

Los Alamos County

Community Broadband Network Business Plan

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Information Technology Division



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Executive Summary

The business plan for Los Alamos County, New Mexico (“LAC” or “the County”) provides a business case for the funding, building, and operating of a Community Broadband Network (CBN), providing direct Fiber-To-The-Premises (FTTP) high speed connectivity to every residence, business, school, research institution, and government facility within the County. This executive summary provides an overview of the CBN development process, market research and financial plan.

CBN Development Process

This business plan was developed from four inputs, the business model, the engineering design, market research, and a financial model, as shown in Figure 1.

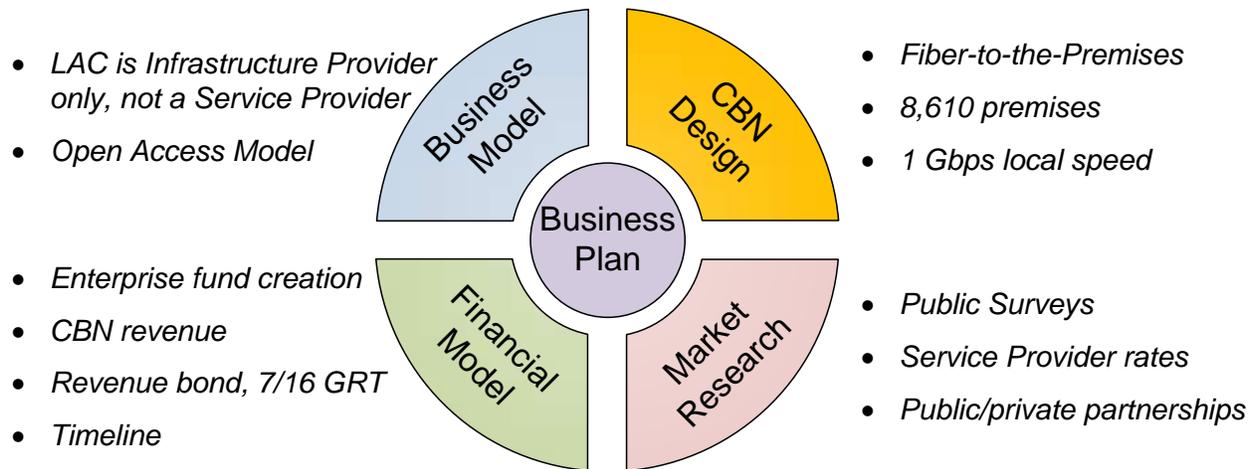


Figure 1. CBN Business Plan Inputs

The framework for CBN was provided by the County Council on April 19, 2011, with the following directives:

1. Develop a plan to build a fiber-to-the-premises network providing open and advanced broadband communications access to all Los Alamos citizens and institutions
2. The local network target speed will be a minimum of 1 gigabit per second
3. The County will not generally be an overall content provider or a Service Provider
4. County services may be provided through the new network infrastructure

The County Council’s directives drove the structure of the engineering design and the business model.

Business Model

CBN’s overall conceptual model consists of these essential elements:

- Creation of an Enterprise Fund by Los Alamos County, for holding the network assets and accounting for all financial transactions for funding, procuring, deploying, and operating the proposed fiber optic network

- Securing project capital for covering capital expenditures associated with network investment, through a recommended municipal bond package backed by a Gross Receipts Tax (GRT) increment
- Operating the network on an open access, wholesale basis, which means any qualified service provider of broadband retail services will have competitively neutral, non-discriminatory access to the network for the purpose of selling its retail services to all potential consumers
- Achieving desired revenues to cover operating expenses, through a mix of wholesale network service products offered to retail service providers
- Completing network implementation and reaching targeted subscription rates with the retail service providers, during the forecasted timelines

CBN's proposed network architecture and non-exclusive business model mitigates high-cost barriers to entry for competitive service providers, while significantly improving network capacity and removing current bottle-neck control. The proposed fiber optic network operates on an open access, non-discriminatory basis, meaning competitive service providers could obtain access to the network under competitively neutral terms and conditions. As the operator of CBN, the County would manage the network and work with retail service providers on a wholesale basis only; CBN itself will not provide any retail services.

Retail service providers would consist of qualifying legal entities offering voice, video, data, and/or other services, such as: distance learning, security, gaming, wireless communications, energy management, resource conservation, medical services, hosted applications, and data backup and storage, to both businesses and residents of Los Alamos. The capacity of the proposed open access fiber network enables 1 Gbps symmetrical bandwidth services (equivalent upload and download speeds) to Los Alamos addresses desiring this service. Higher bandwidth services would also be available for businesses on a limited basis.

More specifically, implementation of CBN enables the following benefits:

- Offers residences and businesses within the County the choice of affordable, high-speed Internet access, data transport, video, and voice services, from retail service providers
- Provides subscribers the freedom to choose from multiple service providers
- Enables work-from-home scenarios and the ability to effectively video conference, reducing or time-shifting commute traffic
- Provides a network that can help to reduce the carbon footprint within the County
- Delivers ubiquitous broadband access throughout the County, and provides a platform for future services and applications, including mobility, public safety, and education
- Offers a low barrier of entry and level playing field for service providers, enabling them to compete on reliability, products, features, price, and customer service
- Partnering with other County departments to utilize the network and develop cost-effective and resource-saving applications for improving or implementing services such as advanced resource management and real-time account information, that will be of growing value to residences and businesses
- Opportunities to collaborate with Los Alamos National Laboratories on research, education, and employee recruitment/retention programs

CBN Design

CBN offers a minimum network interface data rate of 1 Gigabit per second. It operates in a wholesale “open-access” environment, allowing retail service providers with fair and equal access to data transport services across a Metro Ethernet network. This proposed countywide fiber optic network provides a platform for developing and enhancing broadband applications, increases accessibility, and improves affordability through its open-access, multi-service/multi-provider environment.

CBN would serve as essential infrastructure for ensuring the County’s long-term strategic goals, economic development, diversification, and competitiveness. CBN would solidify the County’s status as a premier center for research, development, discoveries and a quality interactive education.

Construction and Implementation Activities

The proposed CBN will be deployed in stages. Stage 1 is construction, estimated to be completed on a countywide basis within three years of initiating the project. This first stage provides all residences and businesses with a 1 Gbps network interface, including the fiber-to-the-premises connection. This enables access to community services through a web-based Portal and subscription to broadband services from retail service providers. The business and engineering plan also includes upgrade options, defined as Stages 2 and 3, which add further network capacity in future years, on an as-needed basis. The upgrade triggers are based on actual bandwidth utilization statistics and changes in market indicators.

The Portal serves as a web-based interface to community services, such as public information and events, access to utility usage information, broadcast of emergency notifications, and provides a platform for local business and retail service providers to market their products. These services would be delivered locally on CBN, meaning the network traffic would not be delivered across the public Internet. The Portal does not provide Internet access, so the County does not become an Internet Service Provider (ISP) by deploying the Portal.

For all residences and businesses, the standard of services and consumer pricing tiers would be set by the retail provider. CBN would establish a wholesale rate schedule at a level with a low floor, such that retail providers would have the ability to deliver affordable services to the end user.

Market Research

Market research was conducted by Research & Polling, Inc. to help project take-rates for broadband Internet services which would be offered by retail providers, and evaluate candidate funding strategies. Take rates were projected from two telephone surveys conducted in May 2011 and September 2012, in-person interviews conducted November 2012 and a web survey conducted November 2012. The two telephone surveys, complete with demographic data, were conducted to test public opinion before and after project costs were known. The community consistently indicated in both telephone surveys that it strongly favors the continuation of CBN.

The research suggests that by Project Year 4, retail service providers would be able to attain a 30% take-rate with residential customers, and 30% from business customers. These targeted

take-rates are factored off of expressions of customer interest to subscribe to broadband services from retail providers on CBN, which were also polled during the market research.

Financial Plan

During the first three project years, the Stage 1 infrastructure investment within the community is expected to be \$47.2m. The CBN Business Plan recommends that this amount be financed through a revenue bond issuance, repaid over the course of 20 years by implementing a 7/16th GRT increment.

Between Project Years 7 and 9, an equipment refresh is recommended, to maintain robust network performance. This would involve an estimated network reinvestment of \$7.6m, which would be funded through a shorter term 7 year revenue bond package, with debt service covered through accumulated cash flows.

Average annual operating expenses associated with the day-to-day administration, maintenance, support, and marketing of the network are estimated to be ~\$2.3m, which would be covered by revenues generated by selling wholesale network services to retail providers, combined with the 7/16th GRT increment.

CBN's revenue model is based on two fundamental elements:

- Broadband revenues for wholesale network transport to retail service providers
- Gross Receipts Tax increment for covering debt service

The CBN Business Plan revenue forecast ranges from ~\$6m in Project Year 3 and ~\$7m in Project Year 10.

Conclusion

This business plan for the Community Broadband Network provides a financially sustainable approach to completing the directives of Council. Implementation of CBN will require a critical choice of service providers, marketers and contractors to successfully execute the project.

Section 1. Building a Community Broadband Network

Los Alamos County, New Mexico (“LAC” or “the County”) is assessing the viability of funding, building, and operating a Community Broadband Network (CBN), providing direct Fiber-To-The-Premises (FTTP) connectivity to every residence, business, school, research institution, and government facility within the County. CBN would offer a minimum network interface of 1 Gigabit per second (Gbps) and operate in a wholesale “open-access” environment, allowing retail service providers with fair and equal access to data transport services across a Metro Ethernet network. This proposed “last-mile” countywide fiber optic network would provide a platform for developing and enhancing broadband applications, increase accessibility, and improve affordability through its open-access, multi-service/multi-provider environment. As directed by the Los Alamos County Council on April 19, 2011, the primary goals and characteristics of CBN are:

- Develop a plan to provide open and advanced broadband communications access to all Los Alamos citizens and institutions
- This purpose will be accomplished through building a fiber to the premises network
- The target speed will be a minimum of 1 gigabit per second
- The County will not generally be an overall content provider or a SP.
- Some County services may be provided through the new network infrastructure

The CBN business plan provides the following information:

- Overviews of the CBN design, network design, and network operations
- CBN business strategy including market analysis
- Capital expenditures and network reinvestments
- Funding Strategy
- Financial forecast
- Risk mitigation strategy

After examining the anticipated expenditures, funding structure, revenue forecasts, and underlying market assumptions, there is a sound business case for building CBN. The pro-forma indicators yield a positive cash balance per annum in the 10-year business plan outlook, including network reinvestments in the form of equipment refresh in Project Years 7 through 9.

Section 2. Planning and Design

CBN is an optical fiber network connecting all premises in LAC. Figure 2-1 shows the core optical fiber cables within the two areas of LAC covered by CBN, Townsite and White Rock, and the fiber cable connecting the two areas.

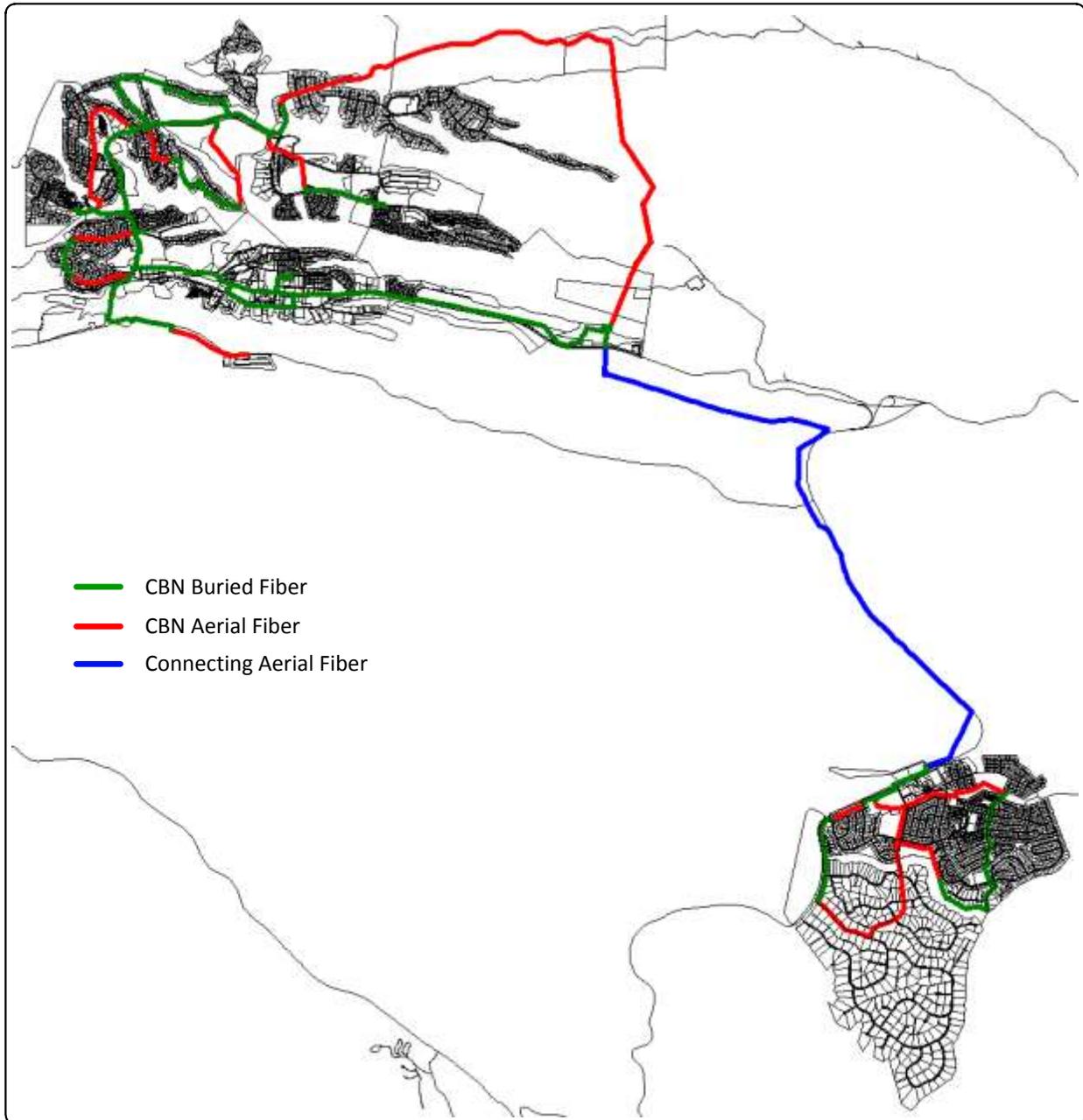


Figure 2-1. Core Fiber Cable Overview

The Townsite and White Rock fiber consists of buried (also referred to as underground) and aerial (also referred to as overhead) construction. Buried construction uses both existing and new conduit pathways. Aerial construction uses only existing utility poles; no new poles are included in the design, except in cases where existing poles must be replaced to accommodate the addition of CBN fiber cables.

While Figure 2-1 illustrates only the core optical fiber routes that form the major pathways of CBN, the CBN design includes the optical fibers that connect the core fibers to every premises in Los Alamos. Detailed design information can be found in the *Community Broadband Network Design Report, September 2012*.

CBN is scalable to grow with demand, flexible enough to integrate multiple applications on the same fiber infrastructure, and adaptable for other uses, such as wireless, government mobility, public safety, and automated meter reading services. CBN uses an Active Ethernet design to accommodate global standards and provide a relatively easy interface for Service Providers. These qualities will accommodate services which can be identified today and provides an efficient and scalable transport layer for future applications.

2.1 System Components

A customer gains access to CBN FTTP network via a series of interconnected optical fiber cables running from the customer's premises all the way to the Point of Presence (POP). A POP is the main hub of the network, the interconnection point between local facilities and to the outside facilities. Each connection is made via a series of fiber cabling connected by equipment, and installed with construction techniques tailored to each premises. Figure 2-2 shows a high-level overview of CBN architecture. It includes the following components:

1. Network Operations Center
2. Point of Presence
3. Core fiber
4. Distribution Switch Facility
5. Lateral fiber
6. Drop Closure
7. Drop Fiber
8. Customer Premises Equipment

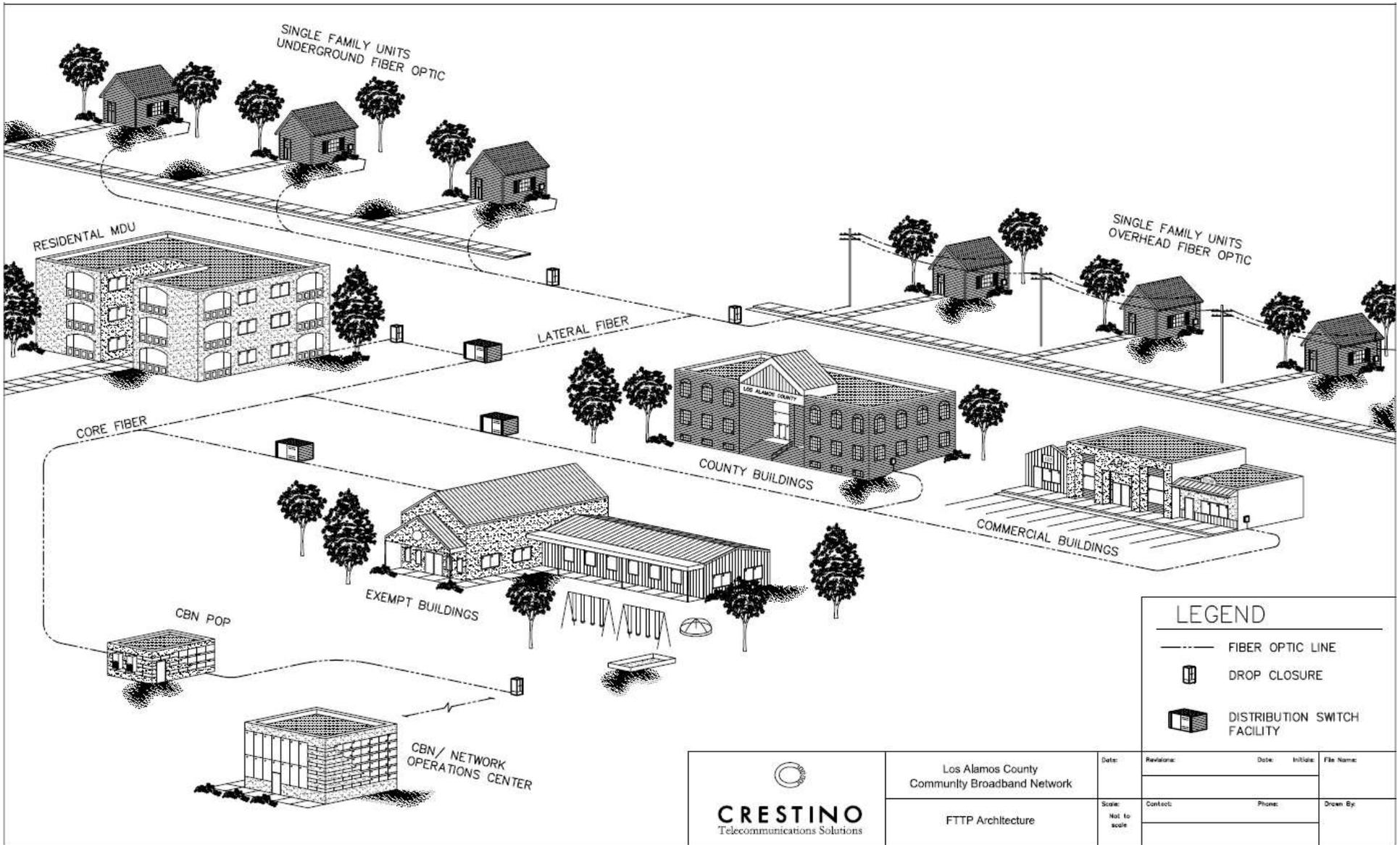


Figure 2-2. CBN Architecture Overview

 CRESTINO Telecommunications Solutions	Los Alamos County Community Broadband Network	Date:	Revisions:	Date:	Initials:	File Name:
	FTTP Architecture	Scale: Not to scale	Contact:	Phone:	Drawn By:	

The Network Operations Center (NOC) is a site where the Network Operator personnel work, monitoring service delivery, Customer usage, and network performance. NOC operations may be outsourced or performed by LAC staff.

A POP is a facility housing the network routing equipment that connects CBN to Service Providers' (SPs) equipment, providing access to the Internet, Voice over Internet Protocol (VoIP), Internet Protocol Television (IPTV), and LAC services. CBN includes three POPs:

1. South POP – located in Townsite at Lavy Lane
2. North POP – located in Townsite on the grounds of Fire Station 4
3. White Rock POP – located in White Rock on the grounds of Fire Station 3

Figure 2-3 shows the connections between the three POPs, and the connections between the POPs and the internet. The Pajarito Cliffs Site (PCS) POP is not a CBN facility. It is a future facility, planned for installation within LAC property near the LAC airport. CBN may elect to use the PCS POP as a source of wholesale internet access.

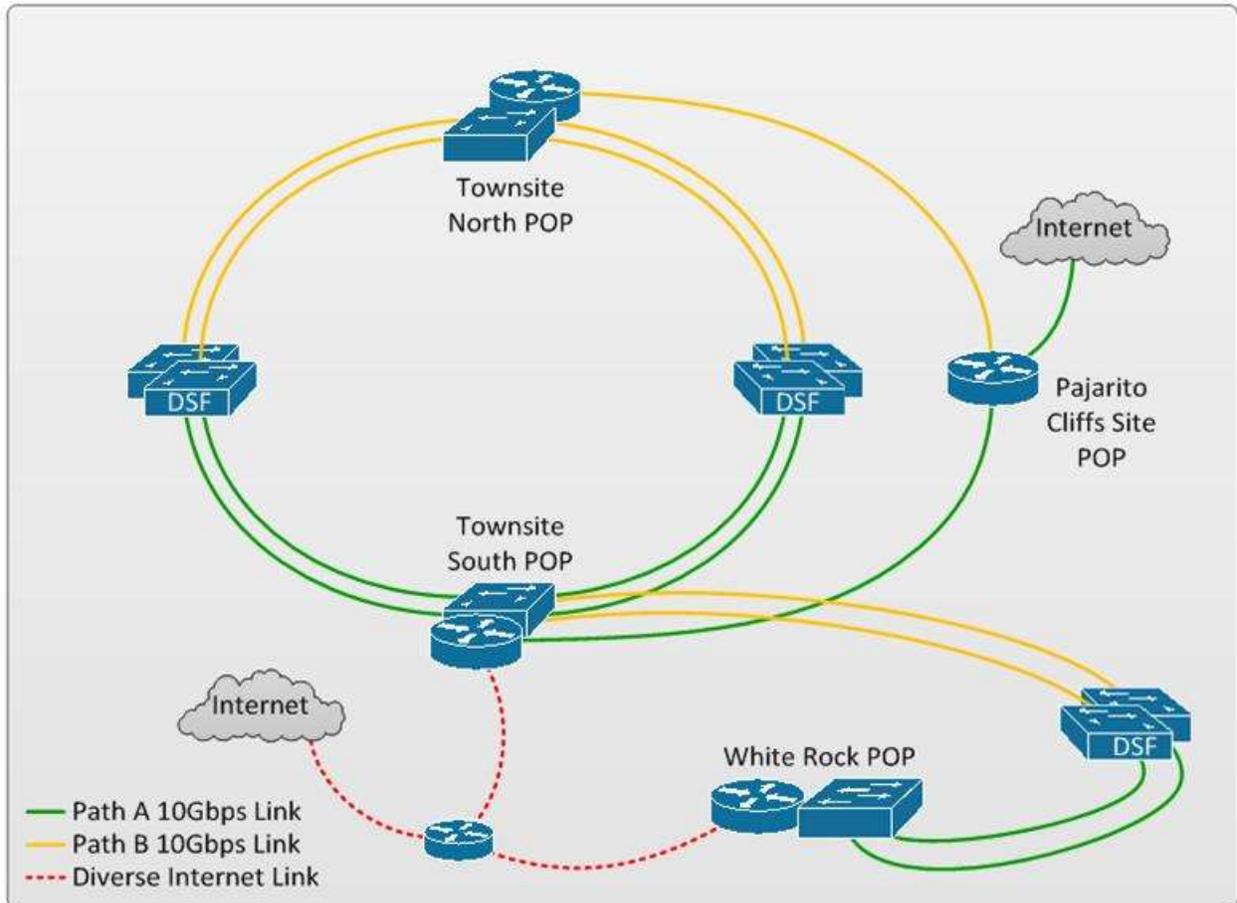


Figure 2-3. POP Connections

CBN's core fiber network, commonly referred to by industry as feeder fiber, provides two redundant fiber routes between the DSFs and the POPs. As much as possible the two routes follow different physical paths, to mitigate the impact of a fiber cut along one route. The nominal

Townsite buried core fiber cable is a ducted all-dielectric cable with 432 fibers. The nominal White Rock buried core fiber cable is a ducted all-dielectric cable with 288 fibers. The buried core fiber routes use existing LAC conduit where possible, to minimize new underground construction. The nominal Townsite aerial core fiber cable is an All-Dielectric Self-Supporting (ADSS) cable with 432 fibers. The nominal White Rock aerial core fiber cable is an ADSS cable with 288 fibers. The Townsite and White Rock core fiber lengths are listed in Table 2-1.

Table 2-1. Core Fiber Lengths

CORE FIBER TYPE	LENGTH (miles)
Townsite Buried in Existing Conduit	9.9
Townsite Buried in New Conduit	3.7
White Rock Buried in Existing Conduit	0
White Rock Buried in New Conduit	2.7
TOTAL Buried	16.3
Townsite Aerial	11.1
White Rock Aerial	4.4
TOTAL Aerial	15.5
TOTAL Core Fiber (Buried + Aerial)	31.8

Detailed routes for the fiber construction in are contained in the *Townsite Fiber Construction and Route Design* and *White Rock Fiber Construction and Route Design* documents. These two documents illustrate the fiber routes and the placement of most CBN components.

A Distribution Switch Facility (DSF) is a telecommunications cabinet that houses Ethernet aggregation switches and fiber management systems that connect the 1 Gbps Customer drop fiber links into a smaller number of 10 Gbps links to the POP. There are 17 DSFs in Townsite and 6 DSFs in White Rock.

Lateral fiber connects the DSFs to the drop closures. It is designed to accommodate the number of Customers serviced by the DSF with an additional spare amount of dark fiber added to accommodate future growth. A drop closure is a weather-resistant housing containing one or more fiber management trays, connecting lateral fiber to as many as 12 premises drop fiber cables. The drop fiber connects the premises equipment with the drop closure. The drop fiber for residential and business Customers will have 2 fibers; one will carry CBN network data, and one fiber will be a spare fiber for future use.

Each Customer will be provided with customer premises equipment providing access to CBN. The CPE consists of a fiber termination box outside the Customer’s premises, connected to a gigabit Ethernet switch. The fiber termination box connects the drop fibers to the in-building cabling. CBN uses an Ethernet switch with one or more gigabit Ethernet ports, and holding an SFP (Small Form-factor Pluggable) transceiver module, which converts between optical and electrical signals.

The proposed CBN would be deployed in phases, beginning with Stage 1 construction, estimated to be completed on a countywide basis within three years of initiating the project. Stage 1 would

provide all residences and businesses with a symmetrical 1 Gbps upload and download network interface and the ability to access community services through a Portal and subscribe to broadband services from retail providers. The *CBN Design Report* includes upgrade options, defined as Stages 2 and 3, which would add further network capacity in future years, on an as-needed basis. The upgrade triggers would be based on actual bandwidth utilization statistics and changes in market indicators.

2.2 Community Portal

The community Portal allows an easy way for Customers to access services and communications from SPs and LAC. The Portal provides a platform for SPs to offer their services by providing a menu of service and SP options to the Customers. These services include Internet, Voice, and Video services, as well as other Community-based services. The Portal allows the Customer to compare services and instantly activate the service (assuming the location is in the service area, the service doesn't require additional equipment, such as a set-to-box, etc.). Figure 2-4 shows a conceptual Portal screen capture. The actual Portal design will depend upon vendor selection and customization.



