotted lines beginning with characters other than "SU" denotes that the union classification and rate have found to be prevailing for that classification. Example: PLUM0198-005 07/01/2011. The first four letters , PLUM, indicate the international union and the four-digit number, 0198, that follows indicates the local union number or district council number where applicable , i.e., Plumbers Local 0198. The next number, 005 in the example, is an internal number used in processing the wage determination. The date, 07/01/2011, following these characters is the effective date of the most current negotiated rate/collective bargaining agreement which would be July 1, 2011 in the above example.

Union prevailing wage rates will be updated to reflect any changes in the collective bargaining agreements governing the rate.

Non-Union Identifiers

Classifications listed under an "SU" identifier were derived from survey data by computing average rates and are not union rates; however, the data used in computing these rates may include both union and non-union data. Example: SULA2004-007 5/13/2010. SU indicates the rates are not union rates, LA indicates the State of Louisiana; 2004 is the year of the survey; and 007 is an internal number used in producing the wage determination. A 1993 or later date, 5/13/2010, indicates the classifications and rates under that identifier were issued as a General Wage Determination on that date.

Survey wage rates will remain in effect and will not change until a new survey is conducted.

WAGE DETERMINATION APPEALS PROCESS

1.) Has there been an initial decision in the matter? This can be:

* an existing published wage determination
* a survey underlying a wage determination
* a Wage and Hour Division letter setting forth a position on a wage determination matter
* a conformance (additional classification and rate) ruling

On survey related matters, initial contact, including requests for summaries of surveys, should be with the Wage and Hour Regional Office for the area in which the survey was conducted because those Regional Offices have responsibility for the Davis-Bacon survey program. If the response from this initial contact is not satisfactory, then the process described in 2.) and 3.) should be followed.

With regard to any other matter not yet ripe for the formal process described here, initial contact should be with the Branch of Construction Wage Determinations. Write to:

Branch of Construction Wage Determinations
Wage and Hour Division
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

2.) If the answer to the question in 1.) is yes, then an interested party (those affected by the action) can request review and reconsideration from the Wage and Hour Administrator (See 29 CFR Part 1.8 and 29 CFR Part 7). Write to:

Wage and Hour Administrator
U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

The request should be accompanied by a full statement of the interested party's position and by any information (wage payment data, project description, area practice material, etc.) that the requestor considers relevant to the issue.

3.) If the decision of the Administrator is not favorable, an interested party may appeal directly to the Administrative Review Board (formerly the Wage Appeals Board). Write to:

Administrative Review Board

U.S. Department of Labor
200 Constitution Avenue, N.W.
Washington, DC 20210

4.) All decisions by the Administrative Review Board are final.

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END OF GENERAL DECISION

EXHIBIT B

CONTRACT PRICING

ACTIVITY	*UNIT*	*PRICE (USD)*
Underground Drop to House or Building—a) fusion splicing at ONT and vault, mounting of ONT and battery cabinets, installation of power supply through building exterior to receptacle, repair wall penetration, testing and turn-up to NOC, provide updates to fiber management system (by others)	Each	$400.00
b. Burial of Underground drop fiber and restoration	Per foot	$3.00
c. VDOT Roadway bore in conduit (36 inches) and install fiber	Per foot	$9.00
d. Bore in conduit driveway or sidewalk (18 inches), install fiber in conduit	Per foot	$7.00
OSP Emergency Repair (4 hour response) loaded including travel to and from closest facility, a. all items except splicing (excavation, photographs and measurements, restoration)	Each Occurrence	$300.00
b. OSP Emergency Repair, Splicing during emergency repairs	Per fiber	$15.00
Rock Adder, Removal and disposal during other work	Per cu. Ft.	$50.00
Repair/Replace Underground Fiber all conditions including emergency 4 hr.	Per foot	$10.00
Option upon request by NCBA: Properly inventory and re order materials including spare parts**	Per hour	NA
Physical disconnect reconnect of services at ONT	Each	$100.00
Option upon request by NCBA: Inspect fiber OSP to include visual inspection of vaults, tower connections, marker posts and marker post test stations. Report evidence of damage or deterioration to NCBA	Per hour	$100.00
Maintain damaged or deteriorating OSP as directed by NCBA	Each	$300.00
Update As Built drawings as required	Per Foot	$0.20
Repair/Replace ONT at customer premise	Each	$100.00
Remove/Replace concrete per inch of depth	Sq Foot	$20.00
Core Drill Building 2 inch diameter (provide details if any)	Per Inch of Wall	$10.00
NOTE: Commercial Installations requiring core drilling, concrete removal, and other building entry activities shall be quoted and approved by the NCBA on a case by case basis.		
**** Under normal conditions as detailed in Service drop includes mounting ONT and testing to NOC.***		

II D

Installation Amortization Policy

1. Neighborhood Installation. Where multiple customers will be served by the installation of an extension from the network fiber backbone along and to the node serving the neighborhood (the "Fiber Extension"), the limit of the cost of installation of the Fiber Extension (apportioned *pro rata* among the initial contracting customers) and the individual service drop, net of any discount, which may be amortized is $2500.00 per customer. Customers connecting to the neighborhood fiber or to the Fiber Extension subsequent to the completion of the initial installation will pay as part of their installation cost a sum equal to the *pro rata* sum paid by the initial customers for their share of the Fiber Extension.

2. Individual Service Drops. The limit subsequent individual customers may amortize of the *pro rata* share and the cost of service drops, net of any discount, is $4000.00.

