

Columbia County Open Access Fiber Lateral & Wireless Assessment

Prepared by:



August 2015

Statement of Confidentiality

All information included in this report is considered confidential. The information in this document was gathered for the exclusive use of Columbia County for the purpose of planning and analysis. Any other use of this information is strictly prohibited. This information is non FOIL-able (Freedom of Information Act) and is not to be reproduced in any form without the expressed written consent of Columbia County and ECC Technologies.

TABLE OF CONTENTS

INTRODUCTION	2
COLUMBIA COUNTY FIBER NEEDS ASSESSMENT	5
INFRASTRUCTURE MODELS AND STATE ENVIRONMENT	18
THE FIBER NEEDS ASSESSMENT SUMMARY POINTS	20
CONCLUSION AND RECOMMENDATIONS	22
ACTION STEPS	24
APPENDIX A – MEETING SUMMARY	i
APPENDIX B – POTENTIAL CUSTOMERS	xiv

INTRODUCTION

Telecommunications and specifically broadband service has transformed the way in which people, public organizations, and companies communicate, educate, work, and live. There is almost no facet of our daily lives that is not impacted by broadband technologies. Broadband has undeniably become in the 21st century what railroads were in the 19th century and interstate highways were in the 20th century. A recent study found that forty-three percent of U.S. homes have four or more online devices, up from 32 percent just in the last 18 months.¹

Throughout rural areas of the country, upgrading the limited bandwidth capacity of copper based infrastructure to the high bandwidth capacity of fiber has not been an area of focus for the telecommunications industry. This is due mainly to the high cost of installing fiber and the low population densities that create lengthy return on investment (ROI) models. Much of the infrastructure in place today, which is unshielded twisted pair copper wire, has been in operation for 50 years or more. Moreover, the majority of telecommunication industry is focusing elsewhere with investment dollars being spent in high growth areas such as tier 1 and tier 2 cities. Comparable to the rural areas of this country before the National Rural Electrification Act of 1930, many areas in New York are being rapidly left behind. The fiber and wireless assessment in this report looks at the need for additional telecommunications fiber backbone infrastructure and wireless technologies in Columbia County.

Federal and State Initiatives That Will Impact Rural Areas

FirstNet and Digital Textbooks

There are two initiatives, one federal and one State, that will be developed over the next couple years that will require high bandwidth service to all areas of Columbia County. The first is called FirstNet. The Middle Class Tax Relief and Job Creation Act of 2012 created the First Responder Network Authority (FirstNet) as an independent authority within the NTIA to upgrade the entire nation's emergency 911 communications system. FirstNet is a federal initiative to develop a network system to "provide emergency responders with the first nationwide, high-speed, broadband network dedicated to public safety."² The goal is to upgrade all 911 networks to include data and video services. This upgrade will increase local public safety need for high bandwidth service tremendously. It appears that FirstNet will be based on the commercial standards for Long Term Evolution (LTE) 4G and above service. At the same time cellular providers are beefing up their backhaul systems by acquiring fiber to their towers which is required for 4G service.

Governor Cuomo has pledged \$500 million in funding for public and private partnerships to provide access to both unserved and underserved regions. The program has been titled Broadband for All because it seeks to ensure that all households in New York have access to broadband by 2018. The program includes a one for one match of any awarded funds. The

¹) website Cisco.com/clouds-systems-management/whitepaper

² website www.ntia.doc.gov/page/about-firstnet

goal of the program is to ensure that all New Yorkers have Internet speeds of 100 Mbps. The program will also accept proposals for speeds at 25 Mbps but only in locations that are very remote and underserved.

To be available to all Columbia County residents both of these initiatives would require an upgrade of the County's current telecommunications environment. Moreover every county in the State will need to address how rural unserved area will have access where there is none today.

Columbia County Telecommunications Study Report

The purpose of the Telecommunications Study Report was to gather and document telecommunications infrastructure and services information to be used to support economic development within the County, help expand broadband availability for residents of the County, and support county planning. The information in the study was gathered through a physical inventory of existing telecommunications infrastructure, interviews with current services providers, and meetings with institutional users.

The Telecommunications Study reported that the broadband access, DSL and cable modem, is available in many areas of the County. Fiber and coaxial cable is installed on many of the major roadways and a number of the secondary roads. That being said, areas of the County were discovered to have "pockets" of no fiber or coaxial infrastructure. This is particularly the case in the northwestern and central regions of the County. In addition DSL is considered by today's standards to be an aging bandwidth technology with limited upgrade capacities. The new baseline definition of broadband access is 25 Mbps down and 3 Mbps up.

Other issues cited in the telecom study included a lack of competition and diversity of infrastructure. Throughout the County the level of competition was poor and in some cases non-existent. The populated areas of the County typically have the incumbent providers, telephone companies, and cable TV infrastructure and services; however the more rural areas may have only one of these providers or none at all. Areas that do not have a choice of providers will also lack infrastructure diversity and redundancy, which is important in attracting new businesses. The ability to choose between more than one competing provider helps to keep prices lower and service quality higher. In addition businesses, particularly those that rely heavily upon broadband, need the ability to contract with more than one provider to ensure reliability and survivability.

Also noted in the telecommunications study are four separate territory-based ILECs, Fairpoint Communications, Germantown Telephone, Frontier and Verizon that for the most part do not compete with each other and three CATV.

Telecommunications Study Recommendations

Assessment Study

ECC Technologies, a telecommunications consulting firm located in Rochester, NY, was retained to provide an assessment of the current need for improving bandwidth infrastructure. The following report provides information on the fiber and wireless needs assessment and the resulting recommendations and preliminary routing for the development of fiber optic

telecommunications backbone infrastructure in Columbia County. The assessment process consisted of identifying and meeting with various users in the County to gain an understanding of the current need for a fiber optic backbone and wireless infrastructure through 1) public private partnerships, or 2) municipal or other means.

Columbia County Fiber and Wireless Needs Assessment

The fiber and wireless assessment summarized in this report examines the options of adding to the existing telecommunications industry fiber infrastructure and/or wireless technologies in Columbia County. It also identifies some of the benefits of new Open Access fiber and discusses the potential of developing the various improvement opportunities to assist the county in improving the status quo.

The information from the preceding Telecommunications Inventory Study identified areas of need and has started the process of promoting collaboration within the County. This assessment furthers that process towards the development of new fiber and/or wireless infrastructure in the county via service provider or County means. The assessment uncovered a number of possible scenarios including open access fiber infrastructure and/or public private partnerships with telecom providers and others. Each of these potential initiatives is discussed in this document.

The County collaboration with others could take shape in a number of different ways. The following is a list of the possible scenarios: 1) the County could install new fiber and/or wireless infrastructure for its own purpose and then at some point open it up to others (called Open Access); or 2) the County could investigate partnering with the K-12 school district to join or aggregate their wide area network needs and work with a new fiber based service provider to install infrastructure; or 3) the County could facilitate a partnership with and support the local WISP for wireless expansion. Whichever path the County chooses it should monitor and pursue any possible grant opportunities to facilitate the installation of new fiber from federal or State agencies, such as the NTIA or NY Broadband grant.

COLUMBIA COUNTY FIBER NEEDS ASSESSMENT

During the Inventory Study, ECC met with service providers, County economic developers, some potential fiber anchor tenants, and other relevant parties to obtain feedback on the need for additional telecommunications infrastructure. During this assessment phase ECC has furthered these discussions as it relates to new fiber infrastructure and wireless technologies being installed in the County and their willingness to get involved in an initiative.

Assessment Interviews/Meetings

The fiber needs assessment process included identifying and meeting with potential high bandwidth users in the County to gain an understanding of the current need for improved fiber infrastructure. In addition to the high bandwidth users, key telecommunications service providers in the area were interviewed to understand their current and future infrastructure needs as it relates to expanding services in the County. The focus of the interviews was on how each organization would benefit from additional (including open access) fiber infrastructure, if it was made available.

ECC interviewed key County personnel, public entities, and private business organizations, documenting current and future Internet use and identified a number of locations requiring connectivity in the County. The meeting notes of these interviews and the basis for the following information can be found in Appendix A of this document.

Some of the organizations interviewed include:

- County Public Safety/EMS, Information Technology, Economic Development
- Higher Education: Columbia Green Community College
- Local K-12 District
- Columbia Memorial Hospital
- Service Providers

The following is a summary of those meetings and who was met with.

Public Safety

Public Safety was represented by the director of 911. The Columbia County communication system is built around a microwave system which was recently upgraded, as was the radio system. The towers are connected by leased fiber from Mid-Hudson Cable and Fairpoint Communications. The county is looking into possibly building two new tower sites, one in Gallatin and one in New Lebanon which would replace a tower that is only 70 feet high. The County has received a grant for the tower replacement.

A County owned fiber optic backbone was discussed with the County PS department. The meeting members liked the idea of a county owned fiber based backup to the microwave system. Although, they are not experience outages or delays to the current microwave system, there are still gaps in coverage that they would like to eliminate. New towers with fiber back-up will help

in greater coverage areas. In addition, it was discussed that any fire departments, police stations, ambulance corps, and other entities along the fiber route could be connected. Further fiber infrastructure would allow the future development of high capacity mobile services that will be part of future Public Safety communications including the FirstNet program.

In addition, to more county owned infrastructure the public safety department is very interested in implementing AVL for the police department and emergency medical vehicles. Public Safety also plans on deploying mutual link, which is a state sponsored tablet deployment that requires streaming. They also informed us that the Hazmat team would like to start using robots to transmit data back to the emergency management center.

