Warren County, Virginia

Community Telecommunications Plan

Adopted by the Warren County Board of Supervisors on October 16, 2012

THE ATLANTIC GROUP OF COMPANIES, INC.

Executive Summary

This study outlines several options concerning the existing and future deployment of broadband services within Warren County, Virginia. The typical market place breaks into four (4) segments of service demand:

1. Residential
2. Small business
3. Municipal/Education
4. Large Business/Commercial

Depending on the application, consumers will seek various service levels and speeds. From activities such as simple e-mail to sophisticated data network distribution, the market place will always seek functionality, speed, access, and cost. Cost will determine what the market place will bare in reference to quality and level of associated service. Simply put, a subscriber whom only requires enough bandwidth to send or receive simple emails will not pay for the services of a small business or municipal government that are of no interest or affordability to him.

Warren County is not unlike many counties in Virginia that have multiple providers offering various levels of operating service. From franchised cable providers, Competing Loop Exchange Carriers, Incumbent Loop Exchange Carriers, Federal Communications Commission (FCC) licensed Land Mobile Radio carriers, to various providers of FCC licensed and unlicensed "spread spectrum" wireless networks, all have targeted voice and data products that consumers are seeking.

The County is fortunate to have many hundreds of miles of fiber optic and coaxial cable that serves as the transport medium. It is estimated that 80% to 85% of the geographic and populated portion of the County currently has or has the ability to get high speed broadband or a level of service that meets current expectation. High speed for this study is considered greater than 5 megabits per second (Mbps).

While evaluating the County and the Broadband "Needs" vs. "Actual" services available, it became important to identify by geographic location large areas that have little to no service. The county is naturally bisected by I-66/US -55 on an East and West axis, with a North and South axis along Rt. 340 from the southern county boundary of Page and Warren to the Northern Boundary with Warren and Fredrick counties. These "areas" form natural "Quadrants" that will be referred to in the following methodology:

1. North-West Quadrant known as the "Reliance Road Quadrant".
2. North-East Quadrant known as the "Howellsville Quadrant".

3. South-East Quadrant known as the "Browntown Quadrant".
4. South-West Quadrant known as the "Bethel Quadrant".

Upon review of these areas, the Southwest Quadrant or Bethel Quadrant is currently served well by Comcast and CenturyLink. Plans for the future should leave only very small gaps in service. We believe these will naturally "fill-in" as Comcast and CenturyLink follow through on their committed plans.

This leaves the three remaining Quadrants:

1. North-West/Reliance Road Quadrant
2. North-East/Howellsville Quadrant
3. South-East/Browntown-Bentonville Quadrant

These three quadrants have large "gaps" in Broadband services that must be addressed to fulfill the county's goals of complete Broadband coverage.

These three areas do not have adequate cable provisioning, electronic switching, or distribution cable services to address current or future customer demand. They are defined on an enclosed map (page 26). In total approximately 1,000 homes do not have broadband service. Many in these areas have home based businesses, distance learning educational requirements, and telecommuting needs.

Questions arise such as: How do we get the service to the 20% of the County residences and businesses that do not currently have access? What level of service is the minimum baseline required? What are the roadblocks for providers to deploy such networks? What type of provider/local government partnership can be developed to help facilitate it? What is the "vision" of the providers and users in a long-term strategy for Warren County?

The following recommendations are potential solutions or strategies that may assist in the 100% deployment of broadband access for Warren County.

1. Educational Tool: Investment $20,000.00

   Warren County develops and administers a *Broadband Resource Page* on the Warren County's official website *(similar to that of Electrical Service Providers).* Titled *"Broadband Service Providers"* this page may include:

   a. Carriers/Providers (wire and wireless) operating in Warren County; Hyperlink to Carrier business website

   b. Fiber Optic/ Cable/Tower locations in County (GIS Layers)

c. By address inquiry as to who provides what service to that address (GIS Data cross- referenced to Service area)

d. For each provider: list, with pictures, of Customer Premise Equipment that will be required; Hyperlinked to Carrier business website

e. Cost Plans for Subscriber; Hyperlinked to Carrier business website

f. Additional equipment information that may be helpful to ensure stronger signal or bandwidth

g. Local Vendors who can Place-Install-Trouble Shoot and act as 3rd party "Dealers" for service providers in Warren County with hyperlink to their web site.

h. Providers and Vendors may advertise on web site.

2. Infrastructure Investment: Investment $2,200,000.00

Areas or corridors that are identified without wire or wireless broadband, the Warren County Broadband Project will incentivize with funding to begin the engineering effort and contribute to the material cost to begin this deployment.

a. Wire Technology Potential Incentives:

i. Warren County Broadband Project will Incentivize wire based broadband providers by the Project contributing up to $1,000,000.00 for the engineering, purchase and placement of fiber optic or coaxial cable to serve residences or business in areas not previously served.

ii. Seek Local, State and Federal Grants to implement these initiatives.

b. Wireless Technology Potential Incentives:

i. Incentivize all Wireless Based broadband providers to service geographic areas of County where there is no cable/wire broadband network within 100 yards. Incentives may include free advertising on County's website, waiver of contractor permit fees or other issues that a carrier may have.

ii. For every home or business that chooses to be served wirelessly because no cable provider is willing to serve, County will credit homeowner $50 for new wireless service if service recipient stays with this service for 3 years.

iii. Warren County Broadband Project will maintain a $1,200,000.00 fund to provide assistance and material support for providers of Broadband.

iv. County Economic Development Authority may assist in the development and ownership of commercial communications towers for wireless providers.

TOTAL INVESTMENT: $2,220,000.00

In summary, these two (2) recommendations place Warren County in the information/industrial wireless facility owners position to complete the last +/-20% of broadband for their community.

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Definitions and Terminology for Communications

1. **ADSL:** Asymmetric Digital Subscriber Line: Technology that increases transmission speed for data services over copper lines. Splits "voice" and "data" from transmission using unused Voice frequencies. Lower tier of data transfer.

2. **BPL:** Broadband over Power Line. This technology uses the existing high voltage power lines to provide a "transport" facility to use laser beams to transport data in the hollow core of the electrical transport and distribution lines. Many local power companies use this resource as a additional revenue source for "long distance" data transport.

3. **Broadband:** Term given in a "generic" mode of the ability to transmit and receive (Uplink or Downlink) large quantities of data such as full motion video, sound, documents, etc. that replicates actual object movement with high quality signal and clarity. Measured in "Bits per Second."

4. **Carrier:** A provider of service such as voice or data services; the company that provides the service that allows communications to occur.

5. **CDMA**: Code Division Multiple Access - A digital cellular technology patented by Qualcomm.

6. **CLEC:** Competitive Loop Exchange Carrier.

7. **DATA:** Bits of information coded with a binary number system of "1's" and "0's" used in a digital format to replicate sound and video to communicate a message.

8. **DSL:** Digital Subscriber Line.

9. **EDGE**: Enhanced Data rates for Global Evolution - 2.5G high speed digital data technology. Compatible with GSM technology, also called Enhanced GPRS.

10. **EVDO**: Evolution Data Optimized - This is the 3G technology on CDMA networks. The initial implementation was Rev0; the latest version is RevA, which has faster download speeds, and much faster upload speeds.

11. **GPRS**: General Packet Radio Service - The first high speed digital data service. Compatible with GSM technology.

12. **GSM**: Global System for Mobile Communications - One of the major standards for cellular networks. Available in over 100 countries, and deemed the standard in Europe. Uses SIM cards.

13. **High Speed**: Minimal level of service rated at 5 mb/s or faster.

14. **HSDPA**: High Speed Downlink Packet Access - 3G digital data cellular service using GSM technology.

15. **HSPA**: High Speed Packet Access - Part of the 3G data services family. Evolved from WCDMA.

16. **ILEC:** Incumbent Loop Exchange Carrier.

17. **ISDN:** Integrated Services Data Network: Circuit Packet Switching for voice and data over copper lines. Early technology to deliver voice, data, and video services.

18. **IXC**: Inner Exchange Carrier.

19. **Kbps**: Kilobits per second: Unit of measurement: 1 Kb = 1,000 bits. Defined as Data transmission over time.

20. **Local Multi-Point Communications System:** Data and Voice system that shares a "switched" protocol to connect various "spots" within the network.

21. **Land Mobile Radio System:** A radio system that receives and transmits from a mobile handheld device that is synchronized to a transceiver located at an antenna at a fixed location. Traditionally known as "cell service."

22. **LTE:** Long Term Evolution - 4G cellular technology standard competing with WiMAX.

23. **Mbps:** Megabits per second.

24. **MiFi**: Mobile hotspot integrating Wi-Fi and mobile/cellular broadband.

25. **PDA:** Personal Digital Assistant.

26. **Point-Multi-Point:** Communications system for voice and data from a fixed group of antennas and transceivers that deliver large or wide spectrums of data for "last mile" linkage to a facility such as a business or home. Known as "Spread Spectrum."

27. **POTS:** "Plain Old Telephone Service", basic voice service from local land line telephone company.

28. **Satellite:** Developed for the reception and transmission of digital information in a fixed earth or earth orbiting trajectory at a calculated distance in space that rotates in a programmed pattern.

29. **Subscriber:** A party or customer that purchases and/or uses a service provided by provider or carrier of a specific voice and/or data service.

30. **Voice:** Ability to hear analog voice signaling at its basic level of clarity transported by an analog or digital signal medium.

31. **VoIP**: Voice Over Internet Protocol - Delivering voice calls over internet data networks.

32. **Wi-Fi**: Wireless Fidelity - High frequency local area network. Consumer friendly name for IEEE 802.11 standards.

33. **WiMAX**: Worldwide Interoperability for Microwave Access - A wireless telecommunications technology for providing high speed data over long distances.

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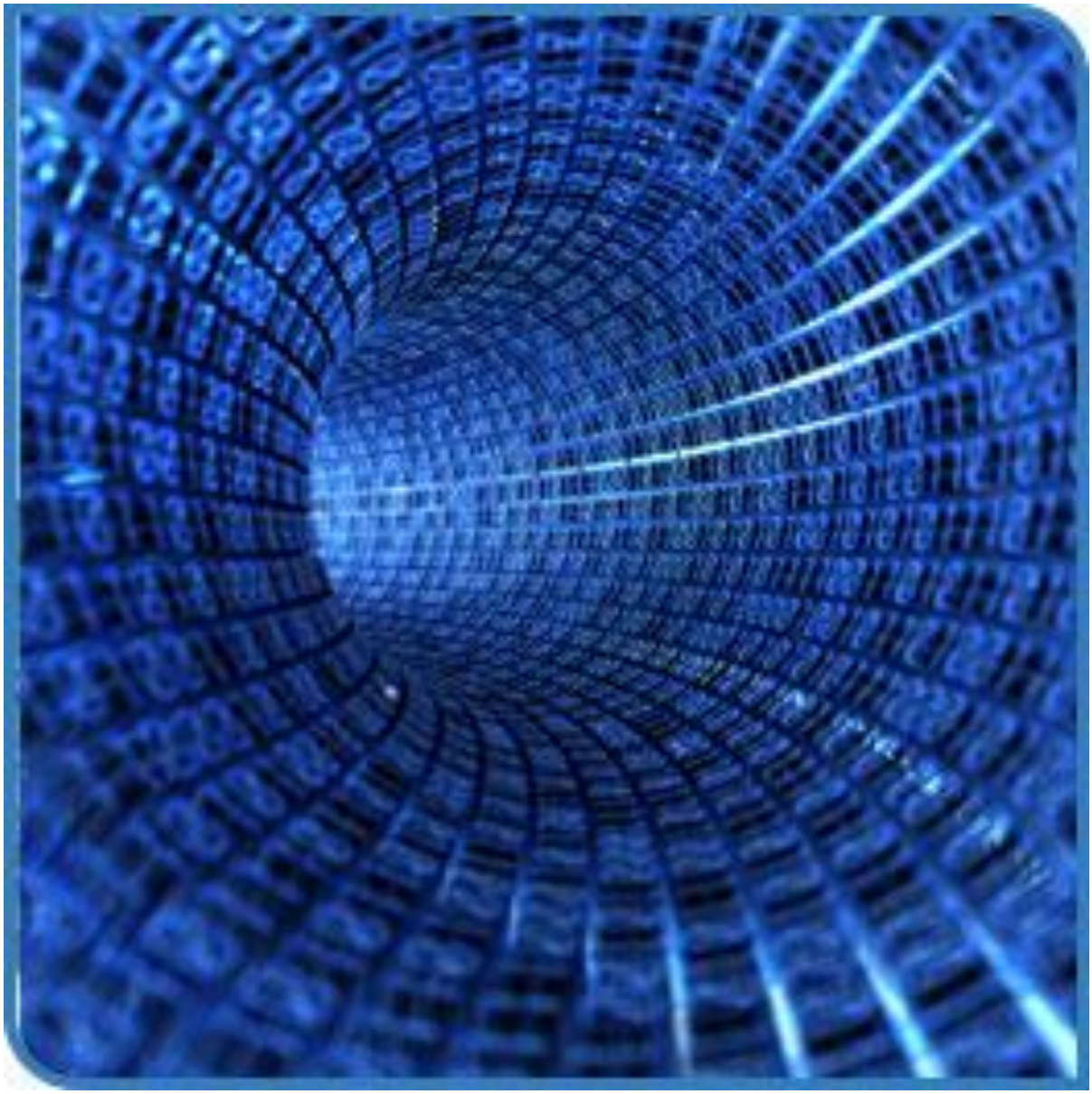
SECTION 1

History and Demographics of County



History of Warren County

The history of Warren County begins with the American Indians between 11,000 and 12,000 years ago. The site of the oldest known permanent habitations in the eastern United States is located in the County along the South Fork of the Shenandoah River.

White men first appeared in the Shenandoah Valley in the mid-1600's. Warren County was first settled around 1730. Many of the County's early settlers were Scots-Irish and English Quakers.

Warren County was situated at the intersection of land and water trade routes. Supplies and manufactured goods came through the Blue Ridge Mountains through Chester and Manassas Gaps. At the confluence of the North and South Forks of the Shenandoah River, much of the early agricultural produce of the Valley was loaded onto barges for shipment to the coastal ports. The Town of Front Royal was eventually established at that river port in 1788.

Leadership and military manpower were the major resources supplied by Warren County and other Shenandoah Valley communities during the Revolutionary War. Pig iron, grain, leather, flour meat, fruit vegetables, and lumber were other valuable resources furnished to the Colonial cause.

Warren County began to boom in the early 1800's. The wars in Europe created a need for breadstuffs and brought a quick change from a tobacco-oriented economy to the raising of wheat.

The County was officially founded in 1836. It was formed from parts of Frederick and Shenandoah Counties. Front Royal has been the county seat from the beginning. In 1840, Warren County had a population of 5,627, one-fourth of which were slaves.

The first railroad made its way into the Shenandoah Valley in 1854 by way of the Manassas Gap and Front Royal.

Warren County was of strategic importance during the Civil War because of its agricultural productivity, its transportation links with Winchester to the north, and its links with eastern Virginia by way of the roads through Chester and Manassas Gaps and the vital Manassas Gap Railroad.

The Battle of Front Royal, on May 23, 1862, was one of the Battles in General Stonewall Jackson's famous Valley Campaign. In that battle, Confederate forces defeated 1,000 Union soldiers to capture a military supply depot, the Manassas Gap Railroad, and the strategic bridges over the two forks of the Shenandoah River at Riverton.

The Civil War destroyed most of the buildings in Warren County, but the soil could still be farmed and the County soon began to attract investors to develop local natural resources. By the 1890's, the County had again erupted in a flurry of activity. An enormous vineyard had been started near Front Royal, and iron, copper, and manganese were discovered within the County. Lime works had been founded in Riverton in 1869. Manufacturing also soon expanded, with sumac, tanning, and leather industries regaining the importance they had previously known. Other industries included tinning and cigar production. By 1900, Warren County's population had reached 8,837.

The two most important changes in Warren County during the 20th century have been the construction of two large manufacturing plants and the growth of tourism.

In 1937, construction began on the American Viscose manufacturing facility. This chemical-textile plant in Front Royal was at one time the world's largest producer of rayon. The U.S. Government operated the plant during World War II, producing materials to aid the war effort. FMC, Inc. purchased the facility and operated it into the mid 1970's. An FMC management team, led by Mr. John Gregg, executed one of the first leveraged buyouts in the United States. The new company was named Avtex Fibers-Front Royal, Inc.

The rayon plant was the economic mainstay of this community for several decades. It was the largest employer within the region for over 20 years. Several major layoffs decreased the workforce from approximately 1,300 in 1988 to 468 at the plant's closing in November 1989.

In 1980, a division of the duPont Corporation was established in Cedarville near Front Royal. Paint for the secondary automotive market is manufactured at this facility. In 1989, with the closing of Avtex Fibers, duPont became Warren County's largest employer.

Since 1994, the Front Royal-Warren County Economic Development Authority has successfully recruited manufacturing, distribution, hospitality and technology companies for an investment of more than $553 million and the creation of 2,200 new jobs.

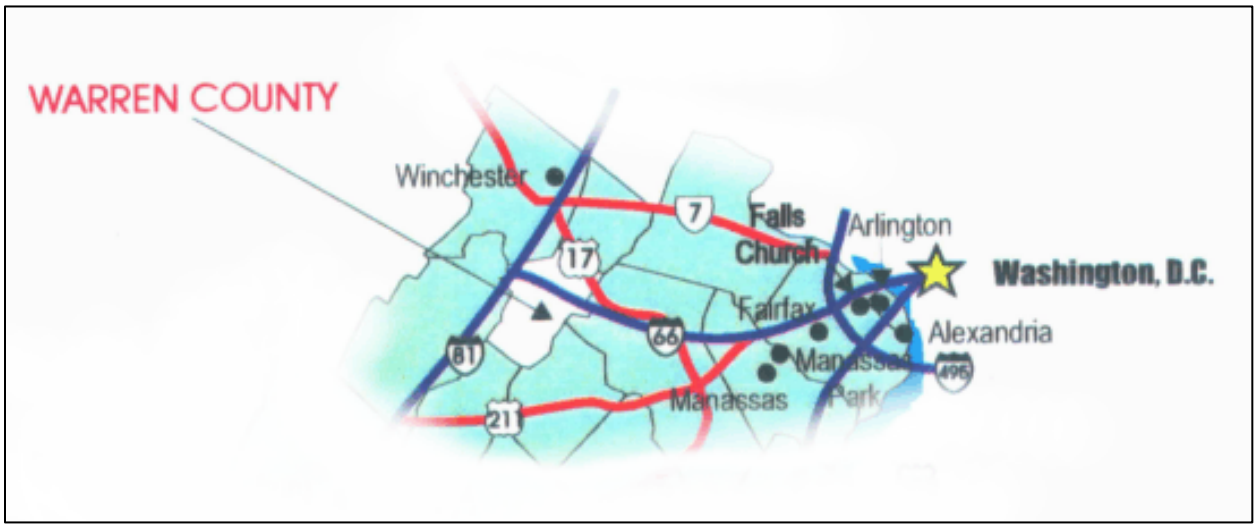
Warren County has long attracted tourists and seasonal residents, who have come to the area because of its climate, accessibility to major cities, and scenic beauty. Major tourist attractions include the Shenandoah National Park, the Skyline Drive, the Shenandoah River and the Skyline Caverns.

Location of Warren County

Warren County is located in the Shenandoah Valley of northwestern Virginia. It is bounded by Frederick and Clarke Counties on the north, Fauquier and Rappahannock Counties on the east, Page County to the south, and by Shenandoah County to the west.

Warren County has a total land area of 219 square miles. The rural part of the County contains 209.9 square miles and the Town of Front Royal covers 9.1 square miles.

Three factors in the County's regional setting have greatly influenced growth and development. The first factor is its location in the Shenandoah Valley. For more than a century, the Valley has been noted for its beautiful mountains and clear streams, and has attracted many tourists and seasonal guests. Because of the ease of travel along its length, the Valley has been an important north-south transportation route since Indian times.



A second regional setting factor influencing growth is the County's location bordering two low passes over the Blue Ridge Mountains. Much pioneer commerce from the Richmond and Hampton Roads areas passed through Chester and Manassas Gaps, across Warren County to distant markets. The early retail and industrial sectors of the economy developed from trans-shipping of manufactured goods and agricultural produce through the County.

The third factor is the close proximity of Warren County to major cities. The distance to Washington, D.C. is 70 miles; to Baltimore, 110 miles; and to Richmond, 135 miles. These and other eastern cities have been major market places for County produce and products, as well as major suppliers of manufactured goods.

Warren County Community Profile

(Updated July 2012)

Vision

Our community's vision is that we must maintain and enhance the quality of life for the residents of Warren County. To do so, the quality and character of Warren County's natural resources should be preserved, conserved, and used effectively to ensure that future citizens will enjoy the benefits of:

- An adequate, sustainable, clean, and potable supply of both surface water and ground water;
- Clean air;
- Farming and open spaces;
- The beauty of our rivers, mountains, and scenic views;
- Protection of our rural character;
- Quality educational facilities and system;
- A balanced tax base; and
- Sound fiscal management.

This mandates that we plan for sustainable growth based on these limited resources. This can be translated to say our annual residential growth rate should be maintained at approximately 2%, no more than 3% annually and our industrial/commercial tax base sustained at 20 to 25%. Only by doing so can we provide quality schools, safety on our roads and in our communities, a balanced tax base, equitable paying jobs, reduced out-of-county commuting, and other social amenities associated with our quality of life expectations.

County Government

The current county government consists of a five member Board of Supervisors, representing the Shenandoah, North River, South River, Fork, and Happy Creek districts, a county administrator, various other county offices, a Sheriff's Department and the Department of Fire and Rescue Services. The County of Warren has 188 full time employees and 96 part time employees. Warren County offers a variety of jobs in various industries including: agriculture, manufacturing, government, and transportation. The Economic Development Authority provides technical and financial assistance to existing, expanding, and emerging companies to encourage investment in Warren County. Since 1995, fourteen international and domestic companies, both large and small, selected Warren County for investments exceeding $185 million.

Demographics

Population in 2010 37,439
Median Age 39
Total Households 13,368
Total Housing Units 16,184
Median Household Income $59,630

Local Revenue: Community Financial Information

Estimated Revenue

From Local Sources - Property Taxes $46,886,349
From Local Sources - Other $1,591,450
From the Commonwealth $7,636,720
From the Federal Government $1,968,190
Total Revenue $57,136,259

Approved Tax Rates

Real Estate $0.59
Tangible Personal Property $4.00
Tangible Personal Property -
Volunteer Fire & Rescue Squad Members $2.00
Tangible Personal Property-Aircraft $0.50
Machinery and Tools $1.30

Top 10 Employers in Warren County	
Employer	**Range of Employment**
Warren County School System	796
Valley Health System—WMH	503
Family Dollar Services	400
DuPont	400
Warren County Government	326
Northeast Cooperative, Inc. (SYSCO)	317
Wal-mart	313
Ferguson Enterprises	234
Interbake Foods, LLC	222
United Parcel Service	171

Total of New Industrial Space: 3,916,000 Square Feet

Social and Educational Activities

Warren County holds a strong belief in the value of education. Warren County offers enrollment to children from kindergarten through 12th grade. Each facility provides various programs and dedicated teachers to meet the needs of each individual student. All Warren County schools are Professional Learning Communities that maintain individual School Improvement Plans in joint collaboration with the Warren County Strategic Plan and strive to create a shared vision of excellence for students, parents, and all staff. All schools offer networked computer labs with internet access. Warren County schools provide a strong basic education for those planning to attend college, as well as an excellent vocational program. All schools are fully accredited by the Commonwealth of Virginia Board of Education.

Current Enrollment Grades K-12 ..... 5,317 students

Elementary Schools

- Five (5) Elementary Schools:
  - Hilda J. Barbour Elementary School
  - E. Wilson Morrison Elementary School
  - A.S. Rhodes Elementary School
  - Leslie Fox Keyser Elementary School
  - Ressie Jeffries Elementary School
- Average Pupil/Teacher Ratio of 16:1
- Basic Instructional Program
- Curriculum based on Virginia Standards of Learning

Middle School

- One (1) Middle School:
  - Warren County Middle School
- Grades 6 and 7
- Team Organization where core subjects are taught by 3 to 5 teachers
- Average Pupil/Teacher Ratio of 23:1

High Schools

- Two (2) High Schools:
  - Warren County High School
  - Skyline High School
- Grades 8-12
- Average Pupil/Teacher Ratio 23:1

Private Schools

The following private schools are located in Warren County or within a reasonable distance of County residents:

- Randolph-Macon Academy
- Riverfront Christian School
- Front Royal Christian Schools

- Guardian Angel Academy
- Wakefield Country Day School
- Mountain Laurel Montessori School
- Seton Home Study School

Colleges

The following colleges are located in Warren County or within a reasonable distance of County residents:

Christendom College

- Four-year coeducational Roman Catholic Liberal Arts college
- Founded in 1977
- Undergraduate and graduate programs offered
- Three locations: Front Royal and Alexandria, Virginia, and Rome, Italy
- Undergraduate enrollment in Warren County: 407

Lord Fairfax Community College

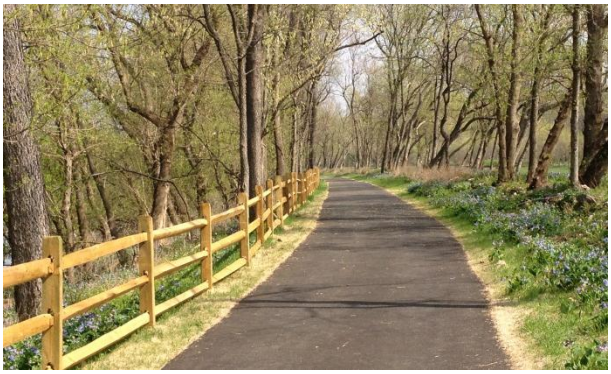
- Comprehensive, multi-campus public institution of higher education
- Founded in 1970
- Offers over 75 associate degree and certificate programs in addition to providing access to bachelor's, master's and doctoral degree programs offered on site by a four-year institution
- Three locations: Middletown, Fauquier County, and Luray-Page County
- Serves more than 7,600 unduplicated credit students and more than 10,450 individuals in professional development and business and industry courses annually

Budgetary Allocations

Public Schools	$45,892,555
Public Safety	$10,331,505
Health/Welfare	$7,305,305
Public Works	$3,350,081
Capital Outlay	$7,509,609
Parks, Recreation & Cultural	$2,810,027
General Government Administration	$2,779,639
Community Development	$1,913,766
Judicial Administration	$1,225,333
Non-Departmental	$394,650
Total:	**$83,512,470**

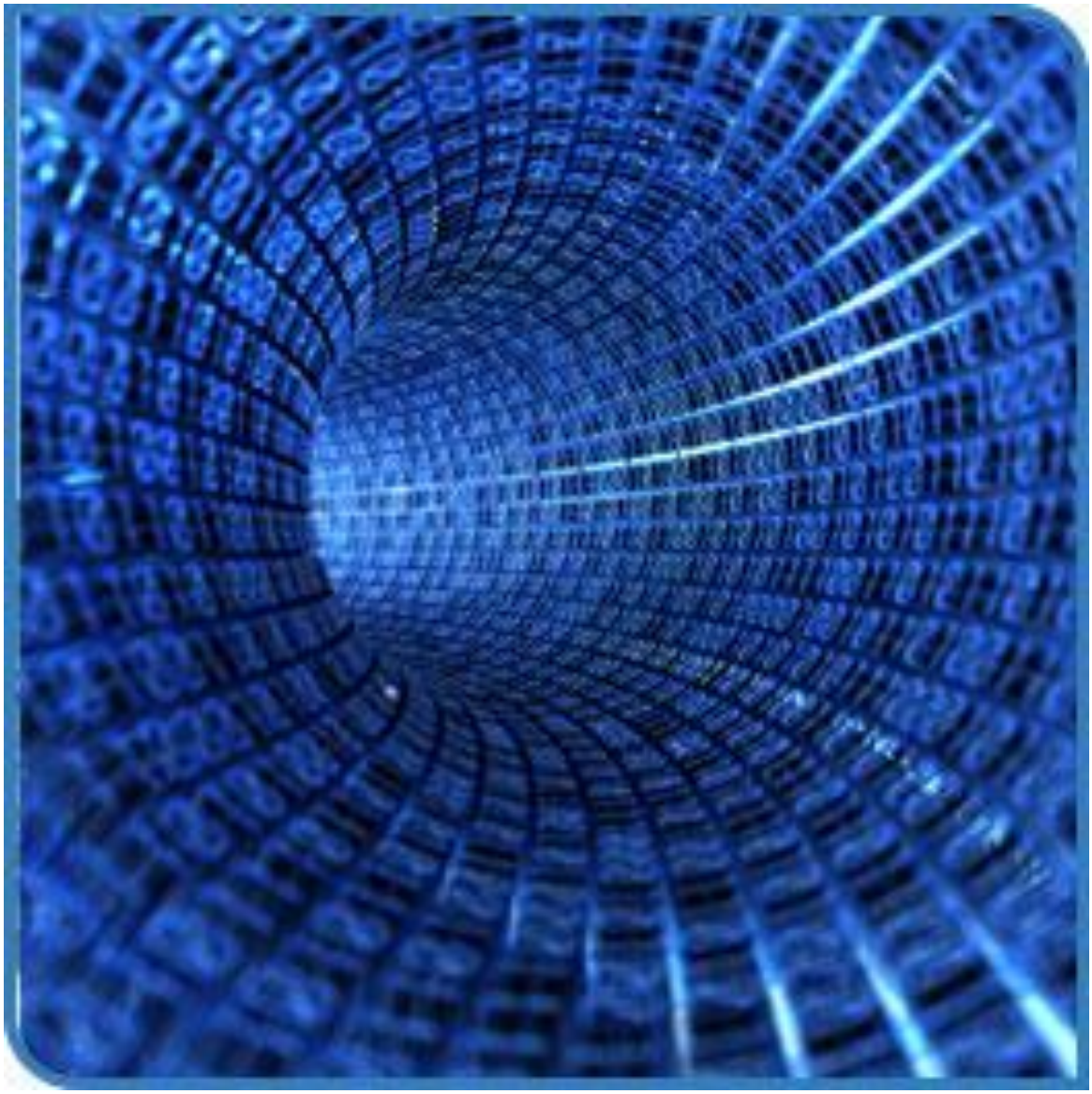
Parks and Recreation

Recreation sites, facilities, and open space are important components of Warren County's quality of life. Warren County has an excellent Parks and Recreation system. In 2006, the County adopted a Comprehensive Parks and Recreation Facilities Plan which provides a framework for implementing new programs and facilities. New community parks, playgrounds, and walking and biking trails are being established in the County. A variety of recreation programs are offered for residents, existing parks are being improved, and new parks are planned. To find out more information about our recreation programs, please visit the County's website at www.warrencountyva.net/parksandrecreation.html.