3. Exception. For service drops, or Fiber Extension and service drops, which would, if amortized, exceed $4000.00 or $2500.00 respectively, the amount, net of any discount, which may be amortized is limited as follows: the equal monthly installment for the amount amortized may not exceed _____% of the projected net monthly income to the NCBA for the service(s) contracted by the Customer(s). Customers connecting to the Fiber Extension subsequent to the completion of the initial installation will pay as part of their installation cost a sum equal to the *pro rata* sum paid by the initial customers, not to exceed $2500.00, for their share of the Fiber Extension.

All amortization requests are subject to administrative review and approval by the NCBA. Approval of amortization requests is, in all cases, subject to the availability of funds in the NCBA budget set aside for amortization of installation costs.

The NCBA may include additional fiber, vaults, and other equipment beyond that required for the initial installation. This is additional equipment and estimated labor costs will not be assessed to the original contracting parties, but will be captured (roughly)when subsequent customers are assessed the *pro rata* share.

Revised 3/27/2015

3/27/15 Policy explained.

The NCBA Board adopted a neighborhood installation program in 2013 as follows:

Neighborhood Installation. Where multiple customers will be served by the installation of an extension from the network fiber backbone along and to the node serving the neighborhood (the "Fiber Extension"), the limit of the cost of installation of the Fiber Extension (apportioned *pro rata* among the initial contracting customers) and the individual service drop, net of any discount, which may be amortized is $2500.00 per customer. Customers connecting to the neighborhood fiber or to the Fiber Extension subsequent to the completion of the initial installation will pay as part of their installation cost a sum equal to the *pro rata* sum paid by the initial customers for their share of the Fiber Extension.

The excess of the cost of installation over the sums which can be amortized must be paid upfront by the original customers. The policy is only economically feasible for the original customers if a sizable number are willing to contract for internet services in the first instance, thus spreading the cost of installation. While the policy could apply when only a few initial customers enter contracts, those few would have to pay upfront nearly all of the cost of the fiber extension.

The policy applies only to customers who are contracting for services and does not apply where there are only potential customers. In addition, amortization is only available to customers who are entering contracts with service providers.

Customers contracting for service after the extension must pay the same fiber extension share as the original customers. As an inducement for these subsequent customers to contract for services, they are allowed to amortize up to $4,000.00 over the period of their service contract.

Since the NCBA must carry the cost of the fiber extension during the repayment of the amortized sums, the financial resources of the NCBA are a limiting factor. Accordingly, "all amortization requests are subject to administrative review and approval by the NCBA. Approval of amortization requests is, in all cases, subject to the availability of funds in the NCBA budget set aside for amortization of installation costs."

II E

Broadband Project 2016
Deadlines

Project Task	Reserv. Date	Due Date-Materials	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.
Create message & form for website		5-Feb	5-Feb											
Revamp Broadband page on website		29-Feb	29-Feb											
Ad/sticker in Nelson County Times	1-Feb	1-Feb		1-Mar										
Blue Ridge Life Magazine - Ad	1-Mar	15-Mar			1-Apr									
Insert in RE & PP Tax Bills	27-Jan	31-Mar			1-Apr									
Ad/sticker in Nelson County Times	1-Feb	1-Apr				1-May								
Parks & Rec Activity Bk - Ad	15-Mar	31-Mar				1-May								
Blue Ridge Life Magazine - Ad	1-May	15-May					1-Jun							
Mailing to Residents/Businesses								1-Jul						
Blue Ridge Life Magazine - Ad	1-Jul	15-Jul							1-Aug					
Ad/sticker in Nelson County Times	1-Feb	1-Aug								1-Sep				
Insert in RE and PP Tax Bills	1-Sep	15-Sep									1-Oct			
Blue Ridge Life Magazine - Ad	1-Oct	15-Oct										1-Nov		
Ad/sticker in Nelson County Times	1-Feb	1-Oct										1-Nov		
Parks & Rec Activity Bk - Ad	15-Sep	30-Sep										1-Nov		
Insert -Business llcense renewal letters														1-Jan
Other: RVCC, WTGN & Stoney Crk HOAs														

Request for Information

For

Partnership for Deployment of a Broadband Network to Provide Universal Service for the Membership of Central Virginia Electric Cooperative

Issued: July 25, 2016

Contents

I. Introduction

Central Virginia Electric Cooperative (CVEC) issues this Request for Information (RFI) to convey its interest in partnering with a proven, committed entity or consortium of entities to make affordable Gigabit-class broadband available to all CVEC members (homes, businesses, and government facilities) over privately or publicly-constructed infrastructure. CVEC seeks proposed approaches from for-profit and/or nonprofit partners who envision a long-term relationship with CVEC.

Rural Central Virginia is fast approaching a crossroads regarding the ability to offer a viable option as the residence of young families and working adults. Broadband internet service is essential to modern elementary and secondary education, and critical to remote work or starting home based businesses. As retirees begin to expect more options for online connectivity, the area will also be challenged to attract those who have completed their careers and expect to remain engaged, connected and have the option of working part time remotely in retirement. The lack of reliable, economic broadband internet connectivity is affecting the rural areas today like the lack of central station electric power did in the first four decades of the 20th century. The area is becoming a place to visit only for its beauty and isolated nature, an area incapable of supporting the basic needs and expectations of a 21st century American resident.

