

Broadband Strategies

Person County,
North Carolina



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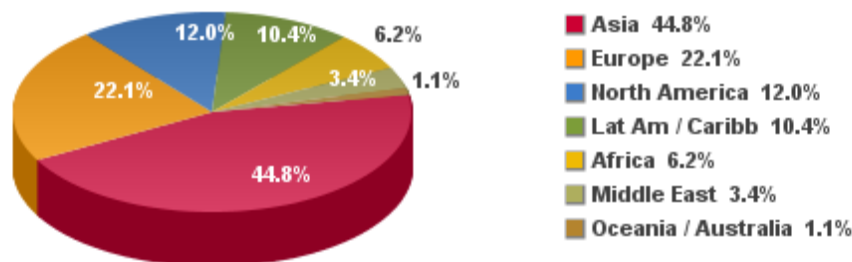
Why is Broadband Important?

The World is Increasingly Online

A good place to begin is with the sheer magnitude of the Internet today. Even if you think you know how big the Internet has become, these numbers will floor you.

- In 2000 there were an estimated 361 million users worldwide. As 2011 came to a close that number had grown to **2.2 billion Internet users**. This represents a 528.1% increase, or *1.8 billion new users in less than 12 years*. 30.3% of the population worldwide is now online. (InternetWorldStats.com data)

Worldwide Internet Use by Regions - 2011



Source: Internet World Stats Basis: Internet Users December 31, 2011
C 2012 : Miniwatts Marketing Group

Staggering Growth Still to Come

These numbers, as enormous as they are, almost pale in comparison the growth projections for just the next three years made by Cisco Systems Visual Networking Index (VNI). Together with a few dozen top consulting, analysis, and strategy firms, Cisco projected broadband connections, video subscribers, mobile connections, and Internet application adoption for the year 2015 using data from service providers, current technology trends, and knowledge of evolving hardware dictating enabling factors such as broadband and computing speeds.

- Annual global IP traffic will reach the zettabyte threshold (966 exabytes or nearly 1 zettabyte) by the end of 2015. (*A zettabyte is a measure of storage*)

capacity. 1 zettabyte is approximately equal to a thousand exabytes or a billion terabytes.)

- **The "terabyte club" will reach 6 million by 2015.** In 2015, there will be 6 million Internet households worldwide generating over a terabyte per month in Internet traffic, up from just a few hundred thousand in 2010. There will be over 20 million households generating half a terabyte per month in 2015.
- **Global IP traffic has increased eightfold over the past 5 years, and will increase fourfold over the next 5 years.** Overall, IP traffic will grow at a compound annual growth rate (CAGR) of 32 percent from 2010 to 2015.
- **A growing amount of Internet traffic is originating with non-PC devices.** In 2010, only 3 percent of Internet traffic originated with non-PC devices, but *by 2015 the non-PC share of Internet traffic will grow to 15 percent.* PC-originated traffic will grow at a CAGR of 33 percent, while TVs, tablets, smartphones, and machine-to-machine (M2M) modules will have growth rates of 101 percent, 216 percent, 144 percent, and 258 percent, respectively.
- **Traffic from wireless devices will exceed traffic from wired devices by 2015.** In 2015, wired devices will account for 46 percent of IP traffic, while Wi-Fi and mobile devices will account for 54 percent of IP traffic. In 2010, wired devices accounted for the majority of IP traffic at 63 percent.
- **Busy-hour traffic is growing more rapidly than average traffic.** Busy-hour traffic will increase fivefold by 2015, while average traffic will increase fourfold. During an average hour in 2015, the traffic will be equivalent to 200 million people streaming high-definition video continuously. *During the busy hour in 2015, the traffic will be equivalent to 500 million people streaming high-definition video continuously.*
- **Internet video is now 40 percent of consumer Internet traffic, and will reach 62 percent by the end of 2015,** not including the amount of video exchanged through P2P file sharing. *The sum of all forms of video (TV, video on demand*



[VoD], Internet, and P2P) will continue to be approximately 90 percent of global consumer traffic by 2015.

- Globally, mobile data traffic will increase 26 times between 2010 and 2015. Mobile data traffic will grow at a CAGR of 92 percent between 2010 and 2015, reaching 6.3 exabytes per month by 2015.
- Business IP traffic will grow at a CAGR of 24 percent from 2010 to 2015. Increased adoption of advanced video communications in the enterprise segment will cause business IP traffic to grow by a factor of 2.7 between 2010 and 2015.
- Business video conferencing will grow sixfold over the forecast period. Business videoconferencing traffic is growing significantly faster than overall business IP traffic, at a CAGR of 41 percent from 2010-2015.
- Global mobile data traffic will grow three times faster than fixed IP traffic from 2010 to 2015. Global mobile data traffic was 1 percent of total IP traffic in 2010, and will be 8 percent of total IP traffic in 2015.

The Internet and The Web

This may seem overly basic, but working definitions we can agree on are important to insure good communication is taking place. In this instance, there are a few key terms that are often misused or misunderstood.

The **Internet** and the **Web** are not the same. And **broadband** is more than one thing.

- The Internet is a global system of interconnected computer networks—a vast network of networks—consisting of millions of separate government, business, academic and private networks that are linked together by a complex of wired and wireless technologies. The Internet is where we go when we login to our computer to download a report, ask our Android phone for a nearby restaurant, or watch a movie on our iPad.
- It's where a nurse goes to remotely monitor the heart of a patient at home 30 miles away, where a university researcher collaborates on a shared computer screen whiteboard and Skype connection with a colleague in Mumbai, and where regional planners from neighboring states join a High Definition Video Conference on best practices for urban renewal. *Like it or not, more and more the Internet is where the world goes to work and to play.*

- **The Web** (or World Wide Web) is a system of linked documents that can be viewed and read on the Internet by using a web browser. What makes the Web work and the Internet so powerful is *hypertext*– the underlying concept defining the structure of the Web. **Hypertext**