SECTION 2

The County and Communications Challenges



The County and Communications Challenges

Every forward thinking community seeks to advance the quality of life. Typically, these are in the general areas of residential housing, business and education. Citizens of a community seek basic needs or requirements to operate. Housing, utilities, sustenance, churches, education, free trade, access to employment, transportation and recreation are a few aspects that individuals look for in a community.

Warren County is a vibrant community. With the town of Front Royal, as the County Seat, is the center of business, trade, communications, education, finance, banking, and residential housing. Front Royal is surrounded by agricultural villages that make up the majority of the County.

As the advent of Interstate Highways and the building of I-66 and I-81 and the improvement of State Highways, Warren County has become a business center by design and location. With business comes retail and residential growth. The placement of the Virginia Inland Port north of Front Royal provides an international hub for collection and distribution of goods.

Following these and many more successes for the Town of Front Royal and the County of Warren, utility infrastructure upgrades and growth of existing utilities have been a challenge. Electrical supply and distribution is a constant project.

The Communications Evolution to "Revolution"

Wire Based Networks

Communications have also become a continuing process of evolution. The demands for voice and the establishment of data requirements for the County have been unparalleled in Virginia. The center of communications for the Town and County begin in Front Royal and expand to the boundaries of the County. The major telephony service provider is CenturyLink. This company is an Incumbent Loop Exchange Carrier or ILEC. CenturyLink serves approximately 80% of the geographical area of the County, with Verizon, also an ILEC, serving the remaining 20%. The current service is provisioned from the Stephens City Central Office in Frederick County.

The evolution of the telephony service in Warren County is not unique to many counties in Virginia. As the deregulation of wire-based telephony service has been the order of the day for the last 30 years, many counties are served with a major Loop Exchange Carrier such as Verizon, ConTel, ShenTel and smaller based telephone cooperatives handling the residual part of the geographic area.

In the case in Warren County, ConTel d.b.a CenturyLink is the primary provider of voice and data, with Verizon being the smaller or residual geographic provider. CenturyLink offers broadband products and services for residential, business and educational facilities. These

services range from simple DSL (Digital Subscriber Loop) to advanced speeds on fiber optic loops.

In addition, the County cable franchise, Comcast d.b.a Xfinity, provides voice, data and entertainment in a countywide distribution plan. Xfinity also competes for business as well as residential subscribers.

The Virginia State Corporation Commission (SCC) and the Federal Communications Commission (FCC) at the state and federal levels respectively, support the philosophy of "market driven" networks. In the case in Warren County, the majority of the County is served by an Incumbent Loop Exchange Carrier (ILEC) or cable provider.

As stated earlier, the County has four (4) natural Quadrants:

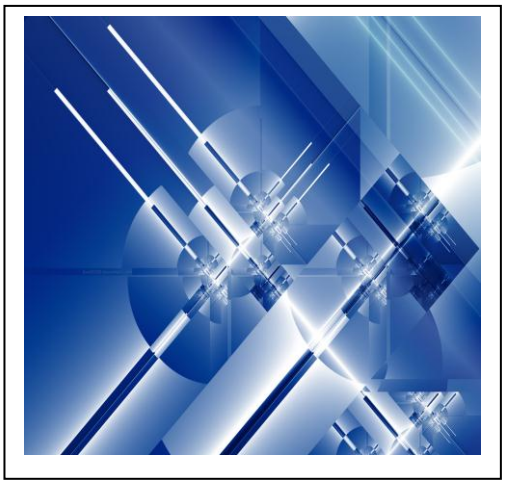
1. North/West Quadrant or Reliance Quadrant
2. North/East Quadrant or Howellsville Quadrant
3. South/East Quadrant or Browntown Quadrant
4. South/west Quadrant or Bethel Quadrant

However, in three (3) distinct areas or Quadrants (two in the northern tier and one in the southern tier) there are large and open gaps in broadband coverage. (See Map located on Page 92)

In Virginia, the SCC has deemed broadband as a non-regulated service, thus not requiring the term of Universal Service to all who seek. In the gap areas of the County served by Verizon, the geographic areas are served with basic voice service known as POTS, or Plain Old Telephone Service, that cannot be used with any success with the subscription of broadband. The cable distribution, electronics, and distance from the Central Office and low subscriber count make the area non-competitive for the typical deployment plan of an ILEC.

The "Revolution" ….Broadband: What is it?

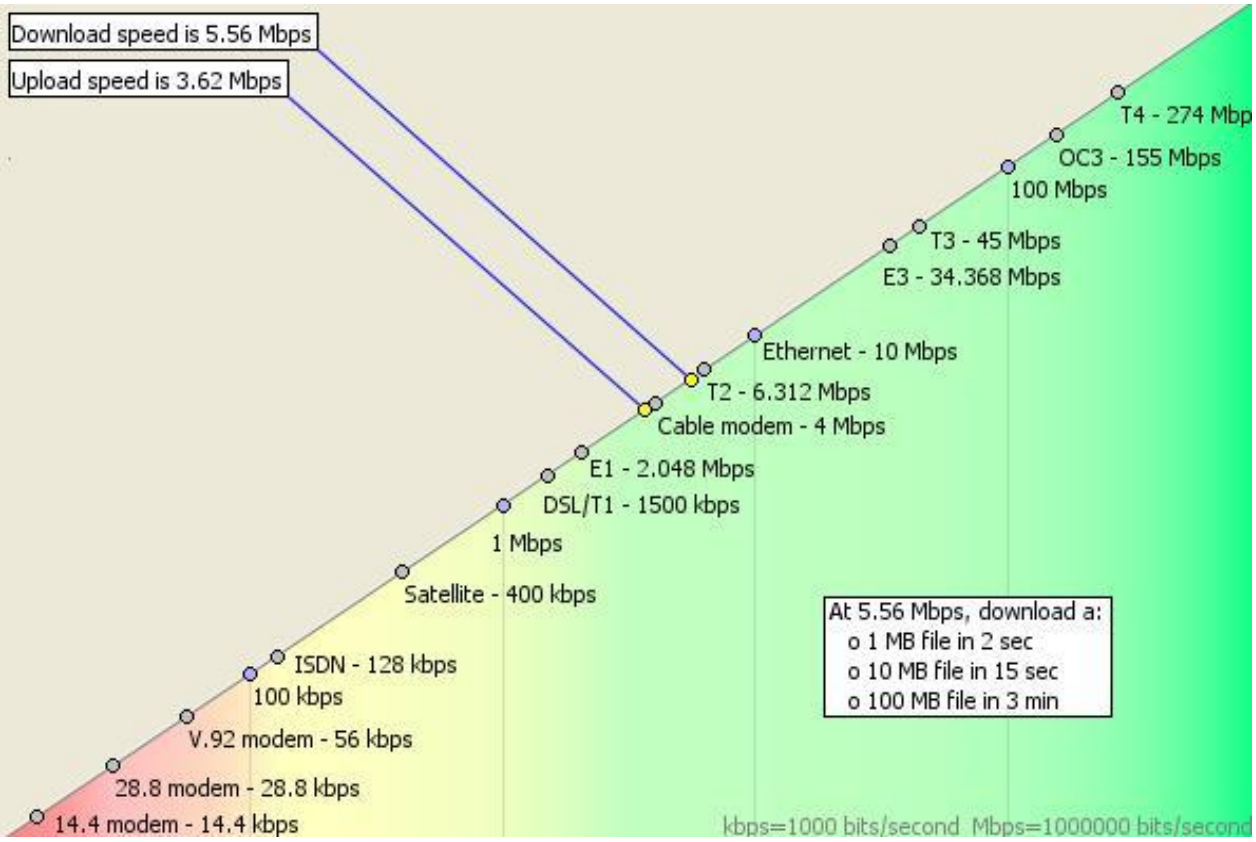
With demand for service to provide large bundles of data, full motion video, and quality sound, providers of these services must continue to evolve their network to meet market demand. Once a service achieves a specific speed and volume of data, the customers ask: "What more speed and volume can I have?" With this being the case, carriers always have the challenge of meeting the demands of customers.



What is the Basic Speed and data package that I can operate?

Residential service seems to be the basic level of service that users measure against for a "yard stick" of speed and efficiency (see Chart #1: Broadband Service Speeds). The basic DSL (Digital Subscriber Line) service ranges from a downlink or download of 5.56 Megabits per second (Mbps) and an upload or uplink of 3.62 Mbps. A subscriber can marginally operate at this band width.

Chart #1: Broadband Service Speeds



As you can see in the chart below, the evolution of remote dialing into an internet server has evolved from the old days of 14.4 Kbps of the 1990's. In the early 2000, satellite dish entertainment service providers such as HughsNet, DirecTV and Dish Network expanded their offerings to provide downlink service at 3 to 5 Mbps with an uplink over a POTS telephone line with speeds up to 56kbps. While this service is becoming better with deployment of more satellites, it would be mostly a first resort for most users of the internet. Downlink of full motion

video is excellent; however uplink is dependent on weather, satellite alignment and field strength leaving a potential service gap.

There are various data broadband networks that serve the entire gambit of residential, educational and business customers. Table #1 describes the basics of what these are in total. Some of the elements that affect what type of service you would seek include need, price point and timely service.

Table #1: Technology Transport References

Carrier Technology	Description	Speed	Physical Medium	Comments
Dial-up Access	On demand access using a modem and regular telephone line (POT)	2400 bps to 56 Kbps	Twisted pair (regular phone lines)	Cheap but slow compared with other technologies Speed may degrade due to the amount of line noise
Integrated Services Digital Network ISDN	Dedicated telephone line and router required	64 Kbps to 128 Kbps	Twisted pair	Not available everywhere but becoming more widespread. An ISDN line costs slightly more than a regular telephone line, but you get 2 phone lines from it 56K ISDN is much faster than a 56K dialup line
Cable	Special cable modem and cable line required	512 Kbps to 20 Mbps	Coaxial cable; in some cases telephone lines used for upstream requests	Must have existing cable access in area. Cost to bring service into an area and trenching cable can be prohibitive Networkable
ADSL/DSL Asymmetric Digital Subscriber Line (ADSL is the same as DSL)	This new technology uses the unused digital portion of a regular copper telephone line to transmit and receive information. ADSL is asymmetric since it *receives* at 6 to 8 Mbps per	128 Kbps to 8 Mbps	Twisted pair (used as a digital, broadband medium)	Doesn't interfere with normal telephone use Bandwidth is dedicated, not shared as with cable Bandwidth is affected by the distance from the network hubs.

	second but can only *send* data at 64 Kbps. A special modem and adapter card are required.			Must be within 5 km (3.1 miles) of telephone company switch. Limited availability Not networkable
Wireless (LMCS)	Access is gained by connection to a high speed cellular like local multipoint communications system (LMCS) network via wireless transmitter/receiver.	30 Mbps or more	Airwaves Requires outside antenna	Can be used for high speed data, broadcast TV and wireless telephone service
Broadband over Power (BPL)	Uses existing electrical infrastructure to deliver broadband speeds using BPL "modems"	500Kbps to 3Mbps	Ordinary power lines	Still an emerging technology, not widely available Significantly lower deployment costs than comparable technologies like DSL/Cable
Satellite	Newer versions have two-way satellite access, removing need for phone line In older versions, the computer sends request for information to an ISP via normal phone dial-up communications and data is returned via high speed satellite to rooftop dish, which relays it to the computer via a decoder box.	6 Mbps or more	Airwaves Requires outside antenna.	Bandwidth is not shared Satellite companies are set to join the fray soon which could lead to integrated TV and Internet service using the same equipment and WebTV like integrated services Latency is typically high Some connections require an existing Internet service account. Setup fees can range from $500-$1000.
Frame Relay	Provides a type of "party line" connection to the Internet. Requires a FRAD (Frame Relay Access Device) similar to a modem, or a DSU/CSU.	56 Kbps to 1.544 Mbps (or more, depending on connection type)	Various	May cost less than ISDN in some locations. Limited availability. Uses one of the connection types below, fractional up to OC3

Fractional T1 (Flexible DS1) .	Only a portion of the 23 channels available in a T1 line is actually used	64 Kbps to 1.544 Mbps	Twisted-pair or coaxial cable	Cheaper than a full T1 line with growth options of 56 Kbps or 64 Kbps increments as required.
T1	Special lines and equipment (DSU/CSU and router) required.	1.544 Mbps	Twisted-pair, coaxial cable, or optical fiber	Typically used for high bandwidth demands such as videoconferencing and heavy graphic file transfers. Minimum for large businesses and ISPs. Expensive
T3	Typically used for ISP to Internet infrastructure.	44.736 Mbps	Optical fiber	Typically used in large business solutions
OC-1	Typically used for ISP to Internet infrastructure within Internet infrastructure.	51.84 Mbps	Optical fiber	Typically used in large business solutions
OC-3	Typically used for large company backbone or Internet backbone.	155.52 Mbps	Optical fiber	Typically used in large business solutions

Geographic Identification of Warren County Areas

To identify larger geographic areas of the county, the consultant divided the County into four (4) geographic areas, called Quadrants.

The areas were divided in the x-axis using Rt. 340/522 and the y-axis using I-66.

The Quadrants were named:

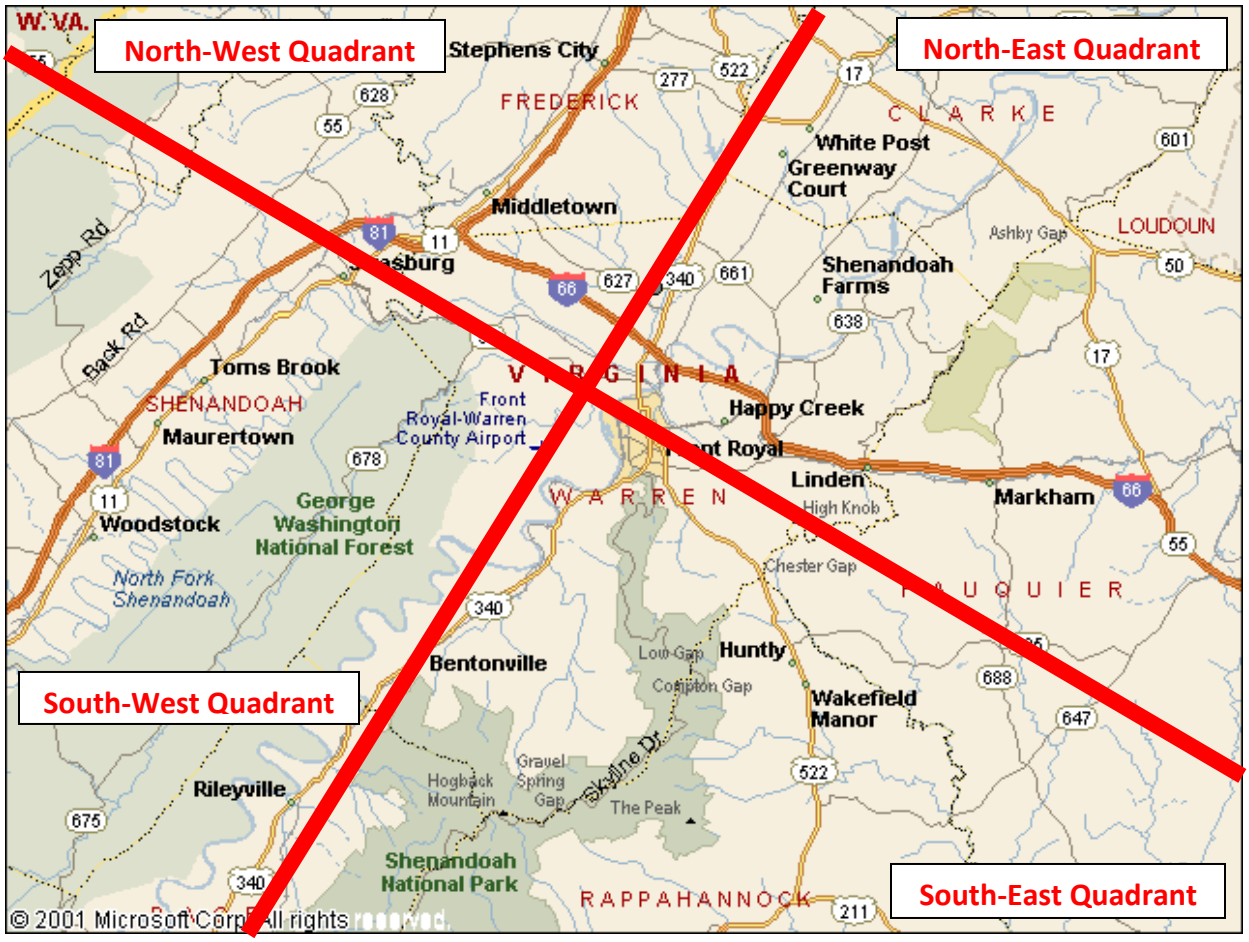
-North-West/Reliance Road Quadrant

-North-East/Howellsville Quadrant

-South-West/Bethel Quadrant

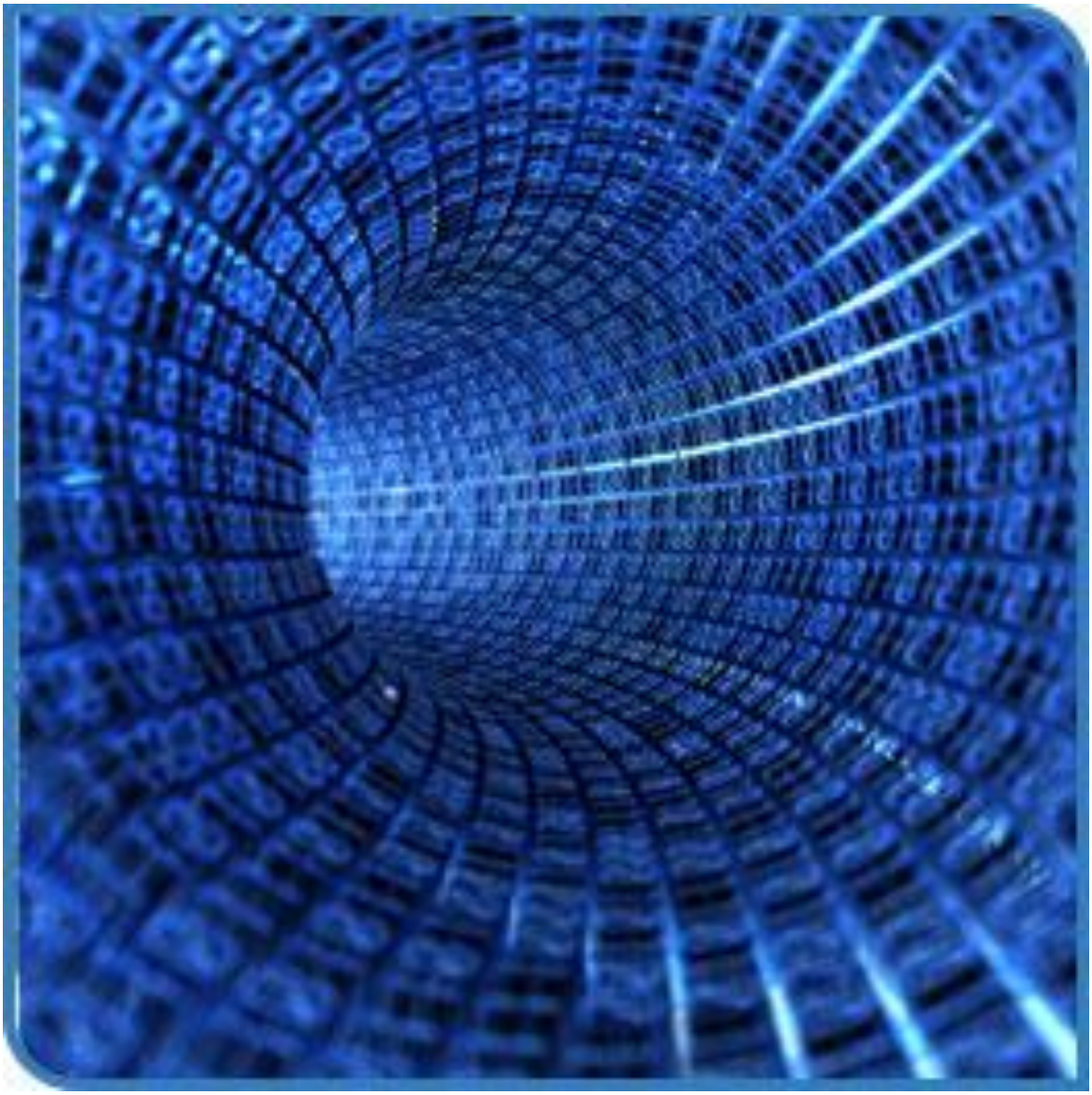
-South-East/Browntown-Bentonville Quadrant

Chart #2: Quadrants of Warren County



SECTION 3

Project Goals and Objectives



Project Goals and Objectives

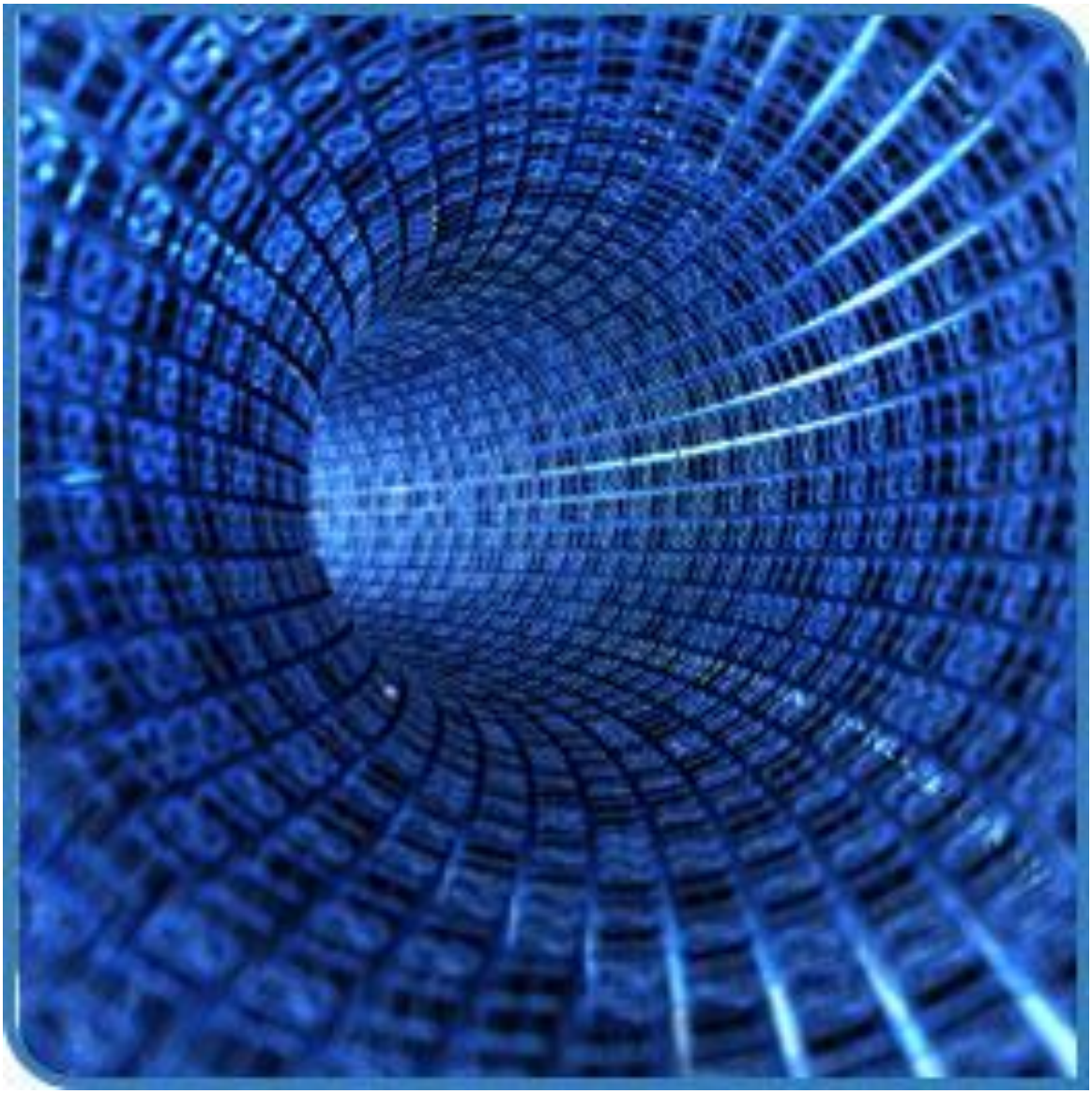
1. **Goals**
    a. **Residential**
        i. Seek that all residential homes have the ability to have at a minimal one (1) provider of broadband service at DSL speed.
        ii. All residents have informational access to the cost and service availability of broadband service(s) in their area.
        iii. Seek that all residents have access to the required hardware to facilitate broadband.
    b. **Business**
        i. Seek that all certified Small Businesses have access to a broadband provider(s) and service speed(s).
        ii. Encourage more for full motion teleconferencing by providing use of County teleconferencing facilities at availability and cost to Minority/Disadvantaged and Women Owned Business.
        iii. Promote Broadband services for one (1) year to all Minority/Disadvantaged/Women owned businesses that currently do not have access to broadband service.
    c. **Government/Schools**
        i. Encourage Home Based Distance Learning at the elementary, middle, high school and college levels for all students.
        ii. Seek to provide opportunities for low income students have access to broadband service for educational purposes off campus.
        iii. Seek to provide for the facilitation of all public school students to be able to access "Live" on-line instruction during inclement weather when the schools are closed.
2. **Objectives**
    a. Seek to have 100% broadband deployment to all homes and business within three to five (3-5) years.
    b. As faster technologies evolve, service providers may supply these solutions of their networks on the Broadband Page of the Warren County's Government web site thirty (30) days prior to launch.
    c. Greater infrastructure with the addition of ten (10) (Communications towers) for wireless based networks based on 2012 inventory levels. Provide this information on the Warren County Government web site with locations of all communications towers.

d. Ensure all disadvantaged student homes (without adequate hardware) have the ability of access school databases, calendars, etc for school assignments within two (2) years.
e. Have annual "Broadband Summits" with providers to see what road blocks may exist and seek to overcome them.
f. Provide mapped locations of fiber-optic lines in a Countywide GIS map hosted on the Warren County Government web site with color codes to indicate service areas within one (1) year.
g. Encourage home based, minority/disadvantaged, women owned businesses to self identify themselves and seek to become a broadband subscriber for one (1) year after the service is technically possible.
h. Seek to facilitate tele-medicine applications for the homebound patients. Use Warren County Government web site with a hyperlink to local hospitals, clinics, and healthcare professionals for information.
i. Seek funding grants up to **$2,200,000 Total for wire based and wireless** broadband infrastructure contribution for engineering and material support.
j. Provide consulting advice to incumbent broadband providers while seeking new providers of broadband technology.