CVEC was formed by the residents of the area in 1937 to provide electricity in areas that did not offer enough profit to attract investor owned utilities. The CVEC mission statement is "To improve the quality of your life in a quietly impressive way." In pursuit of that mission, CVEC is committed to enhancing life in the rural areas to foster a sustainable rural lifestyle for those who choose to live outside the urban and suburban clusters. Reliable, economical broadband internet availability is critical to attracting businesses, providing medical care, educating students, providing remote employment options, and many other facets of life in a thriving and prosperous rural area.

CVEC seeks a partner who will collaborate to build and operate the proposed broadband network throughout CVEC service area and offer service to every CVEC member. In return, CVEC offers the financial incentive of waiving all annual pole attachment fees to the partner, whether it's a single company or a consortium of companies, for the duration of its universal service arrangements. CVEC also intends to contract with the partner for broadband service to each of its electric substations and wholesale delivery points; consideration will also be given to contracting for service at certain downline equipment and data collection points around the CVEC system. In addition, CVEC will provide its full support and facilitation of any necessary processes at the federal, state and local levels, as well support of potential grant opportunities or assistance with accessing the lowest cost of capital available for the project. CVEC is committed to providing any other advantage we may be able to bring to facilitate the success of the partnership.

CVEC envisions a system-wide fiber-to-the-premises (FTTP) deployment with ubiquitous gigabit-class broadband access, which will enhance the broadband connectivity of the CVEC member account from residents to businesses to government entities by expanding the range and quality of available broadband and data transport services. While a full FTTP network is the clear preference, alternative infrastructure may be considered that meets the minimum system requirements should there be no offer of system-wide FTTP deployment.

CVEC has initiated this RFI to identify one or more potential partners or a consortium of partners to enable or directly provide high-capacity broadband services to all CVEC members. Responses to this RFI should state how the respondent's approach will result in a financially sustainable business model

that furthers the project goal of ensuring that all members have access to affordable broadband services that can easily and inexpensively scale to provide higher-speed services as demand for bandwidth increases.

CVEC seeks input from potential partners regarding the terms and conditions under which they would participate in such a project. We seek partners who will consider a variety of business models that utilize innovative technological, operational, and financial risk management to provide the rural communities the broadband necessary to provide a viable modern lifestyle in the CVEC territory.

We encourage respondents to share their expertise, which may be used to shape the direction and form of the network. Respondents may work together to respond to this RFI. CVEC is open to creative solutions that optimize use of existing public and private fiber backbone facilities as well as leverage new infrastructure investment to provide reliable economic broadband service to each member.

We welcome the responses of all prospective partners, including incumbent service providers, as well as competitive providers, nonprofit organizations, public telephone cooperatives, and entities that are not traditional Internet service providers (ISP) but are interested in acting as a partner in offering service under innovative business models. Nontraditional providers may respond as part of a partnership with an ISP, or may provide separate responses outlining their approaches.

CVEC will review responses based on the respondents' experience, how well the responses address the project objectives, the potential for success of the business model proposed, and other factors.

Following the evaluation of responses, CVEC may begin negotiations with preferred RFI respondent(s), issue a more detailed Request for Proposal (RFP) relating to the broadband project, issue an RFP to selected RFI respondents, cancel or delay plans to partner to deploy a broadband delivery network, or choose another direction that is deemed in the best interest of the cooperative membership.

Responding to the RFI is not a guarantee of a contract award. Further, there is no guarantee an RFP will be developed as a result of this RFI. CVEC reserves the right to withdraw the RFI or any subsequent RFP, or to decline to award a contract for facilities extensions without annual pole attachment charges.

All respondents must follow the instructions and provide all requested material. Failure to follow instructions is grounds for rejection of the response. All respondents must complete the attached responsibility matrix (Appendix A) and financial responsibilities questions (Appendix B), and submit each in the format (structure and page limitations) specified in the RFI instructions in Section VII.

II. The CVEC Vision

We envision modern, cooperative-wide communications infrastructure for CVEC's businesses and residents that will meet the needs of today and provide the necessary communications access for the quality of life expected in the United States in the 21st century. Broadband is critical infrastructure—just like roads, water, sewer, and electricity. Every home, farm, business, nonprofit organization, government entity, and educational institution should have the opportunity to connect. Providing equal and affordable access to communications infrastructure and service is essential to promoting equal opportunity in business, education, employment, healthcare, and all other aspects of day-to-day life.

Universal access to electricity and telephone are standards set to assure all Americans have the basic services necessary for safety and a minimum standard of living. The expansion of internet access, and the exploitation of that resource by business, education, medicine, communication and entertainment have changed the landscape in the United States. Access to broadband internet is now just as important as access to electricity was after the Great Depression. CVEC intends to find a partner who sees the same necessity and is willing to make universal broadband internet access in rural Virginia a reality.

The Central Virginia Electric Cooperative service area is located approximately in the triangular area that begins west of the Richmond suburbs and heads northwest to the area surrounding Charlottesville and then southwest to the area near Lynchburg. Each of those cities have robust broadband offerings for their residents. Some more densely developed subdivisions of the rural counties have options for broadband. Most other residents of the CVEC area have limited internet connectivity and no realistic, cost effective option for broadband.

The CVEC service area has suffered a loss of manufacturing jobs over the past decades similar to other areas of the country. New business have been slow to locate in the rural countryside. The lack of broadband internet access for the businesses and their workers exacerbates the problem of attracting businesses to rural areas. The CVEC area has been transformed towards bedroom communities for workers living remotely from their urban and suburban jobs.

