

Los Alamos County

Community Broadband Network Business Plan

February 2013

Prepared for:
Los Alamos County, NM
Information Technology Division



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Introduction

This document is a condensed version of the *Los Alamos County Community Broadband Network Business Plan, February 2013*. It is intended for an audience looking to understand the main concepts and findings of the business plan in a quicker fashion. The first section is a copy of the Executive Summary from the Business Plan. The second section is the Business Case Summary itself.

Section 1. 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.

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.

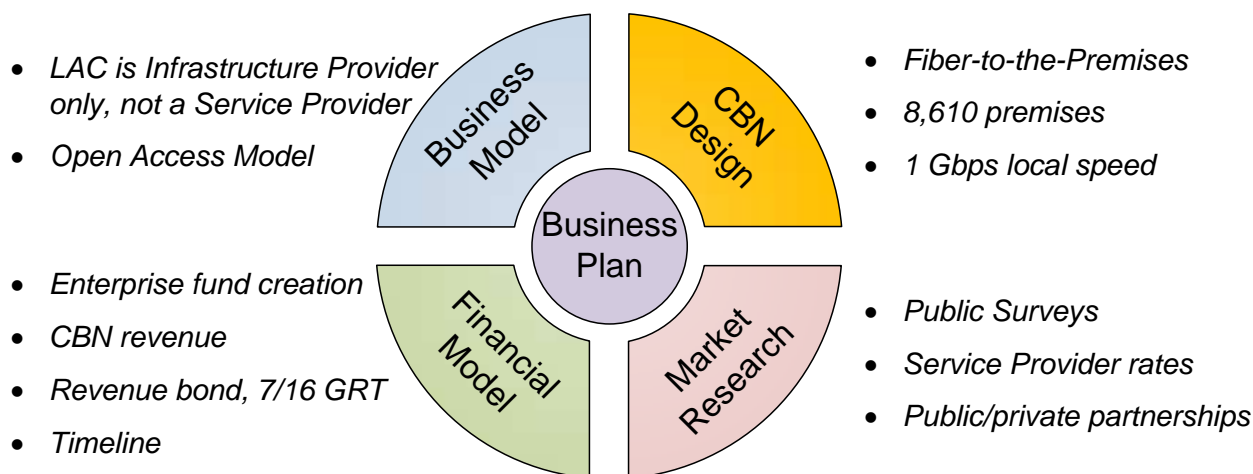


Figure 1. CBN Business Plan Inputs

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 2. CBN Business Case Summary

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 gigabits 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 following sections summarize the financial analysis process and results that are presented in greater detail in the Business Plan.

2.1 Financial Planning

CBN would require significant capital resources for the development, construction, and operation of the network. 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 re-investment 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 recommended 7/16th GRT increment. The CBN Business Plan revenue forecast ranges from ~\$6m in Project Year 3 and ~\$7m in Project Year 10.

After reviewing the anticipated expenses, revenue forecasts, funding structure, 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. The economic fundamentals used as the baseline for this recommendation are expected take rates, wholesale

revenue expectations, cash flows, capital expenses, operating expenses, and funding model. A few highlights:

- Estimated \$47.2m cost to build CBN
- Estimated \$7.6m cost for future equipment refresh
- Estimated \$2.3m annual operating expense to run CBN
- Estimated \$47.2m funding required from revenue bond proceeds for initial construction capital expenditures in Project Years 1 through 3
- Estimated \$7.6m funding required from revenue bond proceeds for network equipment refresh in Project Years 7 through 9
- Market size of 8,610 premises directly connected with fiber optics
- 30% take-rate on residential broadband Internet services by Project Year 4, 40% by Year 7
- 30% take-rate on business broadband Internet services by Project Year 4, 40% by Year 7
- Estimated annual revenue of ~\$6m in Project Year 3 to ~\$7m in project Year 10
- 7/16th GRT increment to cover debt service on ~\$47.2m revenue bond, for capital expenditures associated with initial network construction

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.

2.2 Budget Projections

The ~\$47.2m estimated initial build cost ("Capital Expenditures") utilizes the CBN Design Report, March 2012 as the initial baseline, then applies adjustments. The CBN Design Report projected costs of ~\$46.6m, after applying cost saving options (see Table 1 and Table 2).