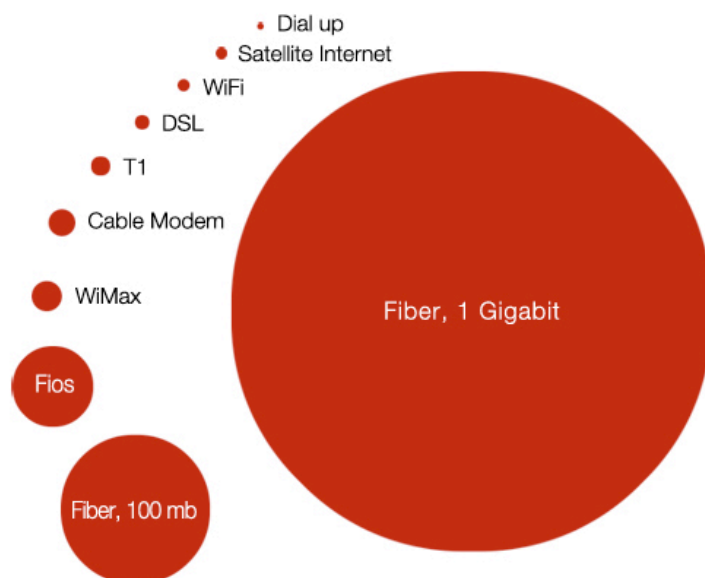
Transfer Protocol (HTTP) is the foundation of data communication for the Web. What began as a technical language that allowed “pages” of text and images to be transferred between computers and viewed in form we humans can read and see now also makes possible streaming and downloading music and video, remote medical services, remote home security and energy management, and something as trivial and amazing as Massive Multiplayer Online Games.

Connectivity, Part I – Not All Broadband is Created Equal

What is broadband? This widely used term means different things to different people. Why? Because this same label is attached to a variety of technologies with vastly different attributes and performance characteristics that have only two things in common: first, broadband technologies connect to the Internet at speeds faster than “dial-up” service; and second, broadband connections are “always on.”

To add further fuzziness, *broadband* and *high speed Internet* are used interchangeably – with neither term saying very much about capabilities. In 2012, saying *better than dial-up* is not saying much. At the end of the day, broadband is really a marketing slogan much more than a useful technical definition.

Bandwidth/Connectivity Comparisons Dial-up Modem to Gigabit Ethernet



The term **Broadband** is used to describe various Internet connectivity technologies, beginning with a satellite Internet connection, providing only slightly better service than dial-up at relatively high cost, and advancing with improving connectivity speed to Fiber-to-the-Premises (FTTH) at the top of the list.

A good analogy can be made between the volume of data an Internet connection is able to manage and the carrying capacity of a water pipe. The diagram above illustrates the relative capacity of each of the so-called broadband technologies.

Fixed wireless, satellite and cable are thought to have very little additional future capacity through advances in engineering. Cable is believed capable of achieving somewhat greater bandwidth capacity in the future.

Optical fibers themselves transmit at the speed of light so the speed limitation on a fiber network is a function of the electronics that power the lasers. Today, there are real-world networks offering Gigabit-per-second Internet connections in dozens of towns and cities in the United States. Affordable high capacity fiber has become essential infrastructure to attract and retain businesses, to create jobs, to enable work from home opportunities, and to provide increased access to distance learning opportunities (e.g. GED, community college, technical training).

Case Studies

There are very few examples of urban fiber projects with community ownership. In the U.S., it is more typical of smaller towns and cities that take on these initiatives, with the common characteristic of a desire to create new job opportunities and to attract new businesses.

In our work with larger cities and urban regions, we note that it is more difficult to achieve consensus on a plan of action than in smaller communities. With a larger number of stakeholders, often with competing goals and objectives, we have seen more than one big city initiative struggle because of the difficulty of obtaining agreement on an initial strategy.

However, despite the difficulty of developing a plan of action, urban communities have a decided advantage due to the density of both business and residential customers; more homes and businesses can be passed with fewer miles of construction, and higher density apartment buildings and condos means the network can pass hundreds of households at much lower cost than in a lower density area.

Danville, Virginia

The City of Danville, Virginia is operating an open access, open services network (www.ndanville.net) focused on creating the right kind of economic development incentives and accompanying infrastructure that will help retain existing businesses and help attract new ones. Danville has a City-owned electric utility, and the growing fiber network is being managed as part of the electric utility operations.

Using a multi-phase approach, the City first hooked up government offices and local schools in 2004, and in 2006 began planning for extending the high performance all fiber network to local businesses and residents throughout the electric service area, which includes a large part of very rural Pittsylvania county. The first businesses began to get hooked up in late 2007, and Danville had fiber passing parcel in its business parks before the end of 2008. The City-County business incubator was one of the first locations to receive the fiber services.

The network has been operating in the black and has generated enough revenue to make an annual contribution to the City's General Fund, and a portion of the nDanville revenue is being used to expand the network. The City has completed the construction of Fiber To The Home (FTTH) to some of its residential neighborhoods (a

total of about 1600 premises), and has been able to sign up an IP TV provider as well as Internet and telephone providers for the residential customers.

The City is not selling any services to businesses or residents; all services are offered by private sector service providers that use the network and pay the City for the use of the network via a revenue sharing agreement.

The availability of business class fiber has been a significant boost to the downtown area of Danville, and the City has counted at least 150 new jobs within walking distance of the Main Street commercial area of town.

Attribute	Description
Governance	nDanville is part of the City of Danville Utilities Department.
Funding	The City of Danville Utilities Department has used a combination of loans and revenue to fund the construction of the network. Revenue from key institutions like the City and County schools have been a significant factor in the development of the network.
Business Model	nDanville is an open access, open services network. All services provided to residents and businesses are offered by private sector providers.
Management	Network operations are managed by the City. Some outside plant maintenance is performed by City utility crews, and some work is outsourced to qualified private sector firms (e.g. splicing, some construction work).
Technology	nDanville is an active Ethernet fiber network, providing a 100 megabit symmetric connection as the standard service. Gigabit and 10Gigabit point to point connections are also available. nDanville has two colocation facilities available to businesses and providers, and the nDanville MSAP (Multimedia Services Access Point) provides access to more than twenty-five local, regional, and national service providers.

Rockbridge County, Virginia

Rockbridge County, Virginia and the two independent cities of Lexington and Buena Vista (both within the borders of the county) formed a broadband authority in 2009 after completing an initial feasibility and market demand study. The authority consists of elected officials from each of the three localities, as well as representatives from the business community and Washington & Lee University. Rockbridge was able to build upon the study for the submission and successful award of a \$7 million grant.