SECTION 4

Needs Analysis For

2012 Countywide Broadband and Technology



Simple Definition of Wired and Wireless Communications

Wired communication refers to the transmission of data over a wire-based communication technology. Examples include telephone networks, cable television or internet access and fiber-optic communication. Also waveguide (electromagnetism) used for high-power applications, is considered as wired line.

Wireless telecommunications is the transfer of information between two or more points that are not physically connected. Distances can be short, such as a few feet for television remote control, or as far as thousands or even millions of miles for deep-space radio communications. It encompasses various types of fixed, mobile, and portable two-way radios, cellular telephones, personal digital assistants (PDAs), and wireless networking. Other examples of wireless technology include GPS units, Garage door openers or garage doors, wireless computer mice, keyboards and Headset (audio), headphones, radio receivers, satellite television, broadcast television and cordless telephones.

These two definitions will begin our evaluation and discussion concerning Warren County.

Table #2: 2012 Broadband Provider Analysis for Warren County

WIRE BASED PROVIDERS

Provider	Market/Service	% of Broadband in Service Area
1. Verizon	18% ILEC service	0
2. CenturyLink	80% ILEC service	90+
3. ShenTel	<2% ILEC service	0
4. Xfinity	Cable Franchise	75

WIRELESS PROVIDERS

Provider	Current Technology Level	Next Generation (4G)
1. AT&T	Currently Operating at 3G	2013
2. Verizon	Currently Operating at 3G	2013
3. T-Mobile	Currently Operating at 3G	2014
4. Sprint/Nextel	Currently Operating at 3G	2014
5. ShenTel	Currently Operating at 3G	2014

SATELLITE PROVIDERS

Provider	Advertising	Local Franchise
1. Dish Network	Market Penetrated in Rural Areas	Yes
2. HughsNet	Market Penetrated in Rural Areas	Yes
3. DirecTVMarket	Penetrated in Rural Areas	Yes
4. MyBlueDish	New Service to Area	No

POINT TO MULTI-POINT PROVIDERS (SPREAD SPECTRUM)

Provider	Service in County	Coverage
1. Visual Link	Yes	Limited
2. Winchester Wireless	Yes	Limited

DISTRIBUTIVE ANTENNAE SYSTEMS

No Known Provider in County

Underserved Areas of Warren County

1. North-East Quadrant: Howellsville

a. **Community Description:** The Howellsville Community is located in the northeast part of Warren County. It is comprised of approximately 250 homes and several small businesses.

b. **Current Providers:**

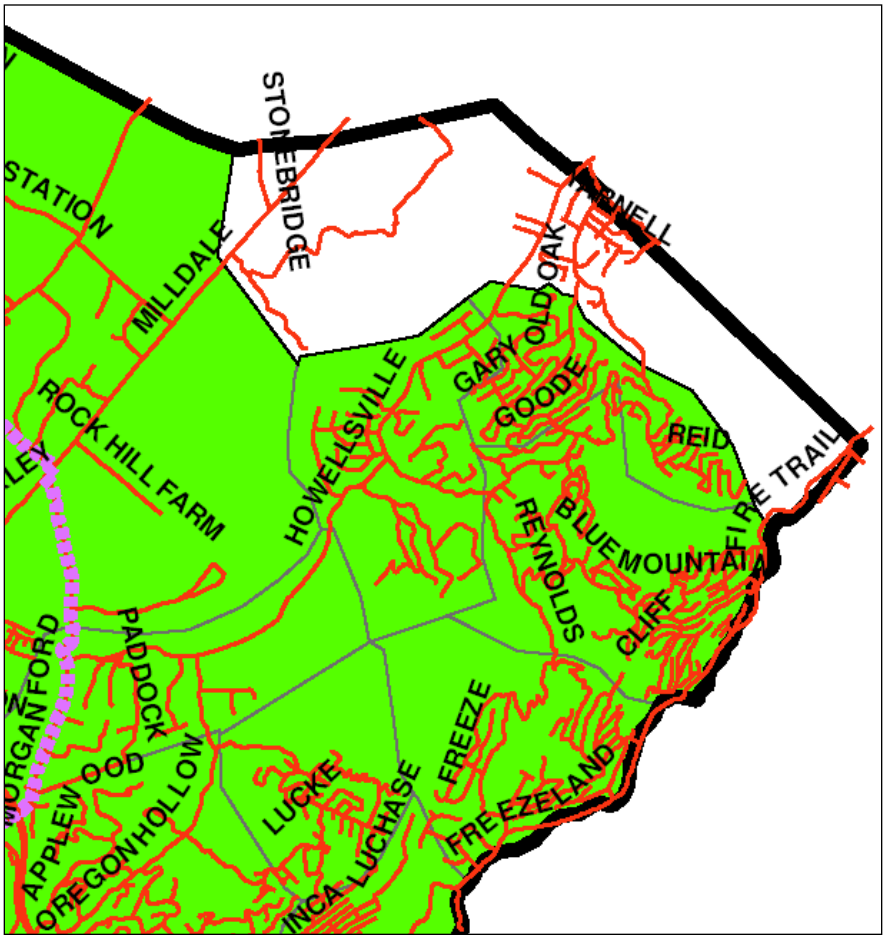
   i. **Verizon** is the service provider for this area and is the second smallest Loop Exchange Carrier operating within Warren County. The Verizon network is a Plan Old Telephone System or POTS in telephony terms. The ***North-East Quadrant-Howellsville*** is served from the Paris Central Office in Fauquier County. The location of this community is greater than 8 miles from the Central Office switch. Because of this distance and the area feed by twisted pair copper, Verizon would require significant investment in electronic switching, fiber optic placement and distribution cable to service this community. In summary, this network is old and obsolete and would require total replacement. *Verizon has stated for the record it does not have any plans to upgrade and invest in this area.*

   ii. **Comcast/Xfinity** the county cable franchise currently serves portions of the Howellsville Community, but does not serve a very large geographic area. This area would require upgrade of joint use poles as well as the burying of cable, both copper and fiber.

   iii. **CenturyLink** serves to the boundary of what was known at one time as the Wire Center boundary. This service stops abruptly on Howellsville Road approximately ½ mile from the County border.

c. **Assessment for Potential Broadband Service:** This area "Gap in Service" has the best chance of success by either **CenturyLink** or **Comcast** expanding or upgrading their respective services.

Chart #3: North-East Quadrant: Howellsville Community



Geographic Area Served with Broadband

2. *North-West Quadrant: Reliance Community*

a. **Community Description:** The Reliance Community is located in the northwest part of Warren County. It is bordered by Reliance Road, I-66, and VA -55 as the southern boundary. The Community is rather large in geographic area and fiber distribution would need to be planned for the largest number of subscribers. *In addition, the Joint Use Attachment Poles know as the "telephone poles" are approximately 50 years old and will not hold from a space and structural loading aspect. This may result in approximately 50 to 100 poles needing to be replaced.*

b. **Current Providers:**

   i. **Verizon** also serves as the Loop Exchange Carrier for the Reliance Community. This network is fed by a current switch from Stephens City in Fredrick County. This Central Office supplies the Regional Medical Center at US Rt. 11 and Reliance Road in Fredrick County. This hospital location has a Fiber Optical Remote switch that is estimated to have potential of growth for the Reliance Road corridor.

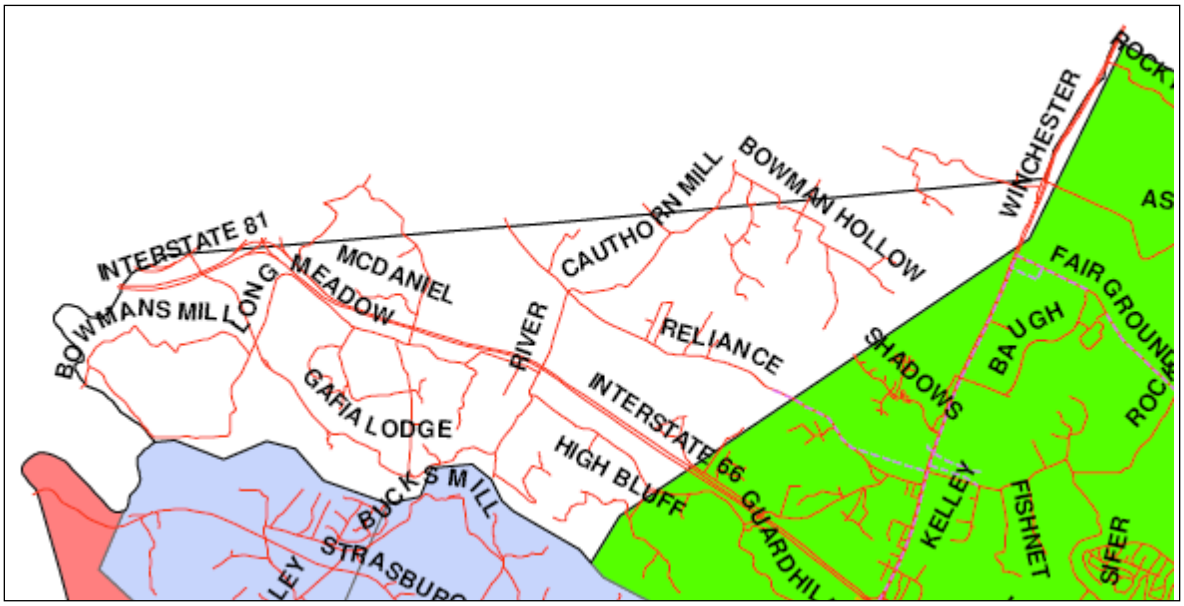
   ii. **CenturyLink** also serves the first 6.7 miles from the east (Rt. 340) Winchester Highway and moving Northwest toward the Intersection of US Rt. 11 and Reliance Road where the Regional Medical Center exists. CenturyLink could also expand its fiber network and add electronics to service this Reliance Road corridor and branches. The fiber optic cable would require burial as per CenturyLink practice in Warren County.

   iii. **Shenandoah Telephone Cooperative** also serves a very small area of subscribers with land line telecommunications services. ShenTel also has a problem with distance from Central Office and cable "plant" that could provide for broadband. The total subscribers that ShenTel serves in the area are approximately 50 homes.

   iv. **Comcast/Xfinity** the Franchised Cable provider also does not serve the entire area because of poor Shared use pole status. The local Cable provider in this area would typically serve the community via "aerial" cable. Pole replacement would also be required for this provider.

c. **Assessment for Potential Broadband Service:** This area "Gap in Service" has the best chance of success by **Verizon**, **CenturyLink** or **Comcast** expanding or upgrading their respective services.

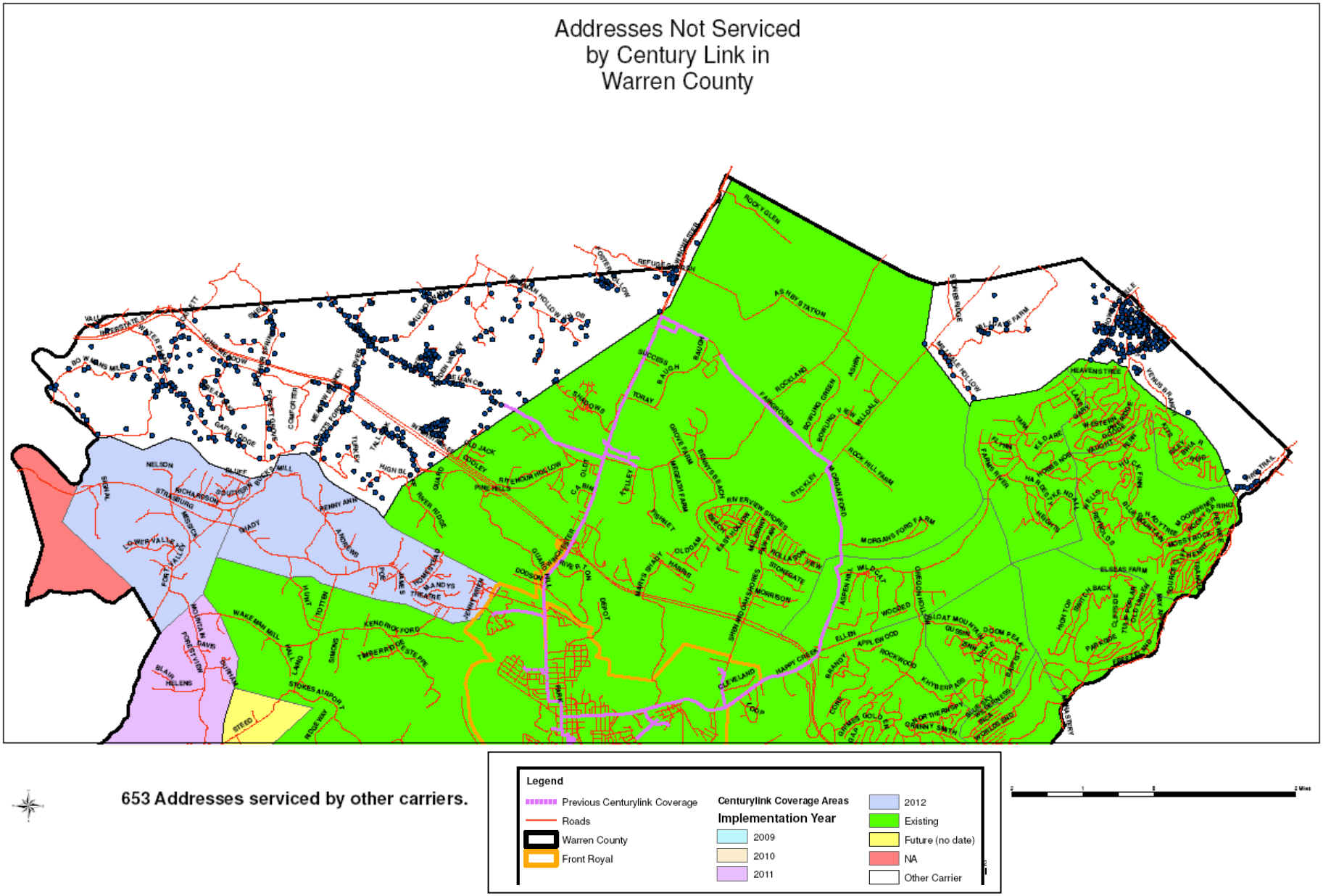
Chart #4: North-West Quadrant: Reliance Community



Geographic Area Served with Broadband

Un-Served Area

Chart # 5 Addresses Not Serviced in North-East & North-west Quadrants by CenturyLink



3. ***South-East Quadrant: Bentonville/Browntown Community:***

a. **Community Description:** The Bentonville/Browntown Community is located in the southeast part of Warren County and will be the most difficult quadrant to provide service to.

   The Browntown Community and north are the areas that have the most subscribers. Many of the surrounding secondary roads have large lots with very little density. Because many of the roads are gravel and have had very little improvement over the years, telephony service consists mostly of voice service. Commercial power serves the community but it also has issues with age and serviceability.

   It would be a major undertaking to replace all the poles in the area. The number would be in the hundreds. Placement of a buried, major fiber optic trunking route transverses the Rt. 340 Corridor from Page County. (See Chart #8.) This network is owned and operated by Virginia Broadband and its partners. This fiber route is a major trunking route between two major communications electronic nodes in Harrisonburg and Front Royal. This fiber can be tapped if an intermediate node was to be placed on the Rt. 340 corridor. This would only be accomplished if demand would be so great that they would be financially incented to do so with many subscriber lines.

b. **Current Providers:**
   i. **CenturyLink** currently severed from a voice telephony service in the specific area. As stated earlier, Browntown Road is the major transportation artery in that geographic area. The major feeder and distribution cabling is along that thoroughfare and branched off into several loops to address service reliability. This area has many small and unpaved roads with very limited "plant" for residential service. Wooden poles are outdated and many are in need of replacement. For CenturyLink to service this area, several miles of fiber optic cable (Approximately 10 miles) along with significant investment in equipment electronics and engineering of easements and right of ways would be required. This being said, there still would be residents up rural unpaved roads that would not be able to subscribe because of significant cost for cable and fiber optics.

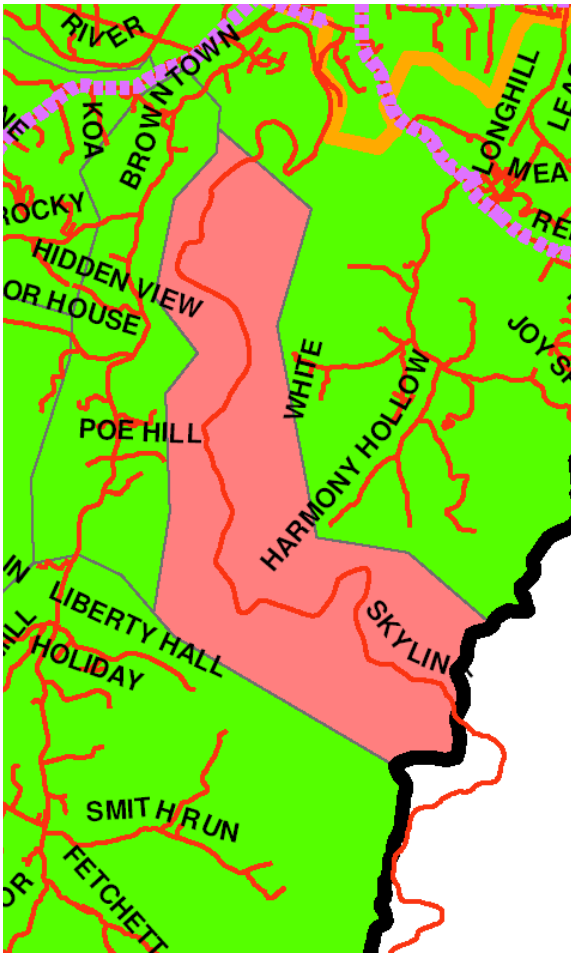
ii. **Comcast/Xfinity** also servers a rather large footprint in that area. (See Chart #6). The Comcast/Xfinity footprint is similar to that of CenturyLink. Comcast/Xfinity service feeds the edges of the geographic area, but the major thoroughfare, Browntown Road is left un-served. CenturyLink and Comcast do not serve this area because of the length and effort to engineer and install the required fiber optic "backbone" with electronics. The area is left as a "corridor" shaped service area. Both of these services (CenturyLink and Comcast) are fed from the Page County area to the south on VA Rt. 340 (See Chart #7).

c. Assessment for potential Broadband Service:

This area "Gap in Service" has the best opportunity of successful broadband deployment by wireless carriers with several wireless applications that the public could integrate into their broadband plans for service. There are several issues to provide this type of service that is outside of the typical fiber optic and electronic equipment solution. The challenges are:

1. Finding a willing property owner who would allow a 195' communications tower to be built.
2. Placement as per Warren County Comprehensive Plan.
3. Coverage for the geographic area sought.
4. "Backhaul" via microwave to several communications towers back to Page County.

Chart # 6: South-East Quadrant: Bentonville/Browntown Community:



Geographic Area Currently Served with Broadband

Geographic Area Un-served with Broad Band

Chart #7: Comcast/Xfinity & CenturyLink Service Fiber Optic Network

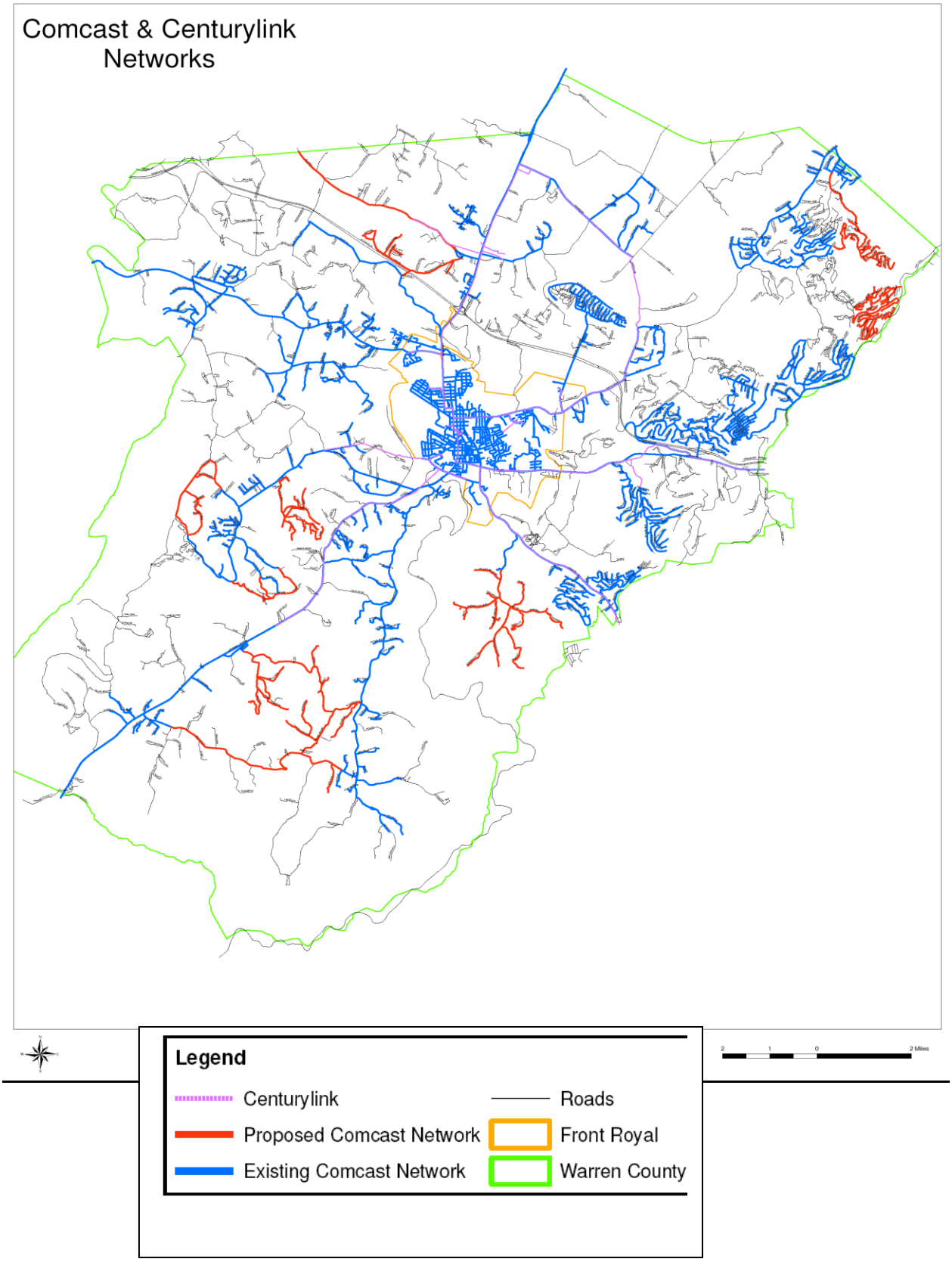


Chart #8: Major Interstate Fiber Optic Cable Supplying Warren County

LSO CLLI	Address	City
HRBGVAXA	105 Newman Ave	Harrisonburg
WNCHVAWC	120 N Braddock St	Winchester
FRRYVAXA	306 N Royal Ave	Front Royal
CHVLVAXA	417 W Main St	Charlottesville
LYBGVACH	706 Church St	Lynchburg

additional information on reverse...

Zayo POPs / Interconnects

Address	# of Demarcs	City
626 2nd St SW	1	Roanoke
Rt. 460, PO Box 20	1	Glen Lyn

additional information on reverse...

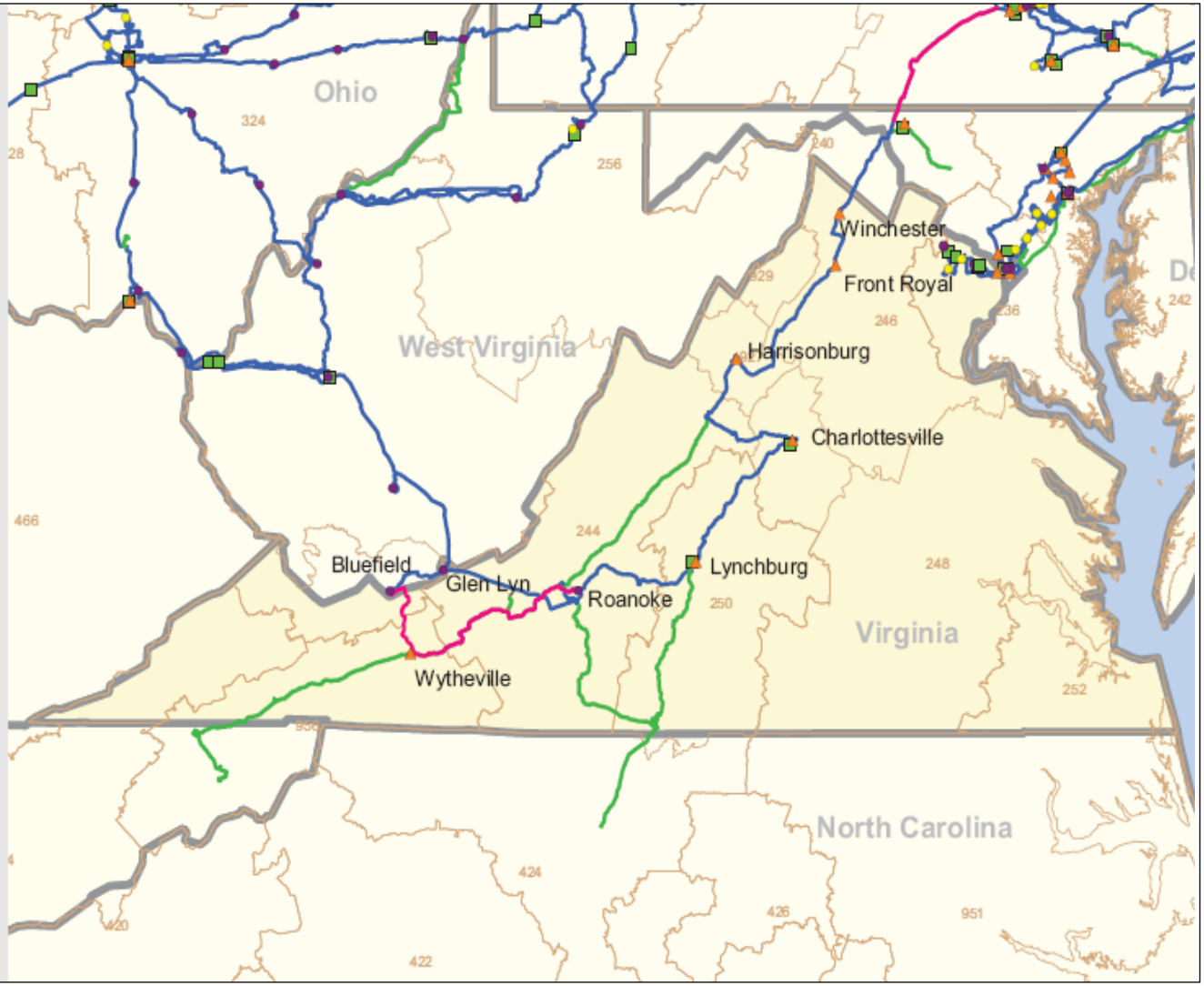
BUILDING STATS:

11 Total On-Net Buildings

- 6 On-Net LSOs
- 5 Interconnects*

LEGEND:

- = Zayo POP
- = Interconnects
- = ILEC LSO
- = Wireless MSC
- = Zayo Fiber
- = LATA Boundary
- = Dark Fiber
- = Under Deployment
- = State Border
- = Highways



Wireless Based Networks

The Wireless Revolution: Mobile Communications

The development of the wireless network has been a rather general one. The coverage objects evolved as follows:

- Where people travel
- Where people live
- Where people recreate
- Where people work

There are several carriers of wireless services that serve Warren County. Most of these are Land Mobile Radio or Cellular/PCS providers operating under FCC Radio License Requirements. They are Verizon, Cingular/AT&T, T-Mobile, ShenTel, and Sprint/Nextel. Warren County is part of the Winchester Basic Trading Area license authorization.