Table 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 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 results from ~\$61.1m being reduced by identified savings of ~\$14.5 and becomes the baseline for building the Capital Expenditure budget. The CBN Business Plan then adds a 2% construction administration expense, in the amount of ~\$600k to cover additional costs associated with supporting the first year of construction activities (Project Year 2). The estimates of \$46.6 and \$600k are combined to result in a total initial cost to build CBN of ~\$47.2m.

2.3 Equipment Refresh

The CBN Business Plan incorporates an equipment refresh strategy as part of the Capital Expenditure budget, to ensure that network appliances are of the latest technology and

performing to levels required to meet Service Level Agreement (SLA) commitments. 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, and not involve an equipment replacement strategy that would require a “fork-lift” upgrade of the network. A fork-lift upgrade would involve removing the network existing equipment and replacing with an entirely new platform, thereby decommissioning the original equipment investments.

Using the above rationale, the CBN Business Plan budgets for equipment refresh starting 5 years after the initial installation date. The equipment refresh assumption is that 25% of the original 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 installation. Therefore, a total of 50% of the original network equipment Capital Expenditure would be reinvested back into the network in the form of equipment refresh, 5 to 6 years after the original install.

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 in reference. 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.

Figure 1 shows the itemized Capital Expenditure projections on a year-over-year basis:

Capital Expenditures (CAPEX) Summary										
Passive infrastructure										
	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
CBN OSP	1	2	3	4	5	6	7	8	9	10
- Network investments	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										
	Year	Year	Year	Year	Year	Year	Year	Year	Year	Year
Core equipment	1	2	3	4	5	6	7	8	9	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
Core investments	0	5,252,473	0	0	0	0	1,313,118	1,313,118	0	0
Access equipment (FTTP)										
- 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
Access equipment investments	0	4,044,881	0	0	0	0	1,011,220	1,011,220	0	0
Customer equipment (FTTP)										
- 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
Customer equipment investment	0	0	5,909,930	0	0	0	0	1,477,483	1,477,483	0
OSS / BSS										
- 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
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 1. Capital Expenditures Annual Forecast, CBN Business Plan, Nov 2012

2.4 Cost to Operate

CBN would incur Operating Expenses associated with the day-to-day activities of running the network and providing wholesale bandwidth services to retail providers. These operating functions would include CBN hiring staff to support network engineering, software engineering, and outside plant maintenance. CBN would also need to contract with a 3rd party entity for providing Network Operations Center (NOC) services, including:

- Service provisioning, network monitoring, and troubleshooting
- Service provider customer support and billing
- Field dispatching

The CBN Business Plan also evaluated the option of LAC staffing and providing the NOC services. This projected a less desirable financial result and therefore the CBN Business Plan does not recommend this approach.

Also included in the Operating Expenses are:

- Fiber locating services
- Marketing
- Outside plant maintenance
- Utilities
- Network equipment and software support
- 18% Enterprise Fund overhead

Operating Expenses fluctuate on a year-over-year basis, ranging from ~\$1.5m in Project Year 3 to ~\$2.3m in Project Year 10. This is primarily associated with anticipated changes in staffing costs. Figure 2 and Figure 3 provide a summary of the Operating Expense projections.

Operational Expenses											
LAC Staff, Outsourced NOC Model	Year	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	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	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	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	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	8
Total staff cost	0	0	739,504	761,689	784,540	808,076	832,318	857,288	883,006	909,496	

Figure 2. Operating Expenses Annual Forecast, CBN Business Plan, Nov 2012

Operational Expenses continued...											
3rd Party NOC Services	Year	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	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	100,000
1st line customer support	0	0	186,100	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	40,000
- Utilities	0	0	66,000	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	106,000
Marketing											
Customer acquisition fee per sub	0	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	25,000
Marketing cost	0	0	100,000	75,000	50,000	25,000	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	630,297
- Access	0.00%	0	0	5,000	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	0
- OSS / BSS / Portal	15.00%	0	0	27,891	27,891	27,891	27,891	27,891	27,891	27,891	27,891
License & support cost		0	0	663,188	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	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	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 3. Operating Expenses Annual Forecast, CBN Business Plan, Nov 2012

The Enterprise Fund overhead would be applied towards direct, non-employee related expenses, and could cover project costs such as human resources, safety, employee training, and risk.