The grant, which included \$7 million in ARRA Federal stimulus funding and \$3 million in local match, constructed 60 miles of backbone fiber and provide another 35 miles of Gigabit last mile connections to 53 community anchor institutions and 175 homes and businesses. The project includes a state of the art data center and will also construct 29 DSL cabinets throughout the county, to help extend service into the underserved regions of Rockbridge County. Construction began in 2012 and the network's first customers were connected in the summer of 2013. The data center in Lexington is the most sophisticated facility of its kind in this part of Virginia. The 95 miles of fiber being built passes more than 11,000 homes and businesses and is "last mile ready," meaning businesses and residents can get the standard Gigabit fiber connections quickly and easily once initial construction is complete.

Attribute	Description
Governance	The network and data center is owned and operated by the Rockbridge Area Network Authority (RANA).
Funding	Approximately \$500,000 in local match from the three local governments and \$2.5 million in funding from Washington & Lee University helped get the project started. These local funds were used as match to obtain \$7 million in Federal ARRA stimulus funds.
Business Model	Services are sold to business and residential customers by private sector service providers using the RANA network for transport
Management	The network began operating in the summer of 2013, and most operations and maintenance has been outsourced.
Technology	The network is an active Ethernet system with a standard Gigabit symmetric fiber connection. 10Gig connections are also available.

Lafayette, Louisiana

Lafayette, Louisiana is perhaps one of the best known community broadband projects in the United States. The City announced its intentions to go into the broadband business in 2004, and was promptly sued by the incumbent cable provider. The court case ground on slowly, and it was not until the City had spent nearly \$4 million on legal fees that the Louisiana Supreme Court decided that the City had the right to compete directly with private sector telecom companies.

Since then, thousands of customers have been connected and Lafayette is now famous for having some of the lowest rates for Internet access in the United States, with a 50 megabit symmetric package of Internet access for only \$58/month. The network has now been operational since early 2009.

Cox Communications, famous in Louisiana for regular rate increases, froze its rates in Lafayette for several years following the city's initial announcement that it would offer telecommunications services. Meanwhile Cox continued to raise its rates in other parts of the state. The result was that even before Lafayette's system began operating it had saved its residents and businesses nearly \$4 million.

Attribute	Description
Governance	The network is owned and operated by the City of Lafayette and is part of the Lafayette Utilities Department.
Funding	The City raised \$110 million in funding to build the network. The long term plan is to pass all 57,000 homes in the city.
Business Model	Services are sold directly by the City in a traditional triple play retail model.
Management	The City Utilities Department operates the network and handles outside plant maintenance.
Technology	LUSFiber is an active Ethernet system with a standard 100 megabit symmetric fiber connection. Gigabit connections are also available.

Palm Coast, Florida

In 2008, the City of Palm Coast began exploring the potential of making existing City-owned fiber assets available for business and commercial use. Existing Palm Coast businesses were expressing concern to City leaders about the high cost of Internet access and the limited bandwidth available in the City. After a six month study of various business and financial options, the City decided to focus on developing the network as a “carrier class” commercial network capable of supporting virtually any level of business service that might be needed.

As of early 2012, all four redundant fiber loops had been completed. The City invested in a dedicated colocation facility with both shared rack space and private cages for service providers, and purchased “carrier class” network switches and routers to light up the fiber. Palm Coast FiberNET was made available for service in May, 2010 (<http://www.ci.palm-coast.fl.us/PalmCoastFiberNET/>), and had three service providers committed on day one.

Palm Coast FiberNET provides service to City buildings and locations, and successfully won a bid to provide services to Flagler County Public Schools. The local hospital also uses the network to connect hospital medical records and data services with several local health clinics and medical offices. FiberNET was operating in the black operationally in year one, and continues to do so as it enters its fourth year of operation.

Attribute	Description
Governance	Palm Coast FiberNET is owned by the City of Palm Coast.
Funding	City enterprise funds were used to pay for the initial \$2.5 million in fiber construction, equipment, and the colocation facility.
Business Model	FiberNET is operated as an open access network. Providers pay a monthly fee per customer, based on connection size.
Management	The City IT Department manages network operations, and private sector contractors are used for outside plant maintenance and construction work.
Technology	FiberNet is an active Ethernet network that provides symmetric 100 megabit, Gigabit, and 10Gigabit connections as standard. DWDM circuits can be provided upon request.

The Modern Network

Last Mile is the First Mile

It is indeed unfortunate that the telecom industry has dubbed the most important part of the network “the last mile.” The so-called “last mile” is the way customers of broadband services get access to the network; the correct term should be “the first mile.” Indeed, the overwhelming problem with broadband assets in the county is the lack of “first mile” connectivity to existing fiber assets—there is very little.

Some providers in the county do make the legally truthful claim that they can provide fiber anywhere it is needed, but what is typically left out is the cost of doing so. A business or school that wants a fiber connection but is not directly on an existing fiber route (most places in the county) will typically be charged the full cost of constructing new fiber to that location, even if the provider now has the opportunity to offer fiber services to other customers now passed by the new fiber. These charges can often be hundreds of thousands of dollars for even just a mile or two of construction.