Figure 2-4. Conceptual Portal Web Page

2.3 Network Design

CBN is a community network planned around an open access design principle, where separate entities provide the physical network infrastructure and content services. An open network design removes traditional barriers to entry caused by infrastructure costs and incumbent local providers who operate closed networks where they are the only service provider option. LAC will own CBN network infrastructure. Various SPs use CBN to provide services such as Internet, IPTV, and VoIP telephone service.

2.3.1 Active Ethernet Network

An Active Ethernet (AE) design was selected for CBN because of its capability to provide 1 Gbps data rates, its wide adoption as a preferred medium for transport, and the ease with which

any network element can be upgraded. This means that all nodes in CBN connect using Ethernet only. Figure 2-5 shows the physical core network topology for CBN, showing all three POPs, representative DSFs in Townsite and White Rock, and their interconnections.

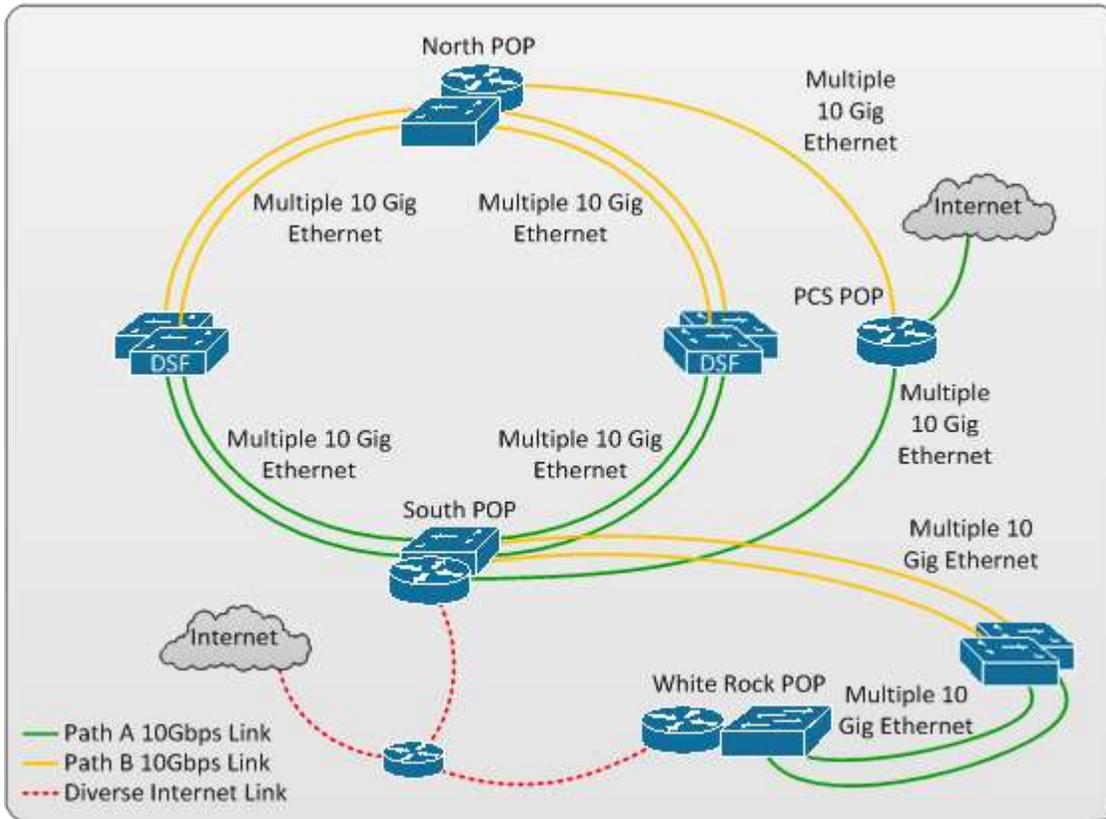


Figure 2-5. Physical Network Topology

Each DSF connects with two POPs over multiple pairs of 10 Gbps links. Each Townsite DSF connects half of its 10 Gbps links with the south POP, and the other half with the north POP. Each White Rock DSF connects half of its 10 Gbps links with the White Rock POP, and the other half with the south POP.

2.3.2 Commercial Services

Commercial services are provided by SPs that have partnered with CBN. The SP provides the service content, and CBN delivers it to the County premises. There are three main commercial services: Internet, IPTV, and VoIP. CBN can deliver Internet services directly to CBN Ethernet switch. IPTV and VoIP services may require add additional set-top box or other information appliance to interface between the Ethernet switch and a television or telephone.

2.3.3 CBN Routing Overview

CBN provides Ethernet transport to SPs so that SPs may provide retail network services to the residents and businesses of Los Alamos County. An SP's router acts as the Internet gateway for Customer equipment connected to CBN. The SP router performs the routing lookup and forwards the data traffic either locally within the SP network (for services provided directly by

the SP, such as IPTV or VoIP) or to an interconnect provider when accessing the Internet. Alternatively, CBN can act as the Internet gateway, providing transport service for SPs. In this case, CBN router will perform the routing function for the SP Customer's traffic.

Multiprotocol Label Switching (MPLS) is deployed in CBN core network. Some benefits of MPLS include robust Quality of Service, multi-service delivery, scalability, and fast network recovery/resiliency. MPLS requires a Layer 3 routing protocol (Open Shortest Path First) to run on each router, as well as a signaling protocol (Label Distribution Protocol) to establish MPLS tunnels. As such, within the context of MPLS, CBN core routers do perform routing and MPLS functions.

Ethernet transport services are implemented using Virtual Private LAN Service (VPLS), where the actual services between the customers and SPs are delivered as Layer 2-only (within CBN) across the MPLS core. The MPLS operation is essentially transparent to an Ethernet transport service.

2.3.4 On-Network Services

CBN is a significant investment of infrastructure, providing fiber optic connections to every premises in LAC. The weak link can many times be interfacing with other networks with lower performance, or inefficient traffic flows, where traffic leaves CBN to the SP, then re-enters CBN to reach the destination. To take advantage of the fiber infrastructure, on-network services may be created, and traffic between the Customer and service remains completely on CBN. On-network services could include:

- Community Portal services
- LANL applications
- Public Safety applications
- Library services
- Los Alamos Public Schools applications such as remote learning
- Department of Public Utilities – automated meter reading and smart grid services
- Municipal wireless

The traffic between the end-user and the on-network service provider should not leave CBN. To accomplish this, CBN must support some degree of routing for on-network services. When a resident or business initially connects a computer to CBN, the resident/business does not have an Internet provider established at this point and has yet to access the self-service Portal to choose an SP. Or, the resident or business chooses to not use an SP on CBN for Internet services, but still connects to CBN Portal for local community services. In this case, CBN acts as the next-hop router for the end devices, to provide connectivity between the end devices and community Portal. A private IP is provided to the end device through DHCP, which is routable only within CBN, for the sole purpose of accessing CBN Portal (this is different than in the wholesale Internet case, where public IPs are used and are routable to the Internet).

Once a resident/business selects an Internet provider, the network is reconfigured as that CBN performs Ethernet transport between the end device and SP, and all IP allocation and routing is performed by the SP. Once a customer selects an Internet provider, as previously mentioned, the SP router is the Internet gateway and acts as the next-hop router for data traffic (with the exception of the wholesale Internet gateway case). The CBN on-network services are on a subnet

different from the end-user devices. Traffic to and from the on-network services is not forwarded from CBN to the SP, but remain on CBN. To support this, proxy Address Resolution Protocol and/or policy based forwarding should be implemented in CBN core routers to enforce this forwarding decision.

2.4 Network Operations

The NOC will be staffed 24/7/365 to monitor and manage CBN operations. NOC personnel activities include monitoring all network equipment, conducting routine testing of circuits, diagnosing problems, responding to trouble reports from SPs, installing software and equipment firmware upgrades, and provisioning new services.

NOC personnel will take calls only from SPs, not from customers. SPs are responsible for first line Customer support. NOC personnel will prepare monthly billing reports and invoices for SPs, listing all services active and subscribed to during the billing period.

NOC personnel will provide information to the CBN Outside Plant (OSP) maintenance field team. For CBN, the term OSP refers to all of the physical fiber cabling and supporting infrastructure, including conduit, vaults, and cabinets, located between the POPs and the Customer premises. NOC personnel identify field equipment problems, diagnose the problems, coordinate with maintenance personnel to repair, replace, or reconfigure defective equipment, and ensure that the problem is fixed.

Network operations personnel are responsible for supporting CBN Network Operations by performing functions including:

- Provide day-to-day network operations, maintenance, and repairs
- Diagnose and troubleshoot problems reported by SPs
- Monitor the network for faults and service issues
- Provide oversight and quality assurance of network operations
- Provision network services for SPs
- Modify existing network services
- Install network management software upgrades
- Install network equipment firmware upgrades
- Prepare monthly billing reports and SP invoices
- Coordinate the repair/replacement of defective or damaged network equipment and fiber
- Perform network upgrades and fiber maintenance
- Deploy and administer the Community Portal and Self Selection Portal
- Deploy and maintain the databases related to the OSS/BSS systems

Table 2-2 lists the operations personnel positions and responsibilities.

Table 2-2. CBN Operations Personnel Positions, Outsourced Model

Position	Responsibilities	Notes
Principal Network Engineer	Network Deployment & Configuration SP Technical Support New Service Definition/Deployment Abuse	Day shift, after hours/on-call as necessary
Senior Network Engineer	Network Deployment & Configuration SP Technical Support New Service Definition/Deployment	Works under direction of Principal; Day shift, after hours/on-call as necessary
Systems Manager	Management of Software/Systems staff	All Software/Systems staff report
Senior Software Engineer	System Integration/Development Portal Administration/Deployment	Customizes Portal, performs integration between CBN systems and also SP/CBN systems
Senior System Administrator	Systems Administration/Deployment Abuse	Deploys OSS/BSS and EMS systems
Database Administrator	Database Administration/Deployment	Deploys/supports databases related to

Figure 2-6 shows the personnel organizational chart for the outsourced model.

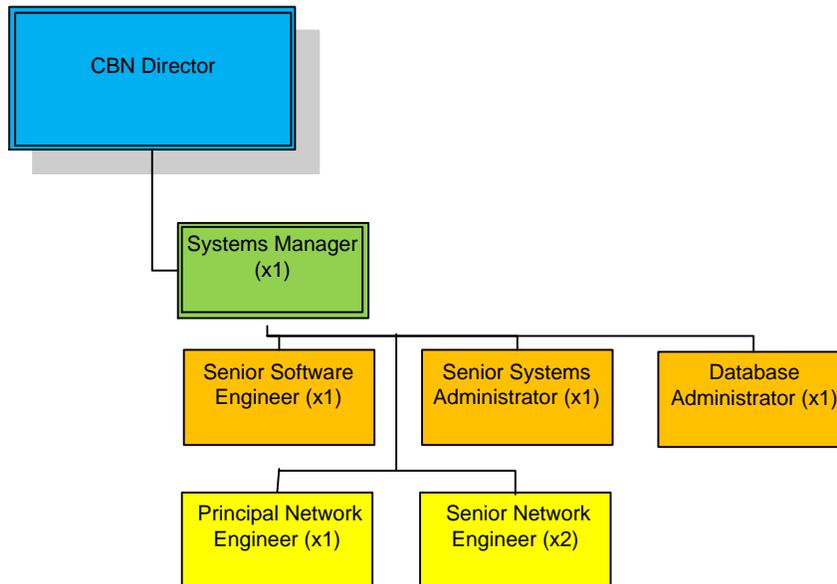


Figure 2-6. Outsourced NOC Organizational Chart

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Section 3. Business Strategy

The Los Alamos County (LAC) Community Broadband Network (CBN) would be a community Fiber-to-the-Premises (FTTP) network planned around open access operating principles. In an open access network the function of infrastructure owner/operator is separated from that of service provider. In the context of CBN, LAC would own the network infrastructure, while services would be provided to the end-user by retail service providers. CBN could be operated directly by LAC or by a 3rd party contracted by LAC. CBN would run as a “wholesale” network within LAC and provide various tiers of data transport services to retail providers. Data transport would involve moving network traffic across CBN from the consumer’s premise, over an end-to-end fiber optic network, to a hand-off point with the retail service provider. For providing such network services, CBN would charge a wholesale rate to the retail provider.

By implementing this business strategy, LAC would not compete with the private sector as a retail service provider, but rather offer a wholesale network platform that would lower the infrastructure investment requirement for the private sector, offer a superior network transport infrastructure (FTTP), increase speeds and reliability, with the intent of making services more affordable to the end consumer. CBN would also enable economic development opportunities within LAC, by marketing the infrastructure to potential businesses as a means of creating and/or retaining jobs in the community. Furthermore, the infrastructure could be utilized for education, research, and development opportunities, by partnering with Los Alamos National Laboratories, the New Mexico Consortium, and the Los Alamos Public Schools, to name a few.

CBN’s overall conceptual model consists of these essential elements:

- The recommended approach for financial administration is the creation of a CBN Enterprise Fund. This Enterprise Fund would provide a separate ledger account within LAC’s accounting systems, reflecting the associated costs for funding, building, and running the network, as well as the revenues generated through wholesale bandwidth services and GRT.
- Securing project capital for covering capital expenditures associated with network investment through a recommended municipal bond package backed by a GRT increment
- Operating the network on an open access, wholesale basis, which means any qualified service provider of broadband retail services will have competitively neutral, non-discriminatory access to the network for the purpose of selling its retail services to all potential consumers
- Achieving desired revenues to cover operating expenses, through a mix of wholesale network service products offered to retail service providers
- Completing network implementation and reaching targeted subscription rates with the retail service providers, during the forecasted timelines

The stakeholders for the LAC Community Broadband Network include:

- **Customer:** the households, businesses, and government institutions in Los Alamos County who purchase services on the network from one or more SPs. In addition, they will have access to the community portal as a government service.
- **Network Owner:** Los Alamos County would own the wholesale open access network, providing fiber optic connectivity to all premises in LAC. CBN would provide the fiber optic cabling and termination equipment from the customer premises to interconnect points with the service providers' network, including the switching/routing equipment and facilities in between. This would serve as a data transport network that the retail service providers would utilize for reaching the end consumer.
- **Network Operator:** LAC, or a contracted 3rd party, would operate CBN. Responsibilities include: service fulfillment, assurance, and service provider billing, within the context of the open access network infrastructure. For the purposes of the business strategy, the Network Operator is assumed to be different from LAC, in order to provide a distinction between the functions of the owner and operator. This does not mandate that a 3rd party (and not LAC) would be the operator when the CBN is built.
- **Service Provider:** Provides retail services on CBN. The network may include several service providers, each with competing services. Service providers would have service agreements with LAC and billed by the Network Operator (on behalf of LAC) for use of CBN. Service providers operate their own network to provide the services, including interconnects to the Internet, and systems specific to delivering their applications and/or content, such as IP-television (IPTV) video head-ends and Voice over IP (VoIP) softswitches.

LAC plans to provide community services and use the CBN for smart metering services. LAC may also use the network to provide network connectivity to county entities. These services are not traditional “retail” services, but from the perspective of the network and operational model, these “services” are implemented similar to retail services, and as such, LAC is effectively the Service Provider for these services. This has minimal impact on the design of CBN.

For use of the wholesale infrastructure, CBN would establish a rate schedule for various tiers of network transport bandwidth. Section 3.2.2 of this business plan addresses the rate schedule concept and proposed pricing levels in detail. The rates would be offered on fair and equal terms to all qualified service providers, in line with open access operating principles. LAC would negotiate CBN Service Level Agreements (SLAs) with the retail providers, outlining the terms and conditions for the respective parties, while incorporating the wholesale rate schedule as the pricing baseline.

CBN would recruit service providers through the use of a community network Portal, and enable service providers to market their services through the Portal as well. The community Portal would provide a simplistic way for consumers to access retail services from the providers and the basic county services from Los Alamos. The Portal provides a platform for service providers to market their services by providing a menu of options to the consumers. These services could include Internet, Voice, and Video services, as well as other Community-based services. The actual Portal design would depend upon vendor selection and customization.

3.1 Industry Practices

Fiber-to-the-Premises networks are becoming increasingly common for delivering broadband services, and they are starting to supplant legacy technologies, such as DSL (Digital Subscriber Line). The most widely known resource for FTTP industry updates and management best practices is the Fiber-to-the-Home Council. At the 2012 Fiber-to-the-Home (FTTH) Council annual conference, RVA Market Research and Consulting reported that approximately 25 million homes in North America have access to direct fiber optic connectivity, with approximately 9 million actively subscribing to services. See Figure 3-1.

North American FTTH Homes Passed Nears 25M

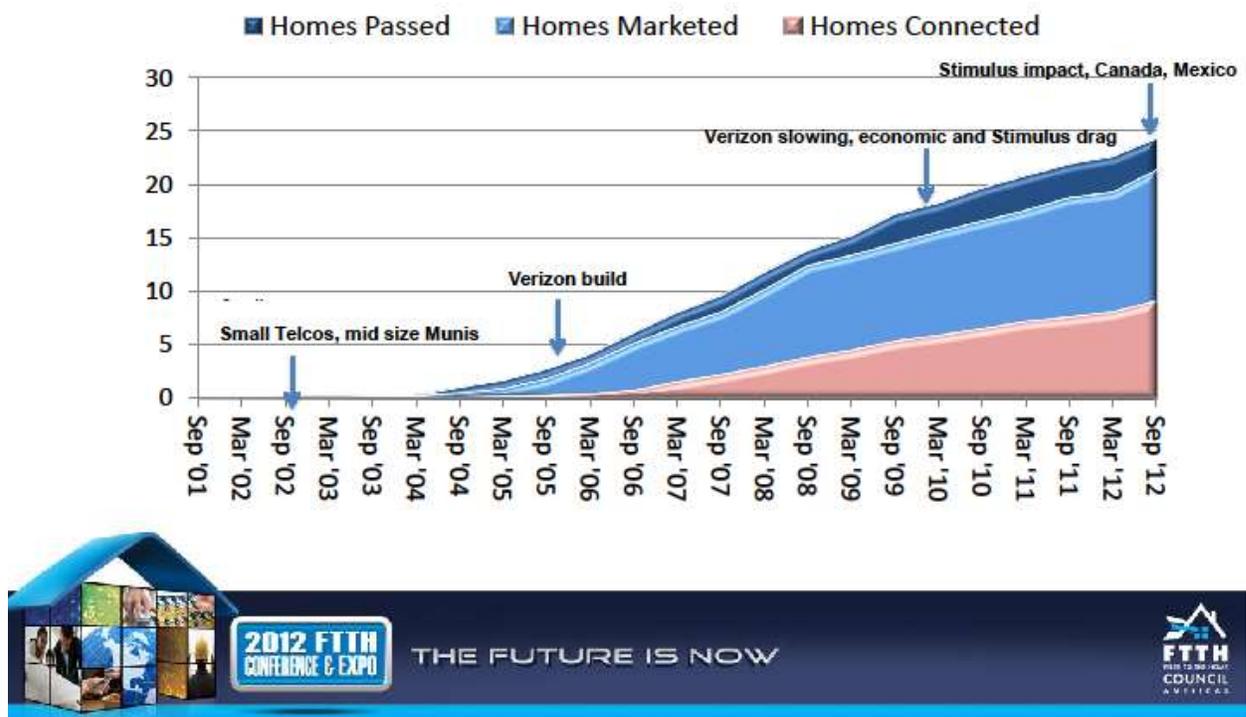


Figure 3-1. Availability of FTTP connectivity

RVA's research substantiates that FTTP networks began slowly with rural telcos and municipalities approximately 10 years ago, then ramped up substantially, spurred by Verizon's Fiber Optic Service initiative. In 2010, as the economy and Verizon's effort slowed, so did the FTTP infrastructure build out. With the help of economic stimulus and more rural communities taking a leadership role in broadband infrastructure investments, FTTP build outs have started increasing again. This is an industry indicator that reflects Los Alamos' consideration of building CBN.

With FTTP infrastructure, broadband speeds are typically higher than that of the older, legacy technologies. RVA found that the FTTP industry is trending towards 1 million subscribers with

50 Mbps services, as shown in Figure 3-2 below. CBN has considered this trend and structured wholesale network products to enable speeds up to 100 Mbps, with the scalability to grow to 1 Gbps. RVA also noted that the number of users of 1 Gbps services is currently limited, but increasing.

Estimated High Bandwidth FTTH Users

50 Mbps FTTH Users Are Approaching 1 M

100 Mbps Users:	
2009	7,200
2010	69,700
2011	170,300
2012	516,500
50 Mbps Users:	
2009	39,800
2010	162,500
2011	347,650
2012	803,461



Gigabit users are currently limited - but growing

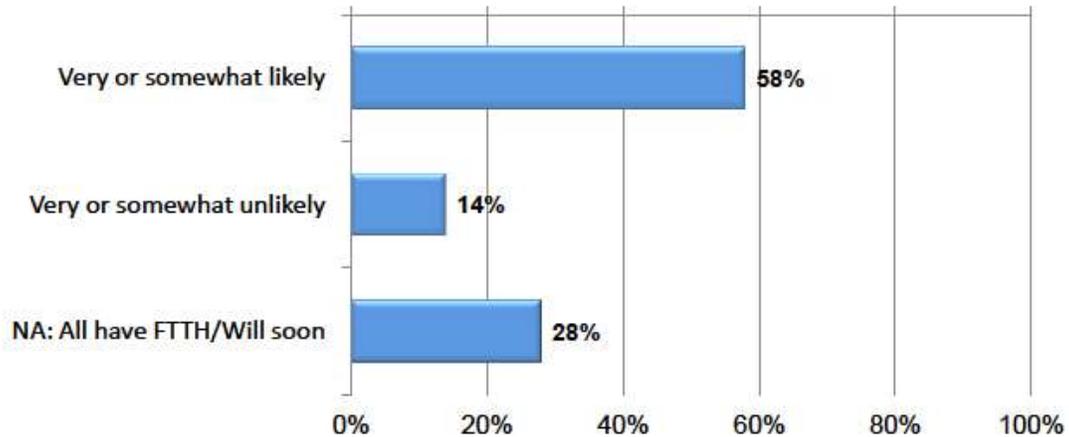


Figure 3-2. FTTP Broadband Subscription Speeds

The majority of current FTTP providers state that they will continue their fiber deployments in the upcoming years, adding stability to the industry growth model. See Figure 3-3 below.

Most Current Providers Likely To Continue Past 2012

Percent saying they will continue building FTTH



**Unlikely includes those concerned with USF reform, those with low take-rates, & some of those with most homes already connected*



Figure 3-3. Likelihood of Continuing with FTTP

Looking at the FTTP industry, in broad terms, municipalities represent the third largest segment of FTTP deployments, behind only the Tier 1-3 telcos (the largest private networks). See Figure 3-4. This suggests a positive indicator that Los Alamos County, as a municipal government, would be entering into an established industry segment.

RBOCs Dominate Connections, But Others Add Up

U.S. FTTH Connections By Provider Type

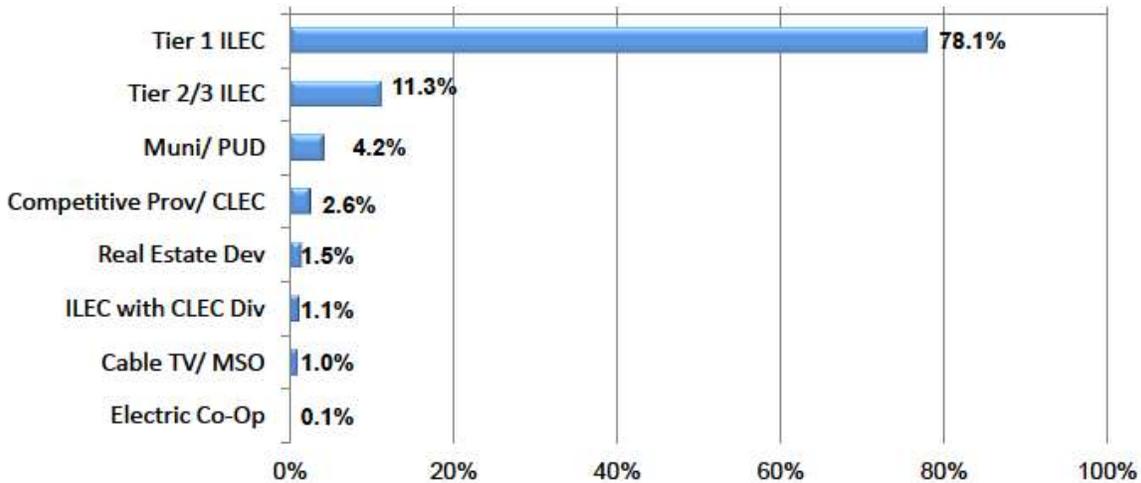
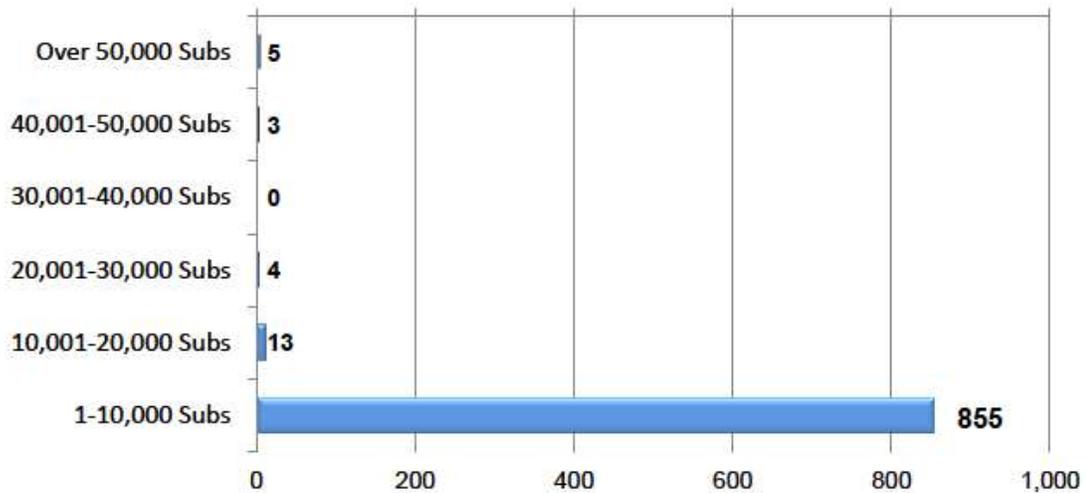


Figure 3-4. FTTP Market Segments

Although overall FTTP broadband subscriptions are heavily weighted towards the larger network operators, looking at individual FTTP deployments shows that most have 10,000 or fewer subscribers. This should serve as a testimony to CBN’s plan for building fiber optics to 8,610 premises. See Figure 3-5.

The US Has A Tradition Of Bottom Up Construction

97% Of US FTTH Providers Have Under 10,000 FTTH Connections



Approximately 880 U.S. Providers, (930 North American Providers Total)

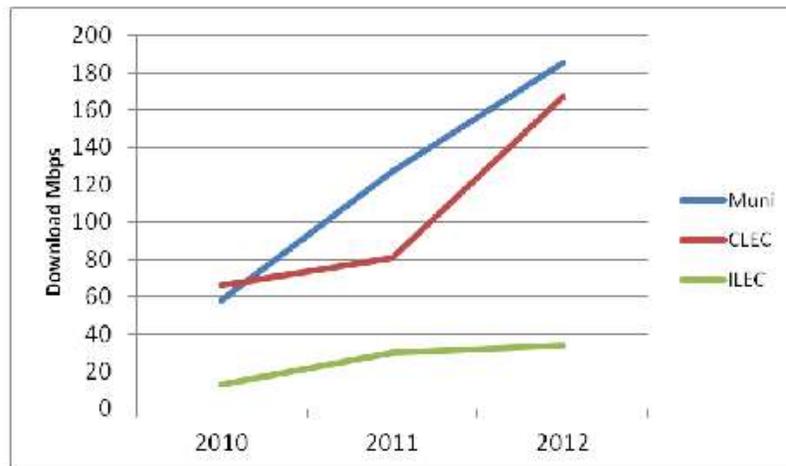


Figure 3-5. FTTP Typical Network Size

Municipalities that are deploying FTTP also represent an industry segment that typically offers the highest download speeds with a trend towards symmetrical bandwidth, two cornerstones that are also shared with the proposed CBN Business Plan. See Figure 3-6 and Figure 3-7.