Access to reliable broadband connectivity across the CVEC service area is patchy; some CVEC members who do have access to internet by satellite or cell service must settle for minimal speeds and/or monthly data caps that generate exorbitant charges. Growth became stagnant after the economic turmoil of 2008 but it remains stagnant due to a lack of adequate internet access. New services growth is under ½% as those seeking homeownership or rental property often ask about broadband availability as a minimum service before considering relocating to a rural area. CVEC intends is taking decisive steps toward offering an incentive to bring universal broadband service and allow the service area residents and businesses to keep pace with a changing economy as well as to open the doors to new growth in the area.

In rural Central Virginia, broadband is a critical component to raising the standard of living. High speed, modern internet connectivity will help lower business costs, provide opportunities to keep young graduates in the area, attract new highly skilled residents, and provide an environment that allows entrepreneurship and the development of sustainable new jobs. Many local students in K–12 who live in the rural areas have access to laptops and tablets from their schools but no connectivity at home to extend the learning beyond the classroom. Internet availability will allow them to develop at the same rate and with the same tools as their urban and suburban peers. Local healthcare providers

will have access to better telemedicine with high definition streaming video. Ubiquitous internet will allow churches to stream services, students to access online classes and government entities to provide video of their meetings to citizens.

We intend to encourage the communications industry to provide our residential members access to the world wide web or information and data services, and to provide them with the opportunity to work, handle personal business needs and transactions, and access education and entertainment sites available to most Americans. Further, we intend to provide our business members with the broadband capacity they need to compete successfully in the global marketplace.

CVEC's broadband initiative is intended to alter the quality of life in rural Virginia. The Cooperative seeks a partner(s) to operate fast, affordable broadband Internet and data services over publicly or privately constructed fiber optics to provide universal service to CVEC members. The priorities for the project are:

1. Universal service via a system-wide FTTP network—connecting every home and business throughout the CVEC territory with Gigabit-class bandwidth and leaving no part of the rural Virginia system behind.

2. A long term financially sustainable business model. The members of CVEC are willing to jointly subsidize the infrastructure expansion through the waiving of pole attachment fees, but the business model must not require any further cross subsidization from electric revenues of CVEC. The model must assure that the partnership will be capable of meeting project requirements for universal service and assure ongoing highly reliable, economic service.

3. An affordable basic level service that enables all members to access broadband connectivity. The business plan and partnership might seek support from government, not-for-profit entities or other organizations to provide support to assure that those below the poverty line have access to the basic level of service and help support the overall business model. Another option is to have the partner or partners reinvest a portion of the substantial incentive offered through the waiver of annual pole attachment fees to "buy down" the cost of basic service for members with household incomes below the federal poverty line.

4. Reliable, cost effective high-capacity communications bandwidth for CVEC between its three offices in Arrington, Palmyra and Appomattox as well as to each of its 36 electric substations and wholesale energy delivery points. In the future, CVEC will look to the system to connect downline equipment and data collection points. Also for future considerations the system must be capable of connecting advanced metering technology at each account on the CVEC system.

5. An open access network that provides access and opportunity for companies that bundle and market broadband services such that members are not subject solely to the commercial priorities of one or more private ISPs; the business model should accept, accelerate, and encourage competition among service providers.

The foundation of the project and the fundamental priority is that all members of the community have access to robust, affordable broadband service. The FTTP network should be built everywhere; a proposal is unacceptable that projects building only to the more dense or affluent areas of the CVEC system where there is a higher likelihood of obtaining subscribers in seeking a quicker return on capital investment. Members in low-income areas are particularly vulnerable, and broadband is

critical to help level the playing field. As the world becomes increasingly connected, broadband access is key to education, job training, banking, business, and even one's own medical records. All members must have broadband access.

This project goes beyond a business opportunity to maximize profits. Instead, the project anticipates a partnership with a mission to change the lives of CVEC members and alter the trajectory of rural living in central Virginia. The project can and should generate revenues in excess of costs over its life, with the greater financial return coming in future years as the community benefits from the opportunities that will become available with broadband access, incomes rise and businesses start and expand.

We understand that a system-wide FTTP network will be a challenge to develop and may seem implausible to some providers; CVEC is prepared to work with the Partner(s) to make this an attainable goal through the waiver of annual pole attachment fees, the option of owning a portion or all of the infrastructure, contracting for a portion of the bandwidth for internal uses, and other non-cash assistance. Respondents that believe the goal of a system FTTP network to be a barrier to their ability to successfully partner with CVEC should clearly articulate their reasoning, and describe their plan for providing universal broadband service through other means. All proposals must provide a plan for minimum 25 mbps download to all CVEC accounts within five years of signing of a final contract for the incentive of the annual pole attachment fee waiver.

CVEC will consider a range of construction, operation, and ownership models for partnership to provide the FTTP network. CVEC and the selected Partner(s) will collaboratively determine the most mutually beneficial partnership structure, which may include cost-sharing, infrastructure leasing, and profit-sharing arrangements. CVEC is willing to consider various business models, which could include, but are not limited to, the following scenarios:

- Provision of services over infrastructure that is a mix of existing public and new private facilities with the new facilities constructed by the partnership, owned by the partner and/or CVEC, and operated and maintained by the private partner;
- Provision of services over infrastructure that is constructed, owned, operated, and maintained by the private partner(s);
- Provision of services over infrastructure that is constructed by the partnership, owned by CVEC, and operated and maintained by the private partner;

CVEC will also consider any combination of these models as well as alternative suggestions offered in proposals.