Fiber vs. Microwave Comparison Chart		
	Fiber	Microwave
Transport / Media	Laser / Optic Cable	Radio / Wireless
System Capacity	Unlimited	Limited
Number of Strands	72-144	N/A
Reliability	99.999%	99.999%
Expected Useful Life	25 + years	5 to 7 years (due to limited capacity)
Expansion & Future Proof	Yes	No
Infrastructure	Aerial or underground	Radio Towers
Topology	Ring/Point-to-Point	Hot Spare (duplicate equip)
Advantages / Disadvantages	Fiber	Microwave
Pros	Infrastructure unlimited capacity available to multiple users	Convenient
Cons	Susceptible to environmental impacts and underground construction	Closed Infrastructure -- limited in bandwidth and number of users / susceptible to high wind and ice storms

Table 1 – Fiber vs. Microwave Comparison Chart

FirstNet

First Responder Network Authority (FirstNet) is an independent authority within the National Telecommunications Information Administration (NTIA) that provides the governing framework for the deployment and operation of a new single, nationwide public safety architecture network. The Federal Act associated with this organization provides \$7 billion in funding towards deployment of this network. In addition, \$135 million has been put aside for a State and local implementation grant program to support State, regional, tribal, and local jurisdictions' efforts to plan and work with FirstNet to ensure the network meets their wireless public safety communication needs. In 2014 the New York Department of Public Safety received a \$4.8 million grant with \$1.2 million of State matching funds to begin the planning of the network.

One of the major goals of the FirstNet initiative is to ensure that every location in the United States, no matter how remote, has access to a robust public safety network.

Municipal

The municipal organizations represented in this study included County Information Technology, GIS, and Economic Development. Generally speaking municipal entities within Columbia County are experiencing the same technology and bandwidth requirement issues as other communities across the State. There is an increasing need within the State, county, town, and village governmental departments to share information for public health, public safety, records management, property files, etc. This is creating the need for wide area networking environments that are capable of supporting high capacity information flows. As these applications continue to develop, collaboration between these entities are creating opportunities for efficiencies. Shared Geographical Information System (GIS) files and centralized record keeping, among other applications, will transform the way municipal entities operate and do business.

According to the Columbia County IT Department, County government could benefit from improved fiber access in the following ways: the ability to add high bandwidth applications such as security cameras and access control systems; the ability to create WiFi areas around libraries, many of the libraries currently have significant bandwidth issues. The ability to bring all of their sites back to the county office building, consolidate services, and obtain higher bandwidth at lower costs was also listed as beneficial to the County.

Planning & Economic Development

Planning & Economic Development was represented by the Commissioner of Planning and the Sr. Planner. In some industries the availability of diversified dark fiber can be a determining factor in the decision making process of where to locate and invest in the local economy. Examples are data centers, call centers, automated warehouses, high tech manufacturing, and other technology based businesses.

The individuals interviewed provided ECC with a list of the key employers in the County. This list was used to help determine which companies to interview for the study. It should be noted that a large amount of businesses in the county are home based. There are no large high tech

companies in the county and only one business park. ECC was informed of a large aviation charter company that the county almost lost due to poor connections.

As a side note, and as discussed in the IT department meeting, many municipalities across the Country are providing free WiFi in designated downtown areas to support existing businesses and encourage economic growth. This is done in the same manner as coffee houses and restaurants, among other retail small businesses, offering Internet access as a way to attract customers. Free Wi-Fi can help stimulate small retail business growth in the areas where it is made available.

Healthcare

The healthcare sector was represented by the Columbia Memorial Hospital. ECC met with its Information Technology Director and Network Administrator.

Today Columbia Memorial Hospital has fiber connections for 32 of their 38 locations. They have care centers in both Greene and Columbia Counties. However, the Medical Center's representative expressed a need to reduce costs of services and increase wide area networking capabilities. The 6 locations that are not connected to the ring via fiber have very poor connections and they are limited in terms of the service they can provide. If the hospital could get these locations added to their ring, it would have a tremendous impact on efficiency of healthcare service and provide them with the ability to transfer high bandwidth files such as CT scans. It was also stated that they have a sleep center that can only get a 20Mbps connection but needs a 1 gig connection to effectively run its equipment

They have received a grant to build a new urgent care center in Copake. There are no fiber based providers in the area and the providers that are there cannot offer the speeds that they need for imaging. At the time of our interview, the project had been put on hold due to lack of high speed service.

The healthcare industry expressed an interest in a fiber optic backbone to link all of their locations together, move phone service to VoIP and move forward with the urgent care center in Copake. It was reported that they would like to provide a uniform service level across the County and would like to have each physician have the same "experience" at every clinic as if they were at the hospital. It was stated that this would provide a higher level of service and increase healthcare.

Education

Both K-12 and higher education organization were interviewed for this study. The meetings were conducted with the IT director for each respective organization and the summary of those meetings are discussed below.

Taconic School District K-12

The School District (CSD) has all grades located on the same campus. They are currently using a 100MB connection that is provided by NERIC (Northeastern Regional Information Center). NERIC leases the circuit from Fairpoint Communications. At this time this bandwidth level has

been reported as adequate to the current needs. However, the school district has several technology related goals which create a need for greater bandwidth.

They would like to move towards a 1:1 ratio for computers and laptops. The district currently has approximately 1600 students with 1386 computers including tablets. The district has two rooms that they use for distance learning. Both are completely booked during school hours and one has additional after school bookings. They are looking into allowing other school districts in the region and the community to utilize their distance learning lab. The district would also like to expand to offering more classes during the day. Another goal of the district is to open a day clinic and connect it to the hospital. Their last goal related to the study is to obtain a redundant connection to their campus. They are currently researching wireless providers to provide redundancy.

The school district reports that it is currently using 70 mb. of its 100 mb circuit. They recognize that they will need more bandwidth before they can execute all of their goals. They issue RFP's for service every 5 years. The last one was completed in 2013.

Higher Education

Columbia Greene Community College has a 100 mb. fiber connection that they lease from Mid-Hudson Cable. The college believes that they will need an additional 100 mb. connection to achieve their long term goals. The only other provider currently in the area is Verizon. The college has done cost comparisons and Verizon is significantly higher priced, according to the people we interviewed.

Columbia Greene Community College does not have dormitories or student housing. However, they plan on adding a multi-bedroom house or an apartment complex in the near future. The plans for this are currently in development. The college has recently been approved for its first on-line degree program. Their concern related to on-line courses is that many of their students do not have home internet access. As a result, they need to come to campus to complete their work. The school has implemented a strict usage policy which prohibits high bandwidth sites. They would also like their virtual library to be utilized more often but lack of home internet service is hampering this goal.

Service Providers

The types of service providers interviewed included fiber based providers, CLECs, WISPs, and cellular. For these companies the availability of new fiber will provide competition to the incumbent's infrastructure, which currently is their only choice, thereby lowering their costs. The fiber infrastructure will allow competitive telecom providers the ability to access markets they previously could not financially justify. In addition to cheaper prices, the increase in the number of providers will equate to more choices between types of providers and advanced high bandwidth services. Due to the layout and characteristics of fiber the infrastructure it will also offer increased redundancy of the provider's services.

Fiber based providers

Fiber based providers, which includes wholesale providers, backhaul providers, fiber to the business and fiber to the home providers, are typically interested in Open Access fiber as a means to access customers and new markets without the cost of building their own backbone. ECC interviewed two (2) fiber based providers, Peg Bandwidth and FirstLight. Each of these companies is interested in talking to the County about fiber access if Open Access is made available.

Additionally each of these companies is looking at counties and markets across the State to build their own fiber systems. These companies are interested in meeting with the public organizations such as county governments, county school districts, and municipalities to discuss Right of Way access, customer locations, types of services, and more. They are looking for public entities that are willing to work with them. Each of these companies expressed an interest in meeting with Columbia County to discuss the use of available fiber in the County.

Peg Bandwidth

Peg Bandwidth is a national provider of fiber based in Dallas, TX. The company works primarily with other carriers, wireless providers and enterprise businesses. In rural areas, they provide a significant amount of backhaul for wireless companies. Their network currently spans over 15,000 route miles. In Columbia County they have fiber on route 295 running towards Chatham. Their fiber is providing connections to wireless towers in the region.

Firstlight

FirstLight is headquartered in Albany, NY. The company, founded in 1999, was previously known as Tech Valley Communications. They have made considerable investment in building fiber within the northeast region of the United States. FirstLight's fiber network spans New Hampshire, Maine, Vermont and the capital region of New York State. They also have connections from Albany to New York City, Boston and Montreal. Similar to Peg Bandwidth, their customer focus is on Wireless Carriers and large Enterprise businesses. Their entire infrastructure in Columbia County is leased from Mid-Hudson Cable. They would be willing to construct their own network if there was a positive return on investment.

To enter a new marketplace, fiber based providers will either lease fiber from the incumbent or other fiber owner or build fiber to access customers. Since fiber is expensive to install, these types of providers will look for high dollar, long term contracts for their service from anchor customers that have multiple locations and high bandwidth needs. Typical anchor customers of the fiber based provider include County school districts, County government, large healthcare systems, and cellular providers. These types of customers help the fiber based provider recoup a large portion of the initial cost to build the fiber.

(Note: To incentivize fiber providers, they will look for pole access from municipal or utility organizations for aerial installation and right of way access for underground installation to reduce cost of builds. They will also look for partnerships to share costs of build for use of fiber strands.)

Alternative Providers

National service providers such as Transbeam will consider Open Access fiber as a means to replace leased access lines owned by the incumbents in rural marketplaces. Many of these marketplaces were deemed too expensive to fiber build to so their presence in these areas is typically limited.