FTTH Maximum Download Speeds Are Increasing

Average Max Speeds For Munis and CLECs Exceed 150 Mbps



ILECS tend to be rural with less speed demand, less competition, and higher wholesale bandwidth cost. There are approximately twenty-five U.S. providers of gigabit service.



Figure 3-6. FTTH Download speeds

FTTH Speeds Are Becoming More Symmetrical

Max Upload Speed As A Percent Of Max Download Speed

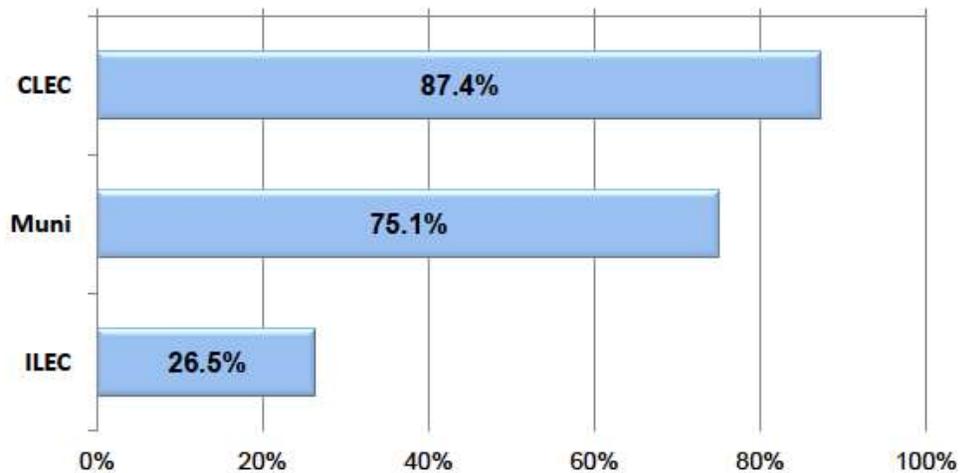


Figure 3-7. FTTP Symmetrical Bandwidth

To assist with achieving maximum take rates, FTTP deployments implement best industry practices for “branding” the community network. RVA found that FTTP networks that promote product features, launch marketing campaigns, enable competition, and provide a local presence are those that are most successful. See Figure 3-8. CBN shares these common elements and the proposed community Portal would be the primary interface for delivering these messages.

Some Take-Rates Exceed 70%

Modeling Shows Multiple Factors Influence Take-Rates



Product features



Marketing



Degree of competition



Local presence



Figure 3-8. FTTP Marketing Practices

The FTTP industry is also fostering work at home environments, a goal that is commonly shared in Los Alamos. See Figure 3-9. Two thirds of FTTP subscribers work from home, and more than 10% have a home-based business.

FTTH Changes How We Work



- FTTH employed users say they work 1.2 extra days per month from home (on average).
- 67% of FTTH users who are employed sometimes work at home.
- 11% of FTTH users have a home-based business.

"I have a young baby so I work around his napping schedule."

"Saves gas, tolls, clothes, and lunch costs."

"I have seizures and my driving is limited."



Figure 3-9. FTTP Work at Home Practices

Communities are also using fiber optics as a way of attracting new homeowners to live and work in the community, with between 78%-89% of home buyers indicating that FTTP is an important consideration in their home purchase. This trend would seem important for Los Alamos, and in particular the Los Alamos National Laboratories, for attracting new employees to the community. See Figure 3-10.

FTTH Is Seen As A Prime New Housing Amenity

Importance Of Area Amenities If Shopping For New Home

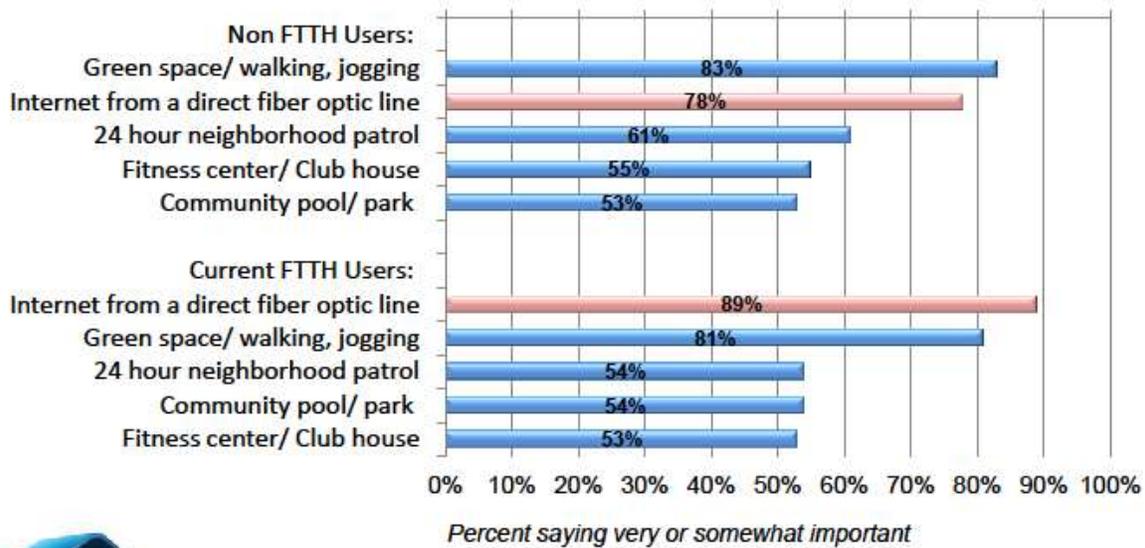


Figure 3-10. FTTP and Home Purchasing

Along the same lines, FTTP is believed to add ~2% to the value of a property, as compared to an equivalent home without direct fiber optic connectivity. See Figure 3-11. This presents another industry best practice for increasing home valuations and community attraction, using FTTP as the platform.

FTTH Adds Home Value



* Based on \$300,000 Home

- Current FTTH owners say fiber increases home value by 2.1%, while non FTTH users say 1.7% increase.
- Non FTTH users believe that a home that doesn't already have very high speed Internet from a direct fiber optic line and advanced inside wiring would have to be discounted an average of \$5,337 more to be considered.*
- FTTH users believe an average discount of \$6,451 would be required.*

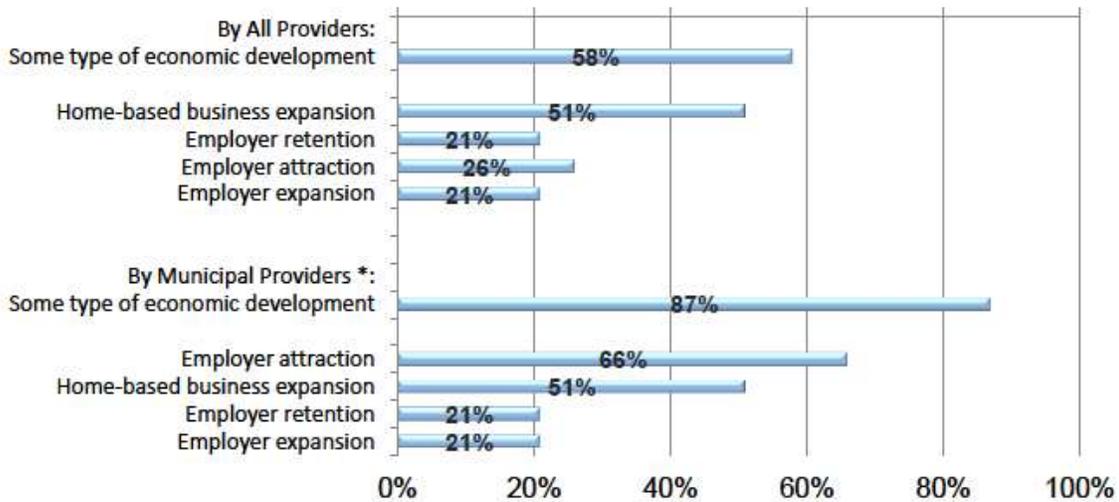


Figure 3-11. FTTP and Home Valuation

FTTP networks are widely regarded as a catalyst for economic development. Municipal fiber optic network providers, in particular, have noticed the greatest results from economic development, when marketing the infrastructure to potential industries. 87% of municipal fiber optic networks have experienced economic development benefits from the infrastructure investments, with 66% being from employer attraction. This would directly support achieving Los Alamos County's strategic objectives. See Figure 3-12.

FTTH Is Increasing Economic Development

Providers Are Noticing Economic Impact



* Municipal providers are more focused on this aspect



Figure 3-12. FTTH and Economic Development

FTTH is becoming a management best practice for lowering community expenses as well, by means of increasing work at home opportunities, decreasing congestion on streets, and lowering the overall carbon footprint. This is demonstrated in Figure 3-13 below.

FTTH Is Lowering Community Costs

FTTH Drives \$Millions In Community Expense Reductions



- FTTH users work an average of **1.2 additional days per month from home.**
- Assuming 50% FTTH take-rates, FTTH drives a **3% community-wide increase in work from home...**
- ...and, thus a **1.8% reduction in total vehicle traffic and related public costs.**
- ...as well as a **1.1% reduction in ozone/CO2 emissions...**



Figure 3-13. FTTP and Lowering Community Costs

Lastly, FTTP can stimulate value within the community. Looking at various industry metrics, FTTP could generate ~\$47,000,000 in revenue per annum in Los Alamos (7,769 households with 11% starting a home-based business @ \$55,000 annual revenue) and as many as 215 new jobs (25 new jobs per 1,000 FTTP passings @ 8,610 total CBN premises passed). See Figure 3-14 below.

FTTH Is Adding Primary Dollars To Communities

FTTH Drives \$Millions In Community Revenue Increases



- 11% of FTTH users have a home-based business averaging **\$55,000 in revenue**. (\$14,500 additional income)
- Assuming 50% take-rates, community revenue increases by an average of **\$0.5 million** per 1,000 FTTH passings.
- FTTH drives as many as 25 new traditional jobs per 1,000 FTTH passings. This could mean as much as **\$1.1 million** in new annual salaries to the community per 1,000 FTTH passings.



Figure 3-14. FTTP and Community Value Creation

3.2 Revenue Model

CBN's revenue model is based on two fundamental elements:

- Gross Receipts Tax increment for covering debt service
- Broadband revenues for wholesale network transport to retail service providers

The first element of the revenue forecast is a 7/16th GRT increment. Los Alamos County has at its discretion and subject to a public election, the ability to implement increases in GRT up to a total of 12/16^{ths} of a percent. Each 1/16th increment would generate approximately \$800,000 in annual revenue to LAC. CBN would require ~\$3.9m annually to cover the debt service on the \$47.2m bond issuance for initial network construction. A 7/16th GRT increment is projected to generate ~\$5.6m annually, sufficient to cover the bond payments. The bond proceeds would be used to cover the Capital Expenditure items forecasted in Project Years 1-3. Since this proposed GRT increment would require a public election to approve, a majority of public support for CBN would be required.

Research & Polling's telephone interviews, as well as Los Alamos County's online and in-person surveys, polled the community to see what level of support there could be for a GRT levy to

support CBN’s implementation expense and sustainability. Figure 3-15 below illustrates the level of community support behind a proposed GRT levy.

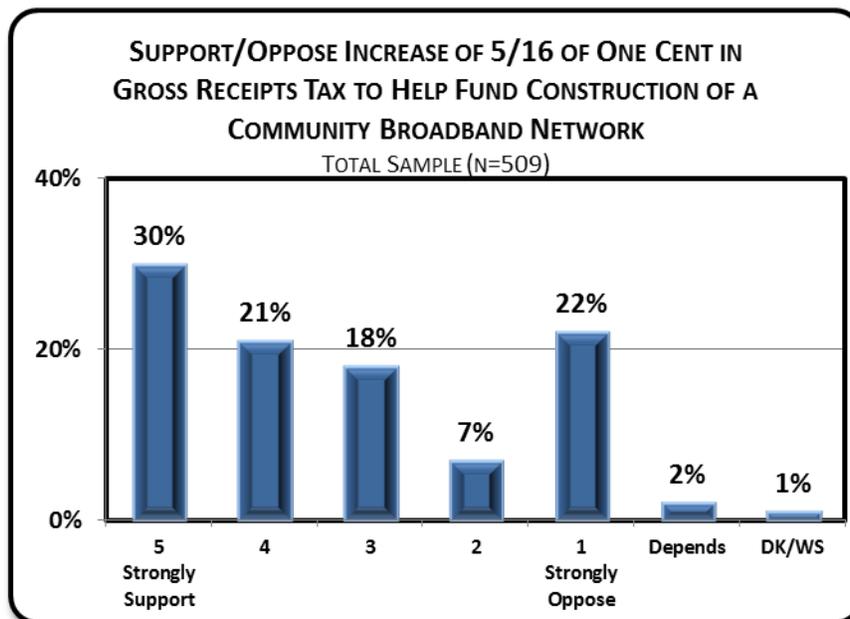


Figure 3-15. Community Support for GRT Levy, R&P, Oct 2012

Research & Polling found that 51% of the community would support a 5/16th increase in GRT (30% strongly), while only 29% were opposed (22% strongly). This polling was based on an initial projection that a 5/16th GRT increment would provide sufficient revenue to maintain positive operating cash flows after servicing the initial bond package network construction. However, given the nature of GRT volatility, a downward adjustment as was applied, lowering the initial expectation of 1/16th GRT being equivalent to \$1m per year in revenue, to 1/16th being forecasted at \$800,000 per year in revenue. As such, the CBN Business Plan would require a total 7/16th GRT to produce sufficient annual revenues to cover the debt service on the proposed revenue bond package for initial network construction. This provides a more conservative outlook with additional downside protection. Given the high level of community support identified for a 5/16th GRT levy, it would be a reasonable assumption that a similar level of support would be provided for a 7/16th GRT increment, as it is a modest increase. The CBN Business Plan recommends holding public information sessions as a means of communicating the change in GRT requirements to support CBN and address the adjustment that was made due to GRT volatility.

The second element of the revenue forecast is broadband revenues for wholesale network transport to retail service providers. CBN’s business model is based upon open access principles, which provide fair and equal access to wholesale network transport services. Wholesale network transport involves moving end-user traffic from the customer premises to a CBN POP facility, when it is then handed off to the retail service provider. CBN would own and operate the infrastructure elements from the customer premises Ethernet switch, also referred to as an Optical Network Terminal (ONT), which delivers traffic to the retail service provider’s consumer electronics, to the head-end network routing equipment at the CBN POP. CBN would offer these wholesale network transport services to retail service providers and charge a fee

associated with various tiers of bandwidth. In turn, the retail providers would market and support their broadband services at the consumer level, to both residences and businesses. CBN would not serve as the retail Internet Service Provider (“ISP”), nor provide the Internet gateway functionality to ISPs.

3.2.1 Service Provider Recruitment

CBN would be open to any qualified service provider to deliver their respective services over the proposed community fiber network. The service provider industry is represented by traditional telephone companies or Incumbent Local Exchange Carriers (ILECs), Competitive Local Exchange Carriers (CLECs), Internet Service Providers (ISPs), wireless service providers and cable television providers. While these services include the traditional voice, video, and data applications, the portal and open fiber network will also accommodate distance learning, healthcare and medical applications, to name only a few. With the symmetrical bandwidth proposed, and the open services approach, CBN would become a “production” environment for local service innovation, telecommuting, and economic development, rather than the current “consumption” model enforced by the incumbent service providers today where their services are the only option.

The open network may host many innovative applications at a future point, and the proposed CBN fiber design would accommodate such, however the most immediate intended use of the infrastructure is to provide a wholesale transport network within LAC, to support the data transport needs of retail service providers, create network partnership opportunities, deliver enhanced County services, and to integrate with other network technologies, such as wireless infrastructure. As such, this proposed open fiber design takes into consideration a long-term infrastructure planning horizon, future potential network uses and partnerships, so that the entire project lifecycle will efficiently accommodate any additional phases, with ease of integration and cost minimization, making the wisest use of public financing.

The key to providing superior services on CBN will be in the careful qualification and selection of service providers. CBN would initially focus on service providers with a proven track record of services and whose presence will lend support for continued network expansion by delivering quality services and building customer loyalty. This approach will help ensure the network’s health and long-term sustainability.

As the network grows, it can seek additional providers that complement the basic video, telephone and Internet services offerings with:

- Unique content
- Targeted services for business
- Specialized applications (education, healthcare, entertainment/recreation)

This will encourage entrepreneurial innovation locally, because the open network design lowers the barriers for entry to provide services in the market. In other words, the network is designed to accommodate multiple service providers, and the network automation suite completely supports that paradigm by making it relatively simple to add new services and service providers to the network at any time.

Once on the network, service level agreements (SLAs) for the service providers can be written and enforced in order to maintain a standard level of quality for all service providers. This is important, because if one service provider doesn't perform well, it damages the reputation of the entire network and can adversely affect take rates for all service providers on the network—thus negatively impacting the financial outcome of the network overall.

LAC released a Request for Interest (RFI) during March 2012, soliciting information from retail service providers interested in participating and ultimately offering Internet services on CBN, should the effort move forward to implementation. This data was utilized for helping to identify potential service providers and substantiate the level interest from the service provider community in utilizing wholesale network transport services from CBN, to reach their retail customers. Service providers projected that they would be willing to offer the retail tiers shown below in Table 3-1. This data further assisted with identifying potential service tiers and price points, to cross reference with the market research data from Research & Polling (May 2011 and October 2012), and ultimately serve as the baseline for projecting the wholesale network revenues.

Table 3-1. LAC RFI, Retail Service Provider Responses, March 2012

Speed	Service Provider 1		Service Provider 2	
	Residential	Business	Residential	Business
3 Mbps	\$29.95	\$39.95	\$29.95	\$39.95
5 Mbps	\$39.95	\$69.95	\$39.95	\$49.95
10 Mbps	\$44.95	\$129.95	\$49.95	\$89.95
20 Mbps	\$69.95	\$329.95		
25 Mbps			\$79.95	\$129.95
50 Mbps			\$149.95	\$249.95
100 Mbps			\$299.95	\$499.95

The respondents expressed interest in offering a 5 Mbps residential Internet service at \$39.95 per month and a 10 Mbps Internet service from \$44.95 to \$49.95 per month, which would closely equate with the \$42.60 consumers indicated they would be willing to spend, on average, from Research & Polling's May 2011 survey. Research & Polling's October 2012 survey found that consumers might prefer the larger bandwidth tiers, although that would be reserved for upside growth.

3.2.2 Wholesale Service Offerings

Wholesale network pricing is primarily a factor of what the market, in this case the retail service providers, are willing to afford in their business model, more so than what the network investment, cost-recovery, and operational models requires. Therefore, the expense structure for building and operating CBN must be in-line with what the anticipated wholesale rates would generate for topline revenues. To establish the CBN wholesale service platforms, data was

collected through the aforementioned LAC RFI (March 2012), supplemented by the two telephone surveys conducted by Research & Polling, Inc., in-person interviews conducted November 2012, and a web survey conducted November 2012.

This market research data was used to build the following wholesale network transport service tiers that CBN would offer to retail service providers, shown in Figure 3-16.

Services & Price Assumptions			
Residential & Small Business Transport			
	Anticipated Retail Rate	Wholesale CBN Rate	% of Subscribers
Residential ISP transport			
- ISP 5 Mbps	\$30.00	\$7.50	30%
- ISP 10 Mbps	\$40.00	\$10.00	30%
- ISP 25 Mbps	\$80.00	\$20.00	30%
- ISP 50 Mbps	\$150.00	\$37.50	10%
Weighted Annual Revenue		\$15.00	
Small Business ISP transport			
- ISP 5 Mbps	\$50.00	\$12.50	30%
- ISP 25 Mbps	\$130.00	\$32.50	50%
- ISP 50 Mbps	\$250.00	\$45.00	20%
Weighted Annual Revenue		\$29.00	

Figure 3-16. Proposed Wholesale Rate Schedule, CBN Business Plan, Nov 2012

In the above Wholesale Rate Schedule, the service that CBN would be providing to the retail service provider is local network transport of Internet bound consumer traffic. This involves delivering network traffic, on behalf of the ISP, from the customer’s premises to a CBN POP facility, where it is handed off to the ISP’s own network. CBN would provide the customer premises Ethernet switch, the fiber optic drop cable, access and distribution infrastructure, and the backbone routes to bring the traffic into the CBN POP. The CBN POP consists of core routing electronics, fiber termination panels, servers, and the potential for Co-location space. The CBN POP would serve as the Meet-Me-Point (MMP) with the retail service providers, where CBN would deliver traffic to and from the retail service provider. Also included in CBN’s wholesale network environment is the Portal, which provides a platform for retail service providers to market their respective offerings to potential consumers, while also enabling the County to provide access to basic services. However, the basic County services are outside of the context of wholesale service offerings, so they are not addressed further in this Section.

Above are the essential infrastructure elements of CBN. However, there are also the operational aspects of running CBN. Included in the CBN wholesale network transport service would be a 24x7x365 network operation center (NOC), which would serve as the front-line support for the retail service providers. Meaning, if a consumer has an inquiry on their service, they would contact their retail provider, and if the retail provider believes the issue relates to the CBN wholesale transport network, they would in turn call the CBN NOC for support. Therefore, the

CBN NOC support is included as part of the wholesale offerings to the retail providers. CBN would also maintain the outside plant fiber optic cabling as part of the operational support model.

In reference to Figure 3-16, the CBN Business Plan recommends using a factor of 25% of the anticipated retail rate a service provider would charge their consumers, to establish CBN’s wholesale network transport rate schedule. However, the rate schedule itself is a fixed monthly fee. The anticipated retail rates are used as a baseline for establishing the schedule, but would not fluctuate based upon changes in retail pricing. Using the 5 Mbps Internet service again as an example, if a \$29.95 per month residential retail rate were an affordability target, then this would suggest that CBN should charge the retail provider \$7.50 per subscriber per month for network transport of their consumer’s traffic. The 25% factor is based on an assumption that, on average, retail service providers allocate ~25% of their retail rates to cover the cost of network bandwidth.

To project the weightings between the different tiers of Internet services, Figure 3-16 also incorporates data provided in Table 3-2 below. Table 3-2 demonstrates that 19% of the respondents would be willing to pay \$150/mo. for a 50 megabit per second (Mbps) Internet service, 40% would be willing to spend \$80/mo. for a 25 Mbps Internet service, and 41% would be interested in a 10 Mbps Internet service at \$50/mo.

Table 3-2. Willingness to Pay for Service Tiers, R&P, Oct 2012

WILLINGNESS TO PAY FOR ULTRA HIGH SPEED INTERNET CONNECTION (SUMMARY TABLE)							
	VERY WILLING 5	4	3	2	NOT AT ALL WILLING 1	DON'T KNOW/ WON'T SAY/ DEPENDS	MEAN
ULTRA HIGH SPEED INTERNET CONNECTION FOR \$150 PER MONTH THAT COULD PROVIDE VOICE, VIDEO AND DATA AT 50 MEGABITS PER SECOND WHICH IS APPROXIMATELY 5 TIMES THE AVERAGE DOWNLOAD SPEED AVAILABLE TODAY IN LOS ALAMOS <i>TOTAL SAMPLE (N=509)</i>	9%	10%	20%	17%	42%	3%	2.3
ULTRA HIGH SPEED INTERNET CONNECTION FOR \$80 PER MONTH THAT COULD PROVIDE VOICE, VIDEO AND DATA AT 25 MEGABITS PER SECOND, WHICH IS MORE THAN TWICE THE AVERAGE DOWNLOAD SPEED AVAILABLE TODAY IN LOS ALAMOS <i>AMONG THOSE NOT VERY WILLING TO SUBSCRIBE TO BROADBAND SERVICE FOR \$150/MONTH TOTAL RESPONSES (N=462)</i>	17%	23%	18%	15%	26%	3%	2.9
HIGH SPEED INTERNET CONNECTION CAPABLE OF PROVIDING VOICE, VIDEO AND DATA AT 10 MEGABITS PER SECOND FOR \$50.00 PER MONTH <i>AMONG THOSE NOT VERY WILLING TO SUBSCRIBE TO BROADBAND SERVICE FOR \$80 OR \$150/MONTH TOTAL RESPONSES (N=383)</i>	17%	24%	17%	14%	23%	5%	3.0

The CBN Business Plan has made a conservative adjustment on those figures, scaling back the anticipated retail rate on the lower tiers of service, in an effort to achieve affordability goals for the community residents and businesses. Also, to keep revenue projections conservative, the CBN Business Plan has over-weighted the lower tiers of service, although the market research in Table 3-2 indicates stronger demand for the higher tiers. This should create some room for upside in the CBN Business Plan. The conservative assumption is that 30% of residential customers would subscribe to a 5 Mbps Internet service from a retail provider, 30% would subscribe to a 10 Mbps Internet service, 30% would subscribe to a 25 Mbps Internet service, and 10% of customers would subscribe to a 50 Mbps Internet service. Along the same lines, the CBN Business Plan assumes that 30% of small business customers would subscribe to a 5 Mbps Internet service from a retail provider, 50% would subscribe to a 25 Mbps Internet service, and 20% would subscribe to a 50 Mbps Internet service. Those weightings are reflected in Figure 3-16.

During the October 2012, Research & Polling expanded the market research to gauge for the level of interest in different tiers of Internet services. The results indicated that there was strong demand for higher tiers of service, suggesting that there could be revenue upside in the CBN Business Plan, should those bandwidth services be offered. The data substantiates that the community at large is willing to pay more for services than previously suggested, when given context on what level of bandwidth would be provided. Currently, the projections are conservatively adjusted to apply more of a weighting towards the lower-cost, lower-bandwidth offerings, as to avoid over estimating revenue expectations. Table 3-2 and Figure 3-17 reflect the community's interest towards various tiers of Internet services, and are utilized for building the CBN proposed wholesale rate schedule in Figure 3-16. Figure 3-17 shows strong demand for Internet products higher than 50 Mbps, with at least 50% being willing to subscribe to that tier of service, should it be commercially available.

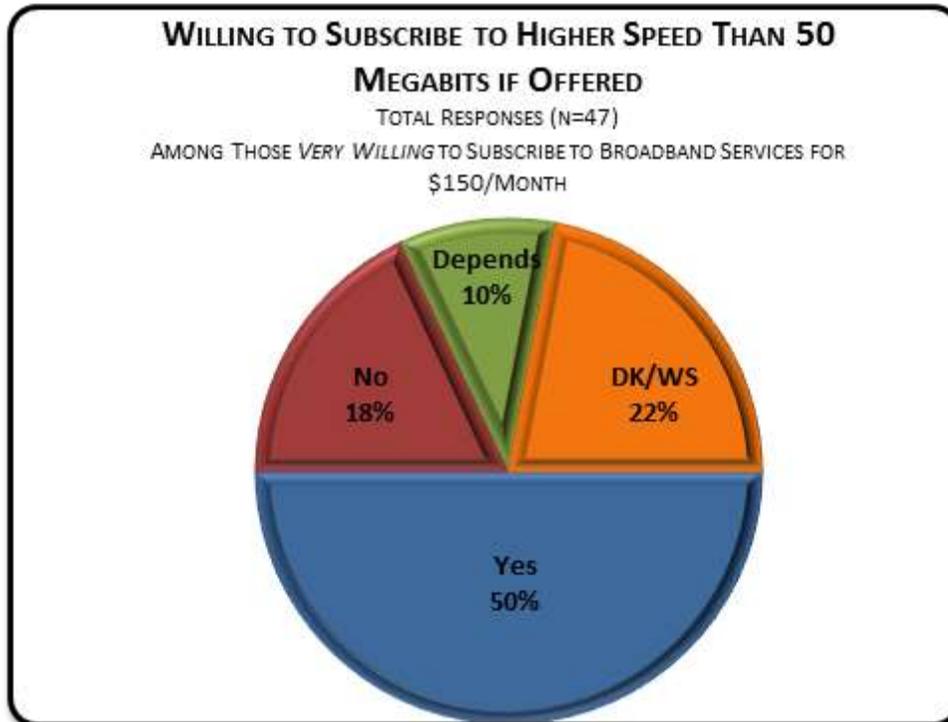


Figure 3-17. Interest in Internet Services > 50 Mbps, R&P, Oct 2012

Research & Polling’s May 2011 survey also assessed community interest in subscribing to broadband services other than standalone Internet, such as telephone, television, and bundles of these services. The survey identified that “More than half (59%) of Internet customers say their Internet service is combined/bundled with other services, such as their home phone (47%) and cable/satellite television (28%).” Although, “Few residents report having voice over IP service at home (9%).” The data would indicate that there is not broad adoption or awareness of voice over IP as a form of telephone service, with most current subscribers likely utilizing this as part of the cable television “triple-play” style bundle. However, the survey does substantiate consumer need for an array of both unbundled and bundle services for Internet, telephone, and television. Figure 3-18 finds that consumers, on average, are willing to spend \$52.20 on television programming and Figure 3-19 shows that the average a consumer is willing to spend on voice over IP telephone services is \$25.40.