2.5 Funding Structure

Several potential sources of project funding were evaluated in the CBN Business Plan, including local, state, and federal programs. LAC revenue bonds are the recommended vehicle for securing ~\$47.2m in capital, to cover the costs associated with initial network construction. This is due to project funding requirements, potential debt limit available, and low borrowing costs. However, this proposed bond measure requires an election with majority public support to implement. The viable funding options are listed in Table 3 and the disqualified programs are in Table 4.

Table 3. 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 4. 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 programs were ruled out due to qualification criteria, such as per-capita income (“PCI”) levels, broadband availability, and regulatory requirements.

Using LAC revenue bonds as the recommended funding source, the funding structure shown in Figure 4 would be necessary to cover the capital expenditures for initial CBN construction in Project Years 1 throug 3 and future equipment refresh in Project Years 7 through 9.

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 4. Funding Structure, CBN Business Plan, Nov 2012

During the initial network construction, \$47.2m would be required to cover costs associated with building the fiber optic cables, Point of Presence (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. 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. 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.

2.6 Project Timeline

The proposed CBN project timeline assumes that Project Year 1 begins once project funding is secured and would focus on pre-construction activities, such as procurement, permitting, right-of-way acquisition, coordination with other infrastructure projects, public information sessions, and any design/engineering refinements. Dedicating Project Year 1 to pre-construction activities will enable a more efficient construction execution plan in Project Years 2-3. Outside plant network construction would commence in Project Year 2 and complete approximately 67% of the overall build-out, comprised primarily of core and lateral fiber routes, POP installation, and DSF networking electronics. The remaining 33% of network construction would be completed in Project Year 3, placing fiber drops to all the residential and commercial buildings and installing the fiber optic Customer Premises Equipment (CPE). This is reflected in the Capital Expenditures annual forecast presented previously. Project Year 3 is also the first year in which revenues are forecasted, for selling CBN wholesale network transport to retail service providers.

Regarding equipment refresh, the useful life of networking electronics is estimated at 5 to 7 years. Therefore, Project Year 7 would represent 5 years from the original install date of the POP and DSF electronics. In Year 7, 25% of the original POP and DSF equipment capital expenditure would be budgeted for refresh, and in Year 8 an additional 25% would be reinvested back into the network. Project Year 8 also reflects 5 years from original install date of the CPE, therefore 25% of the original CPE capital expenditure is budgeted for refresh. In Project Year 9 an additional 25% of the original CPE capital expenditure is reinvested back into the network. As explained in the earlier financial assumptions, 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.

2.7 Market & Take-Rate Projections

CBN is built on the assumption that 100% of the residential and business premises within LAC would be directly connected with fiber optics. Therefore, the market size for CBN is defined by the number of utility customers within the County. Through the period ending June 2011, there were 8,610 premises using electrical service. 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 and are correlated with the construction timeline, as shown in Figure 5:

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 5. Market Assumptions, CBN Business Plan, Nov 2012

An excerpt from the LAC Department of Public Utilities (DPU) electrical meter report is provided in the CBN Business Plan, Section 3.2.2.1 Take-rate Assumptions.

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 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.

2.8 Market Research

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 retail service providers would be able to attain a 30% take-rate with residential customers by project Year 4 and 30% from business customers in that same project year. These targeted take-rates are factored off of expressions of interest to subscribe to broadband services from retail providers on CBN, which were polled during the market research. A chart is provided in the CBN Business Plan, Section 3.2.2.1 Take-rate Assumptions, depicting the survey results.

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, 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.

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. Charts provided in the CBN Business Plan, Section 3.2.2.1 Take-rate Assumptions, demonstrate 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.

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

The same methodology was applied towards forecasting anticipated business take-rates on business class Internet services. The same research identified that 38% of the potential business users would be very likely to subscribe to an Internet service offered from a retail provider over CBN and 38% would be likely or indifferent to subscribe. Using the same approach, these figures have been 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 perceived community benefits and willingness to switch from their current providers, 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 would be on par with residential forecasts.

While the Research & Polling May 2011 and Oct 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, if not modestly higher, 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 reflected of 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, and the take-rate projections forecasted. If anything, the Los Alamos County data would suggest that there might be additional upside in the take-rate assumptions, however the CBN Business Plan continues its conservative approach and the quantitative analysis for the take-rate projections is based solely off of the Research and Polling market analysis.