About Fiber Networks

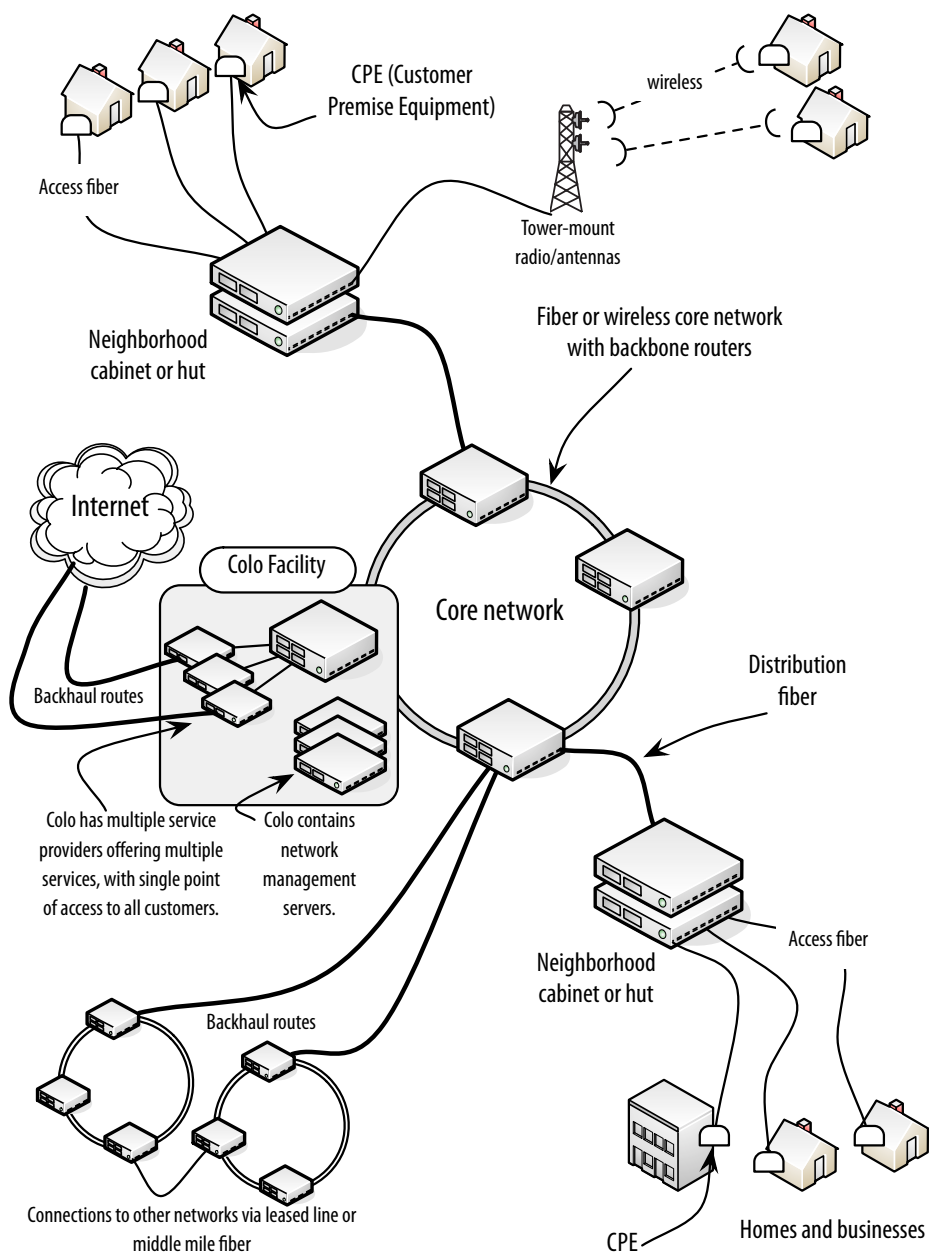
Fiber network designs have five primary components that must be considered when developing a strategy for fiber investments.

- **Backhaul** – Backhaul fiber constitutes the routes in and out of the county. Person County has a significant future potential advantage with the MCNC network that passes through the county. What is needed is local fiber so that more businesses (and eventually residents) can gain access to the competitively priced services that will be available from providers on the MCNC network.
- **Core Network** – The most desirable core network design is at least one “ring” of fiber around the community, so that if the fiber cable is cut at any point, data traffic can be automatically re-routed in the opposite direction without creating a failure. In the county, a redundant fiber ring would ideally connect a series of smaller redundant rings to provide a higher level of protection against fiber cuts. We know of a business in the mid-west that has calculated the loss of Internet access at one million dollars per minute--the firm processes a very large number of online transactions. Relocating businesses are typically keenly

interested in the design of a county-wide core network, and want to see both redundant rings and path diversity in and out of the county.

- **Distribution** – Distribution fiber constitutes the fiber cables that go up and down the streets of the community, passing homes, businesses and institutions. Distribution fiber can be the most expensive portion of a community-wide network design. Private providers typically cannot make a business case to build large amounts of distribution fiber; instead, they build distribution fiber only to the largest customers (e.g. schools, large businesses, etc.). Homes and most smaller businesses and retail stores are left out.
- **Access** – Access fiber is the connection from the street to the premises. Once a business, school, or home has been passed by distribution fiber, the crucial “first mile” fiber is needed to connect the premises to the network.
- **Colocation/Data Center** – A colocation or data center is needed to provide a meet point for various public and private fiber cables and network to inter-connect. In the past, the telephone company switch office (Central Office, or CO) has provided that function. Today, many communities have either a community-owned data center or a privately owned data center that offers an affordable range of options for customers of broadband services. The rise of Software as a Service (SaaS) and cloud-based computing and data services has increased the need for affordable data centers. Many companies now backup company data in multiple, geographically diverse data centers to reduce the likelihood of any data loss. We know of one company that uses multiple data centers for storage of corporate data and enforces a rule that any two data centers must be a minimum of twenty miles apart to reduce the likelihood of a natural disaster (e.g. flood, wind storm, earthquake, etc.) would affect both data centers at the same time.

The illustration below shows how the parts of a broadband network fit together.



Funding and Revenue

“There is no money for broadband....”

The financial analysis on the next page demonstrates 30 year expenditures for routine and normal telecom services for businesses, residents, schools, and institutions for Person County. Over the next three decades, nearly \$1 billion dollars will be spent on telecom services. This is a very conservative estimate that does not take into account the ever expanding demand for new kinds of services. The model looks only at current demand. A community investment in a community-owned and managed digital road system, where all services are provided by the private sector, would have substantial benefits.

What the table shows is that the residents, businesses, and institutions in the county are already spending substantial sums of money on broadband—about \$32 million per year. This amount represents an estimate of what is being spent by all public, residential, institutional, and business customers for landline services, including telephone, TV, and Internet access.

The table is a flat rate projection, in today’s dollars, with no increases for inflation or for the typical annual rate increases that many companies include. In fact, just the money spent in a single year in the county would come very close to paying for the complete cost of building an entirely new all-fiber network to most homes and businesses in Person County.