Transbeam is a national communications provider that is based in NYC. They do not provide residential services, focusing instead on commercial services. Their product offerings include, data, voice, wireless LAN network installation, wireless back-up and short-term connectivity for trade-shows and conferences. In Columbia County they provide wireless Internet and phone services. In other markets, they have deployed their own fiber.

WISPs

Local wireless Internet service providers or WISPs are interested in Open Access models due to the affordability of shared fiber backbone infrastructure. They are also interested in inexpensive access to vertical structures. Wireless Internet Service Providers or WISPs utilize mountain top sites, buildings, and wireless and water towers as wireless access points. To reduce costs, WISPs will look to partner with municipalities or others in the State to mount equipment on water towers and other community structures. WISPs will look at various financial models, including revenue sharing and/or reduced or free access to County owned towers and tower space in exchange services to the County. An initiative becoming popular in many regions is to allow WISPs on 911 towers owned by counties.

ECC had meetings with one wireless service provider that is currently operating in the county and another that is expanding into Greene County which will provide some overlap into Columbia County as well. A third wireless provider in the area did not respond to meeting requests. ASA Networks indicated that having access to vertical assets such as wireless towers and water towers in the County would allow them to expand and provide services into the underserved areas of the County. High cost of tower rental fees and high cost of backhaul from the towers to their core networks are barriers to entry for providers seeking to expand into underserved areas. Favorable conditions for these providers to enter the County would be if fiber was available to these vertical assets at a reasonable cost and tower access could be provided by the County. They would then be able to expand services to cover underserved areas.

(Note: To incentivize WISPs they are looking for paying low rent or no rent on county vertical assets such as water towers and 911 towers, or looking to trade services for tower space. Start an initiative with a pilot or “seed” program which would include revenue sharing and then, once off the ground, pay a monthly set amount. They are also looking to access to inexpensive fiber for Internet backhaul.)

Wireless Providers

ASA Networks

ASA networks is using white space technology in conjunction with wireless technology. Whitespace Internet providers transmit data over the unused television broadcast channels also

known as the TVWS spectrum. White space technology has a greater distance range than traditional wireless technology. White Space signals can travel up to 10 kilometers and also has a greater line of sight capability than traditional wireless service. ASA Networks is currently offering service in Gallatin and have plans to expand into Chatham, Copague and Philmont. Their expansion plans will require leasing space on towers that are fiber fed at a reasonable price. Currently, ASA Networks is not meeting the FCC's new broadband guidelines. Their service offering is 15 mg for both upload and download speeds however with channel bonding they can achieve up to 50 mg.

Hudson Valley Wireless

Hudson Valley Wireless was created to deliver high speed internet services to rural areas in upstate New York. Their deployments focus on areas that do not have access to cable or DSL. They are upstate New York's largest WISP, delivering last mile and middle mile connectivity to subscribers in rural and remote villages and townships. They are continually expanding their coverage to unserved and underserved markets by partnering with local communities.

Their broadband platform has the product name of Nitro. They have two different types of service offerings, the basic service is 6MBPS upload and 1.5Mbps download. The higher service offering is 10mg upload to 2mg download. Basic service starts at \$40 per month.

HVW does not currently offer service in Columbia County. They have plans to expand service into Greene County which will create some overlap into Columbia County. They are interested in potentially expanding into other areas of Columbia County as well.

NYAir

NYAir did not respond to ECC's requests for a meeting. The NYS Broadband map shows their speeds to be significantly under the FCC's new broadband guidelines. Their maximum download speed is 5Mbps and their maximum upload speed is 1Mbps.

Cellular

There is the potential that in the future cellular service providers such as AT&T, Verizon Wireless, and Sprint will upgrade the bandwidth to their tower locations. Each of these companies is considering dark fiber as an alternative to their current lit service providers.

These organizations reported that they generally do not have fiber in rural areas. They have 2 to 4 T1s, microwave service to their towers or they lease fiber if it is available. With the change-over that is occurring in the cellular industry from 3G to 4G wireless technology an increase in bandwidth via fiber to the towers will be necessary.

Provider Summary

County owned fiber could be used as a catalyst for the expansion of broadband services in the County for both business and residential customers. Open Access fiber could allow new service providers access to Columbia County's marketplace. This would provide local businesses,

healthcare and others access to new service providers to foster competition, which equates to bigger bandwidth and lower costs

Potential High Bandwidth User

The map on the following page illustrates where there could be Open Access fiber “anchor” tenant and/or fiber user (through 3rd party providers) locations in the County. Included on this map are businesses, healthcare, education, government, wireless towers and the ten (10) public safety tower locations.

COLUMBIA COUNTY, NY

FIBER STUDY MAP

REDACTED

MAP CONTAINS CONFIDENTIAL AND PROPRIETARY INFORMATION

Columbia County Telecommunications Environment

The telecommunications study found that the vast majority of existing fiber infrastructure in Columbia County is owned by the four telecommunications companies operating in the County and three cable TV providers. Since these are private organizations that have fixed capital infrastructure development plans and quarterly/yearly revenue goals, new infrastructure is constructed primarily in the populated areas. Therefore, these organizations will place fiber in areas that can provide them with a quick return on investment (ROI), typically two to three years. Since many of the areas in Columbia County do not fit into this ROI model, there are areas outside of the City of Hudson and the villages that are lacking.

The City of Hudson has the greatest density of telecommunications services and competition in the County. Mid-Hudson Cable and Verizon are the major owners of telecommunications and cable TV (CATV) infrastructure respectively. Fairpoint covers the entire eastern portion of the county.

Owners of Fiber Infrastructure

The County is served by a network of fiber optic transmission and distribution routes that run through the center of the County and some outlying areas. Cable TV and telephone fiber is present into and out of the City of Hudson: north and south on Rte. 9, east and west on Rte 66, and east and west on Route 23/217/203.*

For the telephone companies, additional fiber routes connect the Central Offices in the villages to the City. Fairpoint's Central Offices (COs), or main points of telephone switching equipment, are located in Canaan, Chatham, Copake, Hillsdale, Kinderhook and Niverville. Frontier has a fiber connected CO in Elizaville. Verizon has 2 CO's, one in Hudson and the other in Claverack. GTEL also has a CO which is located in Germantown. These COs are configured in a SONET based fiber optic ring and are connected with other COs in the area, which provides system redundancy and diversity. The telephone companies have fiber routing from their Central Offices to the remote terminals in the field to expand DSL based broadband service. The cable TV industry (TWC) has fiber routed out to select rural areas that provides backhaul infrastructure to their coaxial cable distribution (last mile to the home) system.³

Competition

In addition to the ILECs present in the County, reseller and extended competitive services are available from Peg Bandwidth, Transbeam and FirstLight. All of these providers focus on the commercial markets and do not offer residential service.

Wireless Providers

Cellular providers in the County are AT&T Wireless, Verizon Wireless and Sprint. Each company provides voice and data services, including Internet, via wireless tower mounted equipment. AT&T and Verizon Wireless have 4G service in the city of Hudson and most of Columbia County. Sprint however 4G has in the City of Hudson and is very limited

³ This was determined by the infrastructure maps from the telecommunications study.

Due to service cost a data caps cellular service can be a very expensive option for home Internet service.

Existing Telecom Cable Infrastructure and Population

The map on the following page shows the landline infrastructure, namely fiber and coaxial cable, and the county's census blocks. Areas that do not have fiber or coaxial cable are limited to DSL, primarily 3G (sometimes 4G) cellular, or dial up service, all of which would be consider sub-standard in today's world.

⁴ This was determined by the infrastructure maps from the telecommunications study.

COLUMBIA COUNTY, NY

FIBER STUDY MAP SHOWING CENSUS TRACTS

REDACTED

MAP CONTAINS CONFIDENTIAL AND PROPRIETARY INFORMATION

INFRASTRUCTURE MODELS AND STATE ENVIRONMENT

Municipal Fiber Models

Municipally or county owned infrastructure has gained in popularity across the country over the last decade. This type of infrastructure can be built for the needs of the county, be privately owned and operated, or be an Open Access system. Private models are installed, operated, and used by government entities to make internal telecommunications connections. They often do not support external needs of non-governmental users. However, a growing trend among private municipal fiber infrastructure is to use excess capacity to expand into what is known as an Open Access Model (OAM).

Open Access Models refer to infrastructure constructed and made available to any and all organizations that wish access to it, including the service provider industry, which will look to improve their telecommunications services. Typically these types of systems are developed through public/private partnerships with the telecommunications industry, where the city or county provides ownership, control, and governance and the industry provides service, operation, and maintenance. Typically private industry participation is important in ensuring fiscal sustainability of these types of networks.

Part of the increase in popularity of these initiatives can be attributed to the availability of government funds. In 2009 the Federal government economic stimulus contained over \$7 billion targeted at broadband service and Open Access infrastructure. This has further increased the number of these types of initiatives across the country to levels far beyond what has been previously seen.

One benefit of a municipal based OAM is that it allows any telecommunications service provider, regardless of size, access to the infrastructure thereby leveling the playing field for all. The result is an environment that has a healthy level of competition and choice of providers for businesses and consumers in the area. Another benefit of the OAM is that public entities have the opportunity to install fiber to reduce their own operating costs associated with voice and data communications, and develop collaborative opportunities with other organizations including public safety, education, healthcare, and more.

As a means to ensure service provider neutrality, the municipal entity owning the infrastructure does not “light” the fibers or provide services to end users, so technically the municipal entities are not competing in the telecommunications industry. In addition the infrastructure is built and maintained (24x7x365) by the telecommunications industry to standard service level agreements (SLAs) that are put in place to ensure end user availability.