2.9 Revenue Model

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

As explained in the introduction to the Executive Summary, CBN's business model is based upon "open access" principals, which provides fair and equal access to wholesale network transport services. CBN would offer these wholesale network services to retail service providers and charge a fee associated with various bandwidth tiers. In turn, the retail providers would market and support their broadband services at the consumer level, to both residences and businesses.

To establish the CBN wholesale rates, market research conducted by Research and Polling, Inc. during May 2011 and again Oct 2012, questioned respondents on what consumer rates they would be willing to pay for Internet access. The survey results found that, on average, residential consumers would spend \$42.60 and business consumers would spend \$112.20. Figures are provided in the CBN Business Plan, Section 3.4 Wholesale Service Offerings, summarizing the survey results.

During Oct 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. Tables and Figures are provided in the CBN Business Plan, Section 3.2.2 Wholesale Service Offerings, reflecting the community's interest towards various tiers of Internet services, and are utilized for building the CBN proposed wholesale rate schedule in Figure 6.

Some of the key findings were 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.

Strong demand was identified for Internet services higher than 50 Mbps, with at least 50% being willing to subscribe to that tier of service, should it be commercially available.

2.9.1 Service Provider Recruitment

The CBN business plan further considers input from the potential retail service providers, as part of establishing the wholesale rate schedule for network data transport. During March 2012, LAC released a Request for Interest (RFI), soliciting information from retail service providers interested in participating and ultimately offering Internet services on CBN, should the effort move forward to implementation. Service providers projected that they would be willing to offer the retail tiers shown below in Table 5.

Table 5. 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

2.9.2 Wholesale Service Offerings

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, through Research & Polling’s May 2011 survey. As such, the CBN Business Plan applies the highest weighted average across these tiers of service, as the retail products most likely to be subscribed to by residential customers. However, Research & Polling’s Oct 2012 found that consumers might prefer the larger bandwidth tiers, although that would be reserved for upside growth.

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 premises. 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.

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, this would suggest that CBN should charge the retail provider \$7.50 per subscriber per month for network transport of their consumer’s traffic. Figure 6 below further projects the various tiers of service, using the above rationale:

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 6. Proposed Wholesale Rate Schedule, CBN Business Plan, Nov 2012

To come up with the weightings between the different tiers of Internet services, Figure 6 also incorporates polling data on the community’s interest towards various tiers of Internet services, which indicates 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. The CBN Business Plan has made a conservative adjustment to 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 indicates stronger demand for the higher tiers. This should create some room for upside in the CBN Business Plan.

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. The

survey data indicates that consumers, on average, are willing to spend \$52.20 on television programming and \$25.40 on voice over IP telephone services. Section 3.2.2 Wholesale Service Offerings, in the CBN Business Plan, includes charts providing a graphical representation of Research & Polling’s analysis.

These findings were carried over into the CBN Business Plan, as the baseline for what consumers would be willing to spend for telephone (VoIP), television (IPTV), and bundled services. Retail providers of VoIP and IPTV services typically have higher cost structures on delivering these products, due to content and programming fees, video processing equipment, set-top boxes, VoIP soft-switches and gateways, as compared to higher margin Internet. The CBN Business Plan considers the nature of the retail provider’s business and varying profit margins on different consumer products. As such, the wholesale rate tiers for transporting telephone and television traffic are set low enough to allow for a reasonable business opportunity for the retail providers. The suggested per subscriber wholesale rate for standalone VoIP transport is \$6.00 per month and \$5.00 per month for standalone IPTV transport. Wholesale pricing for bundles factors in an additional \$19 for Internet transport, at a modest discount to standalone 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 7.

Services & Price Assumptions		
Residential & Small Business Transport		
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 7. 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 the Section 6 of the CBN Business Plan.

For municipal and educational facilities, that require a different class of service, equipment, and configuration, and alternative rate schedule is suggested as.

Services & Price Assumptions		
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 8. 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 high Quality of Service (QoS) parameters. These rates could also be extended to large commercial entities, should they have the need for private network services.

The aforementioned CBN wholesale rate schedules (Figure 6, Figure 7, and Figure 8) are then applied to the subscriber forecasts in the market assumptions (Figure 5) to generate the annual revenue projections. The subscriber forecasts are further broken down on a per-subscription level, to develop an accurate picture of revenue expectations per wholesale product offering. Figure 9 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. Taking the 7,769 total residential market and applying a 30% take-rate on subscription-based broadband services, yields a revenue generating customer base of 2,331 residences. At a 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 9. 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 being subscribed to. Referencing Figure 9 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. 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 Oct 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 from CBN.