Each of these providers has deployed a network of transceivers that have evolved over the last 20 years. These are classified by generation as shown below:

1st Generation .....Analog format voice

2nd Generation .....Digital format voice and low data package

3rd Generation.....Digital format voice and data/internet access

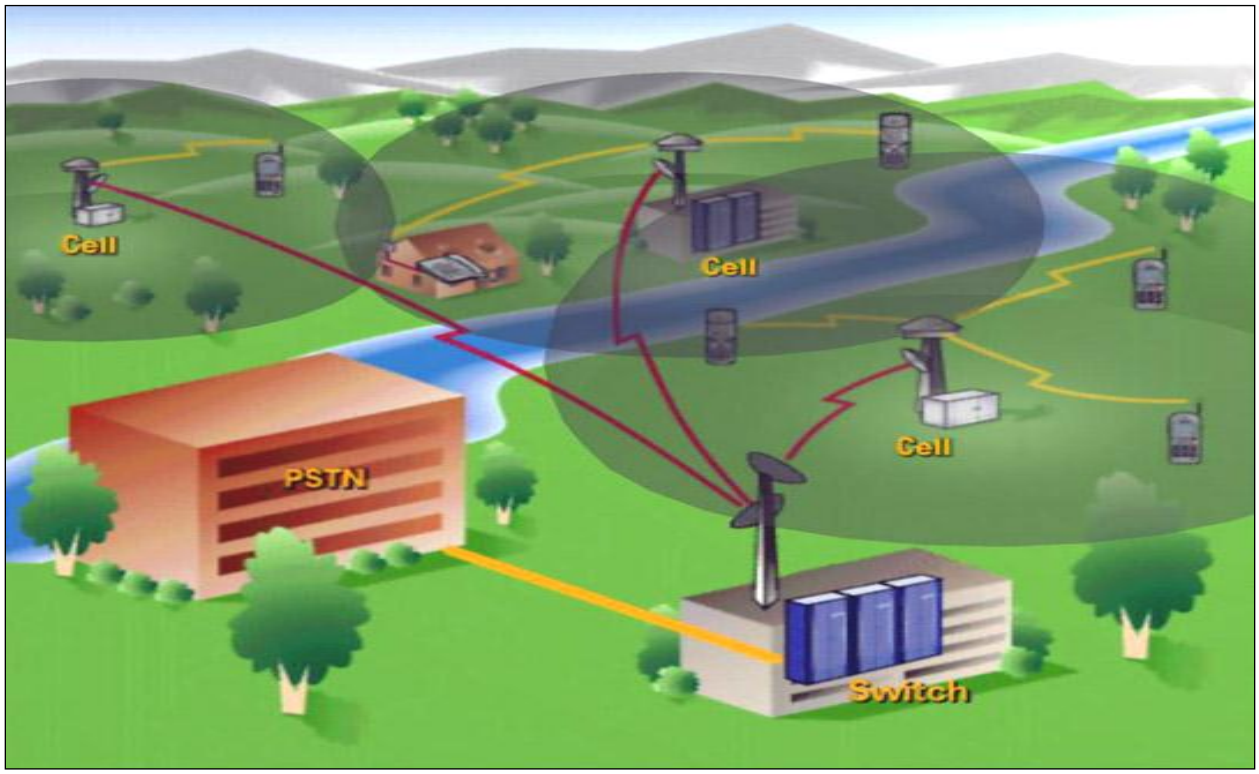
4th Generation.....Long Term Evolution digital format voice with broadband data speeds and bandwidth

With the digitization of the network, the strategy of providing greater bandwidth and Personal Digital Assistant (voice phones to Blackberry type of multiple use hand held devises) the placement of communications towers with access for voice and data antennas to be able to uplink and downlink have become critical for this medium to compete with the wire based networks.

Network Schematics:

The following schematic is an example of the typical cellular system for outside land-mobile radio.

Schematic #1

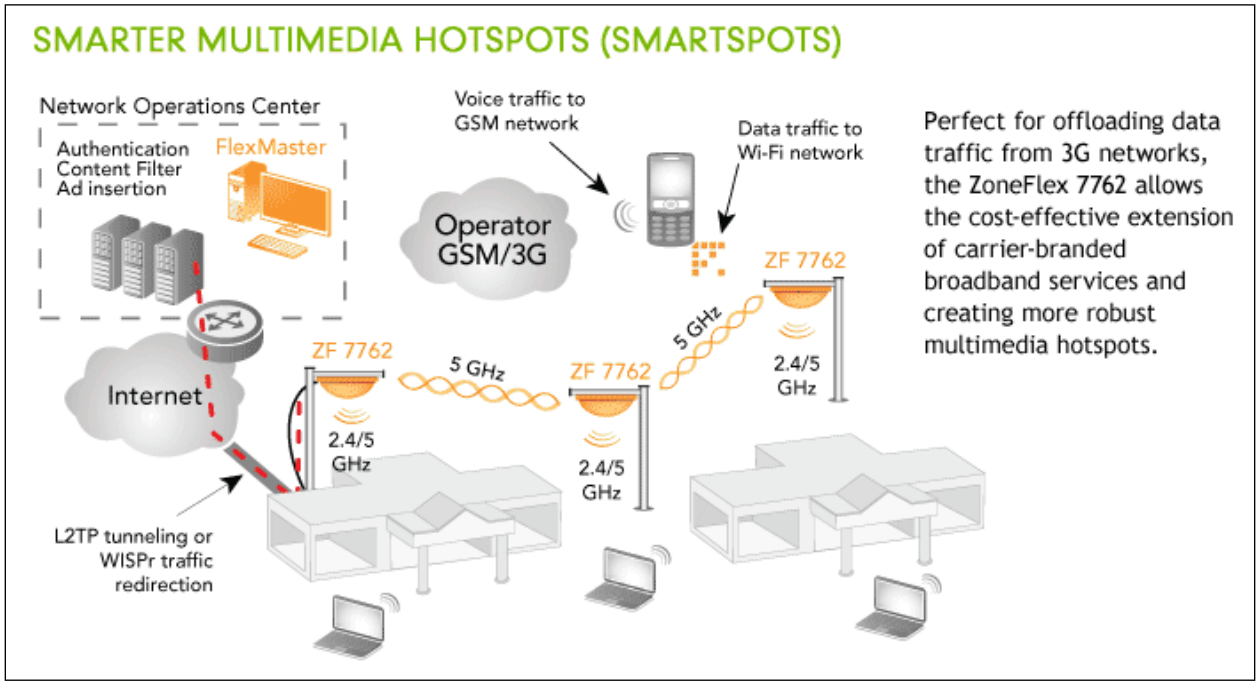


A call is generated from a cell phone as indicated in the upper left of the picture. The phone or PDA transmits a signal and is "voted" to the tower that has the best reception. The cell tower "captures" the call and transmits the conversation via microwave to a tower nearby that places the call into the telephone "switch" and then into a publically switched telephone network to seek the number dialed. The call will then be placed to a wire based number or back out to another cell phone using a active/passive signal technology to the receiving device. Simply put, the call is routed to the party sought in the number translation.

The wireless carriers such as Verizon and AT&T have developed several devices that will assist the mobile phone user to deploy 3G internet. These are known as Mobile Hot Spots. The devices that are in synchronization with the subscriber's phone which signal boost or amplifies the signal to assist in the signal strength and bandwidth to have a successful broadband connection. These are on the market today in 3G or 3rd Generation.

Schematic #2

Example of Hotspot/SmartSpot Deployment Over "PCS" Network



This example is reflective of a cellular or PCS wireless network that ***can be achieved today*** in Warren County if cell service is available and if computers are fixed with wireless antennas or cards to accept this signal.

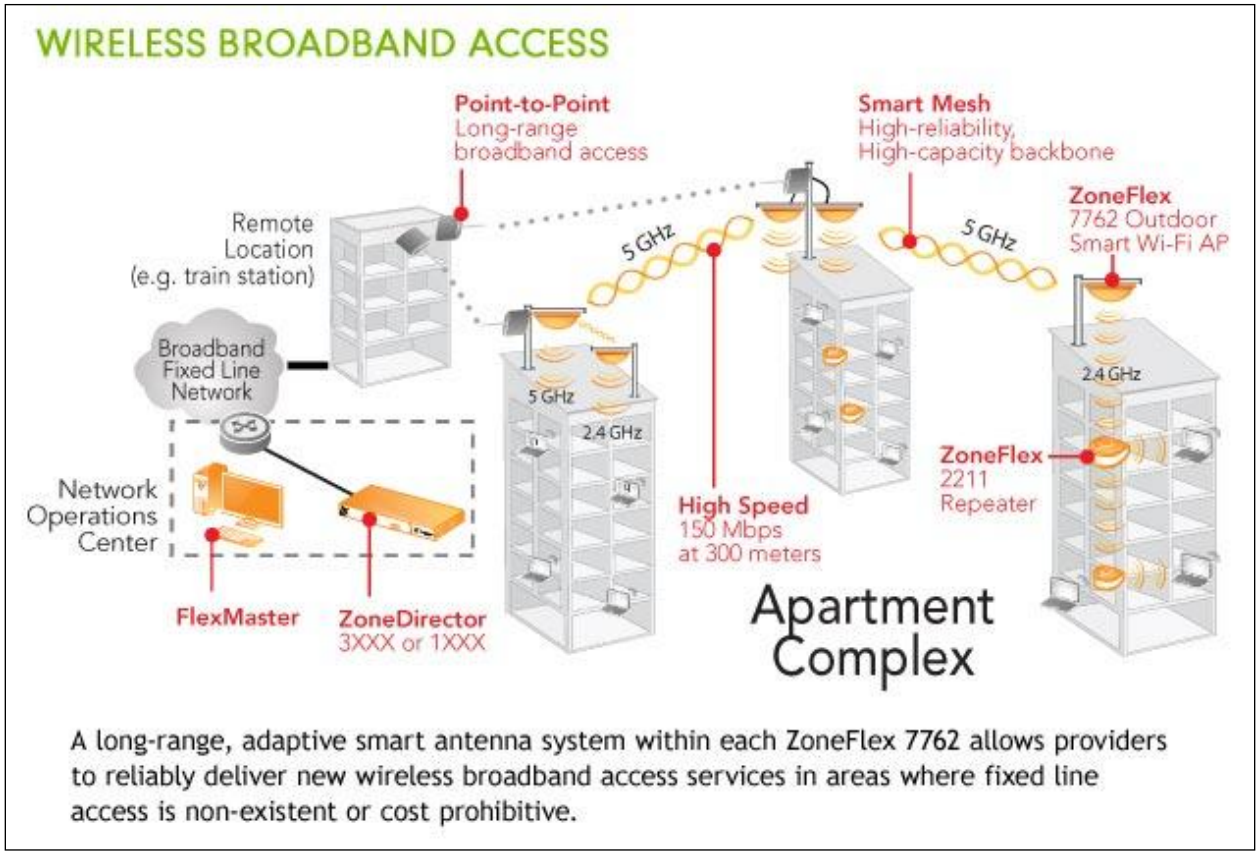
There are two major issues with this type of broadband access:

1. Location to the closest tower that your "host" carrier is on (AT&T, Verizon, Sprint etc.)
2. In building penetration of signal

Most of these systems require signal strength of -74dbm to be effective and not drop or cut out of the uplink or downlink. This type of service may work in rural areas such as those located in Warren County if the location is within 1.5 to 2 miles of a tower.

Schematic #3

Point to Point or Spread Spectrum Broadband



The simple explanation for this type of service is to provide broadband speed and bandwidth in an urbanized type of setting such as apartment complex, village, college campus or small lot subdivisions. Typical speeds are up to 10 Mbps. There are several small companies located in Frederick and Loudon Counties that provide this service. The subscriber equipment is of low cost and the base transmit and receive units must be tied into the high speed telephony network at some point to gain access to the World Wide Web.

Wireless Coverage Analysis and Map for Warren County

The following propagation chart is a composite map of the Land Mobile Wireless carriers that will be deploying the 4-G networks over the next several years. The areas shown in yellow represent the current PCS/Cellular coverage for Warren County. The areas shown in white represent places in which PCS/Cellular coverage is unreliable.

The results of this coverage gave excellent coverage to the center of Front Royal and the immediate area along the highly trafficked arteries; however, it left rather large gaps in the geographic areas to the northeast, northwest, and to the south.

WIRELESS SERVICE ANALYSIS:

Provider	Current Technology Level	Next Generation (4G)
1. AT&T	Currently Operating at 3G	2013
2. Verizon	Currently Operating at 3G	2013
3. T-Mobile	Currently Operating at 3G	2014
4. Sprint/Nextel	Currently Operating at 3G	2014
5. ShenTel	Currently Operating at 3G	2014

WIRELESS TOWER INFRASTRUCTURE: See Charts #10 and #18

Towers..... 35
Structures (Power Line Tower) 20
Total Number of Tower Infrastructure 55

Tower Infrastructure Shortage Identification

In 2007, Warren County studied the wireless service produced from Cellular companies operating Land-Mobile–Radio systems. This study looked at the existing wireless tower facilities, technology trends, and public usage. As a result of this study, several definite needs were identified. These needs are still valid today.

They are:

1. Significant gaps in wireless service exist. Ten (10) identified.
2. While the majority of the communications traffic is outdoors and typically Voice service, stationary data service for internet access will be required.
3. For Enhanced Services such as Broadband, significant electronic equipment in the wireless network along with fiber-optic infrastructure will be required to “back-haul” the signals to the telephony network.
4. Usage is growing at rates of 20 to 40% annually.

Study Results

As a result in the Wireless Study, it was determined that the following recommendations.

They are:

1. That the County adopts the Wireless Study and the siting and design criteria for the County Comprehensive Plan.
2. The County addresses the ten (10) significant holes in service by allowing ten (10) 195' communications Towers to be built approximately in a 1 mile radius from the Planed location.
3. Future Communication tower applications will be evaluated by a competent third party to ensure the location, need, and advancement of wireless services are met.
4. Work to ensure that the Warren County citizen as well as its guests have wireless services that keep pace with the technology deployment.

Note:

It is estimated that it would take ten (10) communications towers at 195' Above Ground Level to provide coverage for all Wireless Service Gaps countywide.

Status of Wireless Service for Warren County- 2012

Warren County as stated earlier has several wireless carriers (such as AT&T Wireless, Verizon Wireless, etc) that have FCC licenses to broadcast and operate a network. These carriers are in the process of converting from third generation or 3G level of digital service to forth generation or 4G service. This conversion is happening now with antenna upgrades etc. From the earlier mentioned Wireless Study, there are several significant areas that wireless does and will not cover until a tower facility is built.

By coincidence, the three Quadrants, North-West–Reliance, North-East-Howellsville and South-East-Browntown/Bentonville also have significant gaps in wireless as well as wire based Broadband.

While the wireless providers can eventually build-out the North-West/Reliance and North-East/Howellsville, the South-East/Browntown-Bentonville Quadrant has the best solution as a wireless network while the previous two quadrants, North-West/Reliance and North-East/Howellsville would be better and quicker served by a wire-based cable deployment.

Point-to-Multi Point

While large providers such as Verizon Wireless and AT&T Wireless are in the process of upgrading their respective networks, the alternative technology is the Point-to-Multi Point or Spread Spectrum as a realistic solution. These networks offer the Bandwidth and Speed and are engineered more for "fixed" devices such as laptops and PDAs in a residential environment.

There are several providers in the area, but their major obstacle is that of communication tower space and market penetration. The equipment required to provide this service at the subscriber end, while not very complicated, it is new to the area and new to the customer base. These firms, several based within a short drive from Warren County, could and will serve areas that have a concentration of potential subscribers, but would hesitate to deploy expensive equipment to serve less than a handful of subscribers.

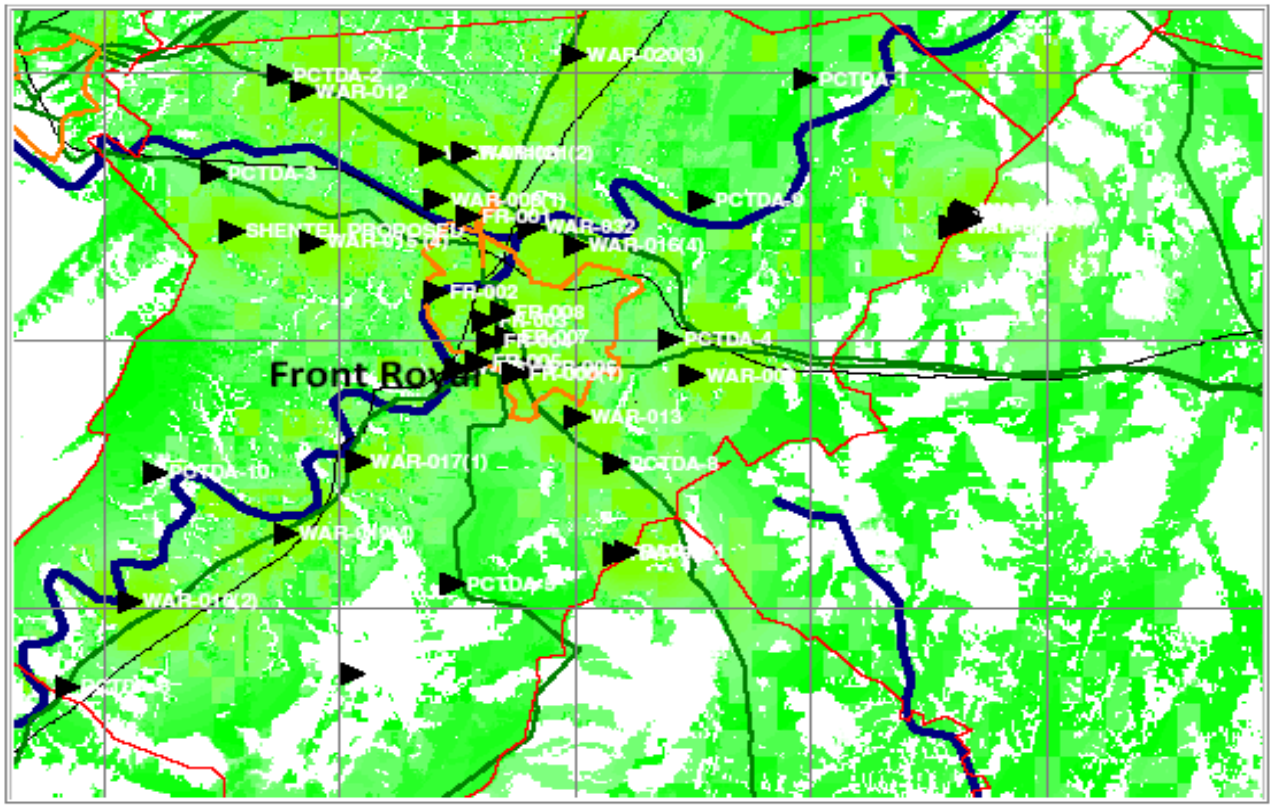
It is the collective thinking of many that the steps to serve the open gaps will be:

1. Build a communications tower.
2. Microwave System to Co-locate on tower.
3. Major wireless carriers such as Verizon Wireless and AT&T Wireless will co-locate on this tower.
4. The smaller Point-to-Multi Point providers co-locate on tower.

In summary, the Point -to- Multi-Point providers will be many of the later parties to occupy and serve an area and therefore cannot be counted on to serve immediately due to lack of infrastructure.

Chart #9: Wireless Coverage for Warren County

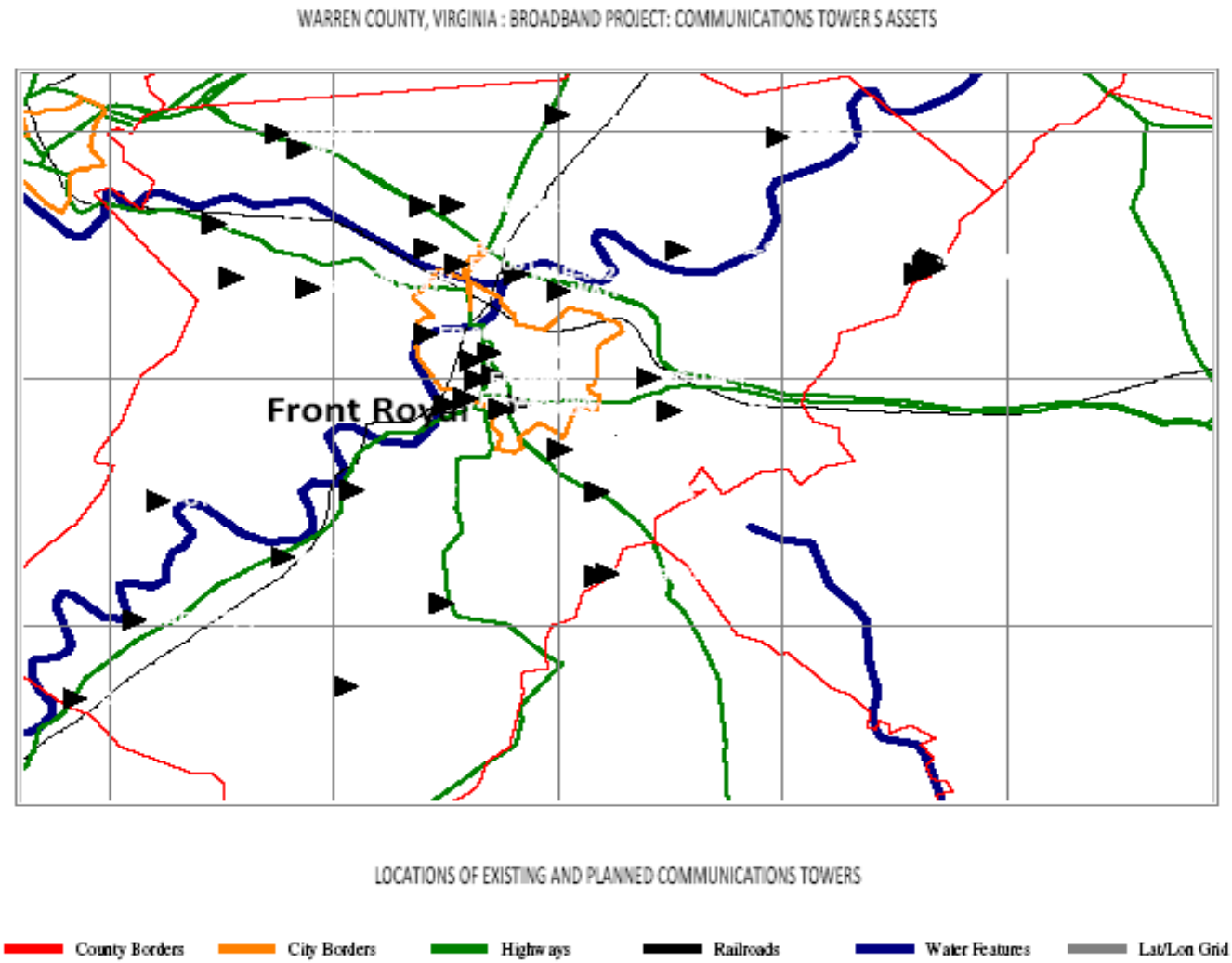
WARREN COUNTY, VIRGINIA : BROADBAND PROJECT: COMMUNICATIONS TOWER S ASSETS

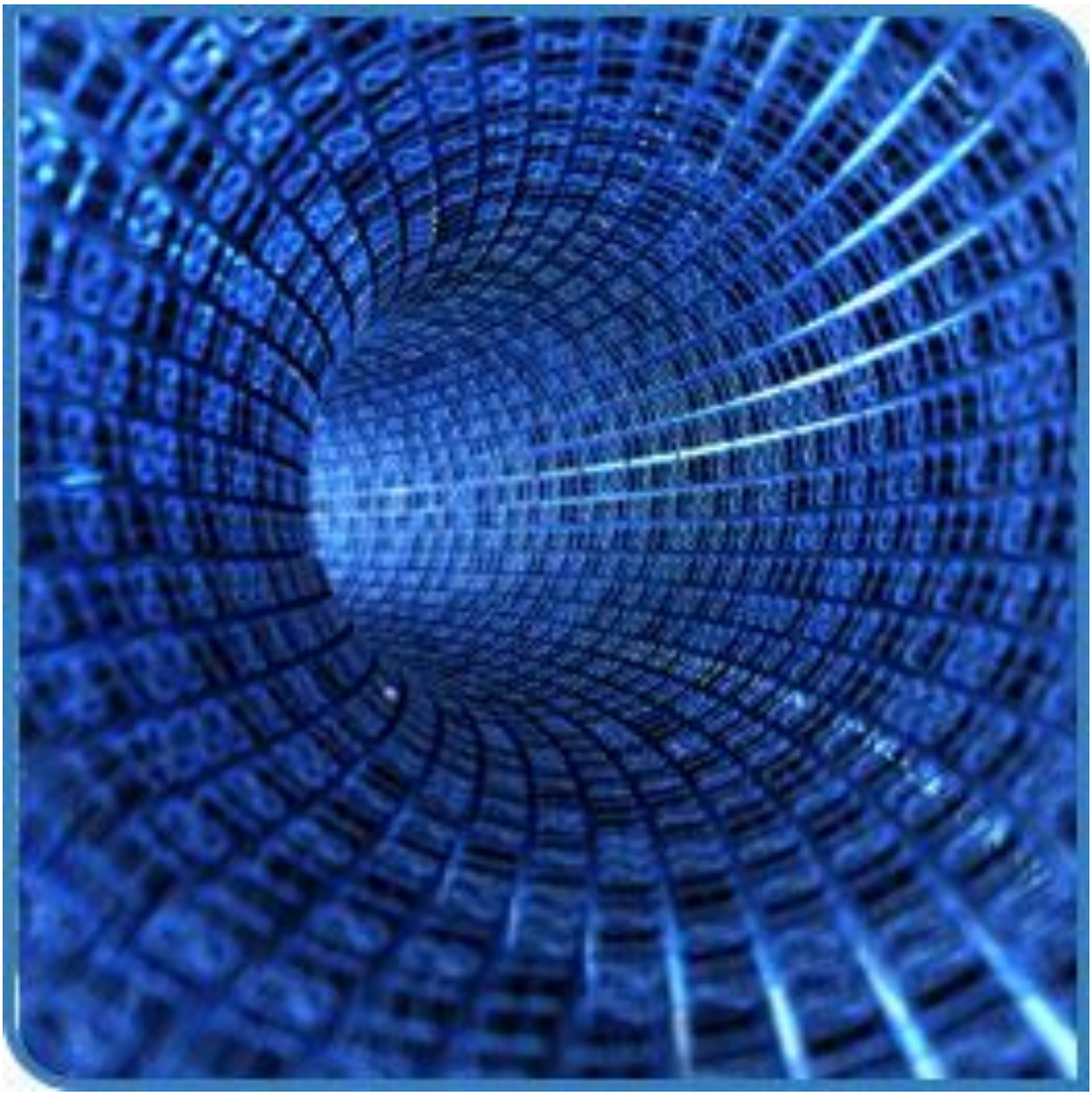


4-G SERVICE FOR EXISTING COMMUNICATIONS TOWERS

County Borders | City Borders | Highways | Railroads | Water Features | Lat/Lon Grid

Chart #10: Locations of Communications Tower and Structures





State of Service Assessment

Market Sectors having Broadband Service "Opportunity"

Residential (See Chart #14)

Suburban.....90%

Rural.....70%

Note: Lack of Fiber Feeder Cables into rural areas such as Reliance Road and Browntown areas.