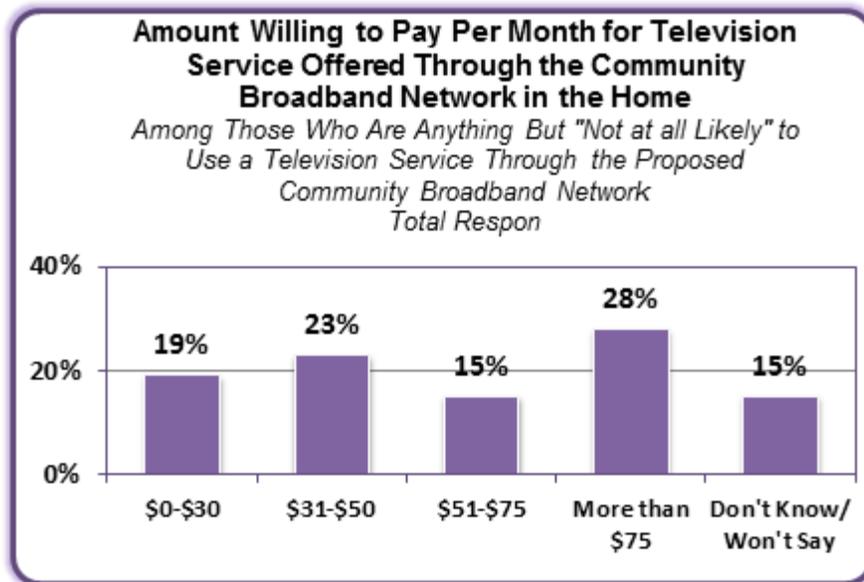


Figure 3-18. Amount Willing to Pay, Residential TV Service, R&P, May 2011

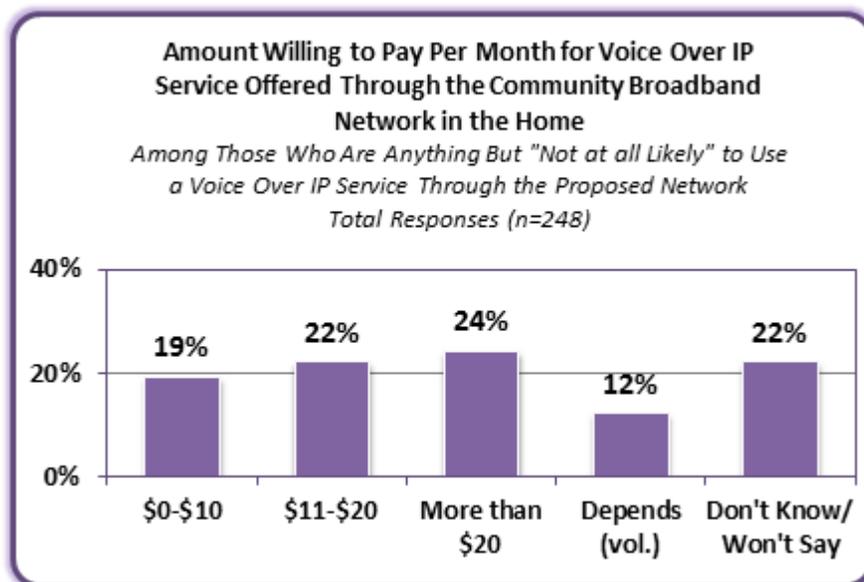


Figure 3-19. Amount Willing to Pay, Residential VoIP Service, R&P, May 2011

These findings were carried over into the CBN Business Plan, as the baseline for what consumers would be willing to spend for telephone (Voice over IP - VoIP), television (IP television - IPTV), and bundled services. However, VoIP and IPTV are different from Internet services from a service provider's profit margin standpoint. Retail providers of VoIP and IPTV services typically have higher cost structures associated with delivering these products, such as content and programming costs, video head-end equipment, set-top boxes, VoIP soft-switches and gateways. Therefore, the service providers do not enjoy the same, higher profit margins that they experience from offering Internet.

The CBN Business Plan considers the nature of the retail service provider’s business and varying profit margins on different consumer product lines. The suggested wholesale rate structures for transporting telephone and television traffic are set low enough to allow for a reasonable business opportunity for the retail providers. As such, the wholesale rate for standalone VoIP transport is set at \$6.00 per subscriber per month and standalone IPTV transport is \$5.00 per month per subscriber. Wholesale pricing for bundles factors in an additional \$19 for Internet transport, which applies a modest discount to the standard wholesale Internet pricing. Therefore, the suggested wholesale rates for a “triple-play” of telephone, television, and Internet is set at \$30.00 per month per subscriber and a bundle of telephone and Internet at \$25.00 per month per subscriber, shown in Figure 3-20.

Services & Price Assumptions		
Residential & Small Business Transport		
	Anticipated Retail Rate	Wholesale CBN Rate
IP Telephony (VoIP) transport	\$30.00	\$6.00
IPTV transport	\$50.00	\$5.00
Bundle 1 - Voice, Video, Data	\$100.00	\$30.00
Bundle 2 - Voice, Data	\$70.00	\$25.00

Figure 3-20. Proposed Wholesale Rate Schedule, CBN Business Plan, Nov 2012

While respondents were not polled for what they would be willing to spend on packaged or bundled pricing, the above estimates are reasonable, based upon market rates for comparable services and also considering the standalone (unbundled) pricing. Should a more detailed explanation be of interest, see Section 6.

The wholesale network service from CBN, for transporting VoIP and IPTV, would involve the same infrastructure elements as described previously for transporting Internet traffic. VoIP and IPTV, however, are more sensitive to delays or disruptions with delivering their packets of information than Internet data. Therefore, CBN could implement higher Quality of Service (QoS) settings for the transport of IPTV and VoIP communications than for Internet data, as a way of improving the local network performance of those applications. CBN would have the ability to segment different types of network traffic, such as Internet, VoIP, and IPTV onto their own “virtual” networks, with different QoS attributes. Once traffic leaves CBN and is handed off to the retail provider, the QoS parameters of the retail provider’s network. As such, any QoS aspects that CBN implement would only be guaranteed on CBN’s infrastructure. The QoS capabilities for different classes or categories of service could be marketed as a “value-add” to the potential retail providers. The same logic applies to the small business wholesale network services, where the incremental cost above the residential rate is typically associated with an upgraded class of service.

For municipal and educational facilities that require the highest class of service, secure virtual private networks (VPNs), specialized equipment, and customized configurations, an alternative rate schedule is provided in Figure 3-21.

Services & Price Assumptions		
Municipal & Education		
	Start Fee	CBN MRC
Ethernet Transport Services		
- 5 Mbps	\$0.00	\$225.00
- 10 Mbps	\$0.00	\$375.00
- 20 Mbps	\$0.00	\$600.00
- 50 Mbps	\$0.00	\$900.00
- 100 Mbps	\$0.00	\$1,350.00

Figure 3-21. Proposed Wholesale Rate Schedule, CBN Business Plan, Nov 2012

The municipal and educational wholesale rates would be comparable with virtual private network services (VPNs), metropolitan optical Ethernet (MetroEthernet) services, or time division multiplexing (TDM) network services, such as DS-1, DS-3, and SONET. This category of Ethernet transport would typically be used to connect one end point on CBN to another end point (i.e. “point-to-point”), or to provision a multi-site network as its own VPN, with the ability to implement the highest Quality of Service (QoS) parameters. This wholesale network service would be customary for transporting mission-critical data, bandwidth intensive applications, or applications implemented in a cloud-based computing configuration. These rates could also be extended to large commercial entities, should they have the need for private network services.

Given the open access model of CBN, consumer rates may go down over time, based upon the capital expenditure and operational savings the providers should experience from not having to build and operate their own last-mile network to the customer premise. However, that would ultimately be a factor of market conditions. Nonetheless, the CBN Business Plan considers the affordability of services for the community at large and for economic development purposes, and therefore suggests establishing a rate structure with a lower market entry point. On a periodic basis, perhaps annually, CBN should reevaluate overall market conditions and any changing landscape in the service provider business climate and adjust wholesale rates accordingly. A comprehensive analysis would need to be conducted on what the impacts would be to the CBN Business Plan, and implement the viable changes. Any potential changes to the wholesale rate structure would need to be offered to all retail service providers on a fair and equal basis, consistent with the open access principles.

3.2.2.1 Take-rate Assumptions

CBN is built on the assumption that 100% of the residential and business premises within Los Alamos County would be directly connected with fiber optics. Therefore, the market size for CBN is defined by the number of utility customers within the County. Figure 3-22 shows an

electrical meter report generated by LAC Department of Public Utilities through period June 2011, there were 8,610 premises taking electrical service.

Consumption Report FY08
Electric

	Jul-10	Aug-10	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Totals
	Period 1	Period 2	Period 3	Period 4	Period 5	Period 6	Period 7	Period 8	Period 9	Period 10	Period 11	Period 12	
Electric Revenue:													
Residential	\$413,907.04	\$485,340.65	\$433,942.18	\$466,054.33	\$399,006.74	\$541,985.41	\$550,545.13	\$329,772.55	\$337,917.21	\$416,495.21	\$355,002.18	\$372,332.83	\$4,386,266.16
Private Area Lights	\$332.00	\$86.62	\$933.37	\$897.17	\$844.30	\$882.76	\$699.46	\$975.59	\$255.30	\$882.20	\$869.73	\$941.75	\$70,335.21
Commercial	\$350,643.81	\$395,759.54	\$325,582.83	\$359,454.78	\$358,888.87	\$278,793.89	\$355,736.82	\$283,272.21	\$317,862.63	\$274,346.23	\$355,707.87	\$334,321.53	\$3,666,311.83
Municipal	\$5,738.03	\$6,740.32	\$8,641.75	\$10,309.23	\$4,403.12	\$8,170.33	\$7,068.03	\$8,853.03	\$5,838.38	\$3,388.34	\$35,877.83	\$29,895.83	\$1,018,762.41
Water Prod. Office	\$1,113.43	\$1,376.71	\$3,033.24	\$2,871.73	\$3,845.33	\$5,274.27	\$5,088.03	\$7,313.43	\$7,886.83	\$6,181.88	\$3,818.48	\$5,812.23	\$866,484.16
Educational	\$19,350.40	\$22,863.84	\$15,473.36	\$24,789.12	\$26,317.75	\$39,370.40	\$38,049.87	\$35,317.84	\$35,783.31	\$22,840.20	\$19,307.18	\$30,581.86	\$387,679.82
Wholesale Sales	\$0.00	\$23,259.75	\$6.06	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.01	\$0.00	\$66.00
High Voltage	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$23,259.75
Misc. Charges	\$3,633.00	\$9,884.93	\$18,204.08	\$14,871.65	\$5,767.30	\$7,781.82	\$3,587.00	\$3,364.43	\$12,494.86	\$4,282.39	\$7,289.04	\$2,432.79	\$146,889.81
TOTAL	\$877,478.73	\$985,498.63	\$730,455.18	\$879,508.89	\$793,779.81	\$1,068,372.48	\$1,044,332.38	\$880,407.14	\$1,091,882.79	\$895,634.94	\$897,469.39	\$1,084,742.33	\$11,384,311.36
Electric Kwh Sales:													
Residential	4,261,023	4,387,897	4,374,087	3,885,007	3,870,188	5,846,381	6,252,024	5,275,788	6,133,341	5,884,265	4,414,894	3,771,233	57,897,526
Private Area Lights	3,118	3,118	3,118	3,118	3,118	3,118	3,118	3,118	3,118	3,118	3,118	3,118	37,418
Commercial	3,002,087	3,041,649	3,685,146	3,495,233	2,887,000	3,657,369	3,774,985	3,893,759	3,208,310	3,968,504	3,834,706	3,142,883	26,181,652
Municipal	418,617	1,027,806	742,734	618,813	493,867	323,380	627,173	677,870	440,834	790,950	773,517	376,269	8,875,807
Water Production	1,286,496	183,371	1,148,638	374,318	311,816	383,881	695,972	825,205	987,083	1,052,945	1,514,264	1,476,419	71,000,004
Educational	192,869	230,454	131,223	225,448	268,119	425,134	428,002	408,612	140,818	237,314	350,542	231,314	4,166,891
TOTAL	9,064,089	10,067,689	10,064,819	8,985,989	8,230,552	11,181,634	11,473,844	10,269,212	11,246,807	9,988,716	9,887,438	9,882,133	121,486,033
 billed Locations:													
Residential	7,317	8,377	8,121	7,718	7,636	7,383	8,083	7,364	8,688	7,454	6,723	7,358	1,769
Private Area Lights	0	0	0	0	0	0	0	0	0	0	0	0	0
Commercial	829	864	846	679	671	800	854	846	621	848	808	880	844
Municipal	147	148	154	197	52	152	161	149	152	152	164	170	148
Water Prod. Office	0	0	0	0	0	0	0	0	0	0	0	0	0
Educational	49	49	49	51	51	51	51	50	50	49	52	49	49
TOTAL	8,392	9,638	9,260	8,545	8,360	8,333	8,938	8,417	9,361	8,399	7,908	8,337	2,660
Revenue Per Kwh:													
Residential	\$0.091	\$0.098	\$0.091	\$0.120	\$0.099	\$0.091	\$0.088	\$0.094	\$0.097	\$0.104	\$0.092	\$0.105	\$0.094
Private Area Lights	\$0.070	\$0.079	\$0.067	\$0.276	\$0.278	\$0.274	\$0.217	\$0.298	\$0.274	\$0.273	\$0.259	\$0.289	\$0.270
Commercial	\$0.088	\$0.077	\$0.091	\$0.087	\$0.090	\$0.091	\$0.094	\$0.097	\$0.087	\$0.095	\$0.104	\$0.093	\$0.098
Municipal	\$0.001	\$0.066	\$0.097	\$0.098	\$0.078	\$0.083	\$0.088	\$0.097	\$0.087	\$0.095	\$0.088	\$0.087	\$0.145
Water Production	\$0.088	\$0.089	\$0.073	\$0.051	\$0.051	\$0.096	\$0.091	\$0.071	\$0.080	\$0.084	\$0.090	\$0.084	\$0.088
Educational	\$0.051	\$0.080	\$0.119	\$0.108	\$0.073	\$0.082	\$0.081	\$0.089	\$0.079	\$0.118	\$0.084	\$0.087	\$0.077
AVERAGE	\$0.088	\$0.087	\$0.090	\$0.103	\$0.098	\$0.094	\$0.092	\$0.090	\$0.093	\$0.091	\$0.092	\$0.101	\$0.091
Loss Calculation													
Power Factor, kwh	18,044,000	18,025,708	18,144,796	8,486,239	10,079,287	11,702,094	11,082,200	16,457,046	10,895,832	9,440,043	8,082,100	10,473,681	132,318,274
Mo. Losses, kwh	686,224	-723,841	-478,860	54,246	1,838,714	16,809	-189,244	181,194	-1,244,176	471,238	-529	883,028	1,732,538
% Mo. Losses	8.25%	-7.37%	-4.18%	0.61%	18.18%	0.15%	-1.91%	1.09%	-13.42%	4.89%	-0.02%	8.48%	1.41%
*COLUMN AVERAGE	8.45%	-6.21%	-5.89%	1.21%	3.82%	2.34%	1.62%	1.81%	-6.29%	6.72%	0.86%	1.47%	1.41%

Figure 3-22. LAC DPU Electrical Customers, June 2011

Of the 8,610 total premises, 7,769 are classified as residential, 644 commercial, 148 municipal, and 49 educational. These figures are utilized as the market baseline within the business plan and are correlated with the construction timeline, as shown in Figure 3-23.

Market and Build Out Assumptions

Market assumptions

	Broadband Build Out in % Passed									
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Potential market										
- Residential	7,769	0%	67%	100%	100%	100%	100%	100%	100%	100%
- Business	644	0%	67%	100%	100%	100%	100%	100%	100%	100%
- Municipal / Educational	197	0%	67%	100%	100%	100%	100%	100%	100%	100%
Addressable market										
- Residential	0	5,205	7,769	7,769	7,769	7,769	7,769	7,769	7,769	7,769
- Business	0	431	644	644	644	644	644	644	644	644
- Municipal / Educational	0	132	197	197	197	197	197	197	197	197
- Total	0	5,769	8,610	8,610	8,610	8,610	8,610	8,610	8,610	8,610
Take-rate										
- Residential	0%	0%	20%	30%	30%	35%	40%	40%	40%	40%
- Business	0%	0%	20%	30%	30%	35%	40%	40%	40%	40%
- Municipal / Educational	0%	0%	20%	30%	30%	35%	40%	40%	40%	40%
Total number of connections										
- Residential	0	0	1,554	2,331	2,331	2,719	3,108	3,108	3,108	3,108
- Business	0	0	129	193	193	225	258	258	258	258
- Municipal / Educational	0	0	39	59	59	69	79	79	79	79
- Total	0	0	1,722	2,583	2,583	3,014	3,444	3,444	3,444	3,444

Figure 3-23 Market Assumptions, CBN Business Plan, Nov 2012

The above table also includes a “take-rate” projection. Take-rate is a percentage of the overall market that would be subscribing to revenue generating services, such as CBN providing wholesale network transport of retail Internet service provider (“ISP”) traffic. The take-rate does not apply to the basic County service that all residents and businesses could enjoy through the Portal. As described earlier, these basic services could include public information and events, access to Utility usage information, and broadcast of emergency notifications.

The targeted take-rates for broadband Internet services, which would be offered by retail providers (not CBN), are projected off of market research conducted by Research & Polling, Inc., during May 2011 and again in October 2012. The research would suggest that by Project Year 4, retail service providers would be able to attain a 30% take-rate with residential customers, and 30% from business customers. These targeted take-rates are factored off of expressions of interest to subscribe to broadband services from retail providers on CBN, that were polled for during the market research, shown in Figure 3-24 and Figure 3-28.

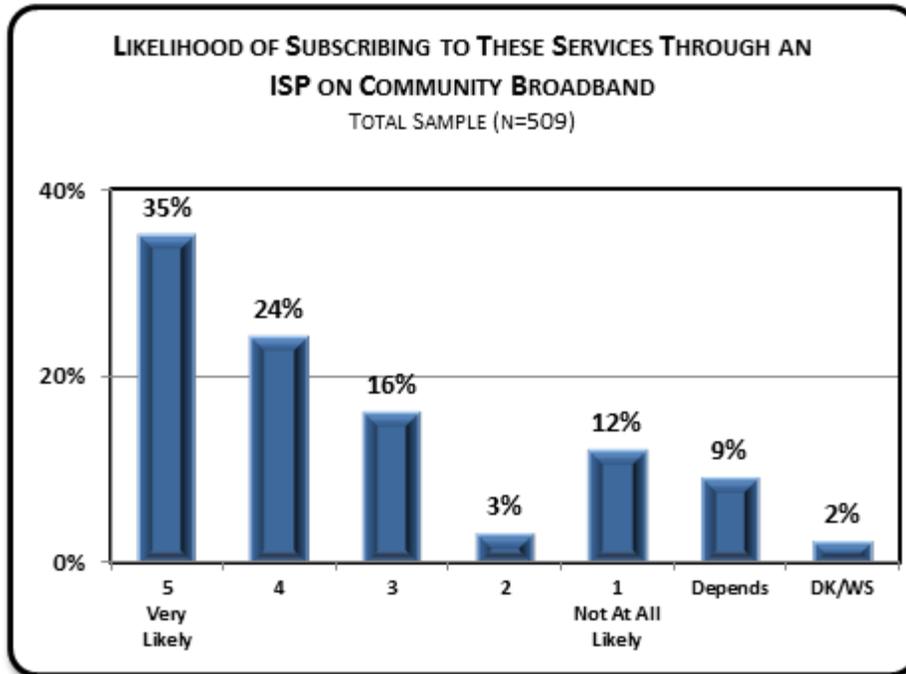


Figure 3-24. Residential Internet Service Interest, R&P, Oct 2012

The market research report quantified that 35% of the residential respondents would be very likely to subscribe to an Internet service offered over CBN and 40% would be likely to subscribe or indifferent. The business plan has adjusted these figures, to produce a more conservative take-rate expectation. The 35% projection of very likely subscribers was reduced by 50%, to an adjusted rate of 17% and the 40% of likely or indifferent subscribers was reduced by 75%, to a 10% projection. Aggregating the 17% and 10% figures (27%), plus considering the overall positive community support for CBN and perceived benefits (see Figure 3-25 and Figure 3-26), it would suggest that a 30% overall take-rate on Internet services offered by retail providers on CBN would be the minimum anticipated take-rate. This is the projected take-rate by Project Year 4, although other market indicators would suggest additional room for growth in future years. This is explained further below.

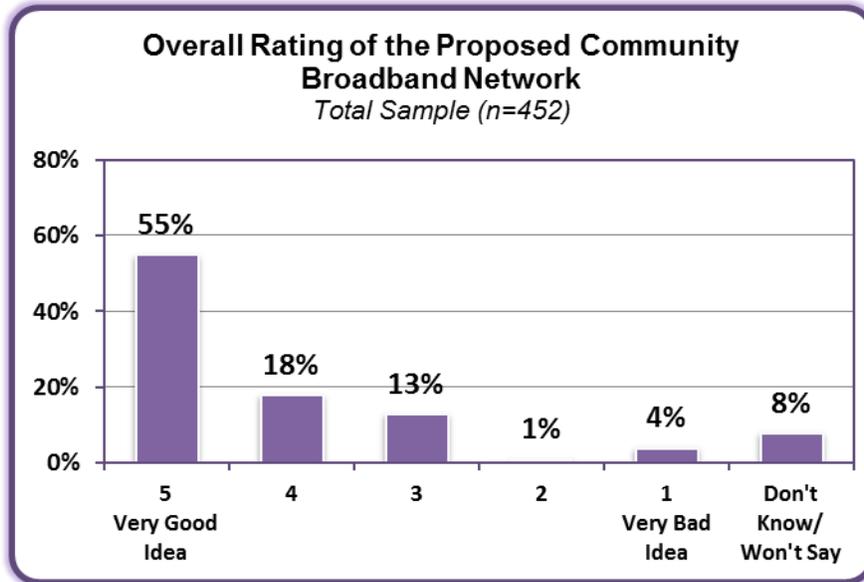


Figure 3-25. Overall Rating of CBN, R&P, May 2011

Over half of the survey respondents felt that CBN was a very good idea for the community and nearly two thirds felt it was a good idea. Only 5% felt it was a bad idea for the community. The positive community support further substantiates the minimum anticipated take-rate of 30% by project Year 4, while indicating additional room for growth. Figure 3-26, below, demonstrates that Los Alamos County respondents have a strong recognition of fiber optics, with 63% feeling that it is a superior technology for delivering broadband communications, with only 1% believing it is worse. This is another indicator, demonstrating upside potential for subscription take-rates.

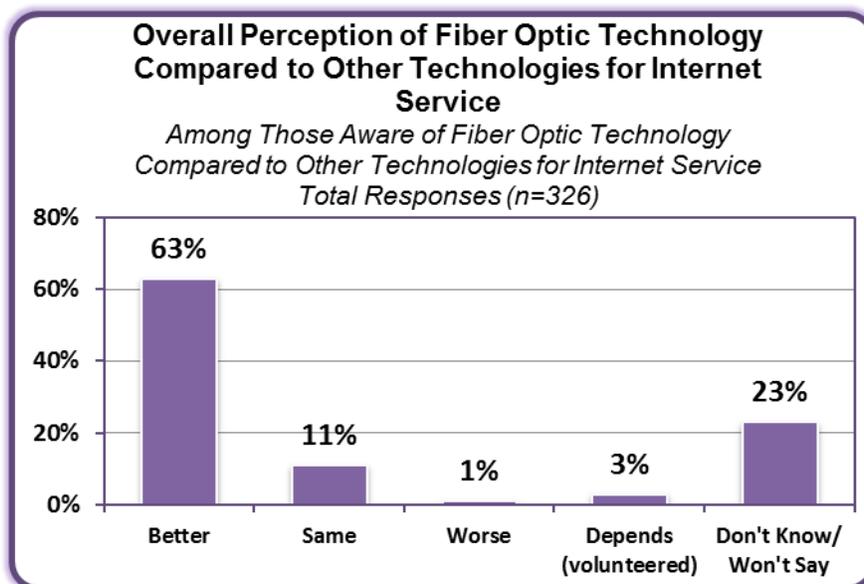


Figure 3-26. Overall Rating of CBN, R&P, May 2011

When looking at broader national trends, FTTP networks such as the proposed CBN are achieving take-rates of 42.2%, on average, according to RVA’s market research presented at the 2012 Fiber-to-the-Home (FTTH) Council annual conference. See Figure 3-27 below. Given the level of community support behind CBN, demonstrated through Research & Polling’s May 2011 and October 2012 research, it would suggest that CBN’s minimum anticipated take-rate of 30% by project Year 4 still has room for upside growth. As such, the CBN Business Plan is projecting that by Project Year 7, the take-rate for residential services would grow to 40%, still conservatively below the national average.

Overall FTTH Take-Rates Hit New Record North American Take-Rates Reach 42.2%

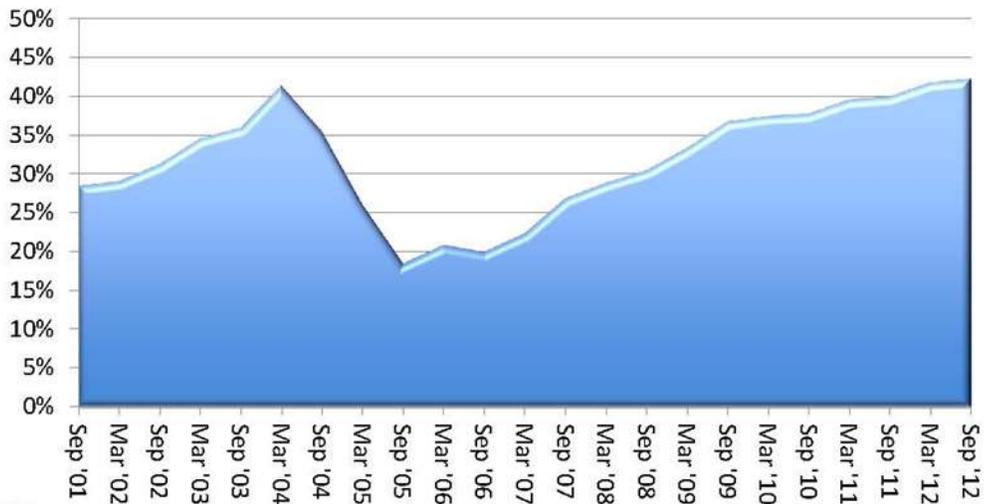


Figure 3-27. National FTTH Take Rates, RVA LLC, 2012

Figure 3-28 shows that 38% of potential business users would be very likely to subscribe to an Internet service offered by a retail provider over CBN and 38% would be likely or indifferent to subscribe.