III. The Service Area of Central Virginia Electric Cooperative

CVEC serves 35,800 members spread through parts of 14 central Virginia counties (Albemarle, Amherst, Appomattox, Augusta, Buckingham, Campbell, Cumberland, Fluvanna, Goochland, Greene, Louisa, Nelson, Orange, and Prince Edward.) The physical plant for CVEC includes 3,312 miles of overhead line operated at distribution voltages, 1,271 miles of underground distribution line, and 68 miles of transmission line.

The accounts include 32,000 residential members, 3500 general service and small commercial accounts, with the remaining accounts being large power and industrial. The accounts include three high schools, three middle schools and seven elementary schools. There are twelve rural medical facilities and clinics, and one dialysis center. The accounts include three local libraries.

CVEC seeks to connect its three offices at Arrington, Palmyra and Appomattox with a fiber ring to provide redundant, highly reliable, high capacity video, voice and data connectivity. CVEC also expects to contract with the partner for broadband connections to 34 electric substations and data delivery points.

More specific information can be provided based on questions from potential providers and the signing of a nondisclosure agreement with CVEC.

IV. Project Goals

Respondents to the RFI should indicate whether and how their proposals meet the project goals:

1. Make infrastructure available to each home, business, public facility, and private institution in the CVEC territory to enable residents, workers, and visitors the opportunity to access affordable, high-speed broadband connections to the Internet and other networks;

2. Offer non-discriminatory, open access to all users, application providers, content providers, and service providers connected to the network. Serving only limited areas of the service territory or specific types of customers is unacceptable. The network should be usable via all standard commercial devices;

3. Service plans that do not impose caps or usage limits on data. All application providers (data, voice, video, cloud services) will be equally able to provide their services.

4. Consider innovative models, including, but not limited to:
a. Leasing existing privately and publicly-owned fiber to provide services or serve as backbone facilities

b. Partnering with CVEC to construct and operate an FTTP network

c. Contracting with CVEC to manage and provide services on a fiber network built and maintained by the partner but owned by CVEC;

5. Consider ways for the CVEC and prospective partners to share capital costs if the arrangement provides benefit to the overall economic delivery of services;

6. Provide cost effective services and flexible pricing plans to help narrow the digital divide and ensure access to all CVEC members.

For the network to have the intended economic and quality-of-life impacts, both cost and availability of service are important. We encourage responses that address both to maximize adoption of service.

All respondents must fully complete Appendix A and fully comply with the instructions in Section VII.

V. Network Design and Construction Parameters

CVEC is willing to consider all proposals for partnerships, and encourages respondents' unique approach to network development and construction. To facilitate respondents' ability to perform network construction and installation, CVEC will dedicate resources to support its Partner(s) through pole attachment application review, coordination of make ready construction, and inspection services to assure an expedited approach to construction and installation along the CVEC ROW and will work with the Partner(s) to facilitate work. CVEC will provide authorization to share the CVEC right of way, but the installing entity must secure their easement for construction of communication from the individual landowners.

The following baseline technical attributes are preferred:

- Full fiber-based connectivity to residential and business customers alike;
- Low latency;
- Fiber loops and other topology design to allow for multiple path communication and increase reliability
- Active components placed in environmentally hardened shelters and/or cabinets equipped with backup power generation and/or batteries, as appropriate, capable of sustaining services in the event of extended power outages;
- Topology and infrastructure to provide minimum 25 mpbs download speeds and 3 mbps upload for each account with a plan to upgrade as required to meet FCC standards for the definition of broadband communications as it is upgraded over time.

VI. CVEC Incentive Offer, Contributions and Assets

CVEC recognizes the critical need for broadband access across the service territory to overcome the growing isolation of the rural Virginia countryside from the global economy. CVEC and its members are willing to absorb significant costs annually to provide a subsidy as an incentive to attract a partner or partners that will provide the broadband service necessary to keep the rural lifestyle sustainable.

Additional cable attachments on CVEC pole create additional costs to CVEC: capital costs, maintenance costs, accounting and business transaction costs, and many other forms of extra expense. To avoid having CVEC members subsidize the use of poles by those who attach, CVEC charges an annual pole attachment fee that recovers the associated costs.

The need for broadband is so critical that CVEC and its members are willing to offer to subsidize the expansion of infrastructure to provide universal broadband service availability. CVEC is willing to waive the annual pole attachment fee for any provider or group of providers that join to partner with CVEC in bringing the 21st century necessity of broadband to every member. CVEC presently has approximately 60,000 poles and an annual fee of $20 per attachment per pole. The waiver offer is the equivalent of an annual subsidy of up to $1.2 million for any partner willing to help make broadband availability a reality across the system.

The members will continue to absorb the additional annual costs caused by the overhead pole attachments, plus any increases in those costs, for as long as the partner or partners provide universal service to CVEC members meeting the FCC definition of broadband. The waiver incentive will be the total annual cost of attachments which can be up to $1.2 million per year in 2016 costs and the costs (and waiver value) are generally expected to increase over time. The waiver maximum is the equivalent of almost $35 per year per member if all poles have attachments. This is a serious and significant offer to attract the investment of a partner willing to commit to a transformative project for rural central Virginia.

CVEC will offer the waiver from day one with an acceptable contract and commitment to provide broadband to every CVEC member within five years of the date of the contract. Should the contract commitments not be met, CVEC will require the waived fees to be repaid to the members.

Any entity wishing to install infrastructure will need to gather easements from the individual landowners for installation of communications cables. The partner(s) will also be responsible for all “make ready” costs for CVEC overhead distribution plant improvements required to provide clearance or workspace for new cable plant.