Person County 30 Year Telecom Expenditure Analysis			
	Households still on dial-up	Households with "little" broadband cable modem/DSL/wireless	Households with no Internet
Total households	16,012		
Total businesses	1,292		
Household Percentage	7%	57%	36%
Number of households	1,121	9,127	5,764
Average monthly telecom expenditures	Local phone: \$25 Long distance: \$25 Cable/satellite TV: \$65 Dial up Internet: \$20	Local phone: \$25 Long distance: \$25 Cable/satellite TV: \$75 Broadband Internet: \$45	Local phone: \$25 Long distance: \$25 Cable/satellite TV: \$65
Annual cost/household	\$1,620	\$2,040	\$1,380
30 year expenditure	\$54,472,824	\$558,562,608	\$238,642,848
Total residential expenditures	\$851,678,280		
Total expenditures ¹	\$979,430,022		

¹ Business, schools, institutions, and government costs estimated conservatively at 10% of residential expenditures

Funding a New Network

A wide variety of funding strategies are available for building new telecom infrastructure, but there are some emerging rules of thumb:

- The first money is the most difficult, and some local funds are almost always required.
- Once even a modest network infrastructure has been built and has some customers and service providers, it becomes much easier to raise additional funds. So the most important funding strategy is *to fund something and get it built*.
- Partnerships with entities like K12 schools and the local governments are critical funding sources, especially for a “Phase One” initiative. The opportunity is to dramatically improve the quality of service (e.g. 10x to 50x bandwidth increases for local K12 schools for what they are paying now), and/or the opportunity to reduce the overall cost of telecommunications by improved efficiencies for combined voice and data uses. One funding approach used by other projects is to get an up front cash payment from local anchor tenants that is equivalent to several years of savings from their telecom budget.

Funding Source	Description	Notes
Revenue Bonds	Long term debt instruments guaranteed with revenue from the network.	Requires some equity/funding from other sources.
General Obligation Bonds	Long term debt guaranteed by local taxes.	Generally more difficult to get approval from elected officials and voters.
Revenue Bond Guarantees	Third party guarantees on revenue bonds, so that if revenue fails to meet financial targets, bond guarantor makes debt payments.	Guarantors could be local or state governments. Does not require a direct cash outlay. Guarantor must have a good credit rating.
New Markets Tax Credits	Tax credits are sold to investors, and funds are used for the network.	Project must meet eligibility requirements and typically takes a year to plan and to receive approval.

Funding Source	Description	Notes
State Funds	State agencies may be a source of planning and capital funds.	Capital funds are usually relatively small, but direct financial grants from the legislature are possible.
Federal Funds	Grants and loans of various kinds are often available from Federal agencies.	Federal grant programs and funding levels tend to change with changes in administration. Can often take 1-2 years for approval.
Municipal Leasing	Local governments can borrow money and pledge the asset as collateral.	Can be used for funding specific (limited) projects, like fiber to a school system or government offices.
Commercial Loans	Local banks are often willing to assist with funding.	Usually requires pledging network assets as collateral. Must be able to show a revenue stream to pay back the loan. Good for small, high priority network extensions with guaranteed customers.
Private Sector Financing	A public/private partnership approach offers the possibility of attracting a mix of private investors as well as some local government financial support.	It depends on the corporate structure, but local businesses and investors could become shareholders or partners in the new telecom firm, effectively vesting community control for the effort. Because most of the funds will be used to create hard assets, it will be possible to attract institutional investors for larger amounts if a good business case is constructed.
Grants and Donations	Citizens and local foundations will sometimes provide grants.	Local foundations may require tying funds to a specific purpose.
Sales Tax	Assess a small increase in the local sales tax to pay for construction, or use existing sales tax revenues as a bond guarantee.	May require a voter referendum.

Where Does the Revenue Come From?

Revenue generated from community broadband projects typically is derived from one of two business models/sources.

- The **Municipal Retail** model sells services like Internet and phone service directly to customers. A portion of the retail service fee is paid to a wholesale

provider for the service (e.g. Internet) and the balance is used to cover other operational costs. In this model, the network owner (i.e. a public/private partnership entity) would bill each retail customer directly and be responsible for collecting all fees. Under current North Carolina law, this model is prohibited.

- The **Community Wholesale** model leases capacity on the network to private sector service providers. These firms do their own marketing and sell broadband services like Internet and phone directly to their own customers. In this model, the service providers bill their own customers. The network owner (typically structured as a public/private partnership) only bills the handful of providers using the network, and the fees charged to providers by the network owner are typically based on the number of customers each provider has.

The Community Wholesale model would be a good fit for Person County, as the operational complexity and staffing requirements are minimized:

- Network management of day to day operations would be out-sourced to a qualified private sector firm that specializes in this work. Network operations could also include generating the billing detail needed to create monthly invoices to providers.
- Routine and emergency outside plant repairs to conduit, fiber cable, and network equipment could also be out-sourced to a qualified private sector firm.

The responsibilities of the ownership entity (public/private partnership) would be constrained to a limited number of activities, including fiscal management, contract management, service provider attraction and management, and general awareness marketing of the network.

With respect to revenue, a small number of anchor customers purchasing relatively large amounts of services would be crucial to getting the network into the black by the end of year one. Anchor tenants might include larger business enterprises, K12 schools, four year colleges and universities, and health care facilities. Without a reasonable mix of anchor tenants, even a small pilot would require operational subsidies while the customer base developed over a period of 12 to 24 months.

Strategic Goals

Goals	Description
Promote Fiber as Part of a Broader Economic Development Strategy	Investments in broadband should be targeted to promote business growth and jobs creation.
Promote the County as an opportunity for “Live Work Play”	Affordable fiber services, widely available, can provide critical support for a broader effort to attract and support a wider range of residents and businesspeople. Fiber in the County will help grow jobs and businesses, enabling not just living in the County and working elsewhere, but living AND working in County.
Develop Fiber-Enabled Business Clusters	Getting fiber widely available in the County will be a multi-year effort. Identify business hub areas (e.g. the Person County Business and Industrial Center) and downtown Roxboro as the first places to add fiber infrastructure.
Develop Strategy for Work from Home, Business from Home	Across the nation, surveys show consistently that 10% of workers are employed full time from home, and other surveys show that as many as 30% to 40% need to work part time from home. Fiber will help create a more diverse work force and more job opportunities.
Create a Residential Fiber Pilot Project	Start with a modest residential pilot to show viability of the concept and use the pilot as leverage to attract more funding for wider deployment.
Consistent Message and Coordinated Public Awareness	If a decision to move forward is made by local governments, stakeholders, and interested parties, a consistent message about the benefits and advantages will be critical to gain public support.