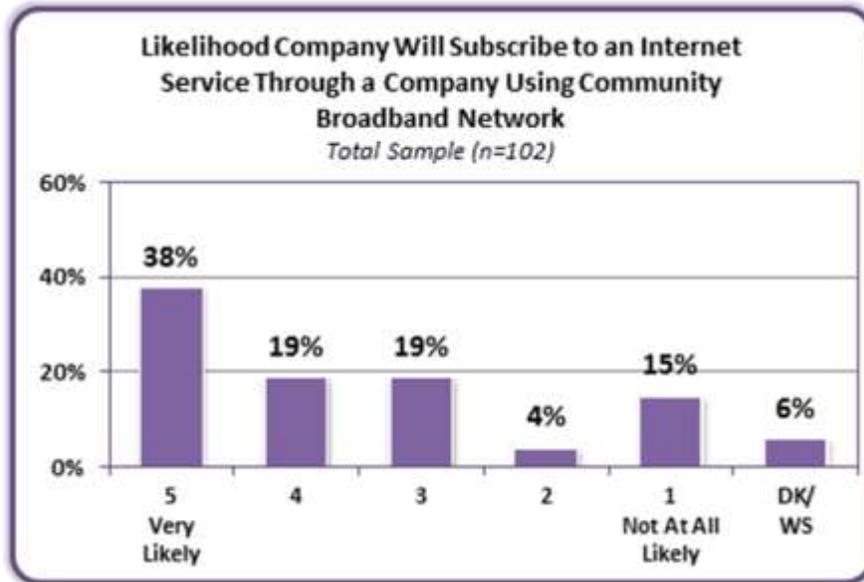


Figure 3-28. Interest in Business Internet Services, R&P, May 2011

Applying the same approach used for determining the residential service take rates, these survey values were adjusted to project a more conservative take-rate expectation. The 38% projection of very likely subscribers was reduced by 50%, to an adjusted rate of 19% and the 38% of likely or indifferent subscribers was reduced by 75%, to a 9.5% projection. Aggregating the 19% and 9.5% figures, the business plan assumes a conservative, minimum anticipated take rate for business class Internet services of 30% by Project Year 4. However, when considering other market factors, such as the awareness of fiber optics (Figure 3-29), overall rating of CBN (Figure 3-30), and willingness to switch from their current providers (Figure 3-31), along with the national research data, the CBN Business Plan suggests that take rates on business subscription would grow to 40% by Project Year 7. This result is on par with the residential forecasts.

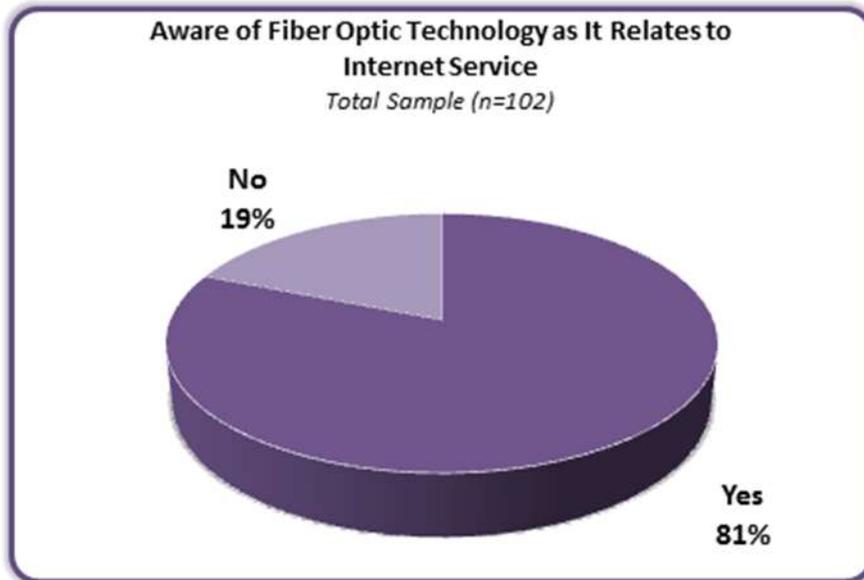


Figure 3-29. Awareness of Fiber Optics, Business Services, R&P, May 2011

Strong awareness of fiber optics (81%) would indicate that higher take-rates could be achieved.

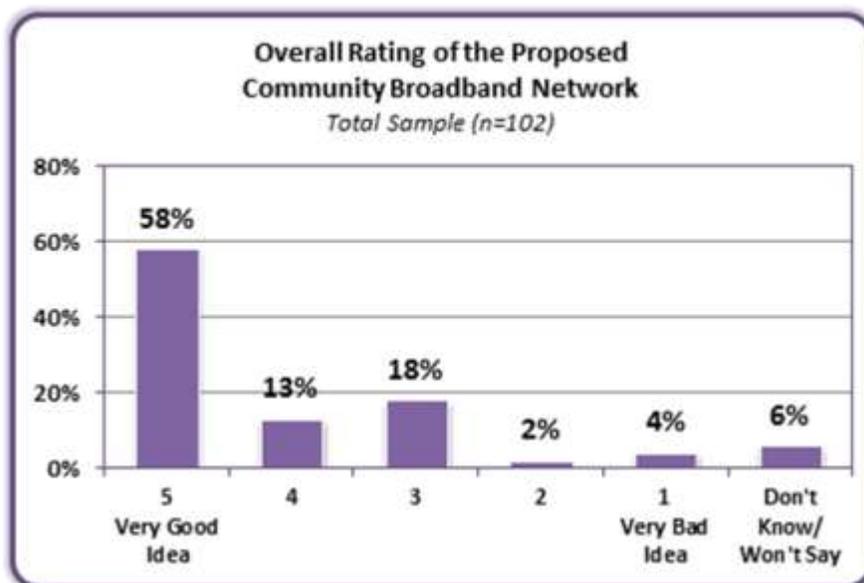


Figure 3-30. CBN Rating, Business Services, R&P, May 2011

With 89% of the business respondents having a positive opinion of CBN, improvements in take-rates could also be experienced.

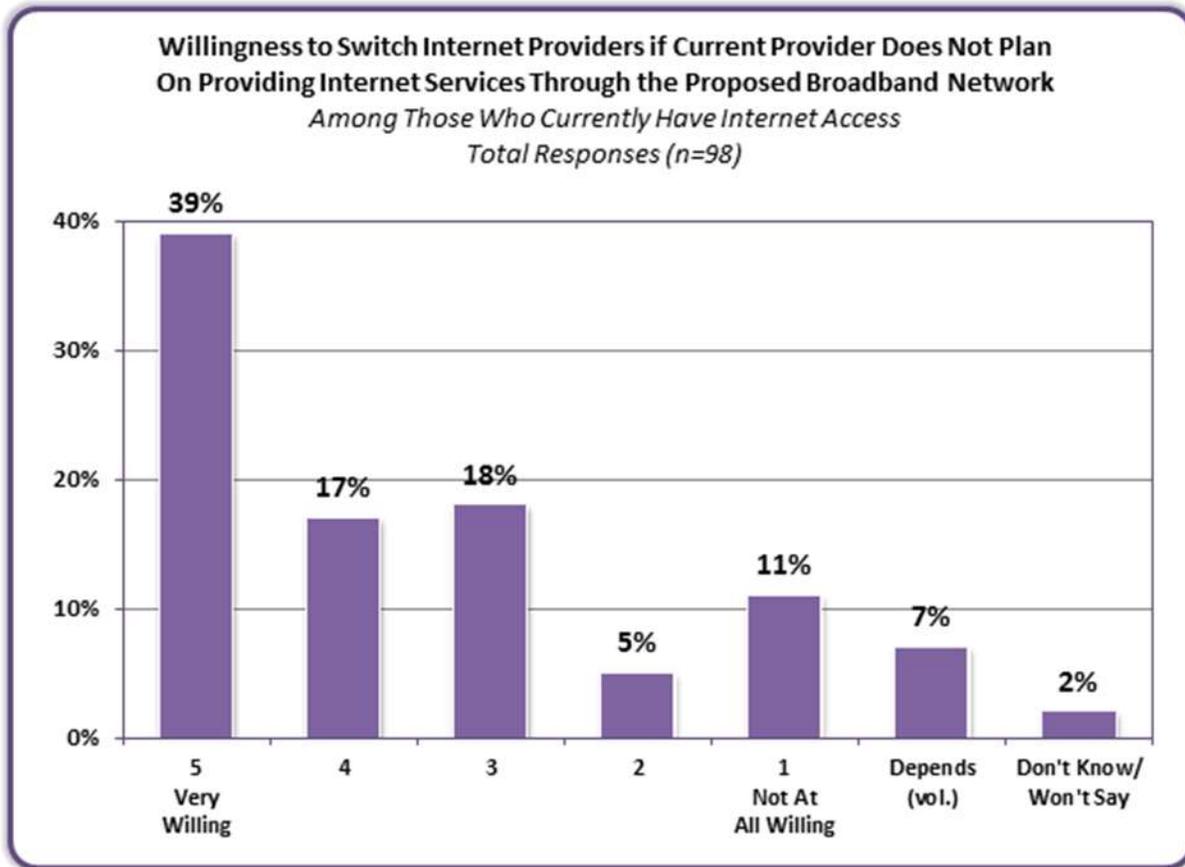


Figure 3-31. Willingness to Switch ISPs, Business Services, R&P, May 2011

74% of businesses surveyed would be willing to switch Internet providers, if their current provider does not offer services through CBN, further substantiating the take-rate projections.

The aforementioned market assumptions (Figure 3-23) are broken down further on a per subscription take-rate, to develop an accurate picture of revenue expectations per wholesale product offering. Figure 3-32 below reflects the 30% minimum anticipated take-rate on residential services by Project Year 4 and the 40% projected take-rate by Project Year 7. The 7,769 total residential market, applying a 30% take-rate on subscription-based broadband services, would yield a revenue generating customer base of 2,331 residences. At 40% take-rate, a customer base of 3,108 would be achieved. Again, this projection is for broadband subscriptions that would provide wholesale revenues to CBN, through the retail providers, and does not include the basic County services for all homes and businesses.

Take Rate Assumptions, cont.

Wholesale Residential Services	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
	1	2	3	4	5	6	7	8	9	10
Fiber to the Home (FTTH) Customer Base										
- New Customers	0	0	1554	777	0	388	388	0	0	0
- Average Number of Customer Per Year	0	0	777	1942	2331	2525	2913	3108	3108	3108
- Year End	0	0	1554	2331	2331	2719	3108	3108	3108	3108
Fiber to the Home (FTTH) Take Rate Per Service										
- Internet	0%	0%	40%	40%	40%	40%	40%	40%	40%	40%
- VoIP	0%	0%	5%	5%	5%	5%	5%	5%	5%	5%
- TV	0%	0%	50%	50%	50%	50%	50%	50%	50%	50%
- Bundle 1 - VoIP, TV, Internet	0%	0%	20%	20%	20%	20%	20%	20%	20%	20%
- Bundle 2 - VoIP, Internet	0%	0%	40%	40%	40%	40%	40%	40%	40%	40%
Net-New										
- Internet	0	0	622	311	0	155	155	0	0	0
- VoIP	0	0	78	39	0	19	19	0	0	0
- TV	0	0	777	388	0	194	194	0	0	0
- Bundle 1 - VoIP, TV, Internet	0	0	311	155	0	78	78	0	0	0
- Bundle 2 - VoIP, Internet	0	0	622	311	0	155	155	0	0	0
Average										
- Internet	0	0	311	777	932	1,010	1,165	1,243	1,243	1,243
- VoIP	0	0	39	97	117	126	146	155	155	155
- TV	0	0	388	971	1,165	1,262	1,457	1,554	1,554	1,554
- Bundle 1 - VoIP, TV, Internet	0	0	155	388	466	505	583	622	622	622
- Bundle 2 - VoIP, Internet	0	0	311	777	932	1,010	1,165	1,243	1,243	1,243
Year End										
- Internet	0	0	622	932	932	1,088	1,243	1,243	1,243	1,243
- VoIP	0	0	78	117	117	136	155	155	155	155
- TV	0	0	777	1,165	1,165	1,360	1,554	1,554	1,554	1,554
- Bundle 1 - VoIP, TV, Internet	0	0	311	466	466	544	622	622	622	622
- Bundle 2 - VoIP, Internet	0	0	622	932	932	1,088	1,243	1,243	1,243	1,243

Figure 3-32. Residential Take Rate Assumptions, CBN Business Plan, Nov 2012

Once the market base of revenue-generating residential consumers has been established, the CBN Business Plan then further projects the types of broadband services subscribed to by these consumers. Referencing Figure 3-32 above, the take-rate assumptions are that, of all residences subscribing to broadband services, 40% would subscribe to a standalone Internet product, 5% would subscribe to a standalone VoIP service, and 50% would utilize a standalone IPTV programming. Furthermore, 20% would subscribe to a triple-play bundle of Internet, VoIP, and IPTV services and 40% would purchase a bundle of VoIP and Internet. Again, these are the distribution of individual service offerings after the overall take-rate has already been applied to the total number of residences. The take-rates per service offering are projected based upon the market survey data provided by Research & Polling, Inc., in May 2011 and October 2012. The forecast is based upon what CBN would assume the retail service providers would achieve when marketing services to the consumer, and then in turn, would purchase the wholesale network transport services from CBN to deliver the broadband products to the end-users.

The same logic for projecting overall market penetration rate and individual service take-rate was applied towards business subscriptions as well. This does not include the basic County services that all businesses would have access to. Figure 3-33 below provides a forecast of anticipated take-rates on wholesale business services.

Take Rate Assumptions, cont.										
Wholesale Business Services										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Fiber to the Business (FTTB) Customer Base										
- New Customers	0	0	129	64	0	32	32	0	0	0
- Average Number of Customer Per Year	0	0	64	161	193	209	242	258	258	258
- Year End	0	0	129	193	193	225	258	258	258	258
Fiber to the Business (FTTB) Take Rate Per Service										
- Small Business Internet	0%	0%	40%	40%	40%	40%	40%	40%	40%	40%
- VoIP	0%	0%	5%	5%	5%	5%	5%	5%	5%	5%
- TV	0%	0%	10%	10%	10%	10%	10%	10%	10%	10%
- Bundle 1 - VoIP, TV, Internet	0%	0%	10%	10%	10%	10%	10%	10%	10%	10%
- Bundle 2 - VoIP, Internet	0%	0%	50%	50%	50%	50%	50%	50%	50%	50%
Net-New										
- Small Business Internet	0	0	52	26	0	13	13	0	0	0
- VoIP	0	0	6	3	0	2	2	0	0	0
- TV	0	0	13	6	0	3	3	0	0	0
- Bundle 1 - VoIP, TV, Internet	0	0	13	6	0	3	3	0	0	0
- Bundle 2 - VoIP, Internet	0	0	64	32	0	16	16	0	0	0
Average										
- Small Business Internet	0	0	26	64	77	84	97	103	103	103
- VoIP	0	0	3	8	10	10	12	13	13	13
- TV	0	0	6	16	19	21	24	26	26	26
- Bundle 1 - VoIP, TV, Internet	0	0	6	16	19	21	24	26	26	26
- Bundle 2 - VoIP, Internet	0	0	32	81	97	105	121	129	129	129
Year End										
- Small Business Internet	0	0	52	77	77	90	103	103	103	103
- VoIP	0	0	6	10	10	11	13	13	13	13
- TV	0	0	13	19	19	23	26	26	26	26
- Bundle 1 - VoIP, TV, Internet	0	0	13	19	19	23	26	26	26	26
- Bundle 2 - VoIP, Internet	0	0	64	97	97	113	129	129	129	129

Figure 3-33. Business Take Rate Assumptions, CBN Business Plan, Nov 2012

Municipal and Educational services is the last category of revenue-based wholesale network transport offerings. As described earlier, this class of service would be utilized for creating private network environments for linking multiple CBN endpoints together and creating a virtual private network for a client, with upgraded equipment options and service features. There are 59 such premises, as identified in the aforementioned LAC DPU customer report, anticipated to subscribe to such services. See Figure 3-34.

Take Rate Assumptions, cont.										
Municipal & Educational Services										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 9
Ethernet Transport Take Rate Per Service										
- 5 Mbps	0	0	16	24	24	24	24	24	24	24
- 10 Mbps	0	0	10	14	14	14	14	14	14	14
- 20 Mbps	0	0	8	12	12	12	12	12	12	12
- 50 Mbps	0	0	3	5	5	5	5	5	5	5
- 100 Mbps	0	0	2	4	4	4	4	4	4	4
- Total E.D. connections, year end	0	0	39	59	59	59	59	59	59	59

Figure 3-34. Muni & Edu Take Rate Assumptions, CBN Business Plan, Nov 2012

The bandwidth tiers are incremental from 5 Mbps to 100 Mbps, although CBN would be capable of providing 1 Gbps wholesale network transport services. However, to keep the revenue expectations conservative in the business plan, bandwidth tiers above 100 Mbps are not forecasted. It is suggested that services above 100 Mbps continue to be evaluated and developed, on a case-by-case basis, to ensure network resources are available and wholesale pricing is competitive with current market conditions.

3.2.2.2 Survey Results

While the Research & Polling May 2011 and October 2012 reports are used as quantitative analysis for projecting subscription take rates, Los Alamos County also collected 177 in-person and 268 online market surveys to gauge community support for CBN. However, the County survey findings did not include demographic data, in an effort to shorten survey time and encourage participation, and are therefore included as an anecdotal reference, rather than as a baseline in the quantitative analysis. Nonetheless, there are interesting similarities and differences to note.

The Los Alamos County in-person and online surveys polled for interest in:

- Basic County services
- Internet services from Retail providers
- Various tiers of bandwidth
- Whether the County should continue with CBN

In general, the Los Alamos County in-person interviews found similar support for various aspects of CBN when compared with the Research & Polling telephone survey results. However, the Los Alamos County online surveys found a noticeably stronger support in the same respective areas than the Research and Polling telephone interviews identified. This could be due to a more targeted, online audience.

The only conclusion drawn in the CBN Business Plan is that there was no evidence from the Los Alamos County in-person and online surveys to discredit the findings from Research and Polling's telephone interviews or the forecasted take-rates. If anything, the Los Alamos County data suggests that there might be additional upside in the take-rate assumptions. Despite this, the CBN Business Plan continues the conservative approach of basing the quantitative analysis for the take-rate projections solely on the Research and Polling market analysis.

The following charts reflect the comparisons between the Research and Polling telephone surveys with the Los Alamos County in-person and online surveys.

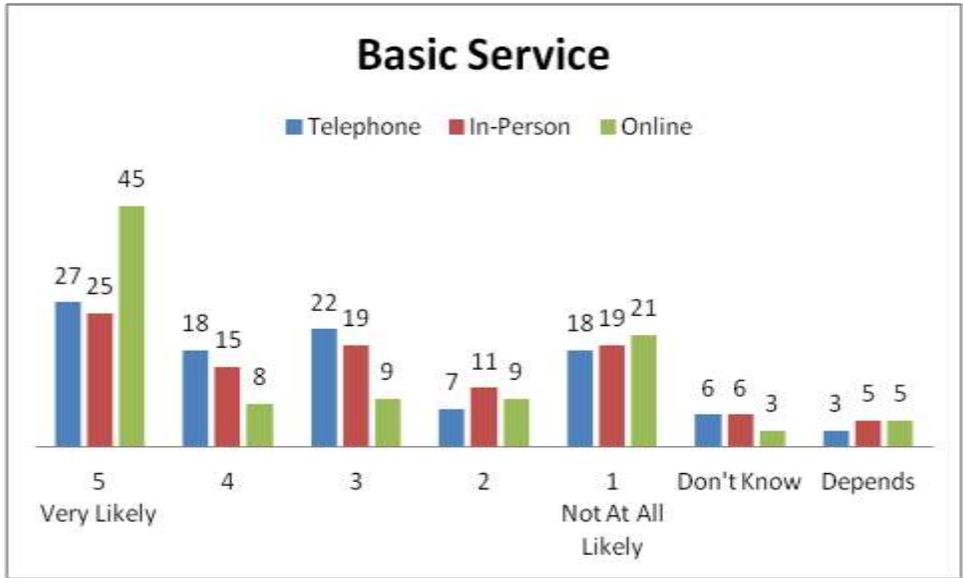


Figure 3-35. Survey Comparison – Basic Service, R&P Telephone Surveys and LAC In-person and Online Surveys, Nov 2012

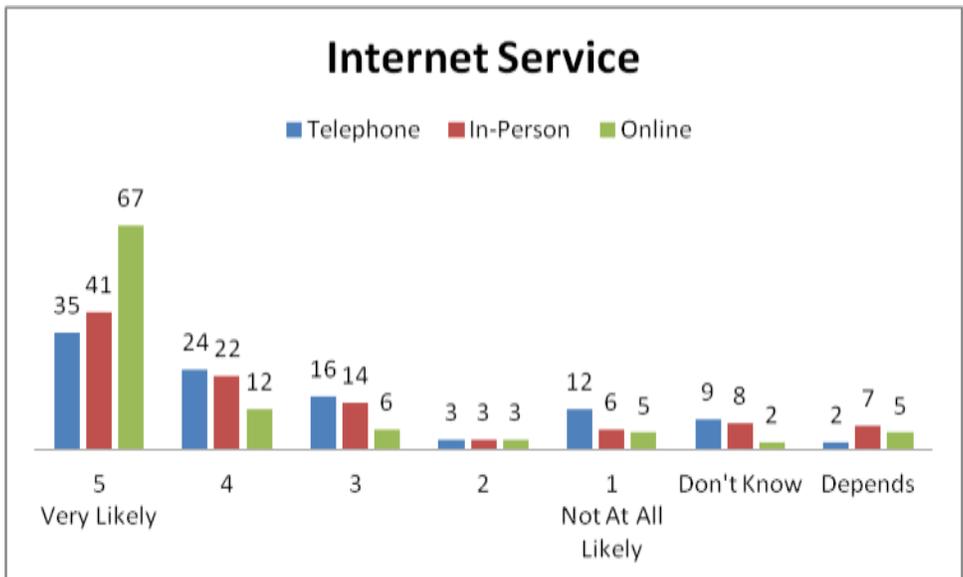


Figure 3-36. Survey Comparison – Internet Service, R&P Telephone Surveys and LAC In-person and Online Surveys, Nov 2012

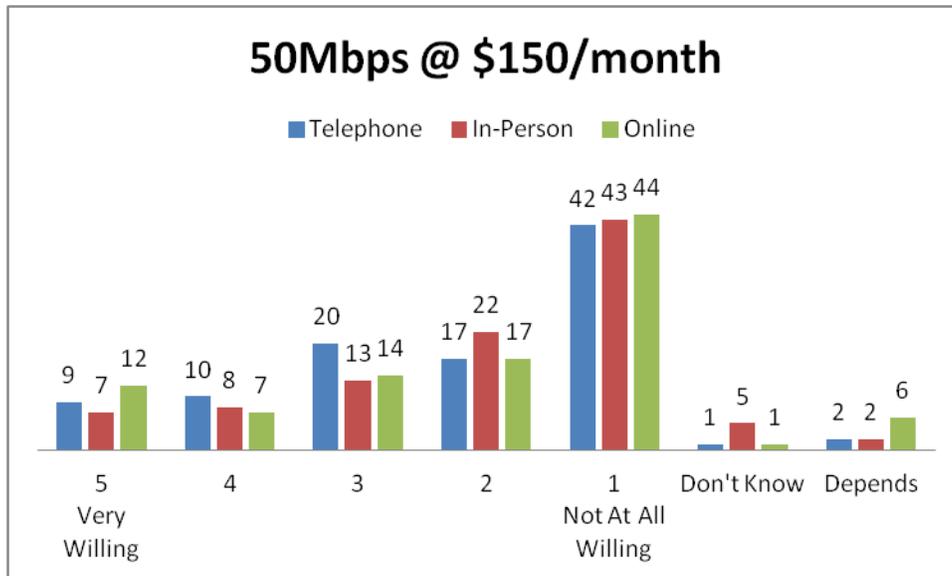


Figure 3-37. Survey Comparison – 50Mbps, R&P Telephone Surveys and LAC In-person and Online Surveys, Nov 2012

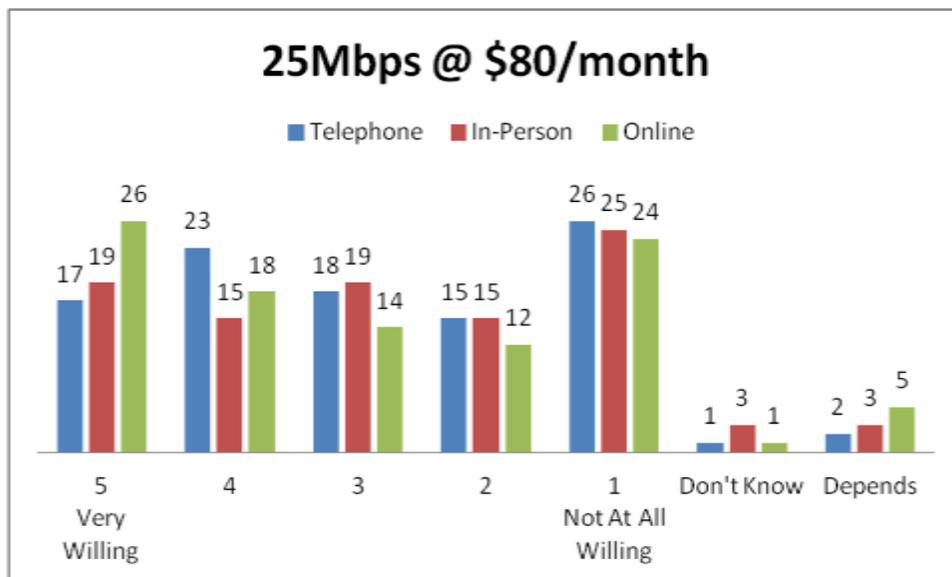


Figure 3-38. Survey Comparison – 25 Mbps, R&P Telephone Surveys and LAC In-person and Online Surveys, Nov 2012

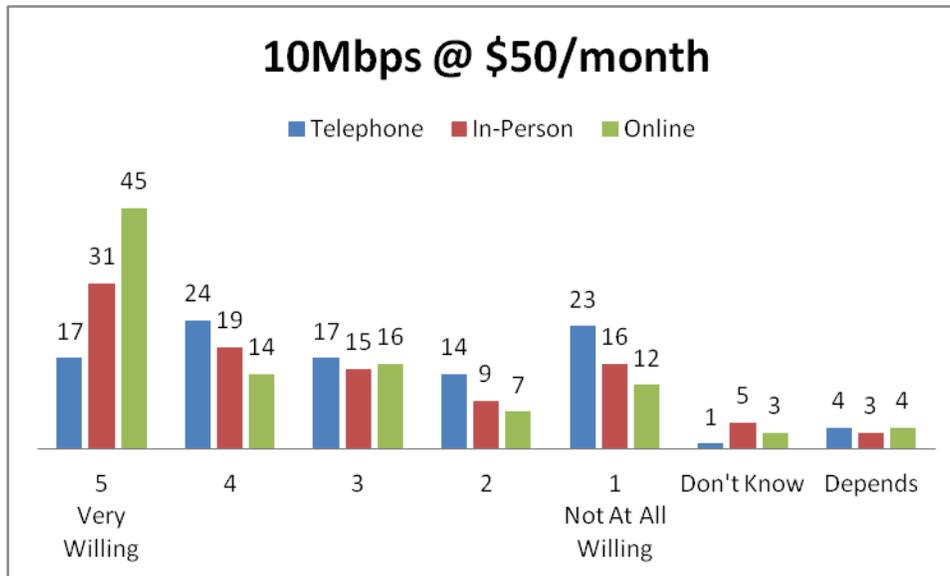


Figure 3-39. Survey Comparison – 10Mbps, R&P Telephone Surveys and LAC In-person and Online Surveys, Nov 2012

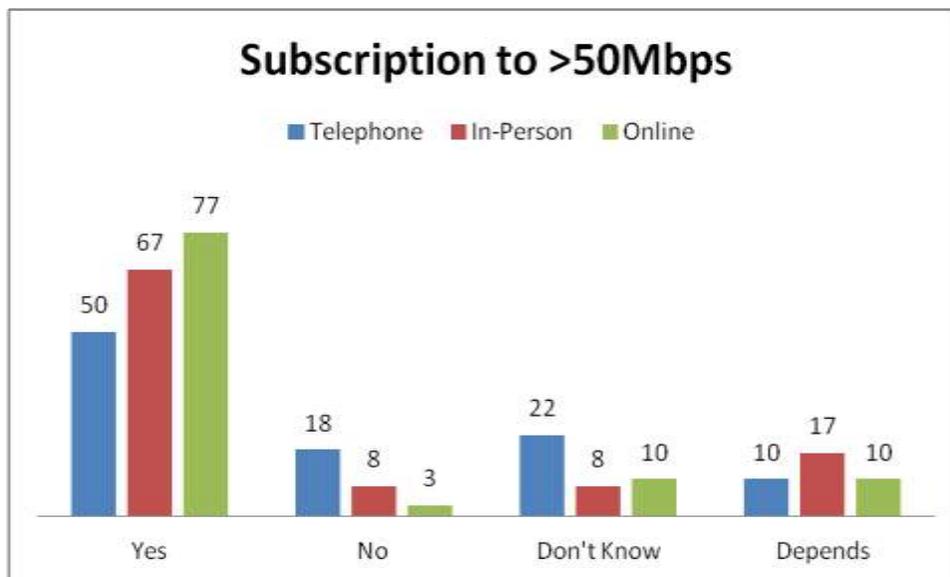


Figure 3-40. Survey Comparison – >50Mbps, R&P Telephone Surveys and LAC In-person and Online Surveys, Nov 2012

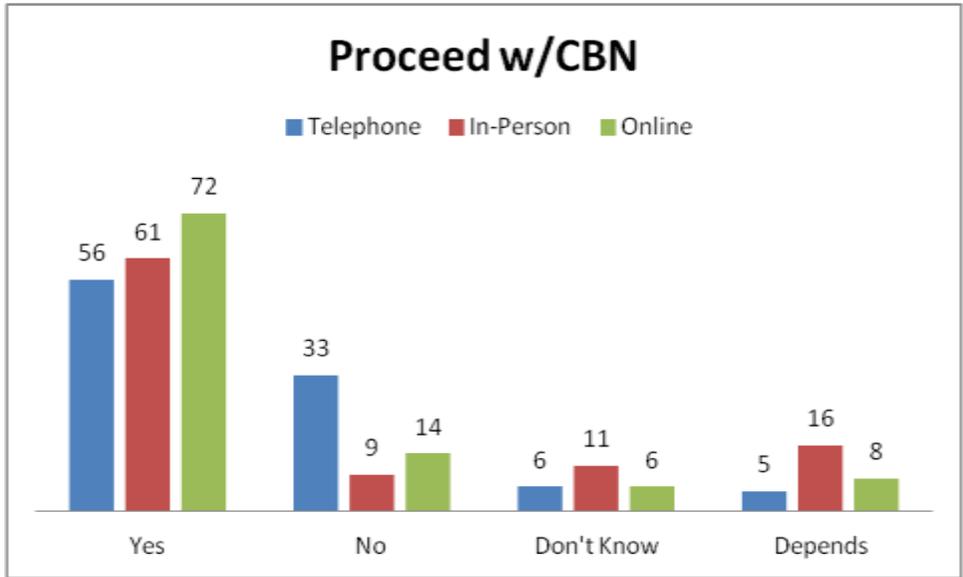


Figure 3-41. Survey Comparison – Proceed w/CBN, R&P Telephone Surveys and LAC In-person and Online Surveys, Nov 2012

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Section 4. Capital Expenditures and Network Reinvestments

The following sections describe how the capital expenditures were calculated and used in this business plan, and the network reinvestment strategy

4.1 Capital Expenditures

The CBN Capital Expenditure budget uses cost estimates from the CBN Design Report, March 2012 for an initial baseline, then applies various adjustments as indicated within this section. The CBN Design Report projected costs of ~\$46.6m, after applying cost saving options (see Table 4-1 and Table 4-2).