CVEC will endeavor to facilitate and expedite the pole application process for the successful partner. CVEC is also willing to commit to coordinate any make ready work on the poles to allow the installing partner to stay on schedule and meet the five year maximum time frame for full system deployment.

CVEC will also provide assistance with applications, licenses or other filings at the federal, state and local level. The Cooperative will provide assistance with grant applications to government and not-for-profit agencies and charitable organizations.

CVEC also will contract for services to support its own internal communications infrastructure needs between offices and to substations.

VII. RFI Response Requirements

CVEC requests the following information from respondents. All responses must adhere to the following response requirements and page requirements. All responses must follow the exact order below and use the appropriate response headers. Start a new page for each response header. Failure to follow these instructions may result in rejection of the response.

1. **Cover Letter:** Include company name, address of corporate headquarters, address of nearest local office, contact name for response, and that person's contact information (address, phone, cell, email). Provide a summary statement of why the members of CVEC should select you to receive their incentive, which will be in a form of a subsidy that they each fund. Make your case for why they will be satisfied with the partnership and what form the return on their investment will take.

2. **Business Model Summary:** Summarize the business model you intend to use for the partnership. This should be a concise explanation of the key components of your business model, including but not limited to the division of network and operations responsibility and ownership.

3. **Affirmation:** Affirm that you are interested in this partnership and project. Address the goals and the network design parameters listed above (Sections IV and V). List each goal and requirement with a brief statement of how you will comply. If you cannot meet any of those requirements, indicate the requirements to which you take exception, and provide an explanation of the exceptions. Maximum three pages.

4. **Experience:** Provide a statement of experience discussing past performance, capabilities, and qualifications. Identify other networks your firm has designed, built, maintained, or operated; include the levels of broadband speed, availability, and adoption among different categories of end users and unique capabilities or attributes. Discuss partnerships with other service providers, government, or nonprofit entities you have undertaken, particularly any involving fiber leasing. Describe the nature of the projects and your firm's role. For entities currently providing communication services in or near CVEC territory, describe your current service footprint within the system borders, including a description of the type of infrastructure and services you currently offer and the technology platform(s) used. Explain how your firm is a suitable partner for this project. Maximum two pages.

5. **Technical and Operations:** At a high level, summarize the technological and operational approach you would use for this project. Maximum three pages including network diagram.

a. How would you use technology to meet the project goals?

b. What approach would you use to interconnect with the Internet and other public networks?

c. How would you perform network management?

d. Provide a proposed network diagram.

6. **Business Structure:** Summarize the business approach you would use for the project. How would your business plan help to meet the project goals? What are the key assumptions? What are your main areas of risk, and how can the project be structured to help reduce the risks? Maximum two pages. Also complete Appendices A and B to clarify areas of responsibility.

7. **Open Access:** If you currently operate communications facilities, indicate whether they are

operated on an open-access basis. Describe whether and, if so, how you would support open access to infrastructure for this project in the CVEC territory. Maximum one page.

8. **Schedule:** Describe your proposed schedule for implementing service. Offer a timeline with key milestones. Would you be able to begin service before the entire network is constructed? Are there areas of the system you would recommend be constructed first? Maximum two pages including schedule.

9. **Maintenance:** If you are proposing to perform fiber network maintenance, describe your ability to perform maintenance on an ongoing and as-needed basis. Provide estimates of the operating cost of maintaining the fiber optic outside plant for a system-wide fiber network and include your main assumptions. If you are not performing maintenance, who is? Maximum one page.

10. **Privacy:** Describe your ability to provide secure network service or infrastructure that complies with public safety and other security and privacy regulations and requirements. Maximum one page.

11. **Financing and Funding:** List any requirements CVEC must meet for you to partner with CVEC on this project by completing Appendix B – Financial Responsibilities Questions.

Please also provide a one-page flow chart that shows the flow of funds between all parties in your response. Include all sources and uses of funds.

If you do not address this question, it will be assumed that you are interested in the partnership but have no financial requirements whatsoever of CVEC. Please keep response to the guidelines of the separately attached PDF, plus the one-page flowchart.

12. **Services:** Describe the service options you plan to offer over this network (for example, data only; voice and data; a triple play of voice, data, and cable television; etc.). What download/upload or symmetrical speeds would you offer and guarantee to end users? How will your residential and business offerings differ? What types of service level agreements (for lit services: availability and packet delivery; for dark fiber: repair time) would you be prepared to offer? Maximum two pages.

13. **Pricing:** Provide your approach to pricing the proposed services. For managed services, please describe factors impacting non-recurring costs (estimated fiber path distances, equipment redundancy, etc.); recurring costs for varying capacity levels; and any key technical assumptions upon which prices are based. For dark fiber offerings, please describe desired pricing models. Maximum two pages.

14. **References:** Provide a minimum of three (3) references, including contact information, from previous contracts or partnerships.

Following the response above, please include your completed Appendices A and B. Keep Appendix A in its native Microsoft Excel format. Keep Appendix B in its native PDF format.

VIII. Response Process

Please address all correspondence regarding this project to CVEC and more specifically to Melissa Gay, Executive Team Assistant: **Melissa Gay email:mgay@mycvec.com**

CVEC cannot guarantee that correspondence directed to other CVEC staff or departments will be received or considered.

Letter of Intent

All interested respondents are asked to submit a letter of intent via email by September 2, 2016 to Melissa Gay at mgay@mycvec.com.