The same logic for projecting overall market penetration rate and individual service take-rate was applied towards business subscriptions as well. Again, this does not include the basic County services that all businesses would have access to. Figure 10 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 10. Business Take Rate Assumptions, CBN Business Plan, Nov 2012

Municipal and Educational is the last category of revenue-based wholesale network transport. As described earlier, this class of service would be utilized for creating virtual private network (“VPN”) environments, linking multiple CBN endpoints together, with upgraded equipment options and service features. There are 59 such premises identified in the aforementioned LAC DPU customer report, anticipated to utilize services on CBN. See Figure 11.

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 11. 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.

Applying the wholesale rate schedules the take rate and subscriber forecasts results in the revenue expectations shown in Figure 12.

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

Figure 12. Revenue Forecast, CBN Business Plan, Nov 2012

The last 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. As demonstrated in Figure 4 of the Executive Summary, CBN would require ~\$3.9m annually to cover the debt service (see Project Year 3 loan payments and interest expense) on the \$47.2m bond issuance for initial network construction. Therefore, a 7/16th GRT increment would 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 of Figure 1 in the Executive Summary. 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 would be for a GRT levy to support CBN’s implementation expense and sustainability. 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. However, 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, given the modest increase. Figure 13 below tabulates community support behind a proposed GRT levy.

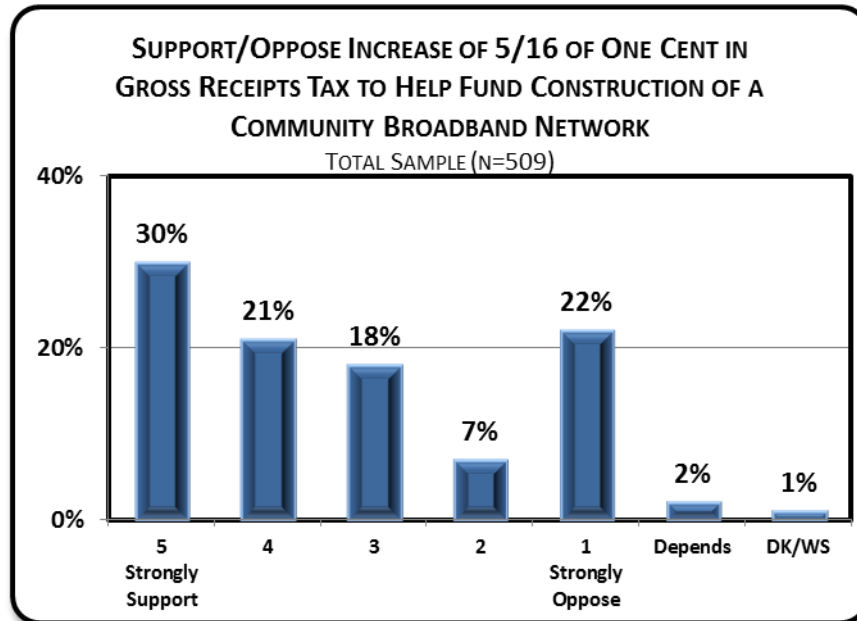


Figure 13. Community Support for GRT Levy, R&P, Oct 2012

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). As mentioned previously, given the downward adjustment of GRT expectations, the CBN Business Plan would require a 7/16th GRT levy. However, given strong community support for increasing GRT to support CBN, it would be reasonable to assume that a comparable level of support would be provided for a 7/16th GRT, versus a 5/16th GRT, 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.

LAC’s online and in-person surveys, although not considered in the quantitative analysis, offer interesting anecdotal comparisons with Research & Polling’s telephone interviews. LAC found modestly higher support for the proposed GRT increase with lesser opposition. A chart is provided in the CBN Business Plan, Section 3.4.1 Take-rate Assumptions, comparing the research results.

Figure 14 summarizes and forecasts the two components of CBN revenue expectations: wholesale network transport revenue and GRT revenue.

Revenues										
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 munj/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 14. CBN Revenue Forecast Summary, CBN Business Plan, Nov 2012

In total, estimated annual revenues reach ~\$6m by Project Year 3 and grow to ~\$7m by Project Year 10 as subscription take-rates ramp up.

2.10 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.

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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