Table 4-1. System Cost, CBN Design Report, March 2012

CBN TOTAL SYSTEM COST	
Item	Adjusted Price
NOC	\$1,449,935
South POP	\$1,428,304
North POP	\$292,879
WR POP	\$287,507
Stage 1 POP Network Electronics	\$5,252,473
Stage 2 POP Network Electronics	\$2,851,892
Stage 3 POP Network Electronics	\$8,010,435
Buried Core Fiber	\$5,490,147
Aerial Core Fiber	\$2,632,627
Distribution Switch Facility Cabinets	\$1,651,078
Stage 1 Distribution Switch Facility Network Equipment	\$4,044,881
Stage 2 Additional Distribution Switch Facility Network Equipment	\$323,122
Stage 3 Additional Distribution Switch Facility Network Equipment	\$1,092,294
Buried Lateral	\$7,077,979
Aerial Lateral	\$983,628
Buried Drop Closure	\$1,762,750
Aerial Drop Closure	\$235,518
Buried Drop	\$7,379,794
Aerial Drop	\$912,225
Customer Premises Electronics	\$3,345,804
Customer Premises Materials and Labor	\$1,804,324
Customer Premises Fiber Termination Box	\$759,802
CBN Components Sub-total	\$59,069,400
Project Management	\$2,043,257
TOTAL	\$61,112,658

Table 4-2. System Cost Savings, CBN Design Report, March 2012

CBN OPTIONS	
Item	Adjusted Price
Build the small south POP instead of the large south POP	(\$949,485)
Eliminate the NOC facility by outsourcing NOC operations	(\$1,263,995)
Omit Stage 3 POP and DSF network equipment build	(\$9,102,729)
Omit Stage 2 POP and DSF network equipment build	(\$3,175,014)
TOTAL	-\$14,491,223

The ~\$46.6m Capital Expenditure budget results from \$61.1m being reduced by identified savings of \$14.5m and becomes the baseline for building the business plan’s Capital Expenditure budget. The savings result from reducing the scope of the south POP, eliminating the NOC facility by outsourcing the network operation functionality to a 3rd party, and omitting the “Stage 2 and 3” network upgrades. This minimum level of investment still fulfills the 1Gbps design requirement during the 10 year forecast of the Business Plan.

The CBN Business Plan then adds a 2% construction administration expense in the amount of ~\$600k, during the first year of network build out (Project Year 2), to cover additional costs associated with supporting construction activities. Thus, the estimates of ~\$46.6m and ~\$600k are combined to result in a total initial cost to build CBN of ~\$47.2m. Figure 4-1 itemizes the Capital Expenditures on a year over year basis.

Capital Expenditures (CAPEX) Summary										
Passive infrastructure										
CBN OSP	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
- Network investments	1	2	3	4	5	6	7	8	9	10
	0	19,553,917	9,631,034	0	0	0	0	0	0	0
Core, Distribution, and Access investments	0	19,553,917	9,631,034	0	0	0	0	0	0	0
Cumulative	0	19,553,917	29,184,951	29,184,951	29,184,951	29,184,951	29,184,951	29,184,951	29,184,951	29,184,951
Equipment										
Core equipment	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
- Stage 1 Investment	1	2	3	4	5	6	7	8	9	10
- Refresh	0	5,252,473	0	0	0	0	0	0	0	0
Core investments	0	5,252,473	0	0	0	0	1,313,118	1,313,118	0	0
Access equipment (FTTP)	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
- Stage 1 Investment	1	2	3	4	5	6	7	8	9	10
- Refresh	0	4,044,881	0	0	0	0	0	0	0	0
Access equipment investments	0	4,044,881	0	0	0	0	1,011,220	1,011,220	0	0
Customer equipment (FTTP)	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
- Stage 1 Investment	1	2	3	4	5	6	7	8	9	10
- Refresh	0	0	5,909,930	0	0	0	0	0	0	0
Customer equipment investment	0	0	5,909,930	0	0	0	0	1,477,483	1,477,483	0
OSS / BSS	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
- Portal/EMS (Outsourced NOC)	1	2	3	4	5	6	7	8	9	10
- Refresh	0	0	185,940	0	0	0	0	0	0	0
Management system investment	0	0	185,940	0	0	0	0	0	0	0
Equipment investments	0	9,297,354	6,095,870	0	0	0	2,324,339	3,801,821	1,477,483	0
Cumulative	0	9,297,354	15,393,224	15,393,224	15,393,224	15,393,224	17,717,563	21,519,384	22,996,866	22,996,866
Other CAPEX										
Professional Services	251,520	1,006,080	754,560							
Administrative, 2%		577,025								
Other investments	251,520	1,583,105	754,560	0	0	0	0	0	0	0
Cumulative	251,520	1,834,625	2,589,185	2,589,185	2,589,185	2,589,185	2,589,185	2,589,185	2,589,185	2,589,185
Total CAPEX	251,520	30,685,897	47,167,360	47,167,360	47,167,360	47,167,360	49,491,699	53,293,520	54,771,002	54,771,002

Figure 4-1. Capital Expenditures, CBN Business Plan, Nov 2012

The \$29,184,951 in “Passive Infrastructure” investments are associated with the construction costs for building the outside fiber optic cable plant and assume a two year construction timeline, beginning in Project Year 2 and ending in Project Year 3. Figure 4-2 provides a unit cost breakdown of the \$29,184,951 Passive Infrastructure investments. Also, reference the CBN Design Report, March 2012, or Section 2. of the CBN Business Plan, for a breakdown of the infrastructure elements.

Ethernet Access Switches (FTTP)			
- GigE Chassis, Stage 1, fully configured, incl. labor	Unit Cost	Qty	Total Cost
- GigE Uplinks, Stage 2 upgrade	17,067	237	4,044,881
- GigE Uplinks, Stage 3 upgrade	17,067	184	323,122
	17,067	622	1,092,294
			5,460,297
			Price / sub
			450
			36
			121

Customer Equipment (FTTP)			
Customer Premise Equipment	Unit Cost	Qty	Total Cost
- GigE ONT w/SFP	309	9,050	3,345,804
- GigE ONT Materials and Labor	191	9,050	1,804,324
- GigE ONT Fiber Termination Box	84	9,050	759,802
			5,909,930

Core Equipment			
POP Equipment	Total Cost		
- Core Routers, Stage 1, fully configured, incl. labor	4,694,653		
- WDM Gear, Stage 1, fully configured, incl. labor	557,820		
- Core Routers, Stage 2, fully configured, incl. labor	2,149,452		
- WDM Gear, Stage 2, fully configured, incl. labor	702,440		
- Core Routers, Stage 3, fully configured, incl. labor	5,551,895		
- WDM Gear, Stage 3, fully configured, incl. labor	2,458,540		
	16,114,800		

OSS/BSS	
Portal & EMS (Outsourced NOC)	Total Cost
	185,940

Figure 4-3. Equipment Unit Costs, CBN Business Plan, Nov 2012

\$2,589,185 is budget for as “Other” Capital Expenditures, and is planned for to cover the costs associated with hiring 3rd party professional services for providing project oversight, procurement supporting, consulting, and construction/contract administration. These expenses are budgeted during the first three years of the project.

Combining the Passive Infrastructure, Equipment, and Other Capital Expenditures, during the first three project years, results in a total initial network investment of \$47,167,360

4.2 Network Reinvestment Strategy

The CBN Business Plan includes a network reinvestment strategy, by way of equipment refresh, within the Capital Expenditure budget. The equipment refresh plan is to ensure that network electronics are of the latest technology and performing to levels required to meet Service Level Agreement commitments. The funding for the equipment refresh would come from a new revenue bond package. The debt service would be covered by operational cash flows accumulated through the project to date and not require additional GRT revenue to support.

It is common practice to estimate the minimum useful life of network equipment at 5 to 7 years. The CBN Business Plan researched the end-of-life or end-of-sale policies of typical equipment vendors and found that support contracts can extend the usability from 5 years up to 20 years, even after a technology platform is no longer being sold. Given the 10-year time horizon of the CBN Business Plan, the assumption is that an equipment refresh strategy would be applicable for keeping the infrastructure performing robustly, instead of an equipment replacement strategy requiring a “fork-lift” upgrade of the network. A “fork-lift” upgrade would involve removing the

network existing equipment, replacing with an entirely new platform, and decommissioning the original equipment.

Using the above assumption, the CBN Business Plan budgets for equipment refresh starting 5 years after the date of initial install, which is Project Year 7. The equipment refresh assumption used in the CBN Business Plan is that 25% of the original POP and DSF equipment expense will be reinvested back into the network 5 years after the initial install and an additional 25% will be made 6 years after the original install date. Therefore, a total of 50% of the original network equipment Capital Expenditure will be reinvested back into the network in the form of equipment refresh, 5 to 6 years after the original install. Applying this methodology, Core and Access equipment refresh would occur during Project Years 7 through 8 and CPE refresh would be implemented during Project Years 8 through 9. Therefore, the first cycle of equipment refresh would conclude during Project Year 9. Reference the previous Figure 4-1 for the annual forecast for equipment refresh.

The equipment refresh strategy also presents an opportunity for adding additional bandwidth capacity to the network, and not simply replacing “like for like” equipment. It is a reasonable assumption that advances in equipment technology will occur during the 5 to 6-year timeframe involved. Therefore, the CBN Business Plan recommends evaluating equipment upgrade options that would also increase network performance, while staying within the same network architecture or family of equipment.

Section 5. Funding Strategies

The funding approach is based on the following expenses:

Capital Expenditures (CAPEX): \$47.2m (initial network construction)

Operating Expenditures (OPEX): \$2.3m (10-year average)

The Capital Expenditure forecast is based on implementing the Stage 1 build out only; Stage 1 is the initial build of network equipment. Stages 2 and 3 add more network equipment in the POPs and DSFs. Stages 2 and 3 are not projected to be required within a 10-year financial analysis period.

5.1 Funding Approach

Due to project funding requirements, potential debt limit available, and low borrowing costs, the selected funding approach uses a mix of LAC revenue bonds to fund Capital Expenditures associated with network construction and a GRT increment to support the bond payments and Operating Expenses.

During the initial network construction, \$47.2m would be required to cover costs associated with building the fiber optic cables, POP facilities, and networking equipment. The proposed revenue bond would be structured as a 20 year term, 3.5% borrowing cost, and drawn down in three annual tranches during the first three years of project implementation. To cover the debt service on the bond payments, a 7/16th GRT increment is required, which would generate approximately \$5.6m in revenue per annum. This amount is sufficient to cover the proposed bond principal and interest payments which ramp up to a projected high of \$3.9m in Project Year 3, and then decline from that point forward and interest expenses decrease.

The equipment refresh, estimated at \$7.6m, would be borrowed over 7 years at 3.5% cost of capital, and structured in three annual tranches between Project Years 7 and 9. The debt service on the equipment refresh bond issuance would be covered through accumulated cash flows.

Projected wholesale network revenues are ~\$1.3M/year, based on a 40% residential subscription rate and a 40% business subscription rate. Wholesale revenues alone are insufficient for sustaining day-to-day operational expenses of ~\$2.3M/year. Therefore, ~\$1M/year from the GRT levy would be allocated towards covering a portion of the Operating Expenditure budget.

This funding structure provides a sustainable business plan. The use of revenue bonds to cover Capital Expenditures associated with network construction and GRT increments to support a revenue bond package, along with a portion of the operating overhead, is a sound funding approach. Combining these two best-practices produces the preferred funding structure for CBN.

5.2 Analysis of Funding Options

A wide range of potential CBN funding sources were evaluated, including local, state, and federal programs, and public-private partnership opportunities. The viable funding options are listed in Table 5-1 and the disqualified programs are in Table 5-2.

Table 5-1. Viable Funding Options

Potential Funding Sources	Funding Capacity	Assumptions
LAC General Obligation Bonds	\$27.5m	4% of total assessed value (\$691m).
LAC Revenue Bonds	Up to \$91m	1/16 GRT increment = \$800k revenue. \$5.6m in revenue supports \$47.2m loan, based on 20yr term @ 3.5% financing. Total of 6/8 GRT increments available.
RUS Distance Learning Telemedicine Grants	\$500,000 with 15% match	Demonstrate “rural” status and intended broadband uses to qualify. 2012 project funding and guidelines unannounced at this time.

Table 5-2. Disqualified Funding Options

Other Funding Sources Considered	Funding Capacity	Reason for Disqualification
RUS Community Connect Grants	\$1.5m with 15% match	Qualification criteria
RUS Distance Learning Telemedicine Loans	\$10m	Program not currently funded
RUS Rural Broadband Loan Program	Determined annually	Qualification criteria and non-preferred debt structure
FCC Connect America Fund & Mobility Fund	Up to \$300m	Qualification criteria
New Mexico State Rural Universal Service Fund	Determined annually	Qualification criteria
US Economic Development Administration	Up to \$2m	Qualification criteria

As part of the analysis, several options were ruled out due to qualification criteria, such as per-capita income levels, existing broadband service availability, and regulatory requirements.

5.2.1 LAC Government

Creating Special Assessment Districts within LAC were also considered, to provide residents and businesses with an option to directly assist with funding network construction. The relatively new nature of this concept and how to best implement within LAC required further due diligence before being able to identify it as a viable source of capital. Lastly, LAC general obligation bonds and revenue bond capacities were closely assessed. General obligation bond funding limits are a factor of the assessed value of LAC (~\$691m), with \$27.5m being theoretical maximum amount available to bond for, although CBN would also have to compete with several other

capital improvements projects also vying for general obligation bonds. Revenue bonds are backed primarily by GRT, where a 1/16th GRT increment would generate ~\$800k/year in revenue. Currently, LAC has 6/8th available to implement, requiring an election to pass.

5.2.2 Grants

Many of the Federal and State programs, such as broadband infrastructure grant initiatives offered through the US Department of Agriculture Rural Utilities Service (RUS) and both the US and New Mexico Economic Development Agencies (EDA), presented qualification criteria based on either current broadband access levels or per capita income thresholds that Los Alamos County (LAC) did not qualify for. Conversely, broadband infrastructure loan programs were considered from RUS, although the debt structure was non-ideal, with local LAC municipal bonding options being a preferred source of capital. Broadband funding programs offered previously through the US Department of Commerce National Telecommunications and Information Administration (NTIA), such as the Broadband Technologies Opportunity Program (BTOP) are no longer funded and emerging programs through the Federal Communications Commission (FCC) Connect America Fund present qualification criteria, such as becoming a regulated telecommunications company directly serving end users, which would be in conflict with CBN's open access business approach.

5.2.3 Public-Private Partnerships

The CBN Business Plan researched potential public-private partnership opportunities with local infrastructure owners, such as with the incumbent telephone and cable TV companies. This included conversations surrounding making better or further use of existing infrastructure assets, sharing common routes or facilities, or even purchasing spare capacity as a way of avoiding new build costs. However, the research concluded that:

- 1) The incumbent infrastructure owners, in general terms, typically do not consider infrastructure partnerships that would share network resources or provide access to spare capacity.
- 2) The network resources themselves are of a different, older technology type (mainly copper based with limited fiber optic technology) that would not be conducive for supporting the capabilities and capacities of what CBN requires.

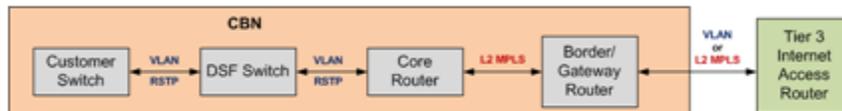
As such, the CBN Business Plan considered, but did not identify a public-private partnership model that would meet strategic or technical requirements.

While not a public-private partnership, CBN would have an opportunity to work with REDI Net as another public infrastructure initiative. In that context, it would be a public-public partnership. REDI Net is a fiber optic and microwave "middle-mile" network, funded through the American Recover and Reinvestment Act (ARRA) of 2009. REDI Net has built fiber optic backbone routes in Los Alamos County (and surrounding County and Tribal governments) and is currently constructing two long-haul microwave links to connect REDI Net's Los Alamos infrastructure to its main trunk lines along US 84-285. REDI Net is not a "last-mile" network such as the proposed CBN, and does not connect directly to homes and businesses. REDI Net does, however, present the potential for infrastructure partnerships and does provide wholesale Internet capacity to last-mile service providers. Should a last-mile provider need upstream Internet capacity to support its consumers on CBN's last-mile network, CBN would be able to facilitate

this hand-off from the last mile network, to the retail provider’s network, and to REDI Net’s middle-mile backbone. REDI Net’s local POP facility in Los Alamos is at the Pajarito Cliffs Site, where the Internet Gateway could be established. There are two potential approaches for establishing this Internet Gateway, described in Figure 5-1 and Figure 5-2.

CBN Internet Gateway

Scenario #1, “Logical Cross-connect”

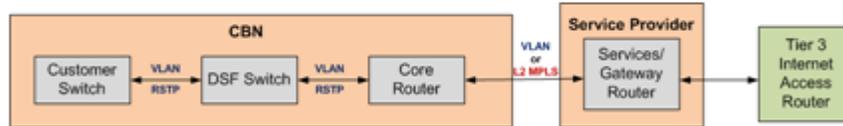


- CBN provisions logical connection with the Internet Access provider (VLAN or L2 MPLS)
- CBN transports Service Provider traffic to the Internet Access provider
- Business case based on Wholesale Rate for bandwidth

Figure 5-1. Logical Cross-connect CBN Internet Gateway

CBN Internet Gateway

Scenario #2, “Physical Cross-connect”



- CBN establishes a physical, facilities-based cross-connect directly between the Service Provider router and the Internet Access router
 - A “jumper cable” between the two routers
- A CBN Co-location option to Service Providers
- Business Model based on monthly service fee

Figure 5-2. Physical Cross-connect CBN Internet Gateway

The CBN Business Plan is built conservatively on offering wholesale data transport locally on the last-mile FTTP network to retail service providers, to project a conservative baseline. The opportunities mentioned above for creating a public-public partnership with REDI Net and providing the hand off to the Internet gateway would be considered upside to the CBN Business Plan.

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Section 6. Financial Forecast

All financial forecast statements are provided in a larger format in Appendix B.

6.1 Income Statement

The Income Statement shown in Figure 6-1 projects bottom line net income/loss, factoring top line revenue, annual operating expense, depreciation, and financial net.

Financial summary										
Income Statement										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Total revenue	1,400,000	5,600,000	6,063,367	6,564,916	6,691,300	6,754,491	6,880,875	6,944,066	6,944,066	6,944,066
Direct Costs	0	0	0	0	0	0	0	0	0	0
Program Fund Revenue	1,400,000	5,600,000	6,063,367	6,564,916	6,691,300	6,754,491	6,880,875	6,944,066	6,944,066	6,944,066
Gross profit margin	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Operational expenses (OPEX)	0	0	-1,477,263	-2,252,510	-2,245,861	-2,239,897	-2,264,139	-2,289,109	-2,314,827	-2,341,318
EBITD	1,400,000	5,600,000	4,586,103	4,312,406	4,445,439	4,514,594	4,616,735	4,654,958	4,629,239	4,602,749
EBDIT margin	100%	100%	76%	66%	66%	67%	67%	67%	67%	66%
Depreciation	-35,931	-2,567,979	-4,028,163	-4,028,163	-4,028,163	-4,028,163	-4,360,212	-4,867,397	-3,524,115	-2,545,482
EBIT	1,364,069	3,032,021	557,940	284,243	417,276	486,431	256,524	-212,440	1,105,124	2,057,267
EBIT margin	97%	54%	9%	4%	6%	7%	4%	-3%	16%	30%
Financial net	-8,583	-1,023,997	-1,484,276	-1,386,830	-1,293,667	-1,197,042	-1,172,879	-1,188,864	-1,119,580	-1,144,493
Interest income	0	22,719	71,170	86,073	96,693	110,775	127,937	141,345	145,474	0
Interest expense	-8,583	-1,046,716	-1,555,446	-1,472,903	-1,390,360	-1,307,817	-1,300,815	-1,330,210	-1,265,054	-1,144,493
EBT	1,355,485	2,008,024	-926,336	-1,102,587	-876,391	-710,611	-916,355	-1,401,304	-14,456	912,773
Net Income	1,355,485	2,008,024	-926,336	-1,102,587	-876,391	-710,611	-916,355	-1,401,304	-14,456	912,773
Program margin	97%	36%	-15%	-17%	-13%	-11%	-13%	-20%	0%	13%

Figure 6-1. Income Statement, CBN Business Plan, Nov 2012

Revenues are composed of the annual outlook for wholesale network revenues and proceeds for the 7/16th GRT levy. These are itemized in more detail in Section 6.6. Operating Expenditures relate to the day-to-day administration, support, maintenance, and marketing of CBN, and are broken down in more detail in the Section 6.8. A Depreciation Schedule is also provided below, which shows the methodology for writing off the assets over their expected useful life. Financial net is the difference between borrowing costs (interest expense) on the proposed revenue bonds and interest income generated from the cash held in the short-term New Mexico Investment Pool. This is explained in more detail in Section 6.9.

While the CBN Business Plan does not forecast positive net income until Project Year 10, it does not imply that the initial net losses compromise the sustainability of CBN. The projected net losses are mainly associated with the ~\$2.5m to \$4.7m in depreciation per year on the network assets. The more critical assessment for fiscal health is the Cash Flow Statement in Section 6.3.

6.2 Balance Sheet

The Balance Sheet in Figure 6-2 shows equivalent assets to net assets and liabilities.

Balance Sheet	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
	1	2	3	4	5	6	7	8	9	10
Assets										
Capital Assets	215,589	28,081,987	40,535,287	36,507,124	32,478,961	28,450,798	26,414,925	25,349,348	23,302,716	20,757,234
Current Assets - Receivables	116,667	466,667	505,281	547,076	557,608	562,874	573,406	578,672	578,672	578,672
Current Assets - Cash and bank deposit	1,262,174	3,953,882	4,781,833	5,371,850	6,154,168	7,107,589	7,852,518	8,081,892	8,149,092	8,164,952
Total assets	1,594,429	32,502,536	45,822,401	42,426,050	39,190,737	36,121,261	34,840,849	34,009,913	32,030,479	29,500,858
Net Assets and Liabilities	1	2	3	4	5	6	7	8	9	10
Net Assets	1,355,485	3,363,510	2,437,174	1,334,587	458,197	-252,414	-1,168,769	-2,570,073	-2,584,530	-1,671,756
Retained earnings	0	1,355,485	3,363,510	2,437,174	1,334,587	458,197	-252,414	-1,168,769	-2,570,073	-2,584,530
Net Income	1,355,485	2,008,024	-926,336	-1,102,587	-876,391	-710,611	-916,355	-1,401,304	-14,456	912,773
Long-term liabilities	238,944	29,139,026	43,262,122	40,903,754	38,545,386	36,187,018	35,820,940	36,389,227	34,422,107	30,977,504
Other liabilities - Accounts payable	0	0	123,105	187,709	187,155	186,658	188,678	190,759	192,902	195,110
Bank overdraft (adjust)	0	0	0	0	0	0	0	0	0	0
Total Net Assets and Liabilities	1,594,429	32,502,536	45,822,401	42,426,050	39,190,737	36,121,261	34,840,849	34,009,913	32,030,479	29,500,858

Figure 6-2. Balance Sheet, CBN Business Plan, Nov 2012

Capital Assets reflect the book value of the CBN infrastructure, Receivables are accounted to 30 days of outstanding revenues, and Cash represents the Enterprise Fund’s bank account balance.

Net Assets are associated with Retained Earnings and Net Income, Long-term Liabilities reflect outstanding debt on the various revenue bond tranches, and Accounts Payable equal 30 days of outstanding operating expenses.

6.3 Cash Flow Analysis

The Cash Flow Analysis in Figure 6-3 demonstrates an annual cash flow position, accounting for revenues, operating expenses, interest expenses, changes in working capital, capital outlay, and funding contributions.