Business (See Chart #11)

Small Business.....70%

Large Business.....100%

Note: Same as above in several rural areas where small businesses are located.

Education

Municipal/Schools.....100%

Infrastructure Deployment (See Chart #12 and 13)

Cable Provisioning

Copper/Coax ..... Adequate to meet needs for Distribution

Fiber Optic..... Inadequate to meet the needs for Feeder

Note: Requires approximately 50 miles of fiber in total of all three (3) Quadrants.

Chart #11: 2009-2011 Zoning Certificates for Home Based Businesses

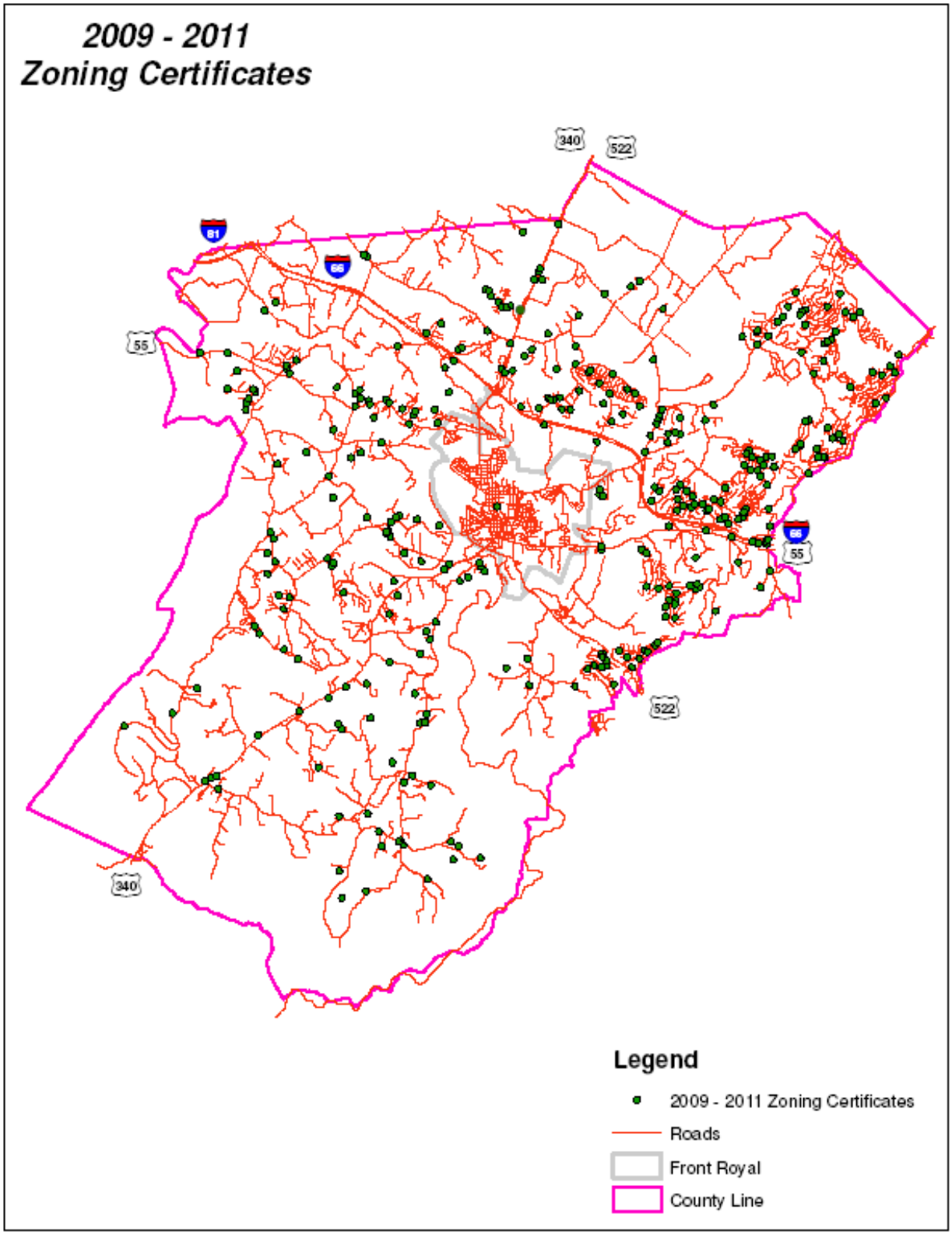


Chart #12: CenturyLink Coverage in Warren County

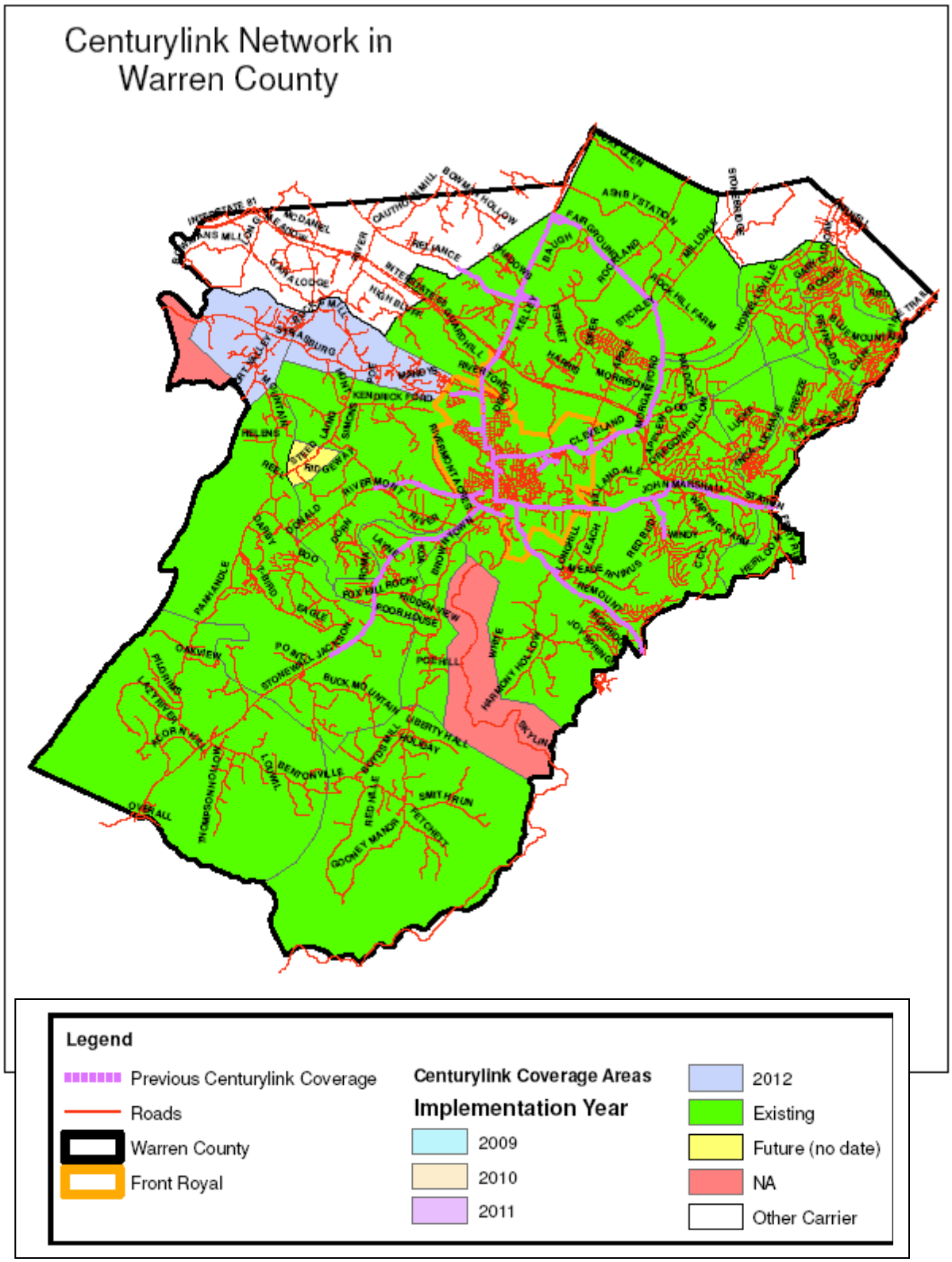


Chart #13: CenturyLink and Comcast Networks in Warren County

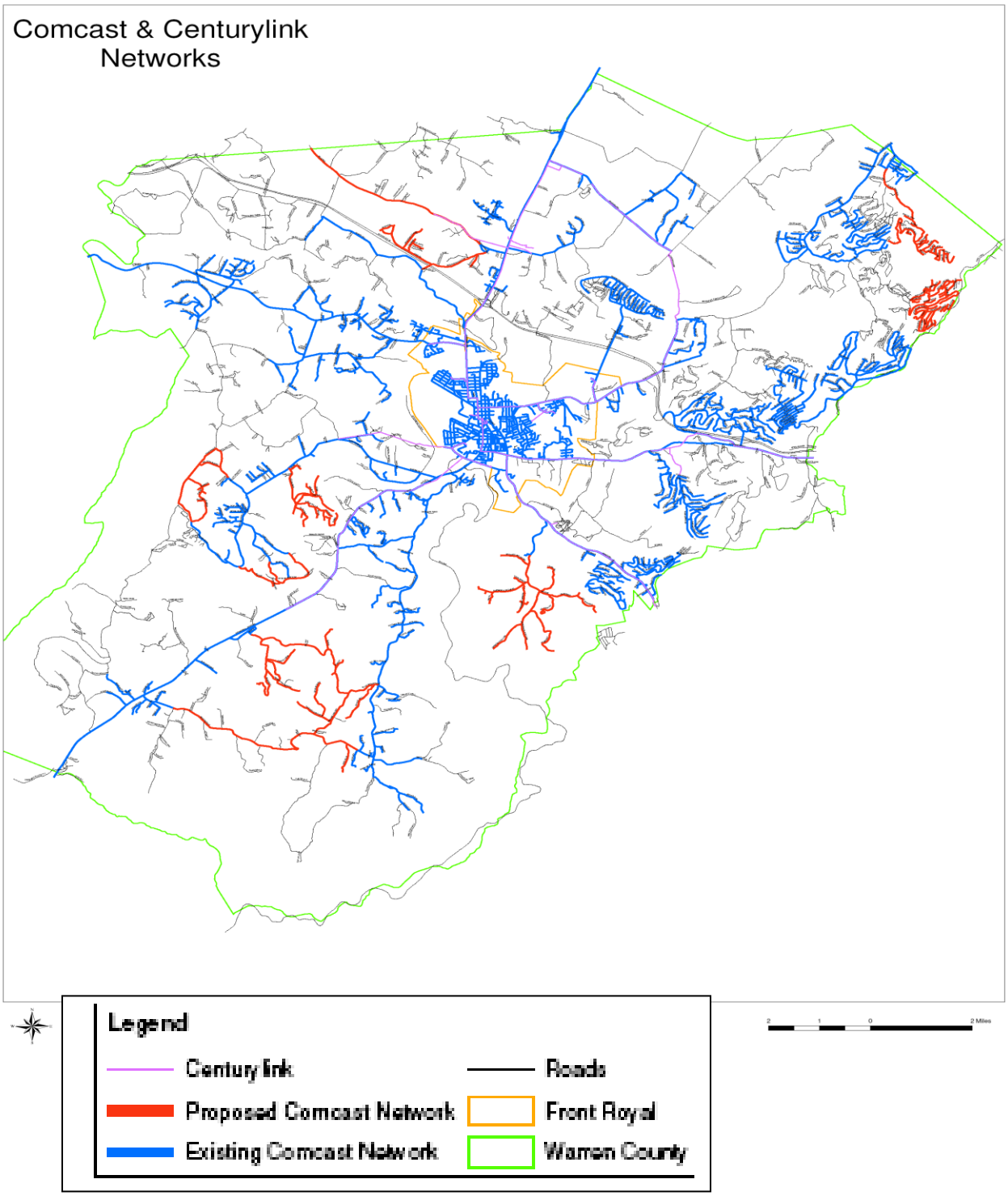
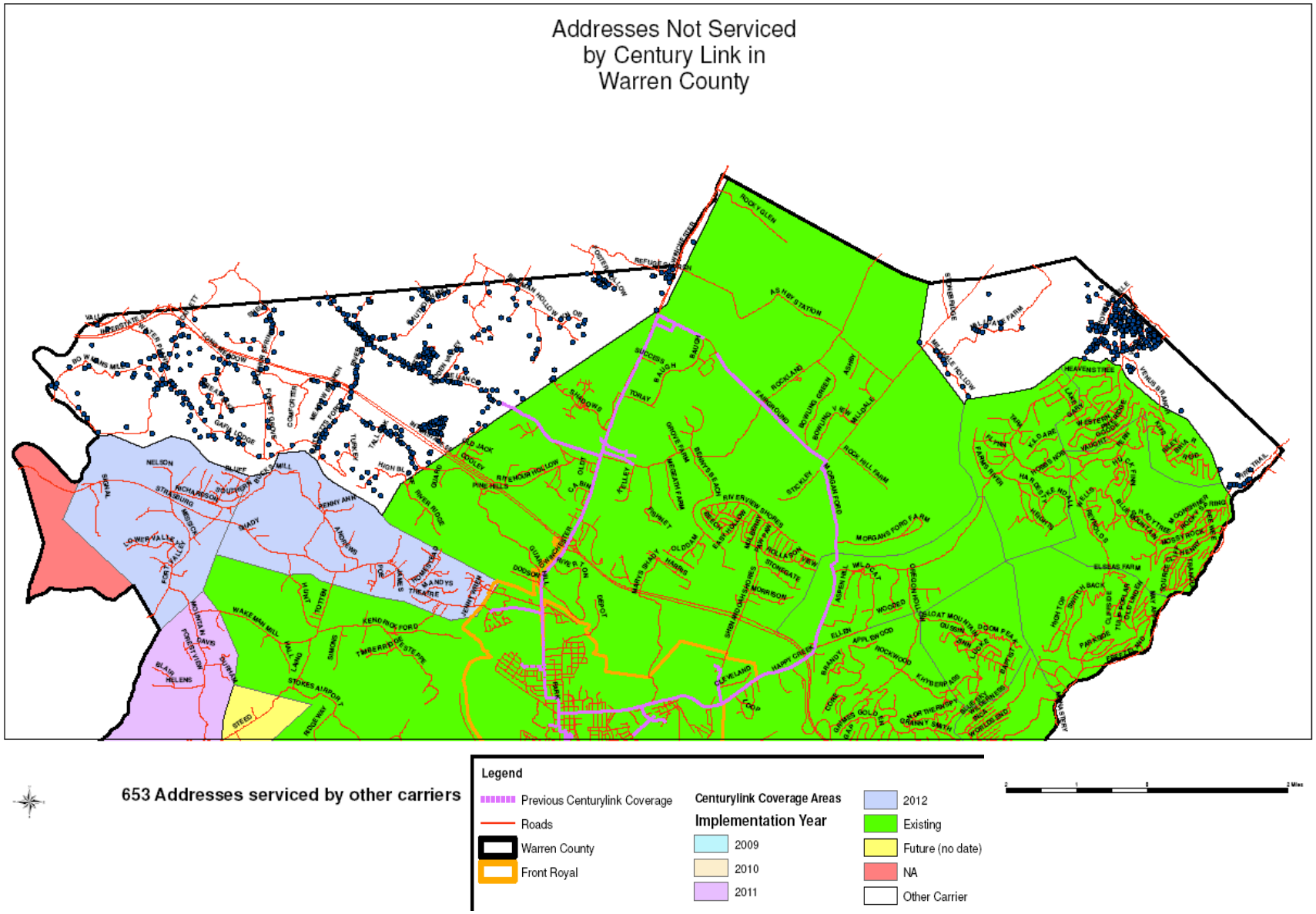
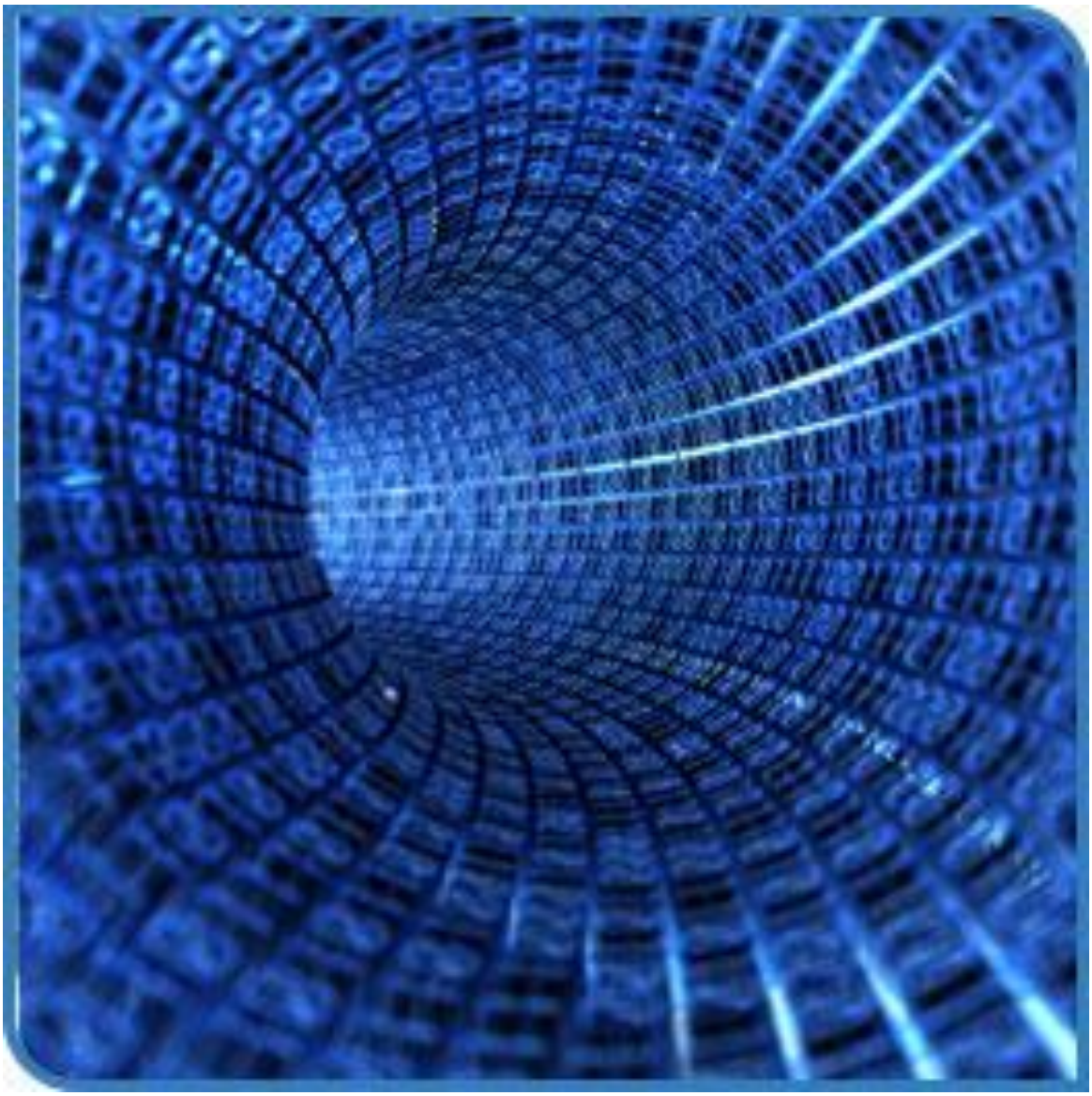


Chart #14: Addresses Not Serviced by CenturyLink in Warren County



SECTION 6

Residential and Business Survey Results



Residential Survey Results and Analysis

Goal: To research and measure County residents and businesses as to their ability, need, and opportunity to have high speed broadband service.

Objective: To determine what geographic areas, potential markets and economic development may be realized with Countywide Broadband Deployment.

Population of Warren County..... 37,438

Number of County Households that Responded 210

Top 15 Readouts: Residential

The following is an encapsulated view of the responses from the survey that explains the state of affairs of Broadband and how it is accessed in Warren County.

1. **64.1%** of the respondents are between the ages of 25-54 years old. This means that most of these people are in the workforce and use Information technology daily.
2. **55.8%** currently living at home. This means that they have a fixed home in Warren County and are considered long term residents.
3. **100%** of respondents could access the survey from any computer with internet service;

   Paper surveys were also distributed to various locations for pick up.
4. **Current Responses for Service and Provisioning**
   a. The following represents the access technology by percentage of how the internet is accessed from a residence.

22.3% = Dialup

26.7% = Satellite

19.9% = Cable based modem

15.5% = Wireless connection

3.4% = no internet service to housing unit = approximately 550 residential units

5. **62.4%** reported inadequate internet service
6. **82.7%** indicated that fast (greater than DSL speed) internet service is not available in area
7. **24.4%** of the households that responded have a home based business
8. **65.5%** indicated that they would be **somewhat likely to likely** run a home based business if high speed internet was available
9. **90.6%** said that they would be **somewhat likely** to **likely** take an on-line course if high speed internet was available
10. **50.7%** complete homework and/or job training over the internet
11. **92.5%** thought that internet service is important to households
12. **Top 2 functions Currently:**
    a. **19.7%** purchase products or services
    b. **21.3%** perform financial transactions.
13. **72.4%** use satellite to receive TV
14. **44.8%** pay more than $75/month for cable or satellite service not including internet
15. **98.7%** use cell phones

Full Survey Tables and Questions located in Appendix 2

Business Survey Results and Analysis

Goal: To survey a sample of the business community in its requirements for broadband services for economic development.

Objective: Determine if the providers of Broadband are keeping up with demand for local businesses.

Approximate Number of Businesses in Warren County..... 500

Number of Businesses that responded 30

Top 15 Readouts: Business

1. **63%** of respondents are in the county (not in the Town of Front Royal)
2. **71.4%** have 4 employees or less
3. **50%** are involved in either contracting and real estate/financial/insurance
4. **53.6%** have a annual revenue between $50,000 -$500,000
5. **82.1%** have five or fewer computers connected to the internet
6. **80.8%** pay $100/month or less
7. **25.9%** have dialup or less than 1.5Mbps of speed
8. **92.6%** indicated internet is critical to their business
9. **59.3%** indicated speed in inadequate
10. **71.4%** indicated that the higher speed that they need is not available.
11. **88.0%** indicated if high-speed wireless was available that they would subscribe
12. **76.2%** of business owners would expand on-line service if higher speed internet was available
13. **95.8%** of businesses have wired phones
14. **77.3%** of businesses have cell phones

15. Future Uses desired by Respondents.

These functions are selectively commented on as the Business community's desire to provide or facilitate these uses.

47.8% future use is advertising

60.2% is on-line sales

65.0% is distance learning

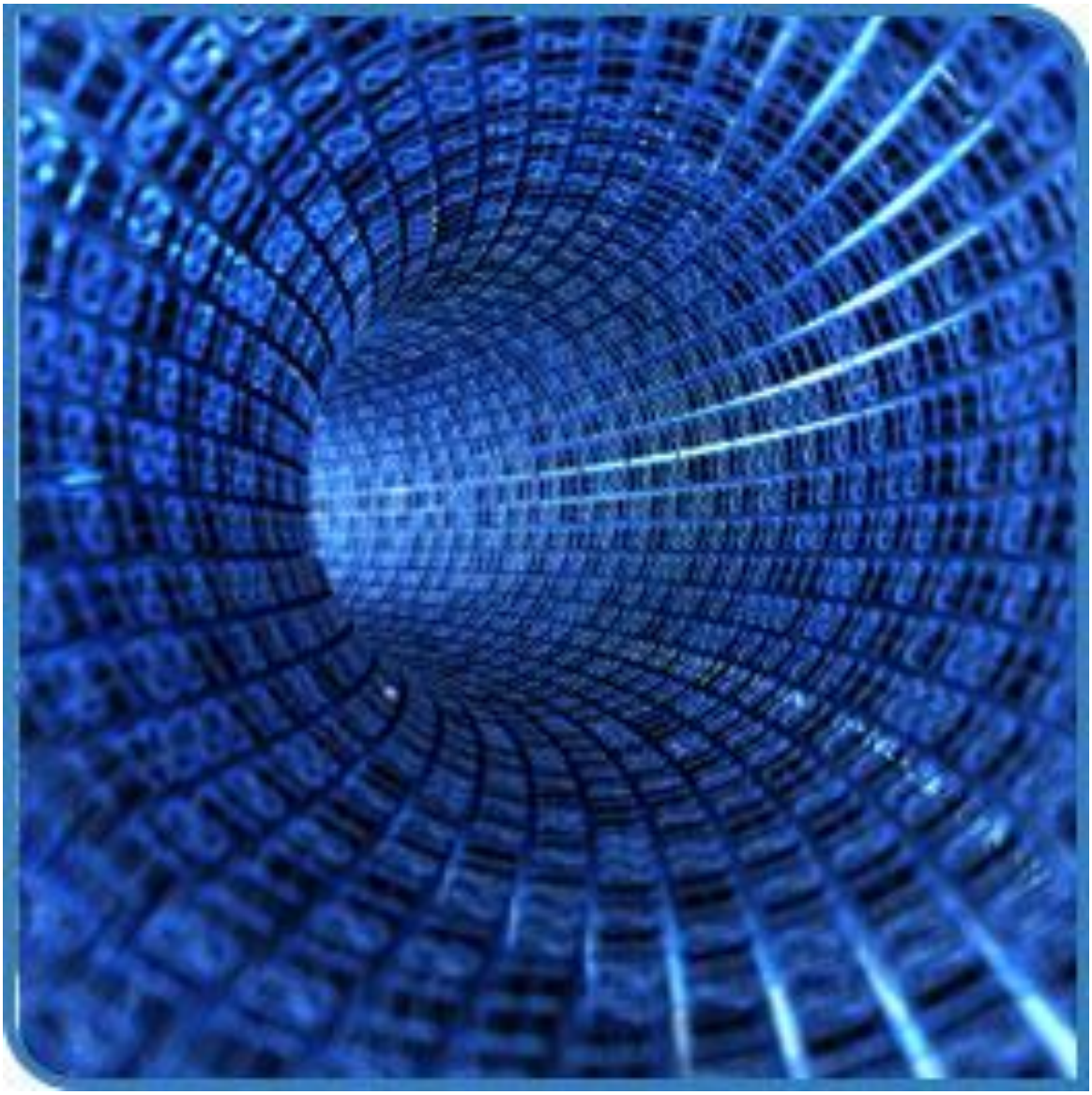
55% is Training

12.5% Telemedicine

Survey Tables and Questions located in Appendix 3

SECTION 7

Broadband Education



Broadband Education

Broadband Education and End-User Applications

There are numerous resources for technology and application training that function optimally with broadband service which are available in Warren County. The majority of the public training is delivered at Lord Fairfax Community College through classes offered to the public or contracted directly through employers. Resident interest has historically focused on entry-level application classes. Employers and employees are beginning to contract for employee training on many business productivity applications.