Goals	Description
Open Ditch Policy	Duct and handholes should be included where appropriate in all new public and private construction. Opportunities for shared trenching should be vigorously pursued.
Create a Fiber Overlay Plan for the County	Identify key areas in the County that would benefit from fiber and develop a fiber overlay plan to guide future streetscape improvements, open ditch opportunities, and use to help support funding opportunities.
Coordinate Broadband Infrastructure Improvements with Public Safety Spending	Coordinate upgrades to public safety communications systems with planned fiber and wireless improvements to reduce the cost and improve the quality of public safety voice/data traffic.
Include a Colocation Facility	A colocation facility is an important component that makes the fiber network more valuable. This facility should be located in Roxboro to provide connectivity to the MCNC network.
Re-evaluate economic development zones	The MCNC fiber should spark a re-evaluation of economic development areas in the County.
Build fiber to all K12 schools	Building fiber to all K12 schools could be financed in part from savings from replacing leased lines with new county-owned fiber.
Get Class A office space in inventory	It is essential to have some high quality Class A office space in inventory in Roxboro and in the county.
Don't Wait	Many other communities have already made investments and aggressively promoting their infrastructure as part of their economic development strategies.

Promote Fiber as Part of a Broader Economic Development Strategy

The county needs more distribution and access fiber, which is essential for meeting future demand for broadband services. The county needs a carefully designed redundant core fiber network with a ring design that gives public and private broadband users maximum access to competitive services from a wide variety of providers.

To the maximum extent possible, this core network should avoid over-building existing privately owned fiber assets, and any construction should be preceded by an effort to obtain long term leases of fiber where it is available.

- Fiber to the home is needed to support work from home opportunities.
- Fiber to the home is needed to support business from home ventures, especially small business start-ups and entrepreneurial ventures.
- Fiber is needed to every economic development area and corridor in the county, and open fiber is needed within every business and commercial/retail area to reduce the cost of broadband services for businesses located in those areas.
- Fiber is needed to support economic revitalization efforts and to meet business needs in those targeted revitalization areas of the county.

Promote the County as an Opportunity for “Live Work Play”

The County has some strategic assets, including outstanding recreational amenities, relatively low cost of living, and proximity to Raleigh/Durham. Young professionals (typically single, married with no children, or married with only one or two children) want and expect affordable high speed broadband access, and will avoid areas perceived as having low quality broadband. Fiber, therefore, becomes a necessary component of a larger strategy to make the county be seen as a great place to live and to work. It is not necessary to raise the money to put fiber throughout the county all at once; instead, having a strategic plan to do so and a modest pilot project can become a key part of a broader “Live Work Play” effort.

Develop Fiber-Enabled Business Corridors

Wherever we go, we find that even relatively small businesses, especially professional service businesses (accountants, law firms, engineering firms, architects, medical offices) are demanding very high performance AND affordable broadband access. Introducing fiber availability into identified business corridors in the county, along with the ongoing streetscape improvements in Roxboro, can help draw more professional offices and commercial activities into the county.

Develop a Work From Home, Business From Home Strategy

Ideally, the county evolves into a place that supports a wide range of socioeconomic households, and having a long term strategy for work from home and business from home could play a key role in avoiding the possibility that the county simply becomes a bedroom community with most residents commuting out of the county for their jobs. Widespread availability of affordable fiber in the residential neighborhoods should be

strategic long term goal for the county. Across the nation, surveys show consistently that 10% of workers are employed full time from home, and other surveys show that as many as 30% to 40% need to work part time from home. Fiber will help create a more diverse work force and more job opportunities.

Create a Residential Fiber Pilot Project

The best way to support the higher level goal of marketing the county for work from home and business from home is to identify a pilot project to bring fiber to a small residential area (perhaps one that has already begun the transition but has the potential to support a mix of incomes. Having even one or two neighborhoods with fiber to the home will provide substantial marketing opportunities and raise awareness that the county is not only changing, but changing in a way that will be interesting and desirable. Fiber to the home and to the apartment/condo is a very strong attractor for young professionals, many of whom want to work part or full time from home. Attracting more young professionals to the county will in turn help pull more retail businesses back into the area, but retail will follow jobs and work opportunities--retail revitalization without building the customer base fails.

Consistent Message and Coordinated Public Awareness

Public support for the project will be important to the long term success of the effort. All parties involved in the effort must be able to address key talking points clearly, succinctly, and consistently to avoid confusion and negative rumors. Incumbent telecom providers often embark on extremely negative and mis-leading public relations campaigns that seem to suggest a wide range of poor outcomes to such an effort. Citizens often assume that taxes will be increased to support the effort. A well-managed public awareness campaign that includes helping elected and appointed officials both understand and discuss key parts of the project will be very important.

Open Ditch Policy

The County should encourage new project guidelines and checklists for both public and private development projects to include conduit, duct, and handholes where appropriate. Just as private developers routinely provide shared infrastructure like roads, sidewalks, light rail, water and sewer, any new development in the county should have developers installing, at a minimum, inexpensive conduit/duct and handholes.

Create a Fiber Overlay Plan for the County

A fiber overlay plan is an essential part of any next steps. The County should develop a shared GIS layer that identifies desired fiber routes and connected facilities, and any

road reconstruction or repairs, water or sewer expansion, and any other civic construction or utility work should be compared to the overlay plan to determine if the new work is on a desired fiber route. If it is, funds should be budgeted during the planning phase of the effort to include adding duct and fiber along that route.

Coordinate Broadband Infrastructure Improvements with Public Safety Spending

Public safety can benefit substantially from cost sharing with a county-wide fiber network. Fiber can be reserved specifically for public safety use so that public safety agencies have secure data transmission with no information co-mingled with commercial and residential data. Public safety radio networks can be enhanced by running fiber to all repeater towers, improving the quality of voice transmission and potentially reducing the overall number of towers and repeaters needed.

Re-evaluate economic development zones

The MCNC fiber should spark a re-evaluation of economic development areas in the County, as access to Gigabit fiber is increasingly becoming a key relocation decision for businesses and entrepreneurs. Roxboro has great potential to attract more workers and businesses to the downtown area with local fiber to buildings that can or do provide Class A office space.

Get Class A office space in inventory

Many business relocation decisions are made in 90 days or less. It is essential to have some high quality Class A office space in inventory. This could and should include some downtown Roxboro buildings that have received high quality renovations or are candidates for such renovations. Existing buildings will have higher lease/purchase value if fiber is available at the premises.

Build fiber to all K12 schools

Building fiber to all K12 schools could be financed in part from savings from replacing leased lines with new county-owned fiber. A properly designed fiber network to all schools in the county could be shared with other county departments (e.g. monitoring water pumping stations, other facilities), public safety needs (e.g. fiber to public safety towers to improve radio communications), business uses, and fiber to the home.