Another benefit of municipal Open Access Models is that they are commonly revenue based and can be self-supporting once the initial build cost is covered. Through the development of public/private partnerships other organizations, including the carriers themselves, pay to use the fiber, which creates revenue to maintain the infrastructure. Ideally over time, 100 percent of the operational costs are paid for by the users of the fiber infrastructure.

These models generally use municipal Right of Ways and are accessible by many diverse entities throughout a community. They are equitable and attractive to many, providing a foundation to

develop and support community-wide programs throughout the foreseeable future. More often than not, these models become regional opportunities because they provide widespread cost reduction, public benefit, and access to metro areas. Finally, through the construction of these networks and their operation, jobs are created both directly and indirectly. A globally competitive advantage is created within these Counties by the existence of a 21st century based telecommunications infrastructure.

Public Networks

Across the Country and around the State, communities (cities, counties and regions) are establishing collaborative public networks through which they can share information and coordinate between organizations. This includes IT, Public Works, Public Safety/911, EMS, fire, police, sheriff, hospitals, and more. Many of the larger communities typically cities in New York have dedicated fiber networks where they control the bandwidth and security.

Telecom Providers ROI

Typically traditional telecom providers have return on investment (ROI) models of three (3) years or less. This makes it difficult for them to justify broadband development into some of the more rural areas of the State. Generally speaking acceptable ROI models are developed for areas that have sufficient population density and demographics which will lower the costs of services and produce the highest number of paying customers. Subsequently, the less profitable areas, which tend to be rural, are left behind. In these areas local governments and non-profits using varying business models can potentially be better suited to develop broadband services initiatives.

THE FIBER NEEDS ASSESSMENT SUMMARY POINTS

There were a number of pertinent facts and issues discussed in the investigative phase of this project. Chief among them are:

1. The County Public Safety recently upgraded their microwave system. They are replacing one tower that is currently only 70 feet and adding an additional tower. The Public Safety microwave backhaul system is limited in capacity by the nature of its technology and with the introduction of FirstNet may not be adequate.
2. The PS director has stated a county owned fiber backbone between towers would be desirable.
3. The Columbia Memorial Hospital is the largest employer in the area. They cannot accomplish some of their long term goals due to a lack of available services in the region.
4. The healthcare industry is looking for advanced access solutions that are high bandwidth and competitive in costs.
5. Some of the K-12 school districts would like to move towards a 1:1 ratio for computers and laptops
6. The County is lacking in telecommunications competition throughout and broadband access in some rural areas.
7. There are a number of non-incumbent service providers, both fiber and wireless, that would be interested in discussing expansion of services in the County given the right incentives.
8. Many home based businesses are suffering due to a lack of reliable Internet service.
9. According to WISPs, broadband expansion to underserved areas of the County will require affordable backhaul and access to municipal towers would be a great benefit.
10. The County airport has had a lot of issues with their data connections. The region has come close to losing private aviation companies as a result.
11. Dark fiber availability to the Economic Development sites is important.
12. Excess capacity of fiber would be attractive to lease or IRU to service providers and local businesses.
13. Dark fiber availability to the cellular industry to promote the expansion of 4G wireless services.

Things Counties Can Do to Promote Broadband Expansion

Meet with the incumbent and regional service providers on a semi regular basis to develop a sense of partnership and discuss possible mutual interests. Identify opportunities with these organizations to expand broadband and develop desired solutions within the County.

Develop “carrots” to entice expansion of services. Through the use of grants, tax programs, right of way, franchise agreements, and County assets such as tall building and tower space, work with the service providers to promote access and competitive services throughout the County.

Develop Infrastructure Partnerships/Let Broadband Expansion RFP

The County could issue a request for proposals (RFP) for expanding broadband services in the County and have the service providers respond to it and pick the best solution. The RFP could include a pledge of matching funds to service providers that are willing to expand services into underserved areas. The County should explore the possibility of getting grants for this purpose..

Pursue broadband grant opportunities for rural area broadband access, such as those periodically provided by the USDA or Golden Leaf. Apply for federal, state, and local grants that help rural areas assist providers in infrastructure development. The USDA Rural Utility Service (<http://www.rurdev.usda.gov/RUSTelecomPrograms.html>) has yearly telecommunications-based grant programs to aid in the development of underserved areas of the country. These types of funding opportunities are often overlooked but can be very helpful in spurring local efforts.

For counties that are interested in facilitating broadband expansion projects it is important to nurture these types of opportunities/providers as they present themselves because these types of companies are looking at many areas of the state to expand and only have limited personnel resources.

Available Grant and Loan Programs

Organization	Program Name	Program Summary
RUS	Telecommunications Infrastructure Loans & Loan Guarantees	Financing for construction, maintenance &, expansion of service in rural areas with a population of 5,000 or less
RUS	Community Connect Grant	Awards for 2015 have been given, 2016 dates have not yet been announced.
RUS	Farm Bill Broadband Loans & Loan Guarantees	15% of households in area must be unserved. Application deadline for 2015 was 9/30/15, additional funding may occur in 2016.
ESD BPO	Broadband for All	500 million with a 50% match. RFI issued on 9/24/15, deadline for submittal is 10/30/15. Program rollout is anticipated by the end of 2015.

CONCLUSION & RECOMMENDATIONS

Along the central region of Columbia County businesses and others generally have the benefit of being able to choose between multiple providers. This is particularly the case in Hudson. However outside these more populous areas of the County there is a significantly diminishing amount of broadband availability with numerous pockets of unserved and underserved locations. Throughout this report the importance of fiber optics in a community and its ability to improve virtually all aspects of a community ranging from efficiencies in government, public safety, and job creation to improving education, healthcare and Broadband Access has been discussed.

One of the most significant areas the County can improve is access to Broadband in underserved areas. By forming partnerships to expand fiber coverage and by working with the wireless providers to gain access to strategically located water and radio towers the County will enhance and expedite the development of Broadband while maximizing efficiencies of several organizations identified throughout this report.

Through the process of this assessment ECC has identified three possible options for the county to pursue to enhance its telecommunications infrastructure and services. The first is a county built and owned fiber backbone that would allow for the connection of many public facilities only and potentially, at a later date, provide backhaul access to local service providers for unserved areas.

The fiber assessment suggests that there is sufficient demand in Columbia County to recommend the creation of a fiber business plan to develop a municipal based initiative. There is also interest from the service provider community to pursue a partnership with the County to develop opportunities for fiber expansion by particular providers. Both of these are discussed below.

The fiber assessment also suggests that the telecommunications industry will have a desire to provide increased services including, but not limited to, broadband into the more rural and underserved areas of the County. At this time the cost for the industry to build to these locations is prohibitive.

The fiber assessment suggests that the needs of communications carriers for advanced, high bandwidth voice, data, and video transmission capacity will increase over the next several years due to various factors. The ongoing desire to expand broadband access as well as the development of high bandwidth applications supporting healthcare, public safety, education, business, and municipal needs will increase the dependency on the fiber optic backbone. The listed benefits of community fiber from the telecommunications study included enhanced broadband access, service redundancy, improved competition, and future proof technology.

The Public Safety system that the County is currently using can be further enhanced with the county owned fiber. In addition with FirstNet on the horizon, which will demand high levels of backbone bandwidth, available fiber infrastructure will be an important asset for the County to use going forward.

The Taconic K-12 School District and Columbia Memorial Hospital have both expressed interest and support of additional fiber as a means for them to reduce telecommunications costs through increased competition for their services and access to diverse and higher bandwidth infrastructure. In addition, these organizations are concerned with broadband access for faculty and staff members and students at home, who in many cases do not have reliable access today.

Columbia Memorial Hospital has received a USDA grant to build an urgent care center in Copague. The grant is \$250,000 grant with a 50% match. The hospital is unable to complete the facility due to lack of infrastructure and the extreme cost to build new infrastructure. Their only option is to use a wireless or microwave connection which will not provide sufficient bandwidth for radiology or imaging.

The second option is a public private partnership with a local fiber provider that would install new fiber infrastructure in the county and make its services available for the general public and private businesses. ECC has identified a local provider, FirstLight that has stated they would be interested in working with the county on a fiber backhaul solution.

The third option is a public private partnership with a local wireless provider that would install new wireless infrastructure in the county and make it services available for the general public and private businesses. ECC has identified a local provider, Hudson Valley Wireless that has stated they would be interested in working with the county on a wireless and/or fiber wireless solution.

The creation of partnerships to develop and use the fiber should be explored with existing entities in the County. Roughly \$3.2 million was identified in fiber builds, as well as, \$ 776,000 in wireless technology needed to be placed at 8 tower locations. It is anticipated that the County would construct approximately 89.6 miles of fiber.

It is expected that the completion of this project will require various funding sources. The County's contribution will come in the form of cost avoidance from leased lines charges currently being paid and for access to towers needed to support wireless rollout. In addition the application of grants to support the fiber and wireless rollout would be required.

ECC has identified 2 local providers interested in talking to the County on this Initiative. Additionally, the County could form their own broadband committee to pursue additional partnerships.

Per its RFP the County has expressed an interest in ensuring the expansion of broadband access throughout the County via wireless and/or fiber network capable of providing both fixed and mobile services to residents, students, and businesses in the County. Although there are challenges that must be worked out with respect to the potential users of the Network, ECC believes that there is sufficient justification to consider the creation of partnerships between fiber and wireless based providers to accomplish the County's goals.

ACTION STEPS

If the County makes the decision to own telecommunications infrastructure, and to “open” the fiber up for others to use, there are a number of required action steps the County should consider.