Warren County employers (large and small businesses) must be shown the value of adopting new technologies and internet applications such as Voice over Internet (VoIP), video conferencing and online business marketing. Classes are available for businesses in these subjects either locally through the various trade schools or online partnerships such as the "Work Force Solutions Program" through the LFCC.

Only 43.5% of Warren County businesses are currently using the internet for advertising their product or service and only 20% are conducting online sales. Nearly 38.1% of businesses are spending in excess of $100 per month on regular telephone service, yet 0% of business internet subscribers are utilizing Voice over Internet service. Education is needed to introduce businesses to the cost-saving applications broadband Internet access offers.

Warren County residents are taking full advantage of the many valuable tools the Internet offers. This is an excellent opportunity to educate citizens on how to become producers of information and services rather than just consumers. The libraries have had requests from patrons for training on how to sell products on eBay, indicating the interest is there but resources for training are not widely available or advertised.

The Hardware Gap

In addition to training, attention should be given to addressing the numbers of families in financial need without computers. There are no known computer donation programs within the County. A focus should be placed on GED students, Minority/Disadvantaged businesses, families on public assistance; families with younger children that do not have computers or access to the internet. School district personnel are the best resource for surveying families to identify need. Schools and libraries report the need to replace aging computer equipment, but funding is limited.

Programs to accept, refurbish and redistribute donated computers could fill this need if funding for new computers cannot be acquired.

Local Resources for Application Education

The best overall training programs are located at Lord Fairfax Community College. There are several programs that offer short, medium and long term Information Technology education. There are single class certifications, program certifications and award of Associates Degree in applied Science. By far, employers as well as other institutions of higher learning, recognize these programs as filling the need.

Below are the web information pages for the Associates Degree in Applied Science-IT and the Workforce Solutions programs.

LFCC
Lord Fairfax Community College

Information Systems Technology

Area

Information Systems Technology

Degree

Associate of Applied Science Degree

Length

Four semesters (two-year) program

Purpose

The associate of applied science degree (AAS) in information systems technology (IST) is designed for students who seek employment or professional development as a generalist in the area of information technology (IT), with specific knowledge in various areas such as Web design/development, computer network design and administration and database administration.

Occupational Objectives

The AAS degree curriculum in IST prepares students for employment with business, industry and government organizations as entry level Web applications developers, network engineers or database administrators, depending on degree specialization.

Transfer Guidelines

Transfer opportunities for AAS degrees, if existing, are very specific in nature. Students enrolling in an applied science degree with plans to transfer to a four-year college or university should explore opportunities with their faculty advisor.

Program Requirements

A student who studies topics in IT must possess general knowledge in systems analysis and design, software design and development, Web markup languages, Internet and network foundations and database fundamentals. Additionally, students must possess sound analytical and problem-solving skills, strong written and verbal communications skills and must have good interpersonal skills. These skills are an integral part of the IST curriculum. The curriculum includes technical courses in IT, business-related areas,

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- Going Green
- Construction and Industrial Trades
- Continuing Education and Licensure
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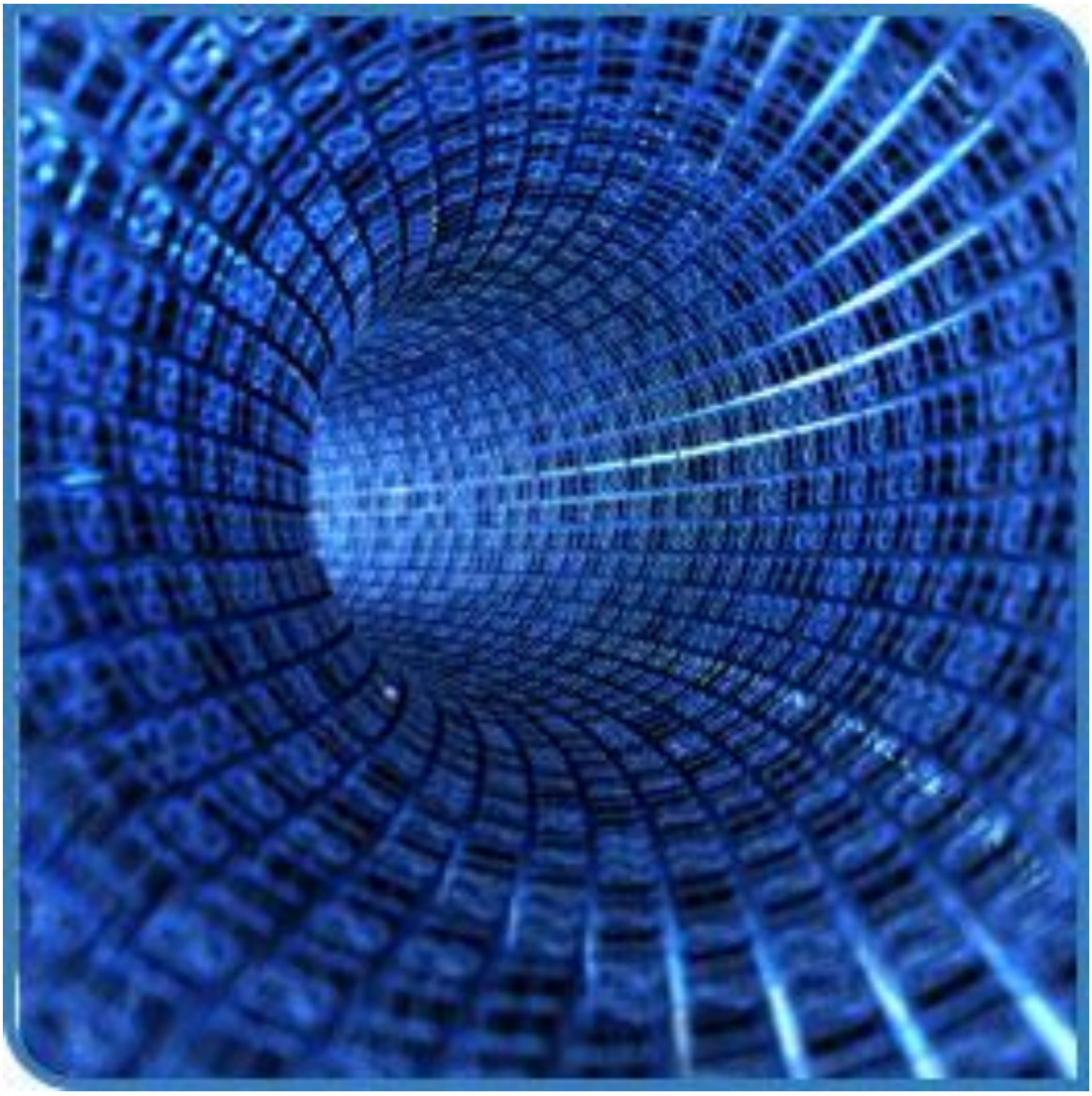
- Career Development
- Computer Applications
- Courses for Teaching Professionals
- Health Care Continuing Education
- IT and Software Development
- Law & Legal Careers
- Skilled Trades and Industrial
- Sustainable Energy And Going Green
- Web & Computer Programming

Part of the class registration and student account set-up requests your social security number. Disclosure of your social security number is not required at this time, but it is highly recommended. Disclosure ultimately will be required for most students at the time of enrollment, per § 6050S of the Restructuring and Reform Act of 1998, or at the time of disbursement of federal financial aid, per 34 Code of Federal Regulations Part 668.36. Section 23-3.2:1 of the Code of Virginia also authorizes the Virginia Community College System to collect student social security numbers and other information prior to a student's enrollment for identification and electronic transmission to the State Police. The VCCS will only use your social security number in accordance with federal and state reporting requirements, and for identification purposes within the VCCS. It shall not permit further disclosure unless required or authorized by the Family Educational Rights and Privacy Act of 1974, 20 U.S.C. § 1232g, or pursuant to your obtained consent.

Workforce Solutions and Continuing Education
Lord Fairfax Community College
173 Skirmisher Lane
Middletown, VA / 540-868-7021
http://www.LFCCworkforce.com

SECTION 8

Last Mile Connectivity Solutions



Subscribers: What are they looking for from the Broadband Service Provider?

A user or a "subscriber" from the service provider standpoint, will have various needs or requirements in the decision making process of what service to "subscribe" to. While cost of service is typically the driving force in the selection process, "use" of the Broadband service will depend on what the "subscriber" is using the service for. Applications for residential, commercial or small business transactions will determine the use and data speed requirement. There is no "one size fits all" service but what is important to the typical subscriber is "download" of material or what is know as "data" then "upload" data in some type of response.

Example: Small Business- Home Building Contractor reviewing and revising Plans.

Typically, many Home Building Contractors in this industry work out of the home as their place of business. The requirement could be to download a set of Computer Aid Design (CAD) plans for review and revision. The Contractor would review and make changes on his CAD set of prints, then upload to a shared file from the architect. The bandwidth to download (Receive) and upload (Transmit) this file would require greater than 5 to 10 Mbps. The question for this small business/home based business would be: "How do I accomplish this?"

The thought process of a typical subscriber is to meet the existing requirement which would include the ability to send and receive e-mails, web surfing, video teleconferencing and entertainment. However, the secondary applications such as small business file sharing, telemedicine or secure on-line banking as a example would depend on the rudimentary ability to have a "quality" connection that is robust, reliable, and dependable.

The following are Questions the typical "subscriber" would ask, thus requiring the providers of these services to address to each subscriber by geographic location.

The questions would be:

1. Determine what Delivery Service is available in my community. (Wire or Wireless?) CenturyLink, Comcast, Verizon Wireless, AT&T Wireless, Valley Broadband?

2. Determine what Speed of Service is minimally required for my current use? Minimum DSL uplink and downlink? Fractional T- Span? Etc.

3. Determine what type of equipment is required? Who pays for the hardware? Can I rent or finance such equipment? Who installs this equipment? Cost?

4. Cost: Determine what Usage Plans are offered? (Limited vs. Unlimited? Peak Service? What quality of signal will be delivered?)

5. What is the reliability of the system during inclement weather?

6. What maintenance is performed on the system? What type of customer service will I receive?

In Warren County, the most frequently asked question is the most important question:

What services are available and where?

Depending on physical location, the following is a summation of providers of Wire and Wireless Systems.

Steps of Subscriber Evaluation:

1. **What Service Technology and Providers available**?

   Below is a breakdown of the current technology offered in Warren County:

   RESIDENTIAL and BUSINESS in select locations:

   Wire Based

   1. Dial-UP/Modem (Twisted Pair)……Verizon
   2. Digital Subscriber Line-DSL .....Comcast/Xfinity
   3. DSL..... CenturyLink
   4. Fractional "T" Span ..... CenturyLink
   5. "T-1" ..... Xfinity & CenturyLink
   6. Digital Service: "DS-1"..... Xfinity & CenturyLink
   7. Optical Control: "OC-1"..... CenturyLink

   Wireless Based

   1. 3-G /4-G/LMR.....AT&T, Verizon, T-Mobile, Sprint & ShenTel
   2. PMP ..... Winchester Wireless & Visual Link
   3. Satellite ..... DirectTV, HughesNet & DishNet

2. **What services are offered in my geographic area?**

   In answering this question for the targeted three (3) Quadrants (North-East/Howellsville, North-West/Reliance Road and South-East/Browntown-Bentonville) it becomes apparent that there is no universal answer. Typically in a Free Market, once service is rendered, competition between the other providers begins. In the case of Warren County's three (3) underserved areas, it has been recognized that they may lie

within geographically remote areas in which communications technology has not kept up with development.

These un-served areas represent over 650 homes, which can be translated into a average family of 2.58 people per family or up to 1,677 people. In addition, the Zoning Permits (represented on Chart #4) represent approximate 50+ small businesses. Combining population and small business, the ability to communicate, educate and perform commerce is great. In addition, residential home prices are being affected because broadband is not available for these homes.

For citizens or businesses located within one of the underserved areas, the question has become

3. **What can I get the quickest that has some sense of reliability?**
   This is determined by the type and volume of use. For some, Satellite service may marginally meet the requirement for residential use, however, would not work for commercial or business use.

4. **Right now in 2012, we have nothing but Dial-up. What would it cost to have some type of Broadband service to my area?**

   Below, the following are the "estimated costs" that a wire based or wireless provider would have to come and invest in infrastructure such as pole, cable, cabinets, electronics, towers, concrete and what it would cost to engineer and labor to construct in a Quadrant area.

5. **How much would the monthly service cost for either a wire or wireless provider? How much will I have to spend on "hardware" cost along with Service Plans and Usage? If is breaks, where do I go?**

   Cost threshold: $50, $100, $200, $300?

6. **What speed and bandwidth will I get downloading and uploading?**

   DSL: 5Mbps minimal or greater.

7. **What kind of maintenance and customer service will I receive?**

   What location, response time and customer service will I get with your service?

Analysis of Provisioning for Underserved Quadrants

The information below provides a three possible of each of the underserved quadrants located in Warren County; Northeast-Howellsville, Northwest-Reliance Road, and Southeast-Browntown Road.

North-East Quadrant: Howellsville Community

a. **Recommended Solution #1: Comcast/Xfinity**

   i. **Reasons for the Recommended Solution**

      (1) Has infrastructure/cable and distribution system in local area

      (2) Least amount of Infrastructure to invest: (engineering, cable, electronics, poles)

      (3) Approximately 250 customers

      (4) Relatively close subscribers in distance

   ii. **Total Estimated Cost to Provider: $350,000**

      (1) Engineering: $50,000

      (2) Materials (poles, cable, cabinets, electronics): $150,000

      (3) Labor: $150,000

b. **Recommended Solution #2: CenturyLink**

   i. **Reasons for the Recommended Solution**

      (1) Has infrastructure/Cable and distribution system in local area

      (2) Low amount of Infrastructure to invest (engineering, cable, electronics, poles)

      (3) Approximately 250 Customers

      (4) Relatively close subscribers in distance

   ii. **Total Estimated Cost to Provider: $475,000**

      (1) Engineering: $75,000

      (2) Materials (poles, cable, cabinets, electronics): $ 200,000

(3) Labor: $200,000

c. Recommended Solution #3 : Wireless (LMR ¾- G and/or PMP)

i. Reasons for the Recommended Solution

(1) Easy to locate in the Rt. 50 corridor.

(2) Low amount of Infrastructure to invest (engineering, antenna, cable, electronics, tower, shelter)

(3) Approximately 250 customers with US Rt. 50 Major East/West

(4) Relatively close subscribers in distance

ii. Total Estimated Cost to Provider: $560,000

(1) Engineering: $75,000

(2) Materials (tower, shelter, concrete, cable, antennas, electronics): $285,000

(3) Labor: $200,000

Summary of Ranking:

1. Cable Solution - Comcast: $350,000
2. Cable Solution - CenturyLink: $475,000
3. Wireless Solution - LMR ¾ G or PMP= $560,000

2. ***North-West Quadrant: Reliance Community***

a. Recommended Solution #1 : CenturyLink

i. Reasons for the Recommended Solution

(1) Has infrastructure/cable and distribution system in local area (Approximately first 6.7 miles up Reliance Road from Rt. 340.)

(2) Least amount of Infrastructure to invest (engineering, cable, electronics, poles)

(3) Approximately 550 customers

(4) Relatively close subscribers in distance along Reliance Road.

(5) Buries cable

ii. Total Estimated Cost to Provider: $500,000

(1) Engineering: $50,000

(2) Materials (poles, cable, cabinets, electronics): $250,000

(3) Labor: $200,00

b. Recommended Solution #2 : Wireless (LMR ¾- G and/or PMP)

i. Reasons for the Recommended Solution

(1) Has infrastructure/towers (2) in local area (I-66 Corridor that can be seen from Reliance and Rt.55)

(a) 4 towers needed (2 Existing +2 New Towers)

(2) Low amount of infrastructure to invest (engineering, antenna, cable, electronics, tower, shelter)

(3) Approximately 550 customers with I-66 and US-55 Major East/West

ii. Total Estimated Cost to Provider: $925,000

(1) Engineering: $125,000

(2) Materials for two towers (tower, shelter, concrete, cable, antennas, electronics): $ 550,000

(3) Labor: $250,000

c. **Recommended Solution #3 : Comcast/Xfinity**

i. **Reasons for the Recommended Solution**

(1) Limited infrastructure/cable and distribution system in local area.

(2) High amount of Infrastructure to invest (engineering, cable, electronics, poles)

(3) Approximately 550 customers

(4) Relatively close subscribers in distance

(5) Primarily locates on joint use poles (many to replace)

ii. **Total Estimated Cost to Provider: $1,075,000**

(1) Engineering = $75,000

(2) Materials (approximately 200 poles, cable, cabinets, electronics): $650,000

(3) Labor = $350,000

Summary of Ranking:

1. Cable Solution: Wire/CenturyLink = $350,000
2. Wireless Solution: Wireless/LMR/PMP = $925,000
3. Cable Solution: Wire/Comcast/Xfinity = $1,075,000

3. ***South-East Quadrant : Browntown Community***

a. Recommended Solution #1 : Wireless (LMR ¾- G and/or PMP)

i. Reasons for the Recommended Solution

(1) Has infrastructure/towers (2) in local area (Rt. 340 Corridor)

(a) 4 towers needed (2 Existing +2 New Towers)

(2) Low amount of Infrastructure to invest (engineering, antenna, cable, electronics, tower, shelter)

(3) Approximately 300 to 500 subscribers

ii. Total Estimated Cost to Provider: $1,150,000

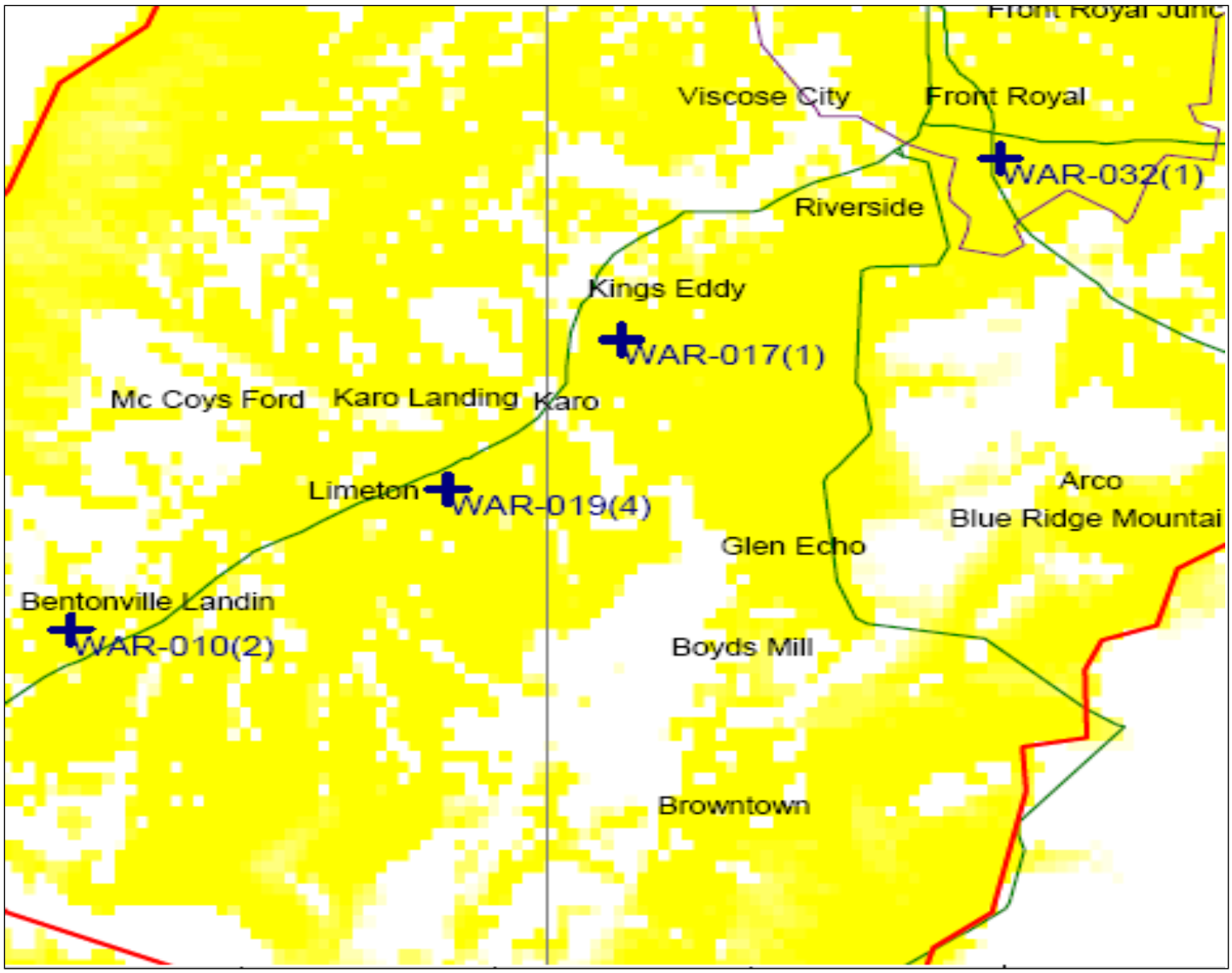
(1) Engineering = $150,000

(2) Materials = 3 towers(Tower + Shelter + concrete+ Cable + Antennas + Electronics) = $ 750,000

(3) Labor = $250,000

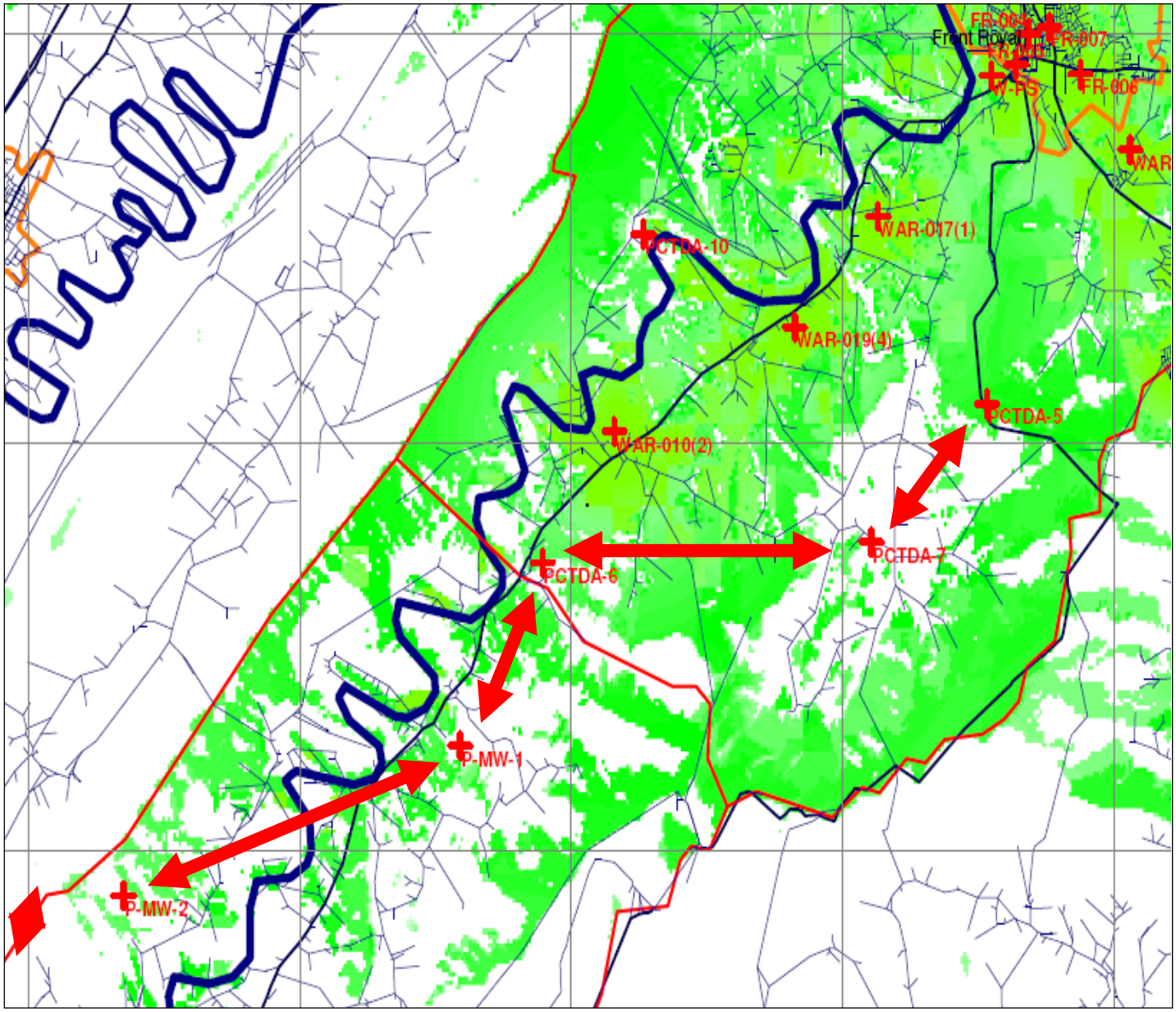
See Coverage Maps Below

CHART #15: Browntown/ Bentonville Wireless Coverage (4G)



Observe the "White" area in the Browntown vicinity. It runs north and south meaning it is a ridge line. In this area there is no wire based Broadband but slight cell service. The "Yellow" is cell service.

CHART # 16: Microwave Path for Data Back-haul



This composite view shows if a Tower known as PCTDA #5 and a Tower known as PCTDA #7 are built, that the 4-G coverage will completely cover the entire Browntown area.