Questions

Questions related to this RFI should be emailed to mgay@mycvec.com no later than 5**:00 PM EDT on September 9, 2016**.

Response Deadline

Final RFI submissions must be either delivered in person or received by mail no later than 5:00 PM EDT on November 11th, 2016. Please deliver or mail the final RFI & the completed required Appendix in a sealed envelope to the following address:

By Delivery Service or in person:
CVEC
Attn: Melissa Gay
800 Cooperative Way
Arrington VA 22922

By US Postal Service:
CVEC
Attn: Melissa Gay
P O Box 247
Lovingston VA 22949

Late responses will not be considered.
Please identify any proprietary and/or confidential information as such.

Summary of RFI Process Deadlines

The following is the schedule for responding to this RFI. The schedule is subject to change:
July 11, 2016 – RFI issued
September 2, 2016 – Deadline for submitting letter of intent to respond to RFI
September 9, 2016 – Deadline for submitting questions
September 16, 2016 – Responses to questions due (from CVEC)
November 11, 2016 – RFI responses due
CVEC thanks you in advance for your thoughtful response.

IX. Personal Presentations

At its discretion, CVEC may request that vendors and other parties that provide a timely response to this RFI make an individual and personal presentation to better explain information or solutions identified in the response. These presentations, if requested by CVEC, shall be held at a time and place of mutual convenience.

Appendix A
Operational & Funding Responsibility Plan

Please respond to all questions fully.

1.Do you propose to serve as a retail ISP?

2. Do you propose to have multiple ISPs have access to the system?

In the next three answers, for the overall project, provide detailed descriptions of the entire project, including but not limited to fiber plant, electronics, network management, marketing and customer support, billing, etc.

3. Describe the financial responsibilities and operational responsibilities you will be responsible for under the proposed plan:

4. Describe the financial responsibilities and operational responsibilities of parties and partners other than CVEC under the proposed plan:

5. Describe the financial responsibilities and operational responsibilities CVEC will be responsible for under the proposed plan:

6. Provide a proposed schedule for the proposed project.

Appendix B: Financial Responsibilities Anticipated

The purpose of this appendix is to provide more detail regarding the business plan for the partnership to provide universal broadband service to CVEC members. The answers will also provide more structure for the anticipated financial arrangements for the partnership of CVEC and partner or consortium of partners in the project.

Please answers each question as fully as possible based on the preliminary plans for the project.

1. In addition to the waiver of annual pole attachment fees which represents a subsidy and incentive of up to $1.2 million annually for the project, what additional financial requirements does your proposal anticipate to be the responsibility of CVEC and its members?

2. What will be the source of the remaining funding for capital costs in the project?

3. What security is planned for the project financing?

4. The waiver will be offered prior to the project buildout being complete. Should the project not be completed and the conditions met for waiver eligibility, the waiver will be rescinded and the waived fees for up to five years will be due to CVEC. What guaranty or security does the partnership offer to support the waiver funding?

5. Provide the projected monthly cost for 1 GB service with looped configuration to the 31 CVEC substations and 10 GB service in a loop configuration to the three CVEC offices.

6. In what year of the project is positive cash flow anticipated?

7. What take rate do you project among residential member accounts? Small commercial?

8. What will be your price point for basic service?

8 September, 2016

Ms. Melissa Gay, Executive Team Assistant
Central Virginia Electric Cooperative
P. O. Box 247
Lovingston, VA 22949

Re: CVEC RFI – Broadband

Dear Ms. Gay:

Please accept this "letter of intent" on behalf of the local government of Nelson County and the Nelson County Broadband Authority in response to Central Virginia Electric Cooperative's "Request for Information for Partnership for Deployment of a Broadband Network to Provide Universal Service for the Membership of Central Virginia Electric Cooperative", as issued on July 25, 2016.

Briefly, Nelson County, as owner of the Nelson County Broadband Network(the Network), and the Nelson County Broadband Authority (NCBA), which is the public entity responsible for the administration and operation of the "open access" local broadband network, are the interrelated entities that successfully planned and operationally deployed the Network in the first quarter of 2013. The Network includes a 39 mile, fiber optic based, middle mile network that spans from Nelson County's northwestern border with Albemarle County on Route 151 to the Colleen Business Park (along Routes 151, 6 and 29) at the door step of CVEC and, a wireless network currently consisting of four towers with access to an additional three towers located within Nelson County.

The fiber based, middle mile network is deployed underground in 2.5" conduit with internet services currently provided to business and residential subscribers by three Internet Services Providers (ISPs), Stewart Computer Services, Nelson County Community Cablevision and Canadian based Ting, which has a Charlottesville office. The Network's wireless component has one Wireless Internet Service Provider (WISP), Stewart Computer Services. Nelson County staff also serve as the as the staff of NCBA. Ting is the current contract Network Operator, responsible for facilitating new connections, monitoring the fiber network, etc. Harrisonburg based Computer Cabling and Technology Services (CCTS) is the contract Outside Plant services provider.

As CVEC's RFI has a response deadline of November 11, 2016, the detailed submission that complies with CVEC's RFI will be provided at that time by the County and NCBA.

A request for CVEC's consideration is an in person meeting with County staff prior to the 11-11-16 submittal to provide for discussion of a strategy County staff and its consultant, Blacksburg based Design Nine (Dr. Andrew Cohill, CES and Principal) have developed as the basis for responding to the

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Cooperative's RFI. The requested meeting would also enable alternative strategies to be discussed. If CVEC is amenable to the proposed meeting with County and Design Nine staff, please advise on a date and time that is convenient to Cooperative staff and County staff will confirm the meeting.