Designate a Champion

As a first step it is imperative that a person within the County be chosen as a “champion” to oversee and provide the necessary “will” to move the initiative forward. Ideally, the champion will possess political weight in the community, some technical experience, and the time needed to devote to such an effort. This person will be in charge of many things including overseeing the project, designating tasks and responsibilities, developing the business structure, and day to day activities associated with the development of initiative.

Steering Committee

Create a small three to four member steering committee to move the fiber initiative forward. The members should include County IT, a County Executive team member, and the telecom champion. This working group should be chartered with providing strategic planning and setting policy for the development of a county-wide fiber initiative.

Telecommunications Industry Consultant

Hire a third-party telecommunications consultant to create an OAM business plan and assist the champion and steering committee with the necessary steps to implement the OAM fiber infrastructure. Within the business plan marketing, legal, regulatory, financial, and operational processes must be defined and developed to insure a successful project.

1) COUNTY OWNED FIBER

This section of the report explores the viability of the County building dark fiber to connect select public entity locations in the County. The cost of this infrastructure would be partially financed by the cost avoidance of expenditures that County organizations are currently making to commercial telecommunication companies. It is anticipated that excess capacity on this network could be made available to telecommunications providers to offer broadband service to areas of the County that are currently unserved or underserved as well as other entities within the County.

Through the process of this study it has been determined that a fiber route connecting 8 of the county’s public safety towers together would consist of approximately 89.6 miles of fiber optic cable. The cost to build this proposed fiber infrastructure is approximately \$3.715 million.

It is recommended that the County fiber optic network be routed in the most efficient and economical manner. Whenever possible, the County should build, lease, and operate the fiber optic backbone in partnership with existing utilities.

The preliminary routing of the fiber optic backbone would be selected based on several factors:

1. Connect the County's 911 Public Safety towers together.
2. The ability to reach the largest number of community facilities and to serve the greatest need.
3. Support educational, healthcare, municipal and economic development programs.
4. Build and maintenance costs.
5. Provide fiber to a customer base for potential service providers.

It is recommended that Columbia County install the fiber optic cabling on existing utility poles wherever possible. Although underground installation would be desirable the high costs associated with underground construction would challenge the financial feasibility of building the network.

To provide access to the fiber optic backbone, a Point of Presence (POPs) or a co-location facility will need to be established in the City of Hudson. In addition, strategically placed fiber optic splice points will be established along the fiber route to allow ready access to the fiber optic backbone.

Users of the Fiber Optic Network

The Columbia County business model will seek to serve three primary customer types: Public Safety Organizations, Schools, and Public Facilities.

- 1) Public Safety – These include police, sheriff, fire, EMS, and hospitals, as well as back up the public safety radio network.
- 2) Schools – The school system is one of the largest employers in the County and education has a need for high levels of bandwidth.
- 3) Public Facilities – These include municipal office buildings, public libraries, and others.

If after the fiber is built there is excess capacity available and the County is inclined to allow private providers to access to the fiber, the fiber backbone could be used to establish a collaborative telecommunications foundation by which commercial service providers, including Competitive Local Exchange Carriers (CLECs) and WISPs, could develop and provide services on an equitable and cost effective basis to unserved and underserved areas of the County. In addition, commercial providers may seek to lease fiber from the County to extend their private enterprise networks. Leasing fiber to private industry will help defray the costs incurred by building and running a fiber optic network.

Backbone Fiber Routes

The proposed fiber backbone routes to connect the Public Safety towers together starts in Hudson and goes to Valatie, East Chatham, Austerlitz, Philmont, Craryville and Ancram.

The red line is the proposed fiber build; the yellow lines are laterals going to the public safety towers.

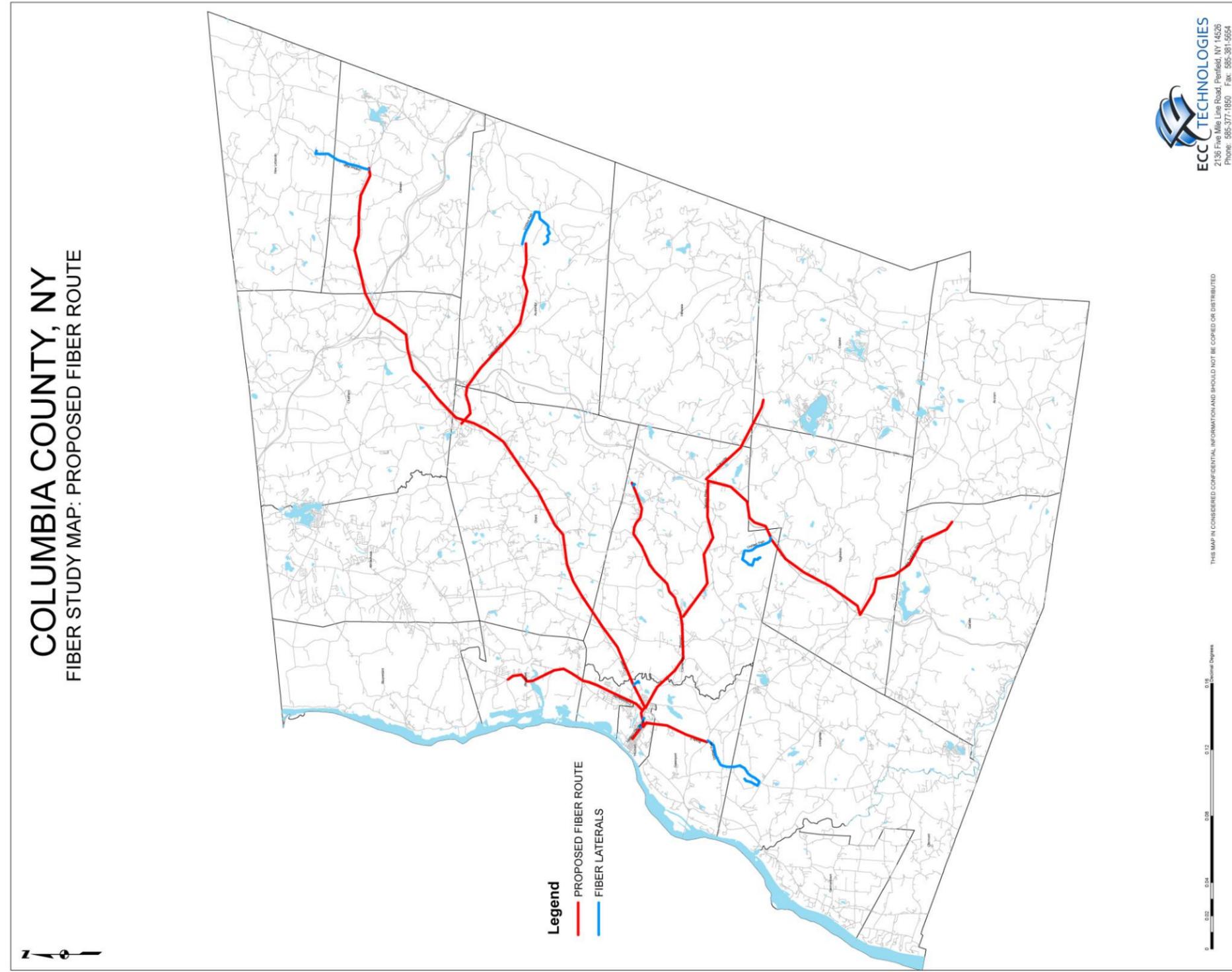
Fiber Routes Preliminary Cost to Build

Below are the estimated costs to build fiber between the public safety towers. A 7.5% contingency is added to this number in the financial documents below.

Description	Miles	Per mile	Cost
Fiber Routes from Hudson City Center to Canaan, Philmont, Spencertown, Craryville and Columbiaville. Laterals to 5 public safety towers	89.6	\$40,882.00	\$3,715,164

Revenue Opportunities

The County may at some point decide to use the fiber for community benefit outside the initial internal County plans. The Preliminary Business Plan has identified 216 viable entities that could become future partners with the County. These potential partners are located in close proximity to the Columbia County fiber backbone. Of these entities, some could be direct customers of Columbia County and others could be customers of service providers who will use the Columbia County fiber to expand their markets and customer base. Direct customers who would seek to lease dark fiber from Columbia County would be entities such as schools, healthcare, broadband providers, government, etc. Customers who will seek to have services provided by broadband providers will be retail, residential, small business, and more. A map of the proposed fiber route can be found on the following page.



Development and Cost

It is expected the development combined with the design and construction of the fiber optic backbone will take up to 24 months to complete. If approval to proceed is provided by January of 2016, the expected completion date of the fiber would be January 2018. The project design and construction schedule has been selected to allow for the development of contiguous fiber optic paths wherever possible. This method allows the Columbia County team the ability to use fiber for internal purposes and lease fiber segments to potential customers as they are completed.

The proposed budget for the building of the fiber optic backbone is roughly \$3.7 million, which includes a 7.5% contingency. Capital (build) costs are expected to be covered by grants, after which cash on hand and user revenues received will be used to sustain the system. The estimated annual operations and maintenance costs as well as potential revenues and additional details will be provided in the financial section of the Preliminary Business Plan.

Backbone Construction:	
Fiber Miles	89.6
Design and Engineering (Fiber Optic Backbone)	\$ 264,202
Make Ready	\$ 325,103
Path and Permitting fees	\$ 223,900
Right of Way (Easements)	\$ 89,560
Material and Fiber	\$ 1,182,192
Construction Labor	\$ 1,321,010
POP setup	\$ 50,000
Total	\$ 3,455,967
Contingency (7.5%)	\$ 259,198
Total with Contingency	\$ 3,715,164

Equipment and Training:		
Equipment	\$	41,679
WISP Equipment	\$	326,800
Training	\$	-
Total Equipment and Training	\$	368,479

IRU		
	\$	-

TOTAL PROJECT COST:	\$	4,083,643
----------------------------	-----------	------------------

Shown on the following page are the Assumptions.