In addition, PCTDA #7 has a line of sight with a large tower in Page County to the south in which a Microwave system can tie these two sites from the south back to Page County.

b. Recommended Solution #2 : Wire Based (Comcast/Xfinity)

i. Reasons for the Recommended Solution

(1) Electronic equipment less costly

(a) Origin from Front Royal Approximately 8 mile of cable

(b) May place on joint Use Poles

(2) Lower amount of Infrastructure to invest (engineering, cable, electronics, poles, cabinet)

(3) Approximately 300 to 500 subscribers

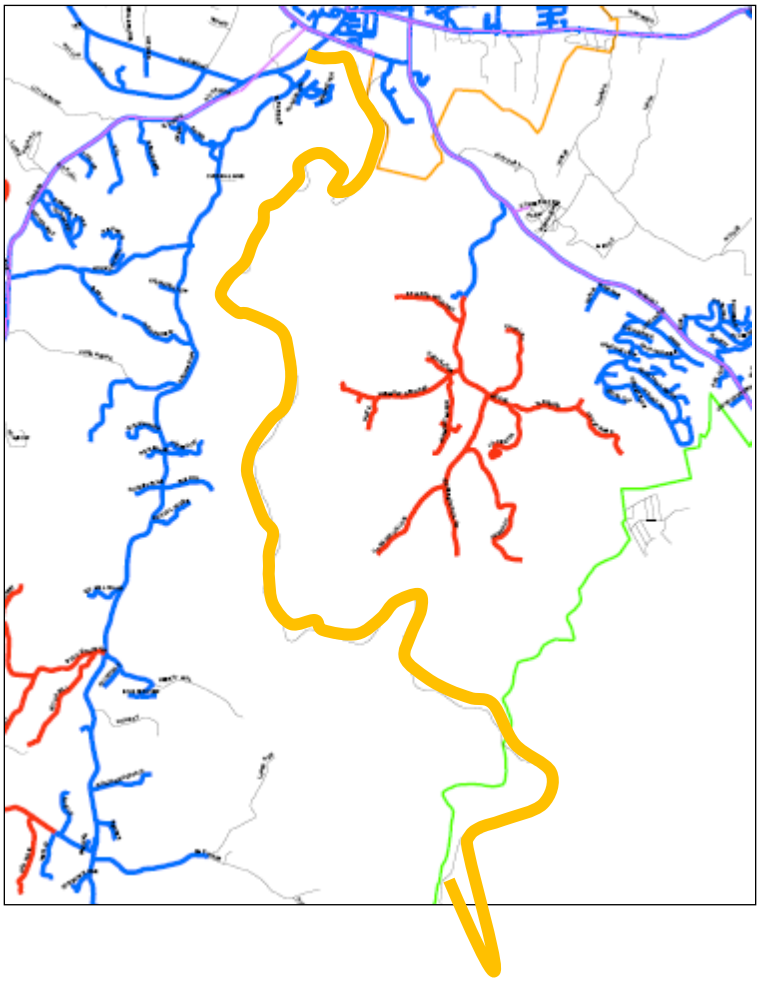
ii. Total Estimated Cost to Provider: $1,325,000

(1) Engineering: $75,000

(2) Materials (poles, cable, electronics) 8 miles @ $125,000/mile: $1,000,000

(3) Labor = $250,000

Chart #17: Approximate Trace of Cable Placement for Both CenturyLink and Comcast/Xfinity



Potential Cable Location

c. **Recommended Solution #3: Wire Based (CenturyLink)**

i. **Reasons for the Recommended Solution**

(1) Has existing cable routes with right of ways and easements

(2) Has existing service – voice

(3) Approximately 300 to 500 subscribers

ii. **Total Estimated Cost to Provider: $1,450,000**

(1) Engineering: $50,000

(2) Materials (cable, cabinets, electronics, poles) 8 miles @ $150,000/mile: $1,200,000

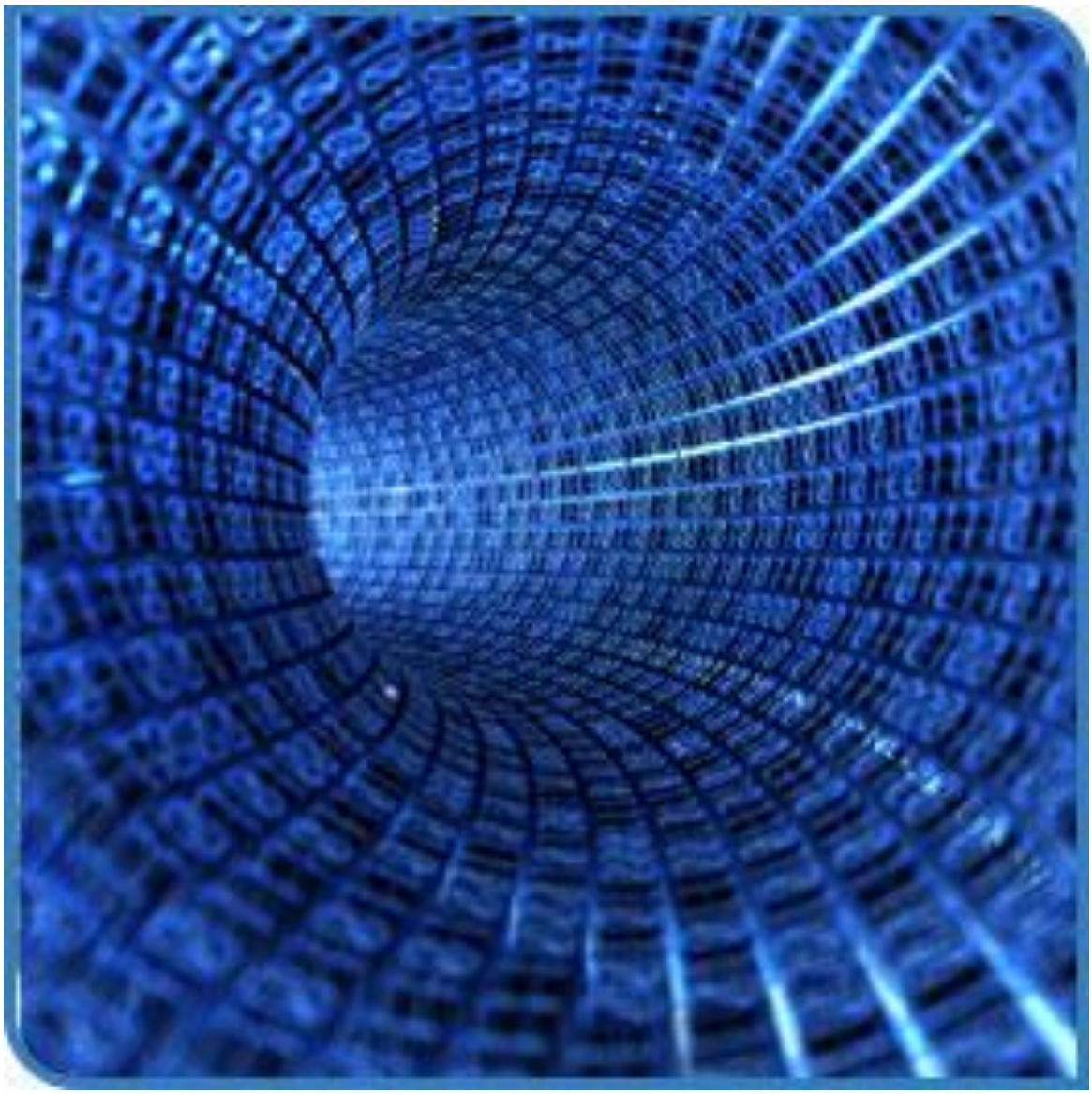
(3) Labor: $200,000

Summary of Ranking:

1. Wireless Solution: LMR ¾ G or PMP: $1,150,000
2. Cable Solution: Comcast: $1,325,000
3. Cable Solution: CenturyLink: $1,450,000

SECTION 9

Organization and Network Operation Options



County Role

Warren County government will play the role of adviser and facilitator between the public, business community, and service providers. With the Community Telecommunications Management Team in place representing a cross-section of citizens, government, business, Information Technology hardware and applications providers, this committee stands at the intersection of planning and growth. The Committee will facilitate current and future broadband deployment and act in an advisory role to the citizens and service providers.

In addition to an advisory role, the Committee will diligently look to develop or implement programs that will identify minority/disadvantaged families, businesses and institutions to help facilitate their access to broadband.

Provider Role

Service providers will play the largest roll in the current and future deployments of technology, services and applications for broadband. As this industry travels "at the speed of light" it is imperative that their information be quickly disseminated to the public/market place.

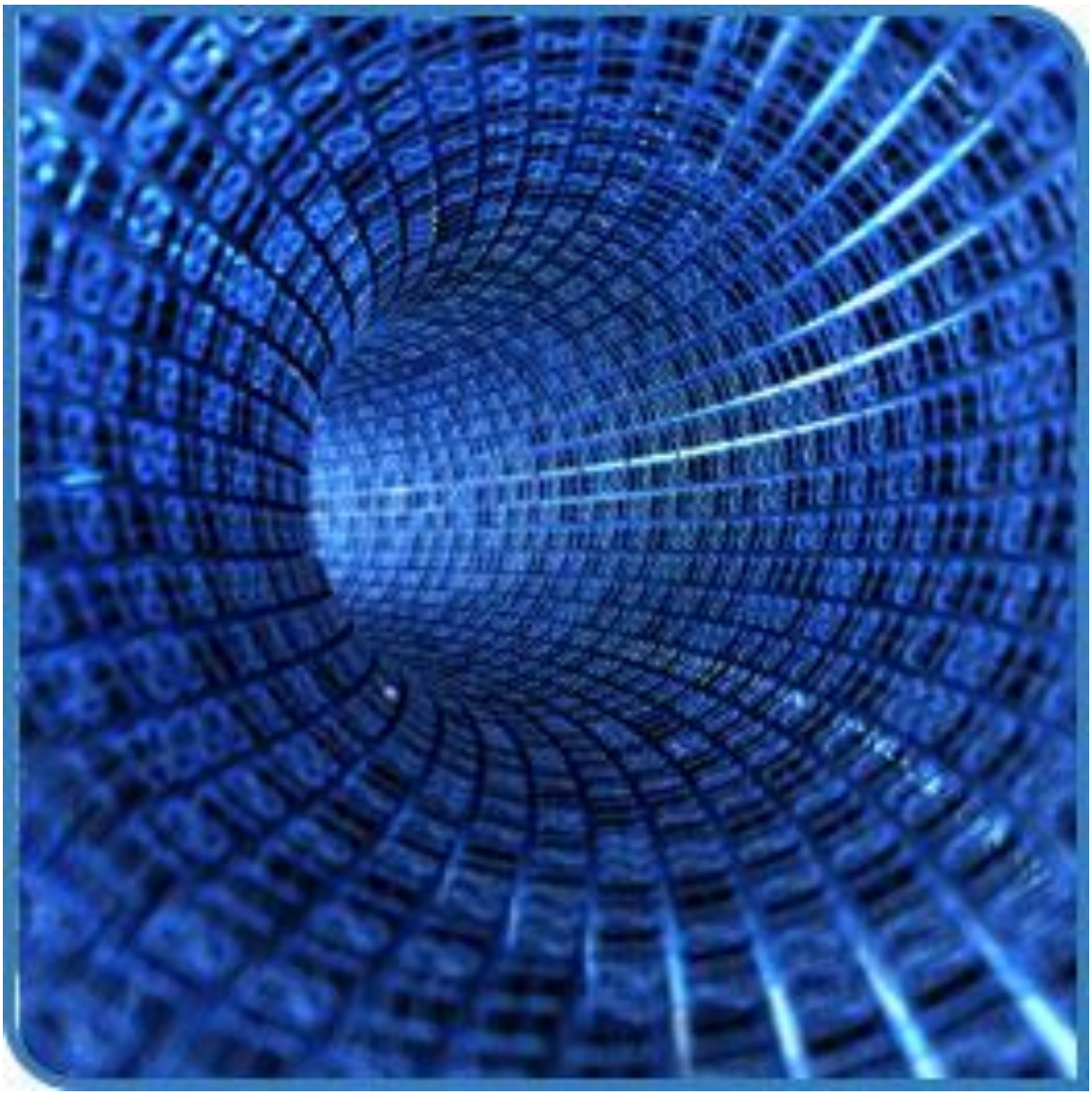
The Warren County Government web site is a centrally located web site that contains information important to the County citizens. The service providers and hardware vendors will have space to hyperlink to their own web sites so that this initiative will be able to sustain itself.

Citizen Role

The citizen role in this initiative is to provide demand, location and identification of need for these services.

SECTION 10

Funding Strategies



Funding Strategies

Projected Project Cost

Two (2) major projects are recommended to Warren County:

1. **Broadband Access Website**

    a. Develop, as part of the Warren County website, a series of pages titled "Broadband Access" that offer information, help and aid to acquire broadband for home, business or educational purposes.

    b. This page should be funded for development and maintenance on an on-going basis but hosting information that is dynamic to the deployment of broadband and the information required to receive service or equipment information to improve service.

    c. This page should be user friendly and a self-help reference for all citizens and businesses.

    d. Each provider of broadband, wire and wireless, should be a part of the page and their data be updated regularly.

    e. Customer Premises and Dealers/Distributers of these services should also have space for advertisement of information.

    f. **Initial Investment: $10,000**

    g. **Reoccurring Cost per Year: $10,000**

2. **Partner/invest in distribution facilities in the County to provide where there is no provider wire based and wireless infrastructure so that service providers will have a financial incentive to deploy their networks.**

    a. Wire Based Partnership

        i. Approximately 50 miles of 10 strand fiber

        ii. Approximately 50 miles of coaxial cable

        iii. **Estimated Cost: $1,000,000**

b. Wireless Based Partnership

i. Three (3) 195' Monopole Communications Towers

(1) Fenced Aggregate Compound with electrical unities.

(2) Non-exclusive easements for tenants.

(3) Competitive lease terms

ii. **Estimated Cost: $1,200,000**

(1) One Time Capital Outlay: $400,000 per tower @ 3 towers

(2) Maintenance paid for by leasing terms

Total Grant Request:

1. Website Development Initial $10,000
2. Reoccurring Cost (Annual) $10,000
3. Wire/Cable Infrastructure..... $1,000,000
4. Wireless Infrastructure $1,200,000

Total Project Cost.....$2,220,000

Financing Options

Communities fund broadband service deployment like they would other municipal projects today. As local government, in this case Warren County, seeks to facilitate the engineering and deployment of broadband services for its citizens. Warren County desires to facilitate and contribute to the deployment of broadband, but not be a physical owner or "business partner" with any other entity. Funding options remain the same in this case verses say owning a sewer or water system.

In Warren County, there are several providers of wire based broadband service. CenturyLink and Comcast/Xfinity are the two major wire network based providers. Verizon only has a small

fraction of the County subscribers and has stated publically that they have no intention of investing in Warren County. Because of the telephony regulations set forward by the Virginia State Corporation Commission, either Comcast or CenturyLink may expand into the Verizon area as an Independent Loop Exchange Carrier and provide this service immediately.

The bulk of the community's investment in broadband infrastructure will be passive in nature. Warren seeks to make cash contributions to the Carrier for engineering and material efforts. From a wire based perspective, many feet of cable will be required to be hung on joint use pole facilities because of the wide dispersion of subscribers. While there are currently poles providing electric and basic telephony services in these areas, these existing poles will not provide the space or structural stability required to add cable. Also, for buried cable, excavation cost for rocky soil also will need to be factored in.

In the case of wireless broadband services, communications towers, microwave trunking and standby power will be the challenges of this provision.

In either case, Warren County desires to be flexible in both delivery platforms, Wire and Wireless services.

There are a wide variety of financing options available, and we believe most projects will end up using three or four different sources of funding, depending on project requirements, where the timeline is flexible, and local opportunities arise.

Revenue Bonds

A revenue bond is a special type of municipal bond distinguished by its guarantee of repayment solely from revenues generated by a specified revenue-generating entity associated with the purpose of the bonds, rather than from a tax. Unlike general obligation bonds, only the revenues specified in the legal contract between the bond holder and bond issuer are required to be used for repayment of the principal and interest of the bonds; other revenues (notably tax revenues) and the general credit of the issuing agency are not so encumbered. Because the pledge of security is not as great as that of general obligation bonds, revenue bonds may carry a slightly higher interest rate than G.O. bonds; however, they are usually considered the second-most secure type of municipal bonds.

Fees

For telecommunications services such as high-speed Internet and mobile phones, an activation fee is commonly assessed, although most companies fail to include it in the advertised price, and activation means only typing some customer information into a computer. For example, as of 2008, Verizon Wireless has begun charging 20 dollars for activation of its phones, even for existing customers who want to upgrade. Customers are told that the phones can be returned or exchanged within 15 days, but are not told that the extra fee (which has been disclosed only in fine print) will not be returned, and

that yet another fee will assessed against him or her for getting a different new phone, or even going back to their old one.

Another fee is the early-termination fee applied nearly universally to cell phone contracts, supposedly to cover the remaining part of the subsidy that the provider prices the phones with. If the user terminates before the end of the term, he or she will be charged, often well over 100 dollars. In the U.S., mobile phone companies have come under heavy criticism for this anti-competitive practice, and the Federal Communications Commission (FCC) is considering limits to prevent price gouging, such as requiring the fees to be prorated.

Many cable TV and telephone companies, including AT&T, include a regulatory-cost recovery fee in the bill each month of around three U.S. dollars, passing the blame onto government regulation, and essentially charging their customers for complying with U.S. law.

New Markets Tax Credit

The New Markets Tax Credit (NMTC) Program was established in 2000 as part of the *Community Renewal Tax Relief Act* 2000. The goal of the program is to spur revitalization efforts of low-income and impoverished communities across the United States and Territories. The NMTC Program provides tax credit incentives to investors for equity investments in certified Community Development Entities, which invest in low-income communities. The credit equals 39% of the investment paid out (5% in each of the first three years, then 6% in the final four years, for a total of 39%) over seven years (more accurately, six years and one day of the seventh year). A Community Development Entity must have a primary mission of investing in low-income communities and persons.

The concept behind the NMTC emerged in the late 1990s, when numerous foundations and think tanks were working to popularize the idea of using business-oriented mechanisms to help disadvantaged communities increase wealth and jobs. For example, business, community, academic, and public sector participants at the 1997 American Assembly meeting issued a report urging business leaders to reinvest in urban areas in the U.S. The final report also pushed nonprofit and government officials to help lead this new effort to open untapped markets through a fostering of “community capitalism.” It defined community capitalism as a “for-profit, business-driven expansion of investment, job creation, and economic opportunities in distressed communities, with government and the community sectors playing key supportive roles.” To accomplish this revival, participants called for improving access to capital (especially through equity investment) and ensuring greater technical assistance for businesses. These were seen as the two key ways of “energizing community capitalism in distressed areas”. The report set out crucial components of the future New Markets initiative. The American Assembly disseminated the final report widely, including sending it to the White House and Congress. Vice President Al Gore, in support of the conference conclusions, stated that, “The greatest untapped markets in the world are right here at home, in our distressed communities.”

State Funds

Many local broadband projects are receiving help from state sources of funding, particularly for early stage planning, but some funds are often available for pilot projects and specific expansion projects that meet certain kinds of public safety or economic development criteria. As a couple of examples, the Virginia Department of Housing and community Development (DHCD) has been providing early phase planning funds to communities that commit to following a specific planning process supplied by DHCD.

State agencies may also be able to assist with applying for Federal funds. Community Development Block Grants are now being provided for some kinds of local broadband efforts. The Wired Road in the Galax area has successfully obtained CDBG funds for fiber in downtown redevelopment districts. In Virginia, GHCD administers CDBG funds.

Federal Funds

Several different Federal agencies provide some support for community or regional broadband efforts. The Appalachian Regional Commission has been making some funds available for broadband education efforts and some modest pilot projects (Rockbridge is in the ARC region). The USDA Rural Utilities Service agency can make low cost loans for telecommunications. Those funds have traditionally been supplied to rural telephone companies and co-ops, but the agency has recently begun looking at assisting local communities' broadband projects.

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

Other Possible Funding Sources

National Telecommunications and Information Administration, Technology Opportunities Program

The National Telecommunications and Information Administration (NTIA) Technology Opportunities Program (TOP) website presents information on grants offered through an annual competition. TOP offers an online application kit that includes a notice of availability of funds, the guidelines for preparing applications, and general instructions for submitting an application. The website also offers resource information publications, evaluation reports, and case studies. For more information, contact the NTIA directly at the contact information below:

U.S. Department of Commerce
1401 Constitution Avenue, NW HCHB
Room 4092
Washington, DC 20230
(202) 482-2048 (202) 482-2048

Municipal Funds

Secured Loans

A secured loan is a loan in which the borrower pledges some asset (e.g. a car or property) as collateral for the loan, which then becomes a secured debt owed to the creditor who gives the loan. The debt is thus secured against the collateral — in the event that the borrower defaults, the creditor takes possession of the asset used as collateral and may sell it to regain some or all of the amount originally lent to the borrower, for example, foreclosure of a home. From the creditor's perspective this is a category of debt in which a lender has been granted a portion of the bundle of rights to specified property. If the sale of the collateral does not raise enough money to pay off the debt, the creditor can often obtain a deficiency judgment against the borrower for the remaining amount. The opposite of secured debt/loan is unsecured debt, which is not connected to any specific piece of property and instead the creditor may only satisfy the debt against the borrower rather than the borrower's collateral and the borrower.

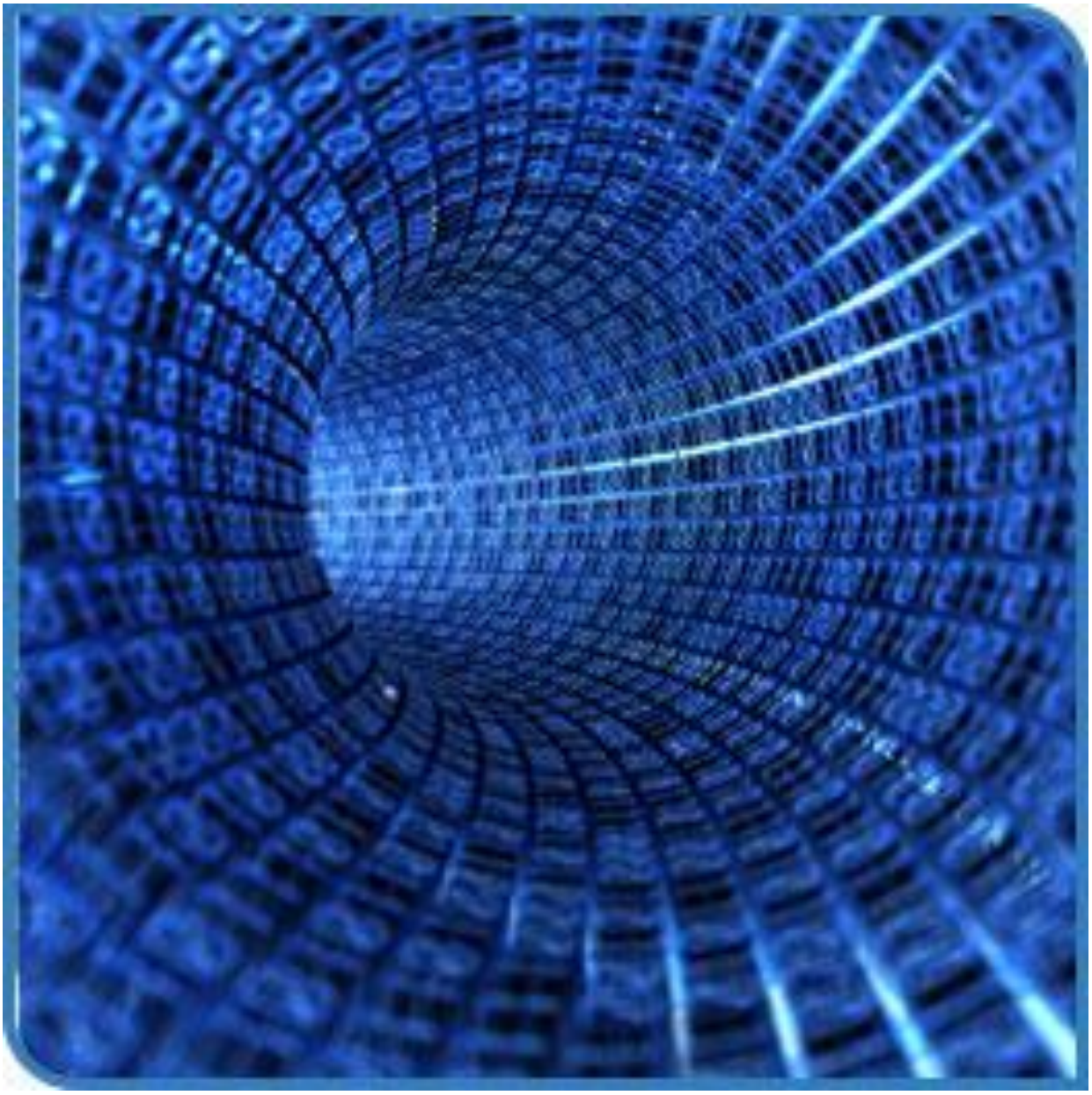
Unsecured Loans

Unsecured Loans are monetary loans that are not secured against the borrower's assets (i.e., no collateral is involved). These may be available from financial institutions under many different guises or marketing packages:

An overdraft occurs when money is withdrawn from a bank account and the available balance goes below zero. In this situation the account is said to be "overdrawn". If there is a prior agreement with the account provider for an overdraft, and the amount overdrawn is within the authorized overdraft limit, then interest is normally charged at the agreed rate. If the POSITIVE balance exceeds the agreed terms, then additional fees may be charged and higher interest rates may apply.

SECTION 11

Recommendations



Recommendations

These recommendations are a result of the Study and are made with a solution based criteria.

1. **Educational Investment: $20,000**

   The County will develop and administrate a ***"Broadband Resource Page"*** on Warren County's Official website (Similar to that of Electrical Service Providers). Titled "**Broadband Service Providers"** this page may include:

   a. Carriers/Providers (Wire and Wireless) operating in Warren County. Hyperlink to Carrier business web site.

   b. Fiber optic/ Cable/Tower locations in County (GIS Layers)

   c. By address inquiry as to who provides what service to that address (GIS Data cross- referenced to Service area.)

   d. For each provider: list with pictures of Customer Premise Equipment that will be required. Hyperlinked to Carrier business site.

   e. Cost Plans for Subscriber. (Hyperlink to Carrier Web Site)

   f. Additional equipment information that may be helpful to ensure stronger signal or bandwidth.

   g. Local Vendors who can Place-Install-Trouble Shoot and act as 3rd party "Dealers" for service providers in Warren county with hyperlink to their web site.

   h. Providers and Vendors may advertise on web site.

2. **Infrastructure Investment: $2,200,000**

   Areas or corridors that are identified *without wire or wireless broadband*, the Warren County Community Telecommunications Plan will incentivize with funding to begin the engineering effort and contribute to the material cost to begin this deployment.

   a. **Wire Technology Potential Incentives:**
      i. Warren County Broadband Project will incentivize wire based broadband providers by the Project contributing up to $1,000,000 for the engineering, purchase and placement of fiber optic or coaxial cable to serve residences or business in areas not previously served.
      ii. Seek Local, State and Federal Grants to implement these initiatives.
   b. **Wireless Technology Potential Incentives:**

i. Incentivize all Wireless Based broadband providers to service geographic areas of County where there is no cable/wire broadband network within 100 yards. Incentives may include free advertising on County's website, waiver of contractor permit fees or other issues that a carrier may have.
ii. For every home or business that chooses to be served wirelessly (because no cable provider is willing to serve), County will credit homeowner ($50) for new wireless service if service recipient stays with this service for 3 years.
iii. Warren County Broadband Project will maintain a $1,200,000 fund to provide assistance and material support for providers of Broadband.
iv. County Economic Development Authority may assist in the development and ownership of commercial communications towers for wireless providers.