In closing, Nelson County and the Nelson County Broadband Authority recognize the importance and significance of what CVEC is endeavoring to accomplish with its issuance of the broadband RFI. It beckons back to 2006 when the Board of Supervisors established a goal of the availability of broadband services within Nelson County being more readily accessible to the County's businesses and residents. The realization of the local broadband network was more than a significant challenge and this accomplishment, which continues to be a work in progress, speaks to what can be done when a need is identified and needs to be addressed. CVEC's RFI is visionary and CVEC is to be commended for this effort, which speaks in so many ways to the vision the Board of Supervisors had in 2006. The potential to partner with CVEC and to continue to facilitate the availability of broadband/internet services in Nelson County and Central Virginia (within CVEC's service area) is both very exciting and a tremendous opportunity. If Nelson County and (the) NCBA can help in any way to accomplish this vision, please do not hesitate to so advise.

Thank you for the consideration afforded this initial letter of intent to CVEC's (broadband) RFI.

Respectfully,

Stephen A. Carter
Count Administrator

Cc: Board of Supervisors
Nelson County Broadband Authority
Dr. Andrew Cohill, Design Nine
Distribution (County Staff)

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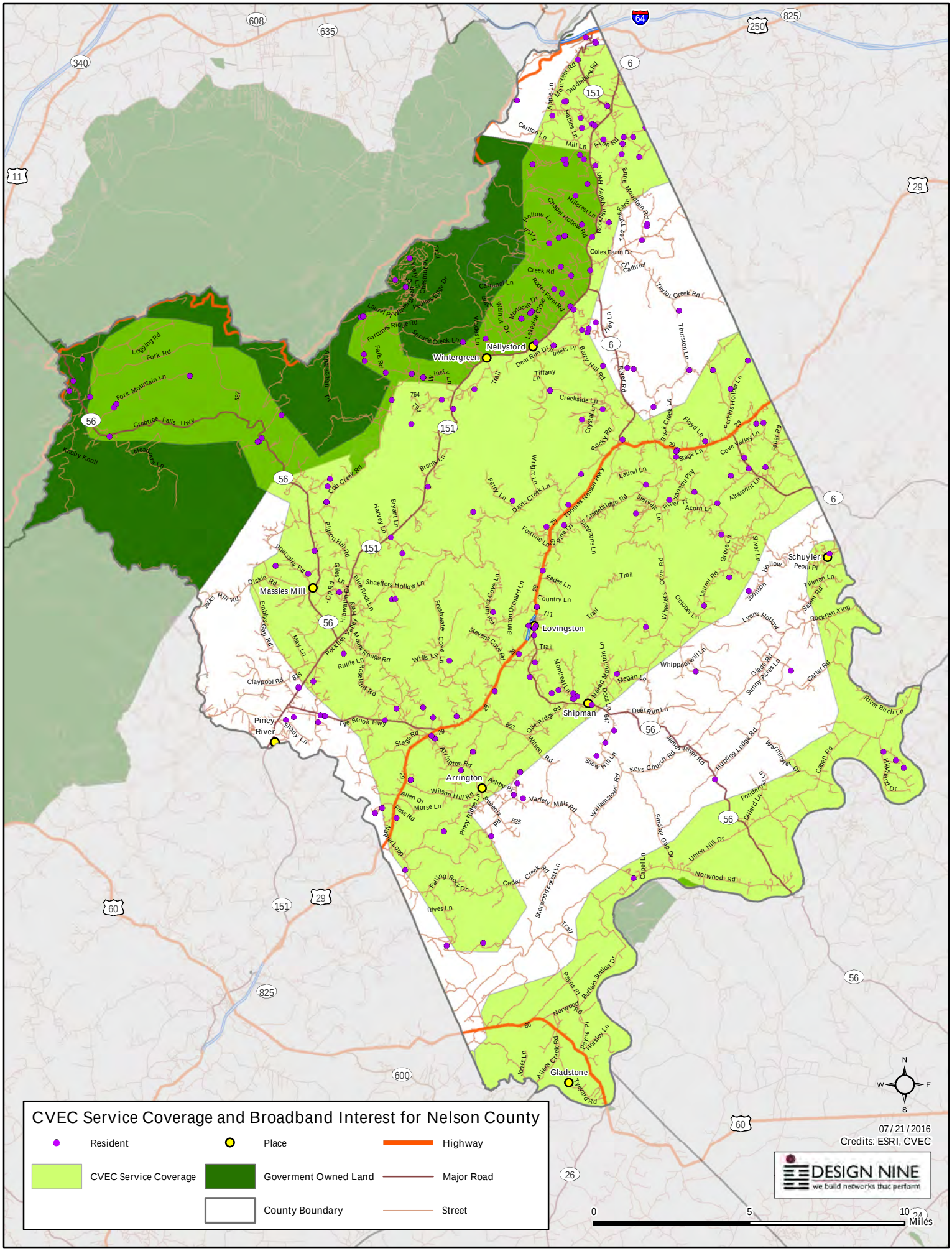
CVEC Service Coverage and Broadband Interest for Nelson County
Resident
Place
Highway
CVEC Service Coverage
Goverment Owned Land
Major Road
County Boundary
Street
Nellysford
Wintergreen
Massies Mill
Lovingston
Shipman
Piney River
Arrington
Gladstone
Schuyler
07/21/2016
Credits: ESRI, CVEC
DESIGN NINE
we build networks that perform
0
5
10
Miles