Don't Wait

Many other regions (e.g. Austin, Texas has just announced a Google fiber initiative), are well ahead of the county in their plans to acquire 21st century broadband infrastructure.

- Kansas City, Kansas and Kansas City, Missouri have construction underway in their Google partnership, which will connect hundreds of government locations, thousands of businesses, and tens of thousands of homes.
- The Utopia project in Utah is investing more than \$60 million to expand its community-based fiber network from 9,000 homes and businesses to a planned 25,000 homes and businesses.
- More than 200 other communities in the United States have operating networks or have substantial network construction underway.

How will the county's businesses, schools, health care facilities, and government agencies be connected? And what will bring businesses to the county?

Getting Started

Success Factors

Local Champion

A local champion (or champions) is an essential component of a success-oriented strategy. The local champion must have the name recognition and respect in the community that enables him or her to make phone calls, hold meetings, develop alliances and partnerships, and to bring a variety of public and private groups with disparate interests to joint commitment of support for the project.

Organizational Commitment

A parent organization is required that can act as fiscal agent, especially during the initial development phase, provide some staff and management time, and potentially own and manage the enterprise over the long term. The Board of Directors must be fully committed to the success of the project, and the Board must be prepared to assist with awareness marketing, publicity, and consensus-building.

Seed Funding for a Phase One Effort

Like any new start up business, the first round of funding is the most difficult. Once the network is operational and there are customers, providers, and a revenue stream, a much wider variety of funding alternatives becomes available. To get started, the seed funding for a Phase One effort is required, typically from a “basket” of funding sources, including grants, contributions, matching funds, and cash.

Strategic Goals and Objectives

The strategic goals document may be very short, but is still important, as it identifies the broader goals and objectives that the investment will support--that is, the community and economic development goals. The strategic goals inform the public awareness campaign for the project, and help potential partners understand and support the effort.

Operational Plan

The operations plan answers key questions that lead to the long term sustainability and success of the project, including who will own and manage the assets, who will manage network operations, what organizational support is available and on what basis, and who will provide financial oversight.

Financial Plan

The financial plan provides revenue projections, take rates for service, projected operational expenses, capital costs of the Phase One effort and projected capital costs for any subsequent expansion, who will provide financial oversight, and the cost of any debt incurred.

Experienced Technical Expertise

A community-owned network is architecturally different from typical private networks (e.g. dedicated local government networks, healthcare networks, education networks). The county will need technical, financial, and business planning expertise that is based on successful execution of similar community network projects.

Targeted Areas of Need

Last but not least, any Phase One or start up effort must be based on a careful study of actual demand. Community network projects that have had financial difficulties often have foundered on this issue--building a network without a thorough study of demand in the targeted service area. The pilot areas identified for initial construction and subsequent service must be tied to the financial planning and the projected take rates in the pro forma.

Build something

Too many communities get caught up in imagining some very large, very expensive project. Identify your budget and what you can afford this year, even if it is just a few blocks of downtown. Get started, get connected to the MCNC backbone, and expand year by year.

Focus on a modern, multi-service network

Multi-service open networks perform where the incumbents have said that they “can’t afford to build fiber” because the business model is different: a multi-service network shares a single infrastructure among several providers--it is a different business model that generates more revenue than the fifty year old incumbent business model.

Avoid over-reliance on wireless broadband

Wireless broadband will not bring businesses and jobs to Person County. Wireless broadband in rural parts of the County may be an important bridge technology until fiber arrives in those parts of the County, but to be economically attractive to relocating companies, Person County needs Gigabit fiber in at least the Roxboro area and in any business and industrial parks.

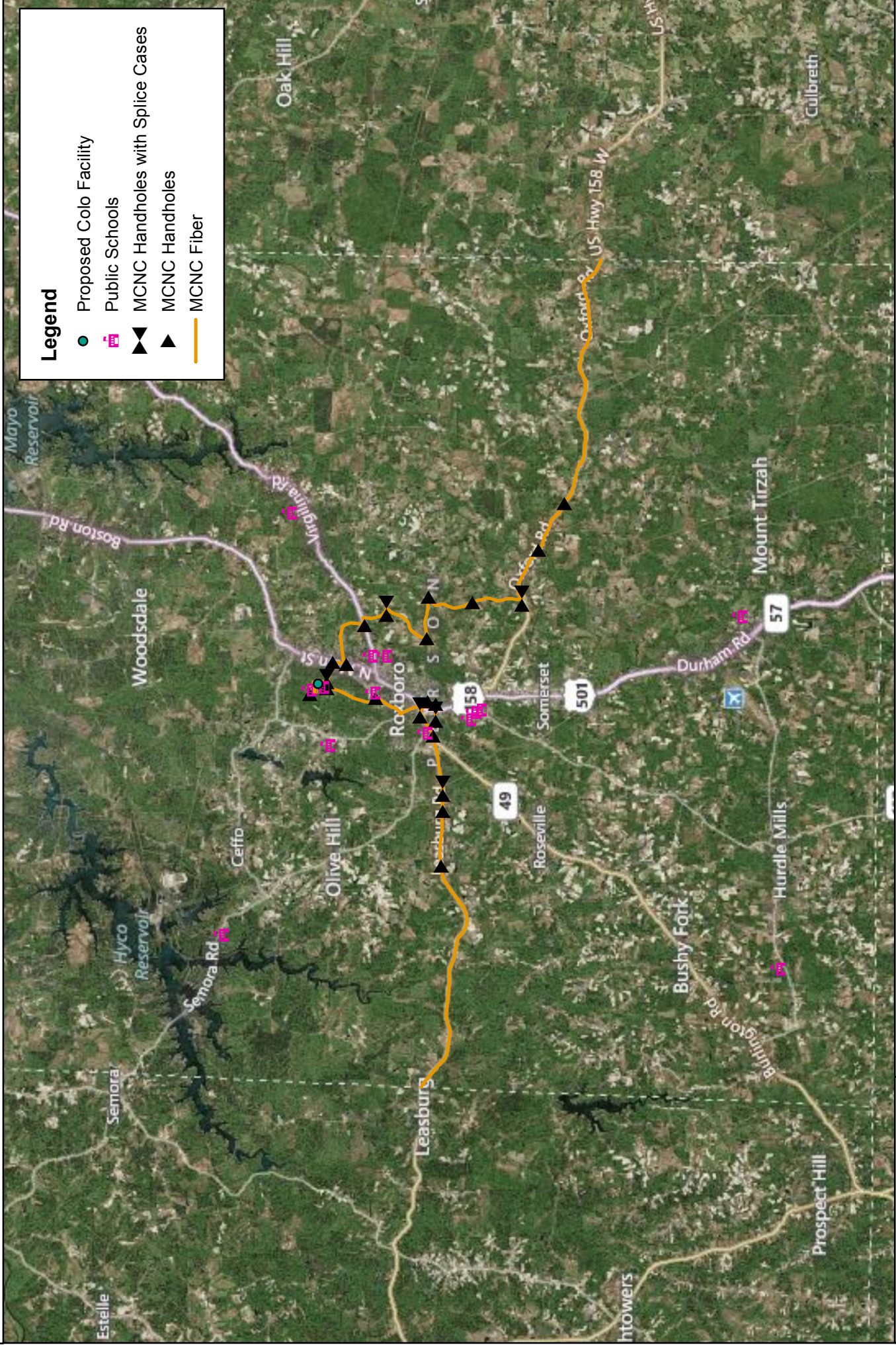
Why Do This?