DRAFT

CAPITAL & INITIAL EXPENSE ASSUMPTIONS:			
Capital Spend			\$ 4,083,643
Setup Expenses			\$ -
Total Capital & Set Up:			\$ 4,083,643
EXPENSE ASSUMPTIONS:			
Administrative Costs (Legal, Accounting)	1.9%		\$75,950
Accounting		\$ 47,825	
Legal		\$ 24,125	
Postage and Delivery		\$ 4,000	
Office		\$ -	
Support Services (Marketing and Sales)	1.8%		\$71,930
Marketing and PR Professional Services		\$ -	
Sales and Planning Administration		\$ -	
Operations Administration		\$ 71,930	
Customer Service		\$ -	
Network Operations			
Engineering, Design, Construction, Facilities Management	0.5%		\$18,479
Connects Per Year		\$ 7,631	
COGS(Engineering, Labor, Material, Documentation)		\$ 3,214	
MCNC IRU Maintenance		\$ 1,800	
Annual Licencing Fees		\$ 1	
Mark and Locate		\$ 4,813	
Telcom Lease		\$ 1,020	
New Business (COGS):	0.6%		\$23,942
Connects Per Year		9	
COGS(Engineering, Labor, Material, Documentation)		\$ 23,942	
Line Maintenance (Network Maintenance, response and repair)	2.4%		\$97,747
Annual Maintenance		\$ 16,075	
Annual Replacement		\$ 81,673	
Pole Attachment Fees	1.1%		\$44,332
POP Maintenance and Support	0.1%		\$3,000
Insurance	0.6%		\$23,841
Property Taxes - Assumes Annual tax of 1.0%	0.9%	1.00%	\$37,152

Appendix A Meeting Summary

DRAFT

Columbia County Fiber Assessment Meetings Summary

Service Providers

Organization: Mid-Hudson Cable

Met with: Dave Fingar - Chief Engineer

Potential User: Medium

Notes:

Mid-Hudson Cable is an independently owned, regional cable provider. The company has a presence in both Columbia & Green Counties. Their service area encompasses most of Green County. They have a much larger presence in Green County than in Columbia County.

[REDACTED]

[REDACTED]

The NYS Broadband map shows their speeds at a lower level than they actually offer. Their residential packages are 7 x 1, 14 x 1, 21x 1.5 and 28x 5; their business packages are all synchronous.

[REDACTED]

Organization: Charter Communications – Cable provider

Met with: Thomas Cohan – Director of Government Affairs

Potential User: Low

Notes:

Charter offers service primarily in the Southeast, Northern Midwest, and Northeast. They have franchises in Columbia County in Ancram, Austerlitz, Canaan, Chatham (Town), Chatham (Village), Copake, Ghent, Hillsdale and New Lebanon. The original network was built by Taconic telephone, which was purchased by Fairpoint. The company only offers cable TV; they do not offer broadband DSL.

[Redacted]

[Redacted]

[Redacted]

[Redacted]

Organization: GTel (GermanTown Telephone) – Incumbant phone provider

Interview with: Bruce Bohnsack - Owner / President
Pete Mercer – General Manager

Potential User: High

Notes:

Gtel is an incumbent local phone provider & CLEC headquartered in Germantown NY. Their footprint is located completely within Columbia County. They provide phone, internet and cable TV services. The company has installed a backbone that is completely fiber. They pass 1200 homes where they offer fiber to the home service. They also own a cable franchise in Frontier territory. They do not offer phone or Internet in that area, all IPTV.

[Redacted]

[Redacted]

Organization: Transbeam –

Interview with: Kevin Donovan – professional services manager
Cyril Konopko – Senior Field Engineer

Potential User: Medium

Notes:

Transbeam is a national provider of managed data, voice, IT and event solutions for businesses. Their network is wholly owned. They provide wireless Internet & Phone in Columbia County. [REDACTED]

Organization: ASA Networks

Interview with: Joe Plotnik – Co- Owner

Potential User: High

Notes:

ASA Networks is a white space provider. The company currently has the largest TV white space deployment in the United States. The company was originally formed 2 years ago with a 6 month pilot program. Their mission is to find the unserved and underserved areas for expansion. They can currently offer 15 mg symmetric speeds. With channel bonding they feel they will achieve 50 mg. Their current distance range is 3-4 miles or 5 miles if there is line of sight. [REDACTED]

Organization: FirstLight – Fiber provider

Interview with: Scott Gilbert – VP of Business Development

Potential User: High

Notes:

FirstLight is headquartered in Albany, NY. The company, founded in 1999, was previously known as Tech Valley Communications. They have a fiber network in New Hampshire, Maine, Vermont and the capital region of New York State. They also have connections from Albany to New York City, Boston and Montreal. Similar to Peg Bandwidth, their customer

focus is on Wireless Carriers and large Enterprise businesses.

[REDACTED]

Organization: Peg Bandwidth

Met with: Abe Nemitz – Director of Sales Engineering

Potential User: High

Notes:

Peg Bandwidth is a national provider of fiber based in Dallas, TX. The company works primarily with other carriers, wireless providers, and enterprise businesses. In rural areas, they provide a significant amount of backhaul for wireless companies. They also provide Internet, Ethernet, and Wavelength services to businesses.

[REDACTED]

[REDACTED]

[REDACTED]

Enterprise Users

Columbia Memorial Hospital

Interview with: Bonnie Ratliff Director of Information Systems, Michael LaForge Network Administrator

Number of Locations: 38 care centers between Columbia and Green Counties, 17 in Columbia County

Current Connection: Varies depending on location

Current Provider: FiberLight, Mid-Hudson Cable and FairPoint

Potential User: High

Notes:

Columbia Memorial Hospital is the only hospital in the region. They have 38 care centers connected to them, located in both Columbia and Greene County. 6 of the care centers are in dire need of better connectivity. They currently have connectivity but it is either DSL or T1. These locations are experiencing slow connections or performance issues. They are unable to send large documents or support radiology. Any imaging requires a minimum of a 100 mg connection. Any location that has orthopedics has a need for a high amount of bandwidth. A 1 gig connection is required for their sleep center but they currently only have 20 mg. They are unable to get more bandwidth to these locations. The locations that have DSL use VPN to connect back to the hospital.

Greene Medical has VoIP service but all of the other locations have traditional POTS lines. They are upgrading each facility as they can. Their phone system is NEC.

[REDACTED]

The hospital received a USDA grant to build an urgent care center in Copake. The grant amount was \$250,000 grant and included a 50% match requirement.

[REDACTED]

[REDACTED]

Organization: Columbia Greene Community College

Met With: Jim Campion – President of the College, Gino Rizzi – Director of Computer Information Systems

Current Provider: Mid-Hudson Cable

Current Connection: 100 mg Ethernet

Potential User: Low

Notes:

They have been using mid-hudson for 7-8 years

The service has been very reliable; they have only had 1 or 2 outages

The bottle neck is their router

Last year they installed wireless throughout the campus

They believe that they will need another 100 mg connection in the future

Their only available competitor is Verizon, they have checked prices and Verizon is higher

They experience cell phone dead spots especially in the middle of the building

They have a strict internet use policy which prohibits high bandwidth sites

They do not have student housing, they have looked into feasibility but a traditional dorm is not sustainable. They may add a small house or apartment complex in the future. The plan is in development now. All back-ups and upgrades are completed at night. The college does no collaboration with other campuses. The campus has no public transportation.

They offer AP courses; a professor from the school goes directly to the HS. The distance learning platform is hosted by blackboard. The college was recently approved for one on-line degree program. They hope to bring more people in from the outskirts of the county Their service area is 1200 sq miles. They have gotten feedback from students that they do not have Internet access at home.

The college has established the following multi-layered business plan:

- 1) More students
- 2) Allow for learning from home / remote areas
- 3) Generate more use of the virtual library

Organization: Taconic K-12 School District

Met With: Dr. Neil Howard – Superintendent, Steve Yankowski – NERIC manager of WAN and server teams

Current Provider: NERIC provides connections to L3 and Cogent

Current Connection: (2) 4 gig connections

Potential User: Medium

Notes:

The school district is currently using 70 mg of their 100 mg circuit to NERIC.

RFP's for service are issued every 5 years; the last one was done in 2013. Multiple carriers are awarded due to lack of providers in the region.

53% of children in the district are on the free & reduced lunch program

The district provides 2 late buses so students without Internet service can use the computer labs for homework.

They have problems communicating with the buses. They currently use both radios and cell service to communicate with bus drivers. There are still pockets of no service. There is iron in the mountains which contributes to the disruption of service.

They are working on a Distance Learning Lab with a number of other school districts in the area.

NERIC supports 110 school districts with 225 individual connections

Most of the connections are 1Gb, however some are 100Mb in the Fairpoint area.

Smaller schools may have lower bandwidths.

Connectivity plans are written on a 5 year cycle, with the next one anticipated in 2018.

Fairpoint partners with FiberTech to get THCS D to Albany

Their 1Gb connections cost between \$600 and \$4,000.

The school feels that the qualities of the circuits are acceptable once they got the initial bugs worked out.

They do not feel that Internet access at home is mandatory for their students to finish homework. They would like to level the playing field so all students have similar Internet access.