Statement of Cash Flows	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
	1	2	3	4	5	6	7	8	9	10
Total revenue	1,400,000	5,600,000	6,063,367	6,564,916	6,691,300	6,754,491	6,880,875	6,944,066	6,944,066	6,944,066
Operational expenses	0	0	-1,477,263	-2,252,510	-2,245,861	-2,239,897	-2,264,139	-2,289,109	-2,314,827	-2,341,318
Interest income	0	22,719	71,170	86,073	96,693	110,775	127,937	141,345	145,474	0
Interest expense	-8,583	-1,046,716	-1,555,446	-1,472,903	-1,390,360	-1,307,817	-1,300,815	-1,330,210	-1,265,054	-1,144,493
Operating cash flow	1,391,417	4,576,003	3,101,827	2,925,577	3,151,772	3,317,552	3,443,857	3,466,093	3,509,659	3,458,255
Change in working capital										
Increase(-)/decrease(+) in current assets	-116,667	-350,000	-38,614	-41,796	-10,532	-5,266	-10,532	-5,266	0	0
Decrease(-)/Increase(+) in current liabilities	0	0	123,105	64,604	-54	-497	2,020	2,081	2,143	2,208
Cash flow after change in working capital	1,274,750	4,226,003	3,186,319	2,948,385	3,140,686	3,311,789	3,435,345	3,462,908	3,511,802	3,460,463
Capital expenditures										
Capital expenditures	-251,520	-30,434,377	-16,481,464	0	0	0	-2,324,339	-3,801,821	-1,477,483	0
Free cash flow	1,023,230	-26,208,374	-13,295,145	2,948,385	3,140,686	3,311,789	1,111,007	-338,913	2,034,319	3,460,463
Funding										
Change in long-term debt	238,944	28,900,082	14,123,096	-2,358,368	-2,358,368	-2,358,368	-366,078	568,287	-1,967,120	-3,444,603
Grants & contributions	0	0	0	0	0	0	0	0	0	0
Increase(+)/decrease(-) in cash	1,262,174	2,691,708	827,951	590,017	782,318	953,421	744,929	229,374	67,199	15,860
Accumulated cash flow	1,262,174	3,953,882	4,781,833	5,371,850	6,154,168	7,107,589	7,852,518	8,081,892	8,149,092	8,164,952
Internal Rate of Return	1,023,230	-26,208,374	-13,295,145	2,948,385	3,140,686	3,311,789	1,111,007	-338,913	2,034,319	34,604,630
3.08%										

Figure 6-3. Statement of Cash Flows, CBN Business Plan, Nov 2012

Total revenue is carried over from the Income Statement. Operational Expenditures are detailed in Section 6.8. Interest Income and Expense are detailed in the Funding Structure proposed in Section 6.9. Changes in working capital are itemized in Section 6.11 and incorporated into the Income Statement. Capital Expenditures are forecast in detail in Section 6.7. The change in long-term debt correlates with the revenue bond amortization schedule provided in Section 6.9. This includes both the initial 20 year bond package for network construction in Project Years 1 through 3, as well as the 7 year bond package for equipment refresh from Project Years 7 to 9.

In summary, the CBN Business Plan projects positive cash flow generated on a year-over-year basis, though the 10 year forecast, with ~\$8.2m accumulated by Project Year 10. This should bode well when presenting the anticipated fiscal health of the project to the capital markets.

6.3.1 Internal Rate of Return

Internal Rate of Return (IRR) measures the profitability of network investments and is a metric investors use when judging the risk of a potential endeavor. The CBN Business Plan anticipates an IRR of ~3%, as indicated in the above Cash Flow Analysis, when looking at the 10 year forecast of free cash flow and using a terminal value of 10. This IRR would be reflective of a municipal government initiative, utilizing revenue backed bonds as a means of funding infrastructure capital expenditures. The IRR expectations also indicate that the project would not have the returns necessary to attract the private equity markets.

6.4 Market, Build Out, & Take-Rate Assumptions

Market Assumptions are provided in tabular format to quantify the overall size of the market and broadband availability on a year-over-year basis. See Figure 6-4.

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
Potential market										
- Residential	7,769	0%	67%	100%	100%	100%	100%	100%	100%	100%
- Business	644	0%	67%	100%	100%	100%	100%	100%	100%	100%
- Municipal / Educational	197	0%	67%	100%	100%	100%	100%	100%	100%	100%
Addressable market										
- Residential	0	5,205	7,769	7,769	7,769	7,769	7,769	7,769	7,769	7,769
- Business	0	431	644	644	644	644	644	644	644	644
- Municipal / Educational	0	132	197	197	197	197	197	197	197	197
- Total	0	5,769	8,610	8,610	8,610	8,610	8,610	8,610	8,610	8,610
Take-rate										
- Residential	0%	0%	20%	30%	30%	35%	40%	40%	40%	40%
- Business	0%	0%	20%	30%	30%	35%	40%	40%	40%	40%
- Municipal / Educational	0%	0%	20%	30%	30%	35%	40%	40%	40%	40%
Total number of connections										
- Residential	0	0	1,554	2,331	2,331	2,719	3,108	3,108	3,108	3,108
- Business	0	0	129	193	193	225	258	258	258	258
- Municipal / Educational	0	0	39	59	59	69	79	79	79	79
- Total	0	0	1,722	2,583	2,583	3,014	3,444	3,444	3,444	3,444

Figure 6-4. Market Assumptions, CBN Business Plan, Nov 2012

The market of 8,610 premises is identified based on Los Alamos County Department of Public Utilities reports, which indicated said number of premises subscribing to electrical services. The network build out is schedule for implementation during Project Years 2 and 3, at which point broadband services would be available to the entire community. Take-rates are forecasted at 30% in Project Year 4 to 40% in Project Year 7. This is based on the quantitative analysis compiled by Research & Polling during May 2011 and October 2012. The market research is explained in Section 3.2. The total number of premises subscribing to revenue-generating broadband services, from a retail provider, reaching 3,444 by year 7, at the 40% targeted take-rate. Metrics for the anticipated number of premises connected for the proposed build out schedule, on a year-over-year basis, are shown in Figure 6-5.

Market and Build Out Assumptions, cont.

Network Build Out

Residential

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
- New connections	0	0	1,554	777	0	388	388	0	0	0
- Average number of connections per annum	0	0	777	1,942	2,331	2,525	2,913	3,108	3,108	3,108
- Year end	0	0	1,554	2,331	2,331	2,719	3,108	3,108	3,108	3,108

Business

- New connections	0	0	129	64	0	32	32	0	0	0
- Average number of connections per annum	0	0	64	161	193	209	242	258	258	258
- Year end	0	0	129	193	193	225	258	258	258	258

Municipal / Educational

- New connections	0	0	39	20	0	10	10	0	0	0
- Average number of connections per annum	0	0	20	49	59	64	74	79	79	79
- Year end	0	0	39	59	59	69	79	79	79	79

Customer split

	%		Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
- Detached & single family homes (SFH)	90%		1,398	2,098	2,098	2,447	2,797	2,797	2,797	2,797
- Apartments (MDU)	10%		155	233	233	272	311	311	311	311
- Business and Government			39	59	59	69	79	79	79	79

Figure 6-5. Market Assumptions, cont., CBN Business Plan, Nov 2012

6.4.1 Service Take Rates & Subscriber Forecast

Subscription take rates are forecasted on a per-service basis to produce accurate revenue projections. Applying a 40% market penetration rate to 7,769 residential premises results in 3,108 subscribing to revenue generating broadband services by Project Year 7. The CBN Business Plan then further breaks down the types of services that the 3,108 households are subscribing to. Some households would be subscribing to more than one service offering. The forecast assumes 40% of the 3,108 residential customers would be subscribing to a stand-alone (“unbundled”) Internet service, 5% would be subscribing to a stand-alone Voice over IP (“VoIP”) phone service, 50% would be subscribing to a stand-alone IP Television (“IPTV”), 20% would be subscribing to a “Triple-Play” bundle of Telephone, TV, and Internet service, and 40% would be subscribing to a “Double-Play” bundle of Telephone and Internet. The above distribution of take-rates per service offering is based upon the Research & Polling May 2011 and October 2012 market surveys. The average number of subscribers per service offering, per year, shown in Figure 6-6, are then multiplied against the wholesale rate schedule to project annual revenues.

Take Rate Assumptions, cont.										
Wholesale Residential Services										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Fiber to the Home (FTTH) Customer Base										
- New Customers	0	0	1554	777	0	388	388	0	0	0
- Average Number of Customer Per Year	0	0	777	1942	2331	2525	2913	3108	3108	3108
- Year End	0	0	1554	2331	2331	2719	3108	3108	3108	3108
Fiber to the Home (FTTH) Take Rate Per Service										
- Internet	0%	0%	40%	40%	40%	40%	40%	40%	40%	40%
- VoIP	0%	0%	5%	5%	5%	5%	5%	5%	5%	5%
- TV	0%	0%	50%	50%	50%	50%	50%	50%	50%	50%
- Bundle 1 - VoIP, TV, Internet	0%	0%	20%	20%	20%	20%	20%	20%	20%	20%
- Bundle 2 - VoIP, Internet	0%	0%	40%	40%	40%	40%	40%	40%	40%	40%
Net-New										
- Internet	0	0	622	311	0	155	155	0	0	0
- VoIP	0	0	78	39	0	19	19	0	0	0
- TV	0	0	777	388	0	194	194	0	0	0
- Bundle 1 - VoIP, TV, Internet	0	0	311	155	0	78	78	0	0	0
- Bundle 2 - VoIP, Internet	0	0	622	311	0	155	155	0	0	0
Average										
- Internet	0	0	311	777	932	1,010	1,165	1,243	1,243	1,243
- VoIP	0	0	39	97	117	126	146	155	155	155
- TV	0	0	388	971	1,165	1,262	1,457	1,554	1,554	1,554
- Bundle 1 - VoIP, TV, Internet	0	0	155	388	466	505	583	622	622	622
- Bundle 2 - VoIP, Internet	0	0	311	777	932	1,010	1,165	1,243	1,243	1,243
Year End										
- Internet	0	0	622	932	932	1,088	1,243	1,243	1,243	1,243
- VoIP	0	0	78	117	117	136	155	155	155	155
- TV	0	0	777	1,165	1,165	1,360	1,554	1,554	1,554	1,554
- Bundle 1 - VoIP, TV, Internet	0	0	311	466	466	544	622	622	622	622
- Bundle 2 - VoIP, Internet	0	0	622	932	932	1,088	1,243	1,243	1,243	1,243

Figure 6-6. Take Rate Assumptions, CBN Business Plan, Nov 2012

The same methodology applies to business consumers. See Figure 6-7 below.

Take Rate Assumptions, cont.										
Wholesale Business Services										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Fiber to the Business (FTTB) Customer Base										
- New Customers	0	0	129	64	0	32	32	0	0	0
- Average Number of Customer Per Year	0	0	64	161	193	209	242	258	258	258
- Year End	0	0	129	193	193	225	258	258	258	258
Fiber to the Business (FTTB) Take Rate Per Service										
- Small Business Internet	0%	0%	40%	40%	40%	40%	40%	40%	40%	40%
- VoIP	0%	0%	5%	5%	5%	5%	5%	5%	5%	5%
- TV	0%	0%	10%	10%	10%	10%	10%	10%	10%	10%
- Bundle 1 - VoIP, TV, Internet	0%	0%	10%	10%	10%	10%	10%	10%	10%	10%
- Bundle 2 - VoIP, Internet	0%	0%	50%	50%	50%	50%	50%	50%	50%	50%
Net-New										
- Small Business Internet	0	0	52	26	0	13	13	0	0	0
- VoIP	0	0	6	3	0	2	2	0	0	0
- TV	0	0	13	6	0	3	3	0	0	0
- Bundle 1 - VoIP, TV, Internet	0	0	13	6	0	3	3	0	0	0
- Bundle 2 - VoIP, Internet	0	0	64	32	0	16	16	0	0	0
Average										
- Small Business Internet	0	0	26	64	77	84	97	103	103	103
- VoIP	0	0	3	8	10	10	12	13	13	13
- TV	0	0	6	16	19	21	24	26	26	26
- Bundle 1 - VoIP, TV, Internet	0	0	6	16	19	21	24	26	26	26
- Bundle 2 - VoIP, Internet	0	0	32	81	97	105	121	129	129	129
Year End										
- Small Business Internet	0	0	52	77	77	90	103	103	103	103
- VoIP	0	0	6	10	10	11	13	13	13	13
- TV	0	0	13	19	19	23	26	26	26	26
- Bundle 1 - VoIP, TV, Internet	0	0	13	19	19	23	26	26	26	26
- Bundle 2 - VoIP, Internet	0	0	64	97	97	113	129	129	129	129

Figure 6-7. Take Rate Assumptions, cont., CBN Business Plan, Nov 2012

Applying a 40% market penetration rate to 644 business premises results in 258 subscribing to revenue-generating broadband services by Project Year 7. The forecast assumes 40% of the 258 business customers would be subscribing to a stand-alone (“unbundled”) Internet service, 5% would be subscribing to a stand-alone Voice over IP (“VoIP”) phone service, 10% would be

subscribing to a stand-alone IP Television (“IPTV”), 10% would be subscribing to a “Triple-Play” bundle of Telephone, TV, and Internet service, and 50% would be subscribing to a “Double-Play” bundle of Telephone and Internet.

Figure 6-8 below projects the service take rates for municipal and educational premises.

Take Rate Assumptions, cont.										
Municipal & Educational Services										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Ethernet Transport Take Rate Per Service										
- 5 Mbps	0	0	16	24	24	24	24	24	24	24
- 10 Mbps	0	0	10	14	14	14	14	14	14	14
- 20 Mbps	0	0	8	12	12	12	12	12	12	12
- 50 Mbps	0	0	3	5	5	5	5	5	5	5
- 100 Mbps	0	0	2	4	4	4	4	4	4	4
- Total E.D. connections, year end	0	0	39	59	59	59	59	59	59	59

Figure 6-8. Take Rate Assumptions, cont., CBN Business Plan, Nov 2012

6.5 Services and Pricing

The CBN wholesale service offerings and pricing models are structured in categories and tiers of service, shown in Figure 6-9. The wholesale rates per service offering are multiplied by the per-service subscriber forecasts mentioned previously to project annual revenues. The assumptions used for building the wholesale rate schedule and price points are explained in detail in Section 3.2.

Services & Price Assumptions

Residential & Small Business Transport

	Anticipated Retail Rate	Wholesale CBN Rate	% of Subscribers
Residential ISP transport			
- ISP 5 Mbps	\$30.00	\$7.50	30%
- ISP 10 Mbps	\$40.00	\$10.00	30%
- ISP 25 Mbps	\$80.00	\$20.00	30%
- ISP 50 Mbps	\$150.00	\$37.50	10%
Weighted Annual Revenue		\$15.00	
Small Business ISP transport			
- ISP 5 Mbps	\$50.00	\$12.50	30%
- ISP 25 Mbps	\$130.00	\$32.50	50%
- ISP 50 Mbps	\$250.00	\$45.00	20%
Weighted Annual Revenue		\$29.00	

IP Telephony (VoIP) transport	\$30.00	\$6.00
IPTV transport	\$50.00	\$5.00
Bundle 1 - Voice, Video, Data	\$100.00	\$30.00
Bundle 2 - Voice, Data	\$70.00	\$25.00

Municipal & Education

Ethernet Transport Services	Start Fee	CBN MRC
- 5 Mbps	\$0.00	\$225.00
- 10 Mbps	\$0.00	\$375.00
- 20 Mbps	\$0.00	\$600.00
- 50 Mbps	\$0.00	\$900.00
- 100 Mbps	\$0.00	\$1,350.00

Figure 6-9. Service and Prices, CBN Business Plan, Nov 2012

6.6 Revenue Forecast

Multiplying the average annual per-service subscriber forecast in Section 6.4.1 by the wholesale service pricing in Section 6.5 produces the following revenue forecast shown in Figure 6-10. The 7/16th GRT levy is also included in the revenue projections.

Revenues										
Wholesale Residential Services										
FTTH Services Yearly Revenue	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
- Internet	0	0	55,937	139,842	167,810	181,795	209,763	223,747	223,747	223,747
- VoIP	0	0	2,797	6,992	8,391	9,090	10,488	11,187	11,187	11,187
- TV	0	0	23,307	58,268	69,921	75,748	87,401	93,228	93,228	93,228
- Bundle 1 - VoIP, TV, Internet	0	0	55,937	139,842	167,810	181,795	209,763	223,747	223,747	223,747
- Bundle 2 - VoIP, Internet	0	0	93,228	233,070	279,684	302,991	349,605	372,912	372,912	372,912
Total yearly fees, FTTH	0	0	231,205	578,014	693,616	751,418	867,020	924,822	924,822	924,822
Revenue per customer	---	---	149	248	298	276	279	298	298	298
Wholesale Business Services										
FTTB Services Yearly Revenue	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
- Internet	0	0	8,964	22,411	26,893	29,135	33,617	35,858	35,858	35,858
- VoIP	0	0	232	580	696	753	869	927	927	927
- TV	0	0	386	966	1,159	1,256	1,449	1,546	1,546	1,546
- Bundle 1 - VoIP, TV, Internet	0	0	2,318	5,796	6,955	7,535	8,694	9,274	9,274	9,274
- Bundle 2 - VoIP, Internet	0	0	9,660	24,150	28,980	31,395	36,225	38,640	38,640	38,640
Total yearly fees, FTTB	0	0	21,561	53,903	64,683	70,074	80,854	86,244	86,244	86,244
Revenue per customer	---	---	167	279	335	311	314	335	335	335
Municipal & Educational Services										
Ethernet Transport Services Yearly Revenue	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
- 5 Mbps	0	0	43,200	64,800	64,800	64,800	64,800	64,800	64,800	64,800
- 10 Mbps	0	0	45,000	63,000	63,000	63,000	63,000	63,000	63,000	63,000
- 20 Mbps	0	0	57,600	86,400	86,400	86,400	86,400	86,400	86,400	86,400
- 50 Mbps	0	0	32,400	54,000	54,000	54,000	54,000	54,000	54,000	54,000
- 100 Mbps	0	0	32,400	64,800	64,800	64,800	64,800	64,800	64,800	64,800
Total yearly fees, Municipal & Educational Services	0	0	210,600	333,000	333,000	333,000	333,000	333,000	333,000	333,000
Revenue per location	---	---	5,400	5,644	5,644	5,644	5,644	5,644	5,644	5,644
Wholesale Network Revenue										
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Wholesale residential, business, and muni/edu	0	0	463,367	964,916	1,091,300	1,154,491	1,280,875	1,344,066	1,344,066	1,344,066
Gross Receipts Tax Revenue										
7/16 GRT Increment = \$5,600,000/yr of revenue	1,400,000	5,600,000	5,600,000	5,600,000	5,600,000	5,600,000	5,600,000	5,600,000	5,600,000	5,600,000
Total Revenue	1,400,000	5,600,000	6,063,367	6,564,916	6,691,300	6,754,491	6,880,875	6,944,066	6,944,066	6,944,066

Figure 6-10. Take Rate Assumptions, cont., CBN Business Plan, Nov 2012

In summary, wholesale network revenues reach \$1,344,066 once the 40% targeted take-rate is achieved, GRT revenues equal \$5,600,000 at a 7/16th increment, and total annual revenues peak at \$6,944,066 during the 10 year outlook of the CBN Business Plan.

6.6.1 Average Revenue per Customer

Average Revenue per Customer provides a measurement of annual revenue per customer type. The revenue forecast above assumes that residential customers, on average, will generate \$298 per year in wholesale revenue to CBN by Project Year 10. Business customers would generate slightly higher wholesale revenues at an average of \$335 per year. Municipal and educational consumers, based on a higher quality of wholesale network service, would generate significantly higher average annual revenues at \$5,644 per customer.

6.7 Capital Expenditures

Capital Expenditures represent the initial costs to build CBN and the equipment refresh to sustain a robust network operation. The CBN Business Plan uses the CBN Design Report as the baseline for projecting Capital Expenditures. Figure 6-11 presents the unit cost assumptions for the outside plant fiber construction, facilities, network equipment and systems. The unit costs are then plotted out on an annual basis to reflect network construction and equipment refresh phases.

Unit Cost Assumptions				
OSP Infrastructure: Fiber Core, Lateral, & Drops				
	Avg Unit Cost		Footage	
	Aerial	Buried	Aerial	Buried
CBN OSP				
- Townsite Core, labor and materials	3,288,639	33.49	18.66	58,288
- White Rock Core, labor and materials	1,344,610	29.70	46.42	22,923
- Townsite Lateral, labor and materials	7,389,529	5.44	30.61	89,060
- White Rock Lateral, labor and materials	4,161,604	7.13	36.16	69,923
- Townsite Fiber Drops, labor and materials	7,101,459	4.33	5.09	160,553
- White Rock Fiber Drops, labor and materials	3,188,827	4.19	4.98	108,089
		Avg Unit Cost	Quantity	
- Distribution Switch Facilities, 50RU, incl. labor	734,110	104,872.86	7	
- Distribution Switch Facilities, 25RU, incl. labor	916,968	57,310.50	16	
NOC & POP Facilities				
- NOC, building and equipment	0			
- POP Facilities, LA South (small), North, and White Rock	1,059,205			
Total OSP and Facilities Cost	29,184,951			

Figure 6-11. Unit Cost Assumptions, cont., CBN Business Plan, Nov 2012

The total investment in outside plant (“OSP”) infrastructure would be \$29,184,951, which presents the “passive” elements – meaning the fiber optic cable and facilities construction. Figure 6-12 represents the network equipment and system investments.

Ethernet Access Switches (FTTP)			
	Unit Cost	Qty	Total Cost
- GigE Chassis, Stage 1, fully configured, incl. labor	17,067	237	4,044,881
- GigE Uplinks, Stage 2 upgrade	17,067	184	323,122
- GigE Uplinks, Stage 3 upgrade	17,067	622	1,092,294
			5,460,297
Customer Equipment (FTTP)			
	Unit Cost	Qty	Total Cost
Customer Premise Equipment			
- GigE ONT w/SFP	309	9,050	3,345,804
- GigE ONT Materials and Labor	191	9,050	1,804,324
- GigE ONT Fiber Termination Box	84	9,050	759,802
			5,909,930
Core Equipment			
	Total Cost		
POP Equipment			
- Core Routers, Stage 1, fully configured, incl. labor	4,694,653		
- WDM Gear, Stage 1, fully configured, incl. labor	557,820		
- Core Routers, Stage 2, fully configured, incl. labor	2,149,452		
- WDM Gear, Stage 2, fully configured, incl. labor	702,440		
- Core Routers, Stage 3, fully configured, incl. labor	5,551,895		
- WDM Gear, Stage 3, fully configured, incl. labor	2,458,540		
	16,114,800		
OSS/BSS			
	Total Cost		
Portal & EMS (Outsourced NOC)	185,940		

Figure 6-12. Network Equipment Investments, CBN Business Plan, Nov 2012

The CBN Business Plan assumes the costs of only the “Stage 1” equipment requirements during the initial 10 year outlook, as the expectations are that this configuration will be sufficient to

support the network performance requirements during that period. See the following year-over-year forecast for the Capital Expenditures in Figure 6-13.

Capital Expenditures (CAPEX) Summary										
Passive infrastructure										
CBN OSP	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
- Network investments	0	19,553,917	9,631,034	0	0	0	0	0	0	0
<u>Core, Distribution, and Access investments</u>	<u>0</u>	<u>19,553,917</u>	<u>9,631,034</u>	<u>0</u>						
<u>Cumulative</u>	<u>0</u>	<u>19,553,917</u>	<u>29,184,951</u>							
Equipment										
Core equipment	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
- Stage 1 Investment	0	5,252,473	0	0	0	0	0	0	0	0
- Refresh	0	0	0	0	0	0	1,313,118	1,313,118	0	0
<u>Core investments</u>	<u>0</u>	<u>5,252,473</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1,313,118</u>	<u>1,313,118</u>	<u>0</u>	<u>0</u>
Access equipment (FTTP)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
- Stage 1 Investment	0	4,044,881	0	0	0	0	0	0	0	0
- Refresh	0	0	0	0	0	0	1,011,220	1,011,220	0	0
<u>Access equipment investments</u>	<u>0</u>	<u>4,044,881</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1,011,220</u>	<u>1,011,220</u>	<u>0</u>	<u>0</u>
Customer equipment (FTTP)	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
- Stage 1 Investment	0	0	5,909,930	0	0	0	0	0	0	0
- Refresh	0	0	0	0	0	0	0	1,477,483	1,477,483	0
<u>Customer equipment investment</u>	<u>0</u>	<u>0</u>	<u>5,909,930</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>1,477,483</u>	<u>1,477,483</u>	<u>0</u>
OSS / BSS	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
- Portal/EMS (Outsourced NOC)	0	0	185,940	0	0	0	0	0	0	0
- Refresh	0	0	0	0	0	0	0	0	0	0
<u>Management system investment</u>	<u>0</u>	<u>0</u>	<u>185,940</u>	<u>0</u>						
<u>Equipment investments</u>	<u>0</u>	<u>9,297,354</u>	<u>6,095,870</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>2,324,339</u>	<u>3,801,821</u>	<u>1,477,483</u>	<u>0</u>
<u>Cumulative</u>	<u>0</u>	<u>9,297,354</u>	<u>15,393,224</u>	<u>15,393,224</u>	<u>15,393,224</u>	<u>15,393,224</u>	<u>17,717,563</u>	<u>21,519,384</u>	<u>22,996,866</u>	<u>22,996,866</u>
Other CAPEX										
Professional Services	251,520	1,006,080	754,560							
Administrative, 2%		577,025								
<u>Other investments</u>	<u>251,520</u>	<u>1,583,105</u>	<u>754,560</u>	<u>0</u>						
<u>Cumulative</u>	<u>251,520</u>	<u>1,834,625</u>	<u>2,589,185</u>							
Total CAPEX	251,520	30,685,897	47,167,360	47,167,360	47,167,360	47,167,360	49,491,699	53,293,520	54,771,002	54,771,002

Figure 6-13. Capital Expenditures, CBN Business Plan, Nov 2012

\$29,184,951 in outside plant Passive infrastructure investments is assumed during Project Year 2 and 3, to coincide with the projected build out schedule. \$15,393,224 in Equipment expenses is also forecasted during that timeframe, along with \$2,589,185 in Other Capital Expenditures relating to professional services and construction administration. In total, these amounts equate to \$47,167,360, or what is referred to throughout the CBN Business Plan as the ~\$47.2m in initial network construction capital expenditures, during the first three years of the project. In Project Years 7 through 9, an additional \$7,603,643 is budgeted for equipment refresh (i.e. “network reinvestments”), bringing the total capital expenditure forecast to \$54,771,002 during the 10 year outlook.

6.8 Operating Expenditures

Operating expenditures itemize the yearly costs for staffing, operating, supporting, marketing, and maintaining CBN. Figure 6-14 below addresses anticipated Los Alamos County staffing requirements for supporting the operational aspects of CBN.