- The County, local K12 schools, and the City should be able to save money on Internet, telephone, and connection costs and/or get more bandwidth without increasing expenditures.
- Increase the local tax base by having the infrastructure needed to attract new businesses and jobs.
- Retain and attract residents who want the excellent life style and quality of life in Person County but need high performance fiber services for work from home and business from home activities.

Next Steps

- Make a decision about whether to move forward or to table the effort for the time being.
- A fiber overlay plan for the county is strongly encouraged, so that other infrastructure projects (e.g. water, sewer, light rail, irrigation, etc.) can more easily include incremental addition of conduit and handholes.
- An open ditch policy for the county should be developed in parallel with the fiber overlay plan, so that other projects begin including consideration of conduit, handholes, and fiber during the planning and funding stages.

Person County: MCNC Fiber



Person County: Roxboro MCNC Fiber

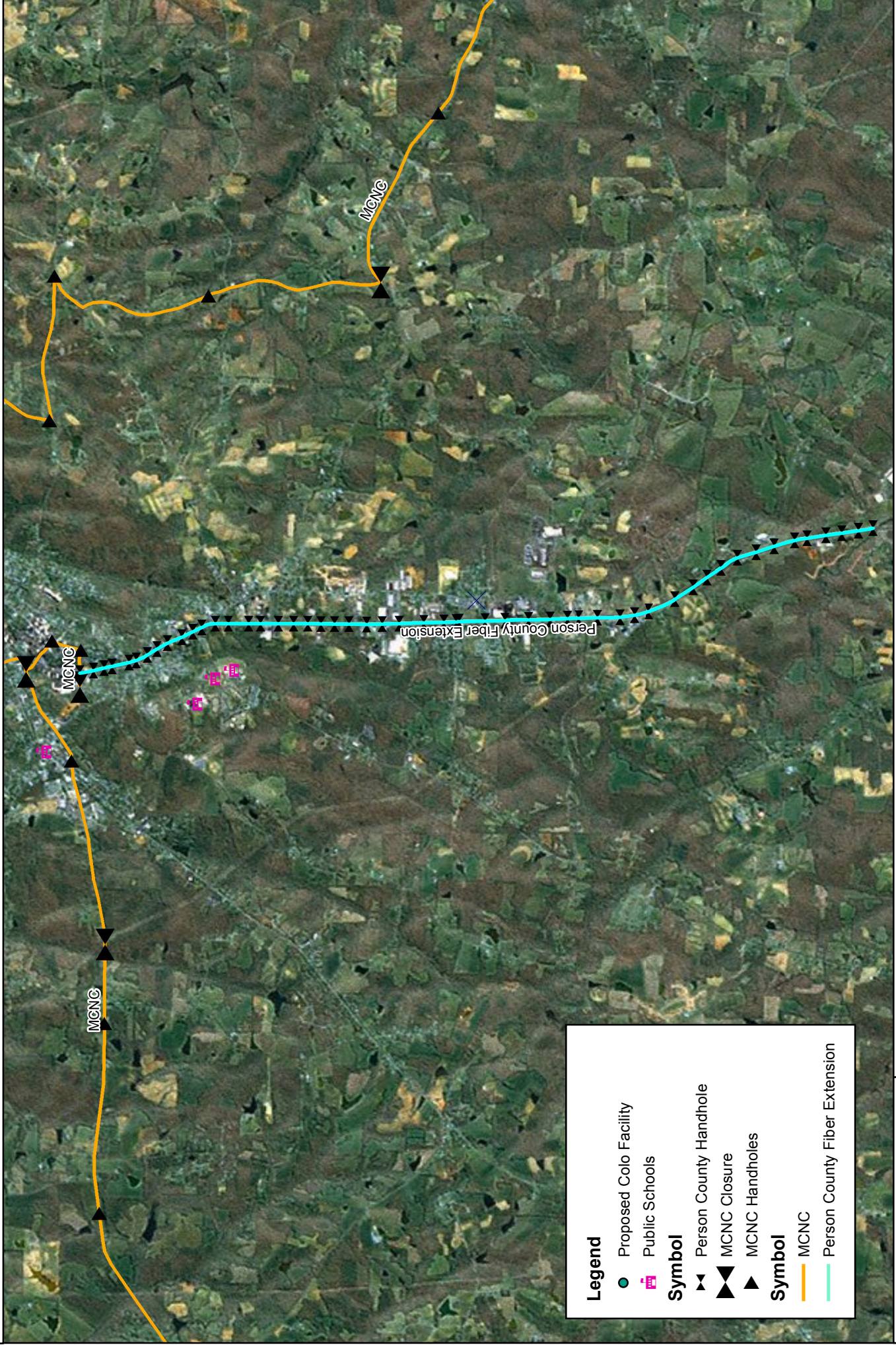
Legend

- Medical Services
- Proposed Colo Facility
- Public Schools
- MCNC Handholes with Splice Cases
- MCNC Handholes
- MCNC Fiber



Drawing: Roxboro
Date: 7/29/2013
Drawn By: M. Vellines

Person County: Person County Fiber Extension



Legend

- Proposed COLO Facility
- Public Schools

Symbol

- Person County Handhole
- MCNC Closure
- MCNC Handholes

Symbol

- MCNC
- Person County Fiber Extension