The Top Concerns of the school district are:

- Parental Access to Broadband for All – Levels playing field

- Safety Communications with Buses

 - Cell and radio coverage inconsistent with dead spots which causes safety concerns

- Lack of Competitive Providers which results in higher connectivity costs

The school district would like to setup a Day Clinic connected to the Hospital but there are some connectivity speed issues and also would like to setup a Business Incubator Program located on THCS D property to use their excess capacity.

Municipal Users

Columbia County Planning / GIS Department

Interview with: Ken Flood - Commissioner of Planning, Patrice Perry – Sr. Planner / GIS, Demographics and Census

Current Connection: 8 (not including the PS towers)

Current Provider: Windstream

Costs: \$2,300 per month

Potential User: Yes

Notes:

There are approximately 30,000 homes county wide. A large quantity of the residents are from NYC and own 2nd homes in Columbia County. Up to 40% of the population are 2nd home owners from NYC. Many people in the community do not have internet service. Telecommuters cannot get the speeds they need. The service is either completely lacking or the connectivity is weak. The planning department put an on-line survey on the web-site asking for input on Internet service and received 1200 responses to it.

Home businesses need to go to the library or some other location with free wi-fi to upload files. East of the Taconic Pkwy has very poor cell service. To the west of the parkway is better. The airport is experiencing issues with their connections. They came close to losing a large charter aviation company due to internet service problems. There is also a small commerce park in Hudson which almost lost a tenant due to service issues. The County has 1 corporate park which is almost at capacity. They only have 1 vacancy. Most of the service complaints in the county are with Fairpoint.

The board of supervisors feels that the service providers should be building out. Most of the towns don't have a lot of funds. They are unwilling to provide money to fund projects. Tourism is the largest industry with agriculture being the 2nd. Cell coverage is important due to tourism. Agriculture has a lot of government reporting needs, making Internet service very important.

There is no zoning in Greenport; it surrounds the city of Hudson. That is where the development, especially retail is. They would like a clear plan with objectives and steps to help community and calm people down.

Columbia County Information Technology Department

Interview with: Rick Juliano

Current Provider: Mid-Hudson Cable

Current Connection: 150 mb but are only achieving 10-20 mb

Costs: \$4500 per month

Potential User: Yes

Notes:

The IT department provides technology based services to all of the County departments. These services include Internet access, email, file and printing services, help desk, and more. They have about 1200 employees with 600 on computers. There used to be 12 separate phone systems, some were in the same building. They now have a scaleable Cisco VoIP system and have eliminated 3 phone systems. They will continue to eliminate the others based on funds. The phone systems are connected by PRI circuits unless there is twisted pair servicing the building. County uses mid-hudson fiber to connect 6 facilities in Hudson and DSL for connecting to Satellite facilities. The mid-hudson fiber connections range from 10-20Mb. They also have a 100Mb. Internet connection from mid-hudson.

No connections to Municipalities or is there any planned shared services projects
Cell coverage affecting Police Cars, OFA Client Interviews and Probation to name a few
Police use NetMotion. They have some issues with employees ability to work from home but it did not seem to be significant. They are converting their website to a Google Site which they plan to include more forms and videos
Some libraries have significant connectivity issues
They feel the cost of Internet service is very high priced with slow, unreliable service
A fully funded Urgent Care project in Copake is on hold because it cannot get the proper connectivity speed back to the hospital

The IT department uses both AT&T and VerizonWireless for cell service, each have dead spots in the county so they let the employees make their choice between the two providers.

Over the short term they would like:

1. More robust communications to Transfer Stations as they collect Checks to pay for service.
2. Better cell coverage for communications with Police, OFA, Probation, and others.
3. Better coverage for Human Services and Mental Health workers as they need to connect back to the County to access their NY State application
4. All libraries to have high speed Internet access

5. Connections from the highway outposts and transfer stations to the main county building.

Organization: Columbia County 911 Communications

Met with: Rob Lopez – 911 Director, Deputy Director of Emergency Services

Current Connection: 5

Number of Locations: 5

Current Provider: Windstream – moving to county owned microwave system

Costs: \$1,800

Potential User: High

Notes:

Emergency Services is very interested in improving broadband. The fire system is on the same towers but a different frequency. There are 5 tower locations. There is a 150 mg microwave connection to each location that has been leased from Mid-Hudson Cable. They also lease fiber from fairpoint & mid-hudson cable.

They just did an upgrade to the microwave backhaul. The previous system was 50 yrs. old; typically the useful life of a system is 20 yrs. They are not experiencing any outages or delays with the new microwave system. There are still gaps in coverage. They have a grant opportunity coming up which they may apply for to help cover the gaps. Their radio system is also brand new.

They are currently using AVL, audio video locator, for the police department only. They plan on eventually doing the same for ambulances. Emergency service is interested in placing video to the schools as part of the safe schools initiative. The department handles all of the dispatch for the county. They also use a wireless video robot. There is one tower is that is going to be replaced.

Appendix B

Potential Customers

DRAFT

Company Name	Primary Industry
1st Advantage Dental Mgmt	Healthcare
A & S Woodworking Inc	Businesses
Acme Kitchenettes Corp	Businesses
Acp Power Equipment, Inc.	Businesses
Advantage Builders Inc	Businesses
ALAN PIZER DDS	Healthcare
Alan Topal Dvm	Businesses
Alana Denter	Healthcare
Alford Guterman PC	Businesses
ALLAN NAHMAN	Healthcare
American Bio Medica Corp	Businesses
Amy J. Davison, D.O., LLC	Healthcare
Any-Time Home Care, Inc.	Businesses
Appliance Guy's Inc	Businesses
Architectural Bureau	Businesses
Arp Sandel, Jeffrey M D	Healthcare
ART/OMI INC	Businesses
Atlantic Engineer Products LLC	Businesses
ATMOST REFRIGERATION COMPANY, INC.	Businesses
Barbara Mc	Healthcare
Berkshire Business Forms Inc	Businesses
Berkshire Farm Center and Services For Youth	Healthcare
Berkshire Telephone Corporation	Businesses
BERKSHIRE UNION FREE SCHOOL DISTRICT	Education
Berkshire Valley Holstin	Businesses
Bert S Goldfinger DDS	Healthcare
Bervy Excavation Corp	Businesses
Beth Hendlin DDS Pllc	Healthcare
Bill Stratton Building Company, LLC	Businesses

BILL-BERN CONTRACTORS INC	Businesses
Bilyk, Olena	Healthcare
BLACK & TAN CORP	Businesses
Blackburn De Guerre	Healthcare
Blass Communications LLC	Businesses
Board of Cooperative Educational Services	Businesses
Buddys Place LLC	Businesses
C W BOSTWICK INC	Businesses
C. Blackburn Inc.	Businesses
Camphill Ghent, Inc.	Businesses
Camphill Village U S A Inc	Businesses
CANAAN FIRE DISTRICT	Government
CANAAN LUMBER & BUILDING SUPPLY INC	Businesses
Carmen Barbato, Inc	Businesses
CATAMOUNT DEVELOPMENT CORPORATION	Businesses
CATSKILL WOMENS HEALTH CENTER	Healthcare
Cavagnaro Construction Co Inc	Businesses
CERTIFIED WATER, SMOKE AND FIRE RESTORATION SERVICES, LLC	Businesses
Chatham Central School District	Education
CHATHAM CENTRAL SCHOOL DISTRICT	Education
Chatham Chiropractic Wellness	Healthcare
Churchtown Fire Co	Government
CITY OF HUDSON	Government
CITY OF HUDSON	Government
Clausson Raught Community Rescue Squad Inc	Healthcare
Clermont Fire District	Government
COARC LAKE STREET ICF	Healthcare
COLUMBIA COUNTY	Government
COLUMBIA COUNTY CHARPTER OF NYSARC INC	Businesses
Columbia County Charppter of Nysarc Inc	Businesses
Columbia County Office For Aging	Businesses

Columbia Dental Assoc PC	Healthcare
Columbia Greene Community College	Education
Columbia Memorial Hospital	Healthcare
Columbia Opportunities Inc	Businesses
Columbia Street Dental	Healthcare
COLUMBIA TRACTOR, INC.	Businesses
Columbia Urology	Healthcare
Columbia-Greene Public Employee Credit Union	Businesses
Convenient Self Storage	Businesses
Copake Lake Realty Corp	Businesses
Cornell University	Education
Countryside Dental	Healthcare
County of Columbia	Government
COUNTY OF COLUMBIA	Government
COUNTY OF COLUMBIA	Businesses
COUNTY OF COLUMBIA	Government
County of Columbia	Government
County of Columbia	Healthcare
COUNTY OF COLUMBIA	Government
County of Columbia	Government
COUNTY OF COLUMBIA	Healthcare
Coxsackie Physical Therapy Association	Healthcare
Craftech Industries, Inc.	Businesses
Crawford & Associates Engineering & Land Surveying, P.C.	Businesses
DANZ & STOLLER DDS	Healthcare
Darrow School	Education
David Picchione	Healthcare
David Starkman DDS	Healthcare
Davis Contracting LLC	Businesses
Daw Pro-Track, Inc.	Businesses
Dawn H Pfaff	Businesses