Operational Expenses										
LAC Staff, Outsourced NOC Model	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
	1	2	3	4	5	6	7	8	9	10
Principal Network Engineer										
- Number of employees	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
- Salary per empl.	87,935	0	87,935	90,573	93,290	96,089	98,972	101,941	104,999	108,149
- Social & pensions fees	40%	0	35,174	36,229	37,316	38,436	39,589	40,776	42,000	43,260
		0	123,109	126,802	130,606	134,525	138,560	142,717	146,999	151,409
Sr. Software Engineer										
- Number of employees	0.0	0.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
- Salary per empl.	76,988	0	76,988	79,298	81,677	84,127	86,651	89,250	91,928	94,686
- Social & pensions fees	40%	0	30,795	31,719	32,671	33,651	34,660	35,700	36,771	37,874
		0	107,783	111,017	114,347	117,778	121,311	124,950	128,699	132,560
Sr. OSP Engineer										
- Number of employees	0.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
- Salary per empl.	64,768	0	194,304	200,133	206,137	212,321	218,691	225,252	232,009	238,969
- Social & pensions fees	40%	0	77,722	80,053	82,455	84,928	87,476	90,101	92,804	95,588
		0	272,026	280,186	288,592	297,250	306,167	315,352	324,813	334,557
OSP Technician										
- Number of employees	0.0	0.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
- Salary per empl.	56,330	0	168,990	174,060	179,281	184,660	190,200	195,906	201,783	207,836
- Social & pensions fees	40%	0	67,596	69,624	71,713	73,864	76,080	78,362	80,713	83,135
		0	236,586	243,684	250,994	258,524	266,280	274,268	282,496	290,971
Total numbers of employees	0	0	8	8	8	8	8	8	8	8
Total staff cost	0	0	739,504	761,689	784,540	808,076	832,318	857,288	883,006	909,496

Figure 6-14. Operational Expenses, CBN Business Plan, Nov 2012

The staffing model used in Figure 6-14 is based upon the premise that Los Alamos County would outsource the day-to-day Network Operation Central (NOC) functionality to a contracted 3rd party. The CBN Business Plan considered an alternative scenario where LAC would provide all of the NOC services in-house, but this produced as less-desirable financial result. Therefore, the CBN Business Plan recommends outsourcing the NOC. By outsourcing the NOC, LAC would require only a minimum staffing level to support the operation. The minimum staffing requirements would consist of 1 Principal Network Engineer, 1 Senior Software Engineer, 3 Senior Outside Plant Engineers, and 3 Outside Plant Technicians, for a total of 8 FTEs (Full-Time Equivalents). Section 2 of the CBN Business Plan describes the resource requirements, job functions, and organizational chart in greater detail. In summary, LAC 8 FTE's would be required at an annual cost of \$739,504 in Project Year 3 to \$909,496 in Project Year 10, based on 3% year-over-year salary increases.

In addition to staffing requirements, other Operational Expenditures include the 3rd party NOC services, fiber locates, utility expenses, marketing, equipment/system support contracts, service/maintenance on the fiber plant, and an Enterprise Fund overhead associated with direct, non-employee expenses. These costs are itemized in Figure 6-15.

Operational Expenses continued...										
3rd Party NOC Services										
	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
	1	2	3	4	5	6	7	8	9	10
1st line support										
- Cost per active port	10	0	86,100	86,100	86,100	86,100	86,100	86,100	86,100	86,100
- Fixed cost per year	100,000	0	100,000	100,000	100,000	100,000	100,000	100,000	100,000	100,000
1st line customer support	0	0	186,100	186,100	186,100	186,100	186,100	186,100	186,100	186,100
Other operational expenses										
- Fiber locates	0	0	40,000	40,000	40,000	40,000	40,000	40,000	40,000	40,000
- Utilities	0	0	66,000	66,000	66,000	66,000	66,000	66,000	66,000	66,000
External expenses	0	0	106,000	106,000	106,000	106,000	106,000	106,000	106,000	106,000
Marketing										
Customer acquisition fee per sub	0	0	0	0	0	0	0	0	0	0
Fixed marketing budget per year	0	0	100,000	75,000	50,000	25,000	25,000	25,000	25,000	25,000
Marketing cost	0	0	100,000	75,000	50,000	25,000	25,000	25,000	25,000	25,000
Support fees (equipment)										
Support fees										
- Core	12.00%	0	0	630,297	630,297	630,297	630,297	630,297	630,297	630,297
- Access	0.00%	0	0	5,000	5,000	5,000	5,000	5,000	5,000	5,000
- CPE	0.00%	0	0	0	0	0	0	0	0	0
- OSS / BSS / Portal	15.00%	0	0	27,891	27,891	27,891	27,891	27,891	27,891	27,891
License & support cost	0	0	0	663,188	663,188	663,188	663,188	663,188	663,188	663,188
Service and Maintenance (fiber)										
Maintenance fees	per route mile									
- Core & laterals	1880	0	0	233,120	233,120	233,120	233,120	233,120	233,120	233,120
Maintenance fees	0	0	233,120	233,120	233,120	233,120	233,120	233,120	233,120	233,120
Enterprise Fund Overhead	18%	0	0	112,540	227,413	222,913	218,413	218,413	218,413	218,413
* applied to direct, non-employee expenses										
Summary Operational Cost	0	0	1,477,263	2,252,510	2,245,861	2,239,897	2,264,139	2,289,109	2,314,827	2,341,318

Figure 6-15. Additional Operational Expenses, CBN Business Plan, Nov 2012

The 3rd Party NOC services are based on the assumption that there would be a fixed, minimum annual cost to operate a year and then a per-network port (network interface) cost associated with the number of premises being supported. This is a customary model for outsourced NOC services. In the context of CBN, the assumption is that the minimum operating expense for the 3rd NOC services would be \$100,000 per year and the cost per port would be \$10 per year, based on 8,610 premises connected.

Fiber locates, which are required under NM One Call “dig safe” policies to identify underground facilities, are based on an anticipated volume of 2,000 tickets per year at \$20 per ticket. The Utilities expenses are based on the forecasted power draw (kWh) of the proposed network equipment at the Los Alamos County Department of Public Utilities “Small County” rate.

The Marketing budget is based on a fixed annual amount, higher in the early project years as CBN is building out and beginning operations, then gradually declines as the network matures. The marketing dollars would be used for branding CBN, promoting the community value proposition, and co-marketing campaigns with the CBN retail service providers. The recommended marketing approach is explained in Section 7.1.

The service and support fees are based on typical and customary rates seen for the respective equipment/system platforms (core, access, OSS/BSS). With respect to CPE, the recommended approach is to procure and maintain an inventory of spare equipment, based on its low unit cost, rather than purchasing a support contract with the vendor.

Service and maintenance of the outside fiber optic cable plant (OSP) is based on \$1880 per route mile, per year, for inventorying the necessary materials for the maintenance technicians to use for break/fix repair on the OSP. Lastly, an Enterprise Fund overhead is applied to direct, non-employee Operational Expenses, to cover indirect expenses, such as Human Resources, safety, employee training, and risk. The 18% overhead factor is based on input from LAC Office of Management & Budget (OMB).

Totaling the above Operational Expenditures results in an annual budget ranging from ~\$1.5m in Project Year 3 to ~\$2.3m in Project Year 4. These expenses are reflected within the pro-forma Income Statement and Cash Flow Analysis provided within this section.

6.9 Potential Funding Structure and Cost of Capital

Figure 6-16 shows the Potential Funding Structure and Cost of Capital outlines the yearly investments to fund network construction, suggests a source of capital, and projects the associated borrowing costs.

Financial assumption											
Financing	USD	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Initial Construction Funding	47,167,360	251,520	30,434,377	16,481,464	0	0	0	2,324,339	3,801,821	1,477,483	0
Equipment Refresh Funding	7,603,642										
- Loan term, initial construction	20										
- Loan term, equipment refresh	7										
- Loan interest rate	3.5%										
- Interest income, NM Investment P	1.80%										
Accumulated loan UB		238,944	29,139,026	43,262,122	40,903,754	38,545,386	36,187,018	35,820,940	36,389,227	34,422,107	30,977,504
Amortization		-12,576	-1,534,295	-2,358,368	-2,358,368	-2,358,368	-2,358,368	-2,690,416	-3,233,534	-3,444,603	-3,444,603
Interest expenses		8,583	1,046,716	1,555,446	1,472,903	1,390,360	1,307,817	1,300,815	1,330,210	1,265,054	1,144,493
Annual cash flow		1,262,174	2,691,708	827,951	590,017	782,318	953,421	744,929	229,374	67,199	15,860
Accumulated cash flow		1,262,174	3,953,882	4,781,833	5,371,850	6,154,168	7,107,589	7,852,518	8,081,892	8,149,092	8,164,952
External funding											
- Loan IB		251,520	238,944	226,368	213,792	201,216	188,640	176,064	163,488	150,912	138,336
- Loan Payments		-12,576	-12,576	-12,576	-12,576	-12,576	-12,576	-12,576	-12,576	-12,576	-12,576
- Loan UB		238,944	226,368	213,792	201,216	188,640	176,064	163,488	150,912	138,336	125,760
- Interest average		8,583	8,143	7,703	7,263	6,822	6,382	5,942	5,502	5,062	4,622
External funding year 2											
- Loan IB			30,434,377	28,912,658	27,390,939	25,869,220	24,347,501	22,825,782	21,304,064	19,782,345	18,260,626
- Loan Payments			-1,521,719	-1,521,719	-1,521,719	-1,521,719	-1,521,719	-1,521,719	-1,521,719	-1,521,719	-1,521,719
- Loan UB			28,912,658	27,390,939	25,869,220	24,347,501	22,825,782	21,304,064	19,782,345	18,260,626	16,738,907
- Interest average			1,038,573	985,313	932,053	878,793	825,532	772,272	719,012	665,752	612,492
External funding year 3											
- Loan IB				16,481,464	15,657,391	14,833,317	14,009,244	13,185,171	12,361,098	11,537,025	10,712,951
- Loan Payments				-824,073	-824,073	-824,073	-824,073	-824,073	-824,073	-824,073	-824,073
- Loan UB				15,657,391	14,833,317	14,009,244	13,185,171	12,361,098	11,537,025	10,712,951	9,888,878
- Interest average				562,430	533,587	504,745	475,902	447,060	418,217	389,375	360,532
External funding year 7											
- Loan IB								2,324,339	1,992,290	1,660,242	1,328,193
- Loan Payments								-332,048	-332,048	-332,048	-332,048
- Loan UB								1,992,290	1,660,242	1,328,193	996,145
- Interest average								75,541	63,919	52,298	40,676
External funding year 8											
- Loan IB									3,801,821	3,258,704	2,715,586
- Loan Payments									-543,117	-543,117	-543,117
- Loan UB									3,258,704	2,715,586	2,172,469
- Interest average									123,559	104,550	85,541
External funding year 9											
- Loan IB										1,477,483	1,266,414
- Loan Payments										-211,069	-211,069
- Loan UB										1,266,414	1,055,345
- Interest average										48,018	40,631
Accumulated loan IB		251,520	30,673,321	45,620,490	43,262,122	40,903,754	38,545,386	38,511,356	39,622,761	37,866,709	34,422,107
Loan Payments		-12,576	-1,534,295	-2,358,368	-2,358,368	-2,358,368	-2,358,368	-2,690,416	-3,233,534	-3,444,603	-3,444,603
Accumulated loan UB		238,944	29,139,026	43,262,122	40,903,754	38,545,386	36,187,018	35,820,940	36,389,227	34,422,107	30,977,504
Interest expenses		8,583	1,046,716	1,555,446	1,472,903	1,390,360	1,307,817	1,300,815	1,330,210	1,265,054	1,144,493
Interest income		0	22,719	71,170	86,073	96,693	110,775	127,937	141,345	145,474	146,684

Figure 6-16. Potential Funding Structure, CBN Business Plan, Nov 2012

The “passive” asset class is correlated with the fiber optic cable and facilities construction, which have a long-term useful life. The “equipment” asset class is associated with the network electronics and systems that are used for activating and operationalizing CBN, and has a shorter term useful life. As such, passive assets are depreciated over 20 years and equipment is written off over 7 years. The depreciation schedule above covers the 10 year outlook of the CBN Business Plan, including the equipment refresh in Years 7-9.

Annual depreciation is incorporated into the pro-forma Income Statement and weighs into the Net Income/Net Loss position. The “Book Value” of the network calculated off of the original investments minus the depreciation amount, as is carried over to the Balance Sheet.

6.11 Working Capital and Tax

Working Capital captures the short term “current assets” and “current liabilities” of the CBN Business Plan.

Working Capital & Tax											
Working Capital											
		Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Receivables	Days 30	116,667	466,667	505,281	547,076	557,608	562,874	573,406	578,672	578,672	578,672
Payable (indir. cost)	30	0	0	-123,105	-187,709	-187,155	-186,658	-188,678	-190,759	-192,902	-195,110
Working capital		116,667	466,667	382,175	359,367	370,453	376,216	384,728	387,913	385,770	383,562
Change in working capital		116,667	350,000	-84,491	-22,808	11,086	5,763	8,512	3,185	-2,143	-2,208
Tax Calculations											
Tax %	0%	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
EBT		1,355,485	2,008,024	-926,336	-1,102,587	-876,391	-710,611	-916,355	-1,401,304	-14,456	912,773
Accumulated EBT		1,355,485	3,363,510	2,437,174	1,334,587	458,197	-252,414	-1,168,769	-2,570,073	-2,584,530	-1,671,756

Figure 6-18. Working Capital, CBN Business Plan, Nov 2012

The assumption for 30 days of receivables is based off of 30 days of anticipated revenues. The 30 days of payables is equal to 30 days of anticipated operational expenses. A 0% tax calculation is used, based off of Los Alamos County being a division of State of New Mexico government and income tax exempt. The Working Capital calculations are included in the pro-forma Balance Sheet and Cash Flow Analysis.

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Section 7. CBN Risk Mitigation Strategy

This section analyzes potential risks to Los Alamos County's Community Broadband Network (CBN). These are categorized as market, financial, network, and legal risks.

7.1 Market Risk

One of the cornerstones to CBN's business model is an accurate forecast of wholesale revenue from sales of network services to retail service providers. The forecast is based on projected customer subscription levels (i.e. take-rates), the retail rates that consumers are willing to pay, and the wholesale rates that retail service providers are willing to pay. Any downward pressure on pricing and subscription levels presents a market risk to CBN. The most common source is competitive pricing incentives from incumbent service providers with proprietary, closed-network models.

The CBN business plan identifies three strategies to mitigate market risks:

- Adjustments to the forecasted take-rates
- Marketing campaigns
- Active management of the wholesale product catalog

The CBN business model adjusts the forecasted take-rates to account for aggressive pricing incentives from incumbent providers. The forecasted take-rates are based on data from the independent CBN market research conducted by Research & Polling, Inc., May 2011 and October 2012 (*Los Alamos County Broadband Network Survey – Residents*). The market research report quantified that 35% of the residential respondents would be very likely to subscribe to an Internet service offered over CBN and 40% would be likely to subscribe or indifferent, as demonstrated in Figure 7-1.

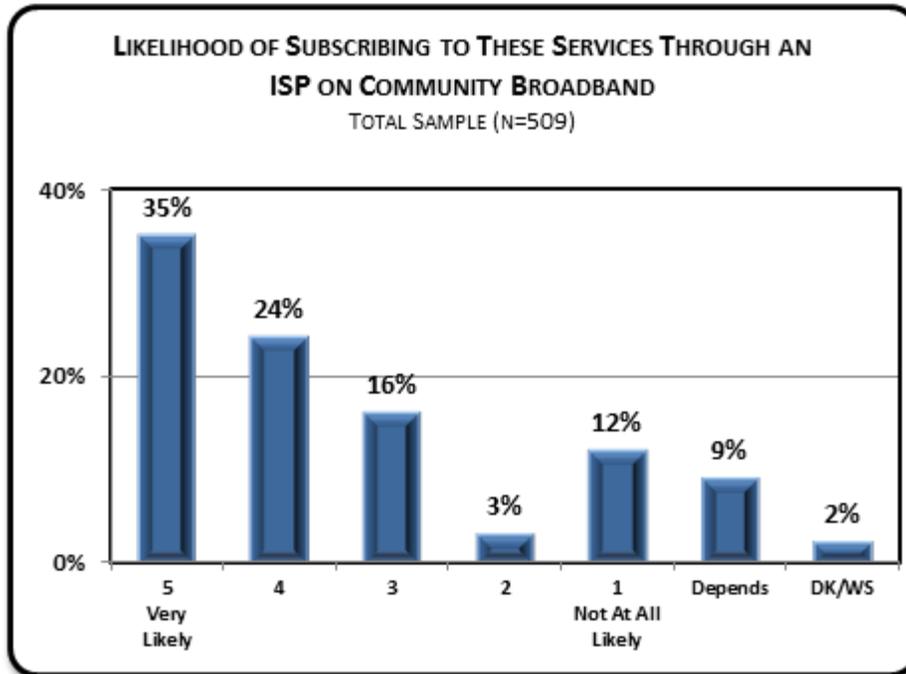


Figure 7-1. Interest in Residential Internet Services, R&P, Oct 2012

The business plan has adjusted these figures, to produce a more conservative take-rate expectation. The 35% projection of very likely subscribers was reduced by 50%, to an adjusted rate of 17% and the 40% of likely or indifferent subscribers was reduced by 75%, to a 10% projection. Aggregating the 17% and 10% figures (27%), plus considering the overall positive community support for CBN and perceived benefits, a 30% overall take-rate on Internet services offered by retail providers on CBN would be the minimum anticipated take-rate. This is the projected take-rate by Project Year 4, although other market indicators suggest additional room for growth in future years. A similar methodology was used to arrive at the same take-rate projections for business class services. These conservative forecasted take-rates provide a margin to accommodate changes in market conditions, including incumbent price competition.

To further mitigate market risks, the CBN business plan recommends implementing a marketing campaign that focuses on local branding of CBN, as community-owned and operated infrastructure, for public benefit. As mentioned in the Executive Summary, CBN uses an “open-access” architecture, delivering an open market environment of advanced, high-speed broadband services from an array of potential retail service providers. The intent for CBN is to improve access and affordability for community broadband services, while encouraging competition amongst the retail providers. CBN has an opportunity to change the current landscape of broadband services within Los Alamos County and the underlying infrastructure on which they are delivered. As such, CBN should focus marketing efforts on leveraging these unique, local qualities, creating a brand that the community can identify and relate with. Building brand loyalty to CBN would further assist in sustaining subscription take-rates and achieving the wholesale revenue projections. This strategy could become a useful tool in helping to mitigate market risks from incumbent service providers.

The final approach to mitigating market risk mitigation is to actively manage the wholesale product catalog. To maintain competitive wholesale rates, CBN should frequently evaluate market conditions for broadband services, including the types of services offered and pricing. If CBN's rates are no longer cost competitive for the service providers, then further analysis should be conducted to evaluate:

- Potential rate adjustments
- Changes to the categories of services
- Requirements on network resources
- Re-projecting take-rate assumptions
- Assessing overall impacts to the pro-forma financial models.

This exhaustive research should be conducted annually, or more frequently if warranted by market conditions.

7.2 Financial Risk

The next section of the CBN Risk Mitigation Strategy looks at potential financial risks associated with:

- Securing Project Capital
- Potential cost overruns (Capital Expenditures/Operating Expenditures)
- Revenue shortcomings
- Planning/forecasting

CBN projects a funding requirement of ~\$47.2m to cover the costs associated with constructing and preparing the network for operations. A municipal revenue bond is the recommended source of capital, with a 7/16th GRT increment to cover the debt service. However, the proposed bond issuance and related GRT increase would require an election to pass. Therefore, this presents significant financial risk to CBN. Bond elections that have succeeded typically involve a strong grass roots campaign to build community support. Should voters elect not to pass a revenue bond package and GRT increase, CBN could further explore funding options from, or a combination thereof:

- Los Alamos County General Obligation (GO) Bonds
- Up to \$27.5m in bonding capacity, although other Capital Improvement Projects (CIP) also competing for
- United States Rural Utility Service (RUS) Broadband Loan Program
- Program funding and statutory requirements determined annually
- RUS Distance Learning Telemedicine Grants
- Program funding and statutory requirements determined annually
- Federal Communications Commission (FCC) Connect America Fund (CAFs)
- To qualify for funding, current program guidelines require that the network directly serves retail consumers, in conflict with the CBN open-access model
- However, the program continues to be revamped and future policy changes may present opportunities for CBN

- Public/Private Partnerships
- Seek private sector capital investments and/or infrastructure partnerships
- Incremental Growth Approach
- Aggregate demand in condensed areas that can self-fund and sustain

The potential for cost overruns exist for large capital investment projects like CBN. The best management practices for mitigating this risk are through detailed planning and procurement guidelines. CBN’s budgetary planning is factored on conservative cost estimates for building and operating the network, to provide upside protection against potential cost increases. Additional monies are budgeted for cost factors that are unique to doing business in Los Alamos County, including typical labor rates experienced, and the environmental conditions that increase construction complexities, such as rock-drilling. Furthermore, capital projections are adjusted for future dollars, to account for inflationary expectations. Lastly, a 3rd party assessment of the network design and construction budget was conducted by NI Solutions, Inc. The report found that:

“The overall design for the Los Alamos County Community Broadband Network (CBN) is in accordance with the guidelines as set forth by the LAC Council. Certain issues may require additional cost considerations to be addressed as stated in the previous segments. The additional costs pertain to the following:

- Make Ready
- Under-sized generators
- HVAC systems
- Logical network design
- Splicing Logic
- Recurring Maintenance & Operations Costs

NI Solutions recommends LAC address the concerns in the current design prior to implementation of the community broadband network.”

With respect to procurement guidelines, Los Alamos County’s purchasing codes are subject to State of New Mexico mandates. CBN’s business plan recommends that pricing be set at fixed unit costs for identified network segments, such as a cost-per-foot measurement, with finite contingency items, such as a cost-per-foot premium for rock drilling. Overall contract values should have a set maximum to protect against cost overruns. Construction contracts based upon time and materials are not advisable. Invoices should be field verified to ensure that actual production is billed correctly. A strict inventory management control policy should be enforced, keeping detailed records of materials received and a logbook tracking when/by whom materials are signed out of inventory to be used in production, to minimize waste and/or loss.

The potential for revenue shortcomings also presents a financial risk to CBN. The best management practice for mitigating this risk is to forecast revenues conservatively, without having to achieve overly optimistic revenue targets to sustain positive cash flow. The CBN business plan follows this measure, by taking a conservative approach with forecasted subscription take-rates and revenue expectations. As explained early in this Risk Mitigation Strategy, the CBN wholesale model is based upon applying a discount rate to the market research

data, representing only a fraction of the residential and business consumers that expressed interest in utilizing broadband services from a service provider on CBN.

Another key ingredient for achieving desired revenues is continuously evaluating and evolving the wholesale product catalog for the service providers, to remain competitive in the marketplace. This strategy was mentioned in greater detail previously in this section, as a means for mitigating market risk, but would also play largely into hedging against financial risk as well.

An advantage of the CBN business model is that it would be locally owned, community infrastructure, not requiring private sector returns to shareholders. Therefore, the model assumes that operational proceeds would be held within the enterprise accounting fund and can serve as operational reserves, to cover the potential for future fluctuations in revenue flows.

The next risk category assessed is related to the network technology itself. The CBN infrastructure design is based upon fiber optics, with a useful life of 25-40 years. History will show that there have been minor advancements in fiber optic cabling over the past 20 years, with research and development providing incremental improvements in single-mode fiber standards. Most of the communications advancements have been in the network electronics that “light up” the fibers and provision services.

However, the majority of the infrastructure investment is represented by the outside fiber optic plant construction, and a lesser portion associated with the network equipment. As such, the CBN plan provides for an abundance of fiber optic strand capacity with a high level of flexibility for adapting to changes in network growth, without having to reengineer the outside plant design to accommodate future expansion. Therefore, technology risk is offset on the largest portion of network investment, by utilizing a scalable network design that could support changes and/or upgrades in equipment advancements, without the need for new fiber optic construction.

Construction quality also presents a potential network risk. The recommended mitigation measures are for clearly defined construction standards that the potential contractor(s) would follow, and incorporating those standards into the construction agreement itself. Construction standards could include, but not limited to, minimum depth for buried fiber optic cable, minimum conduit wall size, traffic ratings for vaults, attachment standards for aerial cable installation, splicing test measurements for power metering and signal loss, and fiber termination guidelines. However, for this strategy to be effective, skilled oversight on behalf of CBN would be required, to independently validate that construction standards are being met.

Operating a community fiber optic network on the proposed scale of CBN creates exposure to potential system impacts, such as accidental cable cuts, vandalism, and storm damage. To prepare for emergency events, the CBN business plan has budgeted and planned for network maintenance. These functions would include outside plant technicians to replace, relocate, and/or install new fiber optic cable, along with engineers to splice the system together and restore service. From a network architecture standpoint, CBN has been designed with imbedded network resiliency and self-healing capabilities, with both redundant network electronics and network protocols, such as Open Shortest Path First (OSPF).

Network security is always a potential risk when running a telecommunications operation such as the proposed CBN. The suggested mitigation measures include implementing controlled access at all buildings where networking equipment is housed or operational functions are

performed, with keypad instrumentation at all main ingress/egress points. All outside plant enclosures, such as distribution switch facilities and drop closures, should also be lockable with restricted key access. At the logical network layer, access control lists should be implemented on networking equipment, with alarm functionality enabled to alert to potential threats. On a periodic basis, such as once a year, a 3rd party should be consulted to run stress tests on the network to identify any potential security holes and suggest corrective measures.

The last element of the Risk Mitigation Strategy addresses to potential for legal challenges. Legal risks may present themselves in the form of:

- Private sector litigation
- Anti-donation
- Procurement/compliance
- Liability

In general terms, municipalities that have chosen to offer retail, consumer telecommunications services have faced heavy scrutiny from regulatory bodies, and in some cases, lengthy and costly legal proceedings. The argument from the incumbent service providers has been, primarily, that local government should not be in the business of offering competing telecommunications services with those of private enterprise – even if strongly supported by the community. This debate has been waged in local, district, state, and even as high as the supreme court. While the final rulings have varied on a case-by-case basis, the common denominator has been that the process is time and cost intensive, and causes a significant drag on the overall effort.

To mitigate the potential for private sector litigation, the recommended best management practice is to implement an open access model, which functionally separates wholesale network transport from that of delivering retail consumer services. In the open access business model that CBN is built upon, the role of Los Alamos County would be infrastructure investment and operations, while offering retail service providers fair and equal network access for deliver broadband services across the infrastructure to reach and support the end user. This provides clear separation in roles and responsibilities, meaning municipalities provide the infrastructure and private enterprise is welcome to share and use the infrastructure to deliver services. Therefore, the open access approach would help to avoid legal, regulatory, financial, and project implementation risks.

With CBN being facilitated by a division of State of New Mexico government, anti-donation risks also exist. Triggers for this clause typically involve overvaluing private sector contributions in exchange for public services provided, or undervaluing public services that are being provided to a private sector entity. The best management practice for hedging against anti-donation violations is to set the public and private sector services being exchanged on a fair market value, itemized in a balanced schedule of values. Furthermore, should a subsequent private sector entity be willing to offer equivalent services and terms as previously granted through an established “In-kind Agreement”, all reasonable efforts should be made to accommodate the private sector partner if conditions are practical.

Legal risks could also present themselves throughout procurement activities. Procurement was discussed previously in the Risk Mitigation Strategy, as a technique for protecting against potential cost overruns, although procurement has legal considerations as well. With Los Alamos

County being a division of State of New Mexico government, procurement is governed by established codes. These codes must be enforced throughout procurement proceedings, with the ability to validate and demonstrate compliance in the event of a challenge or audit. These records should be maintained for the period as defined under State procurement statute.

The final legal risk considered is liability. The potential for injury liability exists at all CBN facilities and outside plant locations, including, but not limited to, network POPs, operations centers, distribution switch facilities, drop closures, and splice locations. As such, employers and contractors should be required to carry at least the minimum level of general and professional liability insurance, as governed by State of New Mexico procurement guidelines, along with disability coverage. Los Alamos County should carry general liability insurance at main places of business and loss/damage/theft coverage on large cost items, such as core routing electronics.

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Appendix A. Abbreviations and Acronyms

Acronym	Definition
AE	Active Ethernet
CBN	Community Broadband Network
CLEC	Competitive Local Exchange Carrier
CPE	Customer Premises Equipment
DPU	Department of Public Utilities
DSF	Distribution Switch Facility
FTE	Full-Time Equivalent
FTTP	Fiber To The Premises
Gbps	Gigabit per second
GRT	Gross Receipts Tax
ILEC	Incumbent Local Exchange Carrier
IRR	Internal Rate of Return
ISP	Internet Service Provider
LAC	Los Alamos County
Mbps	Megabits per second
MDU	Multiple Dwelling Unit
MMP	Meet-Me-Point
NOC	Network Operations Center
ONT	Optical Network Terminal
OSP	Outside Plant
PCS	Pajarito Cliffs Site
PON	Passive Optical Networking
POP	Point of Presence
R&P	Research & Polling
SLA	Service Level Agreement
SP	Service Provider

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Appendix B. Financial Statements

This appendix details the complete pro-forma financial statements for the CBN business plan.

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