Denise Morett Dr	Healthcare
DEPARTMENT OF CORRECTIONS AND COMMUNITY SUPERVISION	Government
Digifabshop LLC	Businesses
DINOSAW, INC.	Businesses
Dr Cohn	Healthcare
East Chatham Fire Co., Inc.	Government
Eco Waste Services, LLC	Businesses
ED HERRINGTON INC.	Businesses
Eye Doctors & Eye Surgeons	Healthcare
FABRIC LIGHTBOX LLC	Businesses
Falls Manufacturing, Inc.	Businesses
Family Eye Care Center Inc	Healthcare
Flanders Precisionaire of New York	Businesses
Foot Specialist Associates PC	Healthcare
GABRIEL B ALARCON DO	Healthcare
Gary E Pearlstein	Healthcare
Germantown Central School District	Education
GERMANTOWN TELEPHONE COMPANY, INC.	Businesses
Germantown Variety Inc	Businesses
Ghent Family Care Center	Healthcare
Ghent Volunteer Fire Co No 1	Government
GINSBERG'S INSTITUTIONAL FOODS, INC.	Businesses
Golden Harvest Farm Inc	Businesses
Greenport Crossings LLC	Businesses
Greenport Mobil Convenience Store	Businesses
Greenport Rescue Squad Inc	Healthcare
GULINELLO'S TOWNE & COUNTRY INC.	Businesses
Half Moon Terrace LP	Businesses
HASMUKH HARDE MD	Healthcare
Hatfield-Joyce Inc	Businesses
Have, Inc.	Businesses

HAWTHORNE VALLEY ASSOCIATION, INC.	Education
Hawthorne Valley Waldorf School	Education
Hazen Gordon	Healthcare
Healthcare Claims Network	Businesses
High Voltage, Inc.	Businesses
Hilltown Pork Inc	Businesses
Hoffman Car Wash	Businesses
HUDSON CITY SCHOOL DISTRICT	Education
Hudson City Schools	Education
Hudson Dental Services PC	Healthcare
Hudson Ent, P.C.	Healthcare
Hudson Fabrics, LLC	Businesses
HUDSON KTD LP	Businesses
Hudson River Bulk, Inc	Businesses
Hudson Valley Creamery, LLC	Businesses
Hudson Valley Office Equipment Inc	Businesses
Hudson Valley Ophthalmology	Healthcare
HUDSON VALLEY ORTHOPEDIC ASSOCIATES PC	Healthcare
Inn At Green River	Businesses
Inna Kudria	Healthcare
Insur Structure	Businesses
Integrated Path Communications, LLC	Businesses
J S L Computer Services, Inc.	Businesses
Jeanne Pierce	Healthcare
Jeff Monkash MD	Healthcare
John L Edwards Elementary School	Education
John R French MD	Healthcare
John S Pomichter	Healthcare
John Y Tsou MD Inc	Healthcare
JOHNNIE WALKER INSURANCE	Businesses
JOHNNY'S IDEAL PRINTING CO INC	Businesses

JOPAL, LLC	Healthcare
Joseph Lalka MD	Healthcare
K B Chiropractic	Healthcare
Karp Ackerman Skabowski Hogan PC	Businesses
Kenneth S Roll DDS	Healthcare
Kenzan Media, LLC	Businesses
Keyser Well Drilling LLC	Businesses
Kinderhook Bank Corp.	Businesses
KINDERHOOK CENTRAL SCHOOL DISTRICT	Education
KINDERHOOK CENTRAL SCHOOL DISTRICT	Education
KINGSWAY LUMBER CARRIERS, INC	Businesses
Kirk A. Hochstetler, M.D., P.C.	Healthcare
Kleins Kill Fruit Farms Corp	Businesses
Kling Magnetics, Inc.	Businesses
L GREITZER MD	Healthcare
L Greitzer MD	Healthcare
Lb Furniture Industries LLC	Businesses
Lebanon Valley Protective Association	Government
Leer Technologies, Inc.	Businesses
Leon N. Weiner & Associates, Inc.	Businesses
Lester A Kempler DDS PC	Healthcare
Local 111 LLC	Businesses
LUCKY PETROLEUM, INC.	Businesses
MAPLE HILL CREAMERY, LLC	Businesses
Marc-A. Bergeron M.D. P.C.	Healthcare
Marcus M Dennis D P C	Healthcare
Maria Mc Pherson MD	Healthcare
Marie Lingat MD	Healthcare
Marilyn Miller	Healthcare
Meltz Lumber Co of Mellenville, Inc	Businesses
MENTAL HEALTH ASSOCIATION OF COLUMBUS-GREEN COUNTIES INC	Businesses

Mgi Land Development, LLC	Businesses
Michael Kortbus MD Facs	Healthcare
MICHAEL SHAFFER DC	Healthcare
MILLER WILKENS INC	Businesses
Modern Farmer Media, Inc.	Businesses
Mountain Road School	Education
My Local Muse	Businesses
Myron H Koch MD	Healthcare
National Union Bank of Kinderhook	Businesses
Neal A Baillargeon MD	Healthcare
NEUROPSYCHOLOGIC REHABILITATION SERVICE PC	Healthcare
New Lebanon Central School District	Education
New Lebanon Central School District	Education
NEW LEBANON CENTRAL SCHOOL DISTRICT	Education
NEW YORK DEPARTMENT OF TRANSPORTATION	Government
New York State Electric & Gas Corporation	Businesses
New York State Thruway Authority	Businesses
Norman Meisner DDS	Healthcare
North Chatham Fire District	Government
NORTHSIDE MEDIA GROUP LLC	Businesses
Oke Benjamin	Healthcare
Old Chatham Tennis Club Inc	Businesses
Packard Andrew	Healthcare
Paramount Abstract Corp	Businesses
PAT ZANCHELLI INC	Businesses
Patricia Boudreau	Healthcare
Pattison, Koskey, Howe & Bucci, Cpas, P.C.	Businesses
Paul A & Joan Groll	Businesses
Periodical Services Company Inc.	Businesses
Philmont Family Dentistry	Healthcare
Philmont Fire Co	Government

Phoenix Services Group, LLC	Businesses
Physician Finder Service	Healthcare
PINE PLAINS FAMILY PRACTICE	Healthcare
Prime Medical Associates PC	Healthcare
PVC CONTAINER CORPORATION	Businesses
R T Blass Inc	Businesses
Rabadi Ibrahim Y & Hechanova Arnel B	Healthcare
Rapid Intellect Group Inc	Businesses
Rapport Meyers, LLP	Businesses
Raymond G Preusser CPA PC	Businesses
Rescue Unlimited	Businesses
Richmor Aviation Stewart, LLC	Businesses
RICHMOR AVIATION, INC.	Businesses
Roeliff Jansen Community Library Association	Businesses
Ron J Innerfield	Healthcare
RONNYBROOK FARM DAIRY INC	Businesses
Rose Felissa	Healthcare
Rosemary Goldman	Healthcare
Roth	Healthcare
Sacco-Brown Inc	Healthcare
Saturn Industries, Inc.	Businesses
Schroeder Chevrolet & Cadillac Inc	Businesses
Sheep Meadow Animal Hospital LLC	Businesses
SHOP-RITE SUPERMARKETS, INC	Businesses
Ski Lodge Land Corp	Businesses
Smith Control Systems, Inc.	Businesses
Smoker's Choice of Mid-Hudson	Businesses
Sneeringer Monahan Provost Redgrave Title Agency Inc	Businesses
Sonoco-Crellin International, Inc.	Businesses
SONOCO-CRELLIN, INC.	Businesses
Sperry, Cuono, Holgate & Churchill CPA PC	Businesses

Staron LLC	Businesses
State Police, New York	Government
STATE POLICE, NEW YORK	Government
STEPHEN L KRIZAR MD	Healthcare
Stockport Volunteer Fire	Government
STRAUS COMMUNICATIONS IN THE HUDSON VALLEY, INC.	Businesses
Stuyvesant Falls Fire District	Government
Stuyvesant Fire Company 1	Government
SUPERIOR WIRELESS, INC.	Businesses
TACONIC BIOSCIENCES, INC.	Businesses
Taconic Hills Central School District	Education
Taconic Telephone Corp	Businesses
THE FLOWELD CO INC	Businesses
The Old Chatham Shepherding Company	Businesses
The Starting Place	Businesses
The Town of Austerlitz	Government
Theodore J Sabot MD	Healthcare
Theresa Meltz	Healthcare
Thyme In Country LLC	Businesses
TIERRA FARM, INC.	Businesses
Town of Austerlitz	Government
Town of Canaan	Government
TOWN OF CLAVERACK	Government
TOWN OF COPAKE	Government
TOWN OF GALLATIN	Government
Town of Greenport	Government
TOWN OF HILLSDALE	Government
TOWN OF KINDERHOOK	Government
Town of New Lebanon	Government
Town of Stuyvesant	Government
TOWN OF STUYVESANT	Government

TRIFORM ENTERPRISES, LIMITED	Healthcare
Tri-Village Fire Company, Inc.	Businesses
Twenty Eight Stony Properties	Businesses
Twin Counties Pro Printers, Inc.	Businesses
Twin County Medical Associates PC	Healthcare
Ubmi Princeton LLC	Businesses
UFP NEW YORK, LLC	Businesses
Upper Hudson Valley Dermatology	Healthcare
Upstate Cardiology, Plc	Healthcare
Vahe Keukjian	Healthcare
Valatie Imaging P C	Healthcare
Van Alstyne, Rita H	Businesses
Vanderbilt Inn Inc.	Businesses
Verizon Communications Inc.	Businesses
VILLAGE OF KINDERHOOK	Government
Village of Philmont	Government
Visage Construction Corp.	Businesses
WALGREEN EASTERN CO., INC.	Businesses
West Ghent Volunteer Fire Company, Inc	Government
Whittier Rehabilitation and Skilled Nursing Health Services	Healthcare
Yinova Health Inc.	Healthcare
Yonder Farms Fruit Distributor, LLC	Businesses