Total Project Investment: $2,220,000

Appendix

Tables, Surveys, Project Information

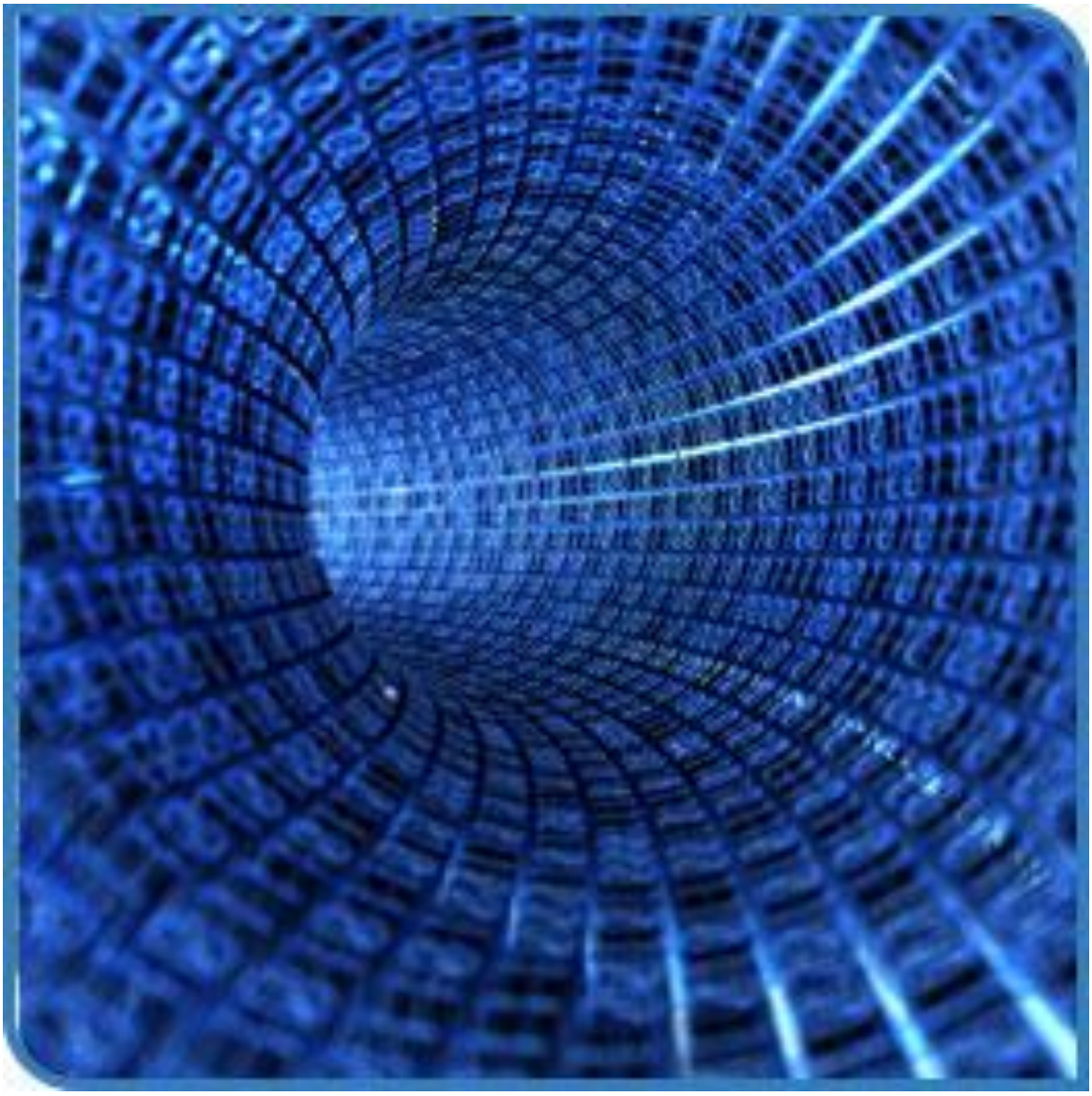
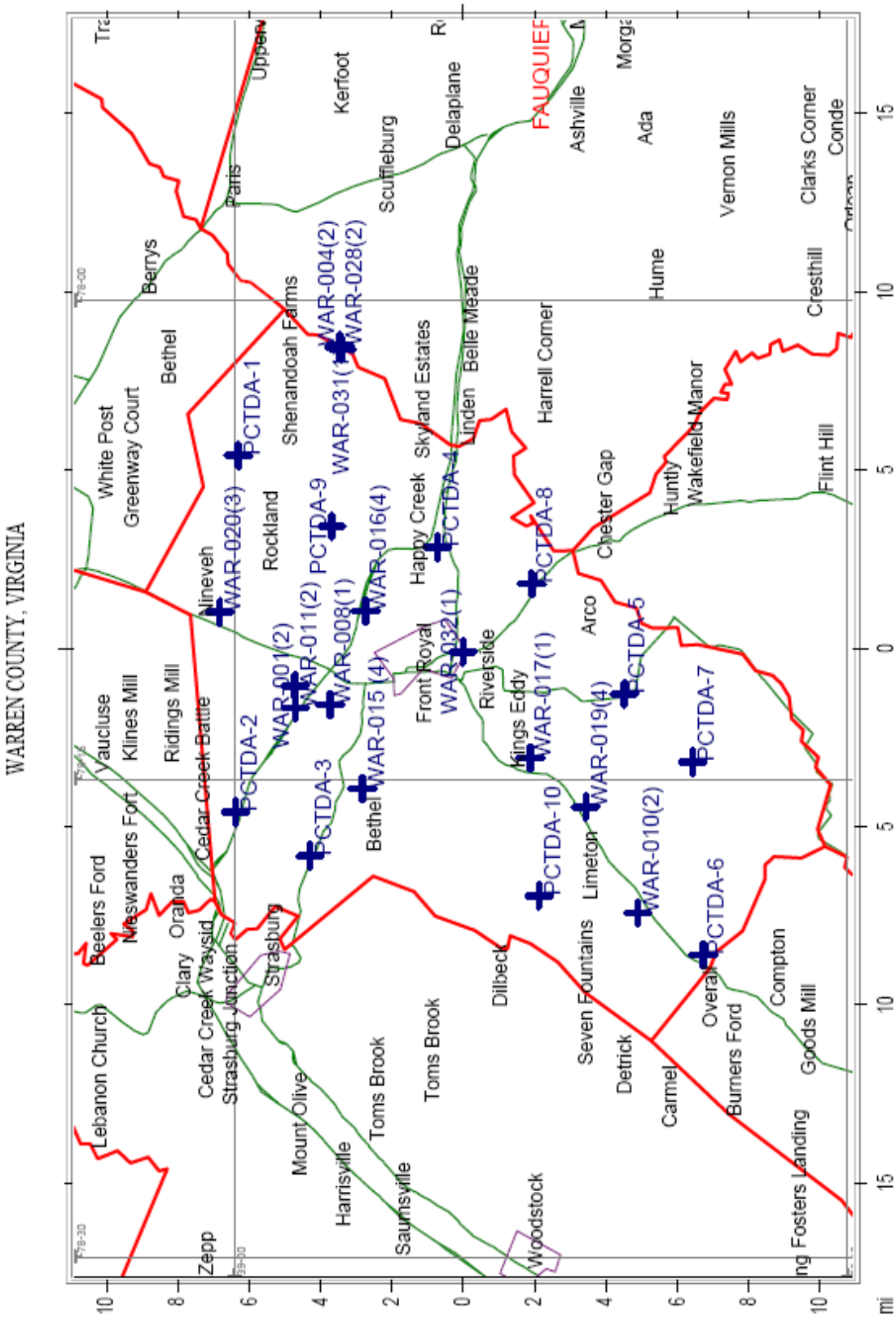


Table #3: Allow Communications towers (Infrastructure) to be built by development community at locations prescribed.

Permitted Commercial Tower Development Areas			
Area	**Name**	**Latitude**	**Longitude**
PCTDA 1	MILLDALE	38-59-53.8 N	78-04-51.3 W
PCTDA 2	CEDAR CREEK	38-59-58	78-16-1.7
PCTDA 3	WATERLICK	38-58-8.7	78-17-25.1
PCTDA 4	HAPPY CREEK	38-55-1.9	78-07-43.4
PCTDA 5	GLEN ECHO	38-50-27.9	78-12-20.0
PCTDA 6	OVERALL	38-48-31.7	78-20-31.3
PCTDA 7	BROWNTOWN	38-48-46.9	78-14-27.7
PCTDA 8	CHESTER GAP	38-52-43.5	78-08-52.6
PCTDA 9	SHENDOAH SHORES	38-57-36.8	78-07-4.3
PCTDA 10	MCCOYS FORD	38-52-32.5	78-18-39.6



TOWERS WITH CO-LOCATION & PERMITTED COMMERCIAL TOWER DEVELOPMENT AREAS

Appendix #2.

Residential Survey Results and Analysis

Scope: To research and measure County residents and businesses as to their ability, need, and opportunity to have high speed broadband service.

Purpose: To determine what geographic areas, potential markets and economic development may be realized with Countywide Broadband Deployment.

 # Taking Survey 210 County Resident households

 # Population of County: 37,000

Top 15 Readouts - Residential

13. **64.1%** of the respondents are between the ages of 25-54 years old. This means that most of these people are in the workforce and use Information technology daily.
14. **55.8%** currently living at home. This means that they have a fixed home in Warren County and are considered long term residents.
15. **100%** of respondents have a personal computer in the home. Of course if you have no personal computer, you could not answer the survey question.
16. **22.3%** = Dialup

26.7% = Satellite

19.9% = Cable based modem

15.5% = Wireless connection

3.4% = no internet service. = (16,184 housing units) = 550 residential units

17. **62.4%** Inadequate internet service
18. **82.7%** Indicate that fast (Greater than DSL speed) internet service is not available in area.
19. **24.4%** of households have a home based business.
20. **65.5%** indicate that they would be **somewhat likely** to **likely** run a home based business if high speed internet was available.
21. **90.6%** said that they would be **somewhat likely** to **likely** take an on-line course if high speed internet was available.
22. **50.7%** complete homework or complete job training over the internet.
23. **92.5%** think the internet is important to households.
24. **Top 2 functions Currently: 19.7%** purchase products or services

    21.3% perform financial transactions.

13. **72.4%** use satellite to receive TV.
14. **44.8%** pay more than $75/month for cable and satellite service not including internet.
15. **98.7%** use cell phones

Warren County Residential Telecommunications Survey

1. Please indicate the municipality located closest to your residence

	Response Percent	Response Count
The Town of Front Royal	12.9%	27
Warren County outside of the Town limits	**87.1%**	**182**
answered question		**209**
skipped question		**1**

2. Which Election District is your residence located within?

	Response Percent	Response Count
Fork	18.3%	35
Happy Creek	18.8%	36
North River	18.8%	36
Shenandoah	7.9%	15
South River	**36.1%**	**69**
answered question		**191**
skipped question		**19**

3. Please enter your street address for geographical locating purposes

	Response Count
	203
answered question	**203**
skipped question	**7**

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4. What is your age?

	Response Percent	Response Count
Under 20	1.4%	3
20-24	1.0%	2
25-34	15.8%	33
35-44	**26.8%**	**56**
45-54	21.5%	45
55-59	9.6%	20
60-64	12.4%	26
65 or Over	11.5%	24
	answered question	209
	skipped question	1

5. Do you have children living at home?

Currently Living in Home

	Yes	No	Respons Count
Currently Living at Home	**55.8% (111)**	44.2% (88)	1

If yes, please indicate age groups:

	Under 5	5-17	18 or Over	Respons Count
Currently Living at Home	11.8% (13)	**74.5% (82)**	13.6% (15)	1
			answered question	1
			skipped question	

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6. Does your household have a personal computer?

	Response Percent	Response Count
Yes	100.0%	208
No	0.0%	0
answered question		208
skipped question		2

7. Which of the following best describe the type of Internet service you subscribe to at home?

	Response Percent	Response Count
No Internet at home	3.4%	7
Dial Up on telephone line	22.3%	46
Wireless	6.3%	13
ISDN	0.5%	1
Satellite	26.7%	55
Cellular	9.2%	19
DSL	11.7%	24
Cable Modem	19.9%	41
answered question		206
skipped question		4

8. What is the name of the company that provides your Internet connection?

	Response Percent	Response Count
Not Sure	**57.1%**	**8**
No Internet Access	42.9%	6
Other (please specify)		190
answered question		**14**
skipped question		**196**

9. How would you assess your current Internet bandwidth (speed)?

	Response Percent	Response Count
Adequate	33.8%	68
Inadequate	**64.2%**	**129**
More Than Needed	2.0%	4
answered question		**201**
skipped question		**9**

10. To the best of your knowledge, how much are you currently paying per month just for Internet access?

	Response Percent	Response Count
Under $20	16.1%	32
$20-$40	**24.6%**	**49**
$41-$60	23.6%	47
$61-$80	24.1%	48
More than $80	11.6%	23
answered question		**199**
skipped question		**11**

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11. If you do not subscribe to an Internet service or high-speed (faster than dial-up) Internet service at home, why not?

	Response Percent	Response Count
Not available in my area	**82.7%**	**67**
Too expensive	14.8%	12
Not interested in this service	0.0%	0
Using high-speed elsewhere	2.5%	2
answered question		**81**
skipped question		**129**

12. Does anyone in your household use the Internet to work from home?

	Response Percent	Response Count
Yes	**65.5%**	**135**
No	34.5%	71
answered question		**206**
skipped question		**4**

13. Does anyone in your home operate a home based business?

	Response Percent	Response Count
Yes	24.4%	50
No	**75.6%**	**155**
answered question		**205**
skipped question		**5**

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14. If Internet services were adequate, how likely would it be that you or a person in your household would operate a home based business?

	Response Percent	Response Count
Very Likely	32.5%	64
Somewhat Likely	33.0%	65
Not Likely	**34.5%**	**68**
	answered question	197
	skipped question	13

15. If Internet services were adequate, how likely would it be that you or a person in your household would complete online educational courses or job training?

	Response Percent	Response Count
Very Likely	**55.9%**	**113**
Somewhat Likely	34.7%	70
Not Likely	9.4%	19
	answered question	202
	skipped question	8

16. Does anyone in your household use the Internet to complete school or job training course work?

	Response Percent	Response Count
Yes, at least once per week	28.4%	57
Yes, at least once or twice per month	21.4%	43
No	**50.2%**	**101**
	answered question	201
	skipped question	9

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17. How important is Internet access to you or your household?

	Response Percent	Response Count
Very Important	**92.5%**	**186**
Somewhat Important	7.0%	14
Not Important	0.0%	0
No Opinion	0.5%	1
	answered question	**201**
	skipped question	**9**

18. In the past 6 months, which of the following activities have you performed online?

	Response Percent	Response Count
Searched for travel related info	9.9%	20
Searched for health or medical info	5.4%	11
Purchased products or services	19.7%	40
Sold products or services	1.5%	3
Visited a news website	6.9%	14
Visited a state or local government website	8.4%	17
Searched for info related to school work	3.0%	6
Researched a major purchase	3.9%	8
Performed a financial transaction with a bank	**21.2%**	**43**
Communicated with a teacher	6.9%	14
Searched for a job	4.4%	9
Took an online course	3.9%	8
Downloaded or watched video online	4.9%	10
	answered question	**203**
	skipped question	**7**

19. If affordable wireless high-speed Internet access was available in your community, how likely would you be to subscribe to this method of Internet access?

	Response Percent	Response Count
Very Likely	**88.6%**	**179**
Somewhat Likely	10.4%	21
Not Likely	1.0%	2
answered question		**202**
skipped question		**8**

20. Do you subscribe to a pay TV service?

	Response Percent	Response Count
Yes, cable	17.2%	35
Yes, satellite	**72.4%**	**147**
No	10.3%	21
answered question		**203**
skipped question		**7**

21. Please indicate the level of cable or satellite TV service you currently subscribe to:

	Response Percent	Response Count
Minimum basic	20.5%	39
Expanded basic	33.2%	63
Digital service	**38.4%**	**73**
No pay TV service	7.9%	15
answered question		**190**
skipped question		**20**

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22. To the best of your knowledge, how much are you currently paying for cable or satellite service each month? Do not include Internet Access.

	Response Percent	Response Count
Under $20	0.5%	1
$20-$40	3.6%	7
$41-$50	10.9%	21
$51-$75	31.8%	61
More than $75	**44.8%**	**86**
Not Applicable	8.3%	16
	answered question	192
	skipped question	18

23. Please indicate the phone service(s) you subscribe to and your total monthly expenses for each:

Currently Subscribed

	Yes	No
Regular telephone service (wired):	**89.4% (168)**	10.6% (20)
Cell phone service:	**97.8% (180)**	2.2% (4)
Internet phone service:	32.8% (42)	**67.2% (86)**

Total Monthly Expenses

	No Charge	Under $35	$35-$75	More than $75
Regular telephone service (wired):	3.0% (5)	24.3% (41)	**60.4% (102)**	12.4% (21)
Cell phone service:	1.7% (3)	7.5% (13)	29.5% (51)	**61.3% (106)**
Internet phone service:	**43.8% (28)**	31.3% (20)	20.3% (13)	4.7% (3)
				answered question
				skipped question

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24. Are you satisfied with the current voice, video and Internet services available to you?			
	Satisfied	Not Satisfied	Response Count
Internet:	19.3% (29)	**80.7% (121)**	150
Video:	**60.4% (29)**	39.6% (19)	48
Telephone:	**76.1% (67)**	23.9% (21)	88
		answered question	**195**
		skipped question	**15**

25. What changes or improvements to communication technology in Warren County would best meet your needs?	
	Response Count
	161
answered question	**161**
skipped question	**49**

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Appendix #3.

Business Survey Results and Analysis

Goal: To survey a sample of the business community in its requirements for Broadband services for economic development.

Objective: Determine if the providers of Broadband are keeping up with demand for local businesses.

 # Businesses answered: 30 Small and Large businesses

# of businesses: Approximately 500 Large and Small Businesses

Top 15 Read-outs (Business)

16. **63%** of respondents are in the county.
17. **71.4%** have 4 employees or less.
18. **50%** are in Contracting and Real Estate/Financial/Insurance
19. **53.6%** have a annual revenue between $50 -$500 k
20. **82.1%** have 5 or fewer computers connected to the internet.
21. **22.2%** have dial up or no meaningful internet service.
22. **80.8%** of business internet users pay $100/month or less.
23. **25.9%** have dialup or less than 1.5Mbps of speed.
24. **92.6%** businesses indicate internet is critical to their business.

25. **59.3%** businesses say speed in inadequate.

26. **71.4%** indicate that higher speed that they need is not available.

27. **88.0%** indicate if **high-speed wireless** was available that they would subscribe**.**

28. **76.2%** of business owners would expand on-line service if higher speed internet was available.

29. **95.8%** of business have wired phones

    77.3% have cell phones.

30. **47.8%** future use is advertising

    60.2% is on-line sales

    65.0% is distance learning

    55% is Training

    12.5% Telemedicine

Warren County Business Telecommunications Survey

1. To which one of the following municipalities are you located in?

	Response Percent	Response Count
The Town of Front Royal	36.7%	11
Warren County outside of the Town limits	63.3%	19
answered question		30
skipped question		0

2. Please enter your street address for geographical locating purposes:

	Response Count
	28
answered question	28
skipped question	2

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3. How many employees work at this location?

	Response Percent	Response Count
None	7.1%	2
1-4	**71.4%**	**20**
5-9	17.9%	5
10-10	0.0%	0
20-49	0.0%	0
50-99	0.0%	0
100-249	3.6%	1
250 or more	0.0%	0
	answered question	**28**
	skipped question	**2**

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4. Which of the following best describes the type of business conducted at this location?

	Response Percent	Response Count
Accounting/Architectural/Engineering	4.2%	1
Agricultural/Forestry/Mining	0.0%	0
Business and Personal Services	0.0%	0
Communication/Technology	8.3%	2
Contractor or Construction	**25.0%**	**6**
Education	12.5%	3
Finance/Insurance/Real Estate	**25.0%**	**6**
Government	12.5%	3
Health Care	4.2%	1
Retail Trade	8.3%	2
Wholesale Trade	0.0%	0
	Non-Classified	5
	answered question	24
	skipped question	6

5. What is this location's annual revenue/sales?

	Response Percent	Response Count
Less than $50,000	35.7%	10
$50,000 - $500,000	**53.6%**	**15**
$501,00 - $1,000,000	0.0%	0
Over $1,000,000	10.7%	3
	answered question	28
	skipped question	2

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6. How many computers at this location have Internet?

	Response Percent	Response Count
None	0.0%	0
1-5	**82.1%**	**23**
6-10	7.1%	2
11-19	7.1%	2
20-50	3.6%	1
51-100	0.0%	0
Over 100	0.0%	0
	answered question	**28**
	skipped question	**2**

7. How does this location connect to the Internet?

	Response Percent	Response Count
No Connection	3.7%	1
Dial-Up	18.5%	5
DSL	18.5%	5
Cable Modem	**25.9%**	**7**
ISDN Line	0.0%	0
Satellite or Microwave	14.8%	4
Wireless	7.4%	2
T1 Line	3.7%	1
T3/DS3 Line	3.7%	1
Access via Optical Fiber	0.0%	0
Cell Phone Coverage	3.7%	1
	answered question	**27**
	skipped question	**3**

8. What is the name of the company that provides your Internet/bandwidth connection?

	Response Percent	Response Count
Not Sure	**80.0%**	**4**
No Internet Access	20.0%	1
	Please Specify	23
	answered question	**5**
	skipped question	**25**

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9. To the best of your knowledge, how much are you currently paying per month for Internet access?

	Response Percent	Response Count
Under $30	11.5%	3
$30-$50	30.8%	8
$51-$100	**38.5%**	**10**
$101-$300	15.4%	4
$301-$500	3.8%	1
$501-$1,000	0.0%	0
$1,001-$1,500	0.0%	0
Over $1,500	0.0%	0
	answered question	26
	skipped question	4

10. What is your current Internet bandwidth or connection speed?

	Response Percent	Response Count
Less than 200Kbps	7.4%	2
200Kbps to 512Kbps	7.4%	2
512+Kbps to 1.5Mbps	11.1%	3
1.5+Mbps to 3Mbps	0.0%	0
3+Mbps to 5Mbps	0.0%	0
5+Mbps to 10Mbps	3.7%	1
Greater than 10Mbps	18.5%	5
Not Sure	**51.9%**	**14**
	answered question	27
	skipped question	3

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11. How important is Internet/bandwidth access to your business?

	Response Percent	Response Count
Very Important or Critical	**92.6%**	**25**
Somewhat Important	7.4%	2
Not Important	0.0%	0
answered question		27
skipped question		3

12. How would you assess your current Internet bandwidth (speed)?

	Response Percent	Response Count
Adequate	40.7%	11
Inadequate	**59.3%**	**16**
More Than Needed	0.0%	0
answered question		27
skipped question		3

13. How would you describe your satisfaction with your current Internet service?

	Response Percent	Response Count
Very Satisfied	18.5%	5
Somewhat Satisfied	**29.6%**	**8**
Somewhat Dissatisfied	22.2%	6
Very Dissatisfied	**29.6%**	**8**
answered question		27
skipped question		3

14. What are your reasons for any dissatisfaction with your current Internet service?

	Response Percent	Response Count
Price Too High	26.1%	6
Connection Too Slow	**30.4%**	**7**
Service is Unreliable	21.7%	5
Poor Customer Service	0.0%	0
Problems with E-Mail	4.3%	1
Not Enough Bandwidth	17.4%	4
	answered question	23
	skipped question	7

15. If you do not subscribe to an Internet service or a higher speed Internet service, why not?

	Response Percent	Response Count
Not Available	**71.4%**	**5**
Too Expensive	28.6%	2
Not Reliable or Secure	0.0%	0
Not Interested	0.0%	0
	answered question	7
	skipped question	23

16. If an affordable wireless high-speed Internet service were available to you, how likely would you be to utilize this access method for your business needs?

	Response Percent	Response Count
Very to Somewhat Likely	**88.0%**	**22**
Not Very Likely	12.0%	3
	answered question	**25**
	skipped question	**5**

17. If an affordable high-speed Internet service were available to you, which of the following growth and expansion opportunities would your business most likely consider?

	Response Percent	Response Count
Other Additional Services via the Internet	**76.2%**	**16**
Expand Current Business	38.1%	8
Hire Additional Employees	9.5%	2
Add Additional Location	4.8%	1
Increase Advertising/Marketing Efforts	38.1%	8
	Other (Please Specify)	2
	answered question	**21**
	skipped question	**9**

19. Please indicate the phone service(s) used at this location and your total monthly expenses for each:

Currently Used

	Yes	No
Regular Telephone Service (Wired):	95.8% (23)	4.2% (1)
Cell Phone Service:	77.3% (17)	22.7% (5)
Internet Phone Service:	38.1% (8)	61.9% (13)

Total Monthly Expenses

	No Charge	Under $35	$35-$45	$46-$100	$101-$300
Regular Telephone Service (Wired):	0.0% (0)	0.0% (0)	19.0% (4)	38.1% (8)	38.1% (8)
Cell Phone Service:	6.3% (1)	12.5% (2)	6.3% (1)	12.5% (2)	62.5% (10)
Internet Phone Service:	58.3% (7)	25.0% (3)	8.3% (1)	0.0% (0)	0.0% (0)
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20. What changes or improvements to communication technology in Warren County would best meet your needs?

	Response Count
	26
answered question	26
skipped question	4

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18. For what purpose(s) does this location currently utilize or plan to utilize an Internet connection? Check all that apply.

	Current Use	Future Use	No Interest	Response Count
Advertising	43.5% (10)	**47.8% (11)**	8.7% (2)	23
Communication	**79.2% (19)**	20.8% (5)	0.0% (0)	24
Customer Service	**78.3% (18)**	17.4% (4)	4.3% (1)	23
E-Mail	**92.3% (24)**	7.7% (2)	0.0% (0)	26
Hosting Your Web Site	**47.6% (10)**	38.1% (8)	14.3% (3)	21
Online Sales	20.0% (4)	**60.0% (12)**	20.0% (4)	20
Purchasing Materials or Services	**72.7% (16)**	22.7% (5)	4.5% (1)	22
Research	**87.0% (20)**	13.0% (3)	0.0% (0)	23
Voice Service	23.5% (4)	35.3% (6)	**41.2% (7)**	17
Distance Learning	20.0% (4)	**65.0% (13)**	15.0% (3)	20
Telemedicine	0.0% (0)	12.5% (2)	**87.5% (14)**	16
Training	35.0% (7)	**55.0% (11)**	10.0% (2)	20
Transferring Data Files	**50.0% (12)**	45.8% (11)	4.2% (1)	24
Accounting/Banking	**78.3% (18)**	21.7% (5)	0.0% (0)	23
Video-Conferencing	13.6% (3)	**50.0% (11)**	36.4% (8)	22
VPN Connections	15.0% (3)	40.0% (8)	**45.0% (9)**	20
			answered question	**26**
			skipped question	**4**

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Project Information

Milestones Achieved

a. Telecommunications Management Team Formed ..... November 1, 2009
   i. Goals and Objectives
   ii. Provider Contacts
   iii. Provider Data
b. Management Plan Drafted ..... November 22, 2010
c. Consultant Hired ..... October 1, 2011

WARREN COUNTY

COMMUNITY TELECOMMUNICATIONS PLANNING PROJECT

MANAGEMENT PLAN

Project Description:

Warren County has received a planning grant from the Virginia Department of Housing and Community Development (VDHCD). The purpose of the grant is to complete a Community Telecommunications Plan that will allow the locality to identify next projects and possible implementation. The Project Management Team and Atlantic Technology Consultants, Inc. (ATC), the consultant, are to conduct a needs assessment of the neighborhood and its residents, create broadband education development strategies and end user application identification, propose last mile connectivity solutions, present preliminary design and costs estimates, develop options for organization and network operation, and present funding strategies for future implementation projects. A project management team has been formed. Warren County will complete all contract activities by ATC. The total project cost is $30,000 of which $25,000 is CDBG monies, and $5,000 is County of Warren monies.

Name	***Affiliation***	***Role***
Douglas P. Stanley	Warren County	County Administrator
Brandy Rosser	Warren County	Grant Administrator
George Condyles	Atlantic Technology Consultants, Inc.	Project Engineer/Consultant
Brandy Rosser	Warren County	Project Manager
Matt Fitzgerald	DHCD	Community Representative
Jerome Aumente	Private Citizen	Management Team Member
Niki Foster	Chamber of Commerce	Management Team Member
Linda Glavis	Board of Supervisors	Management Team Member
Marla Jones	EDA	Management Team Member
Craig Laird	Royal Oak Computers	Management Team Member
Melody Sheppard	WC Public Schools	Management Team Member
Martha Shickle	Regional Commission	Management Team Member
Jim Wells	Valley Health Link	Management Team Member
Taryn Logan	Warren County	Management Team Member
James Payne	CenturyLink	Management Team Member
Jeanian Clark	Lord Fairfax CC	Management Team Member

Task	*Person Solely Responsible*	*Person(s) Providing Support*	*Scheduled Completion Date*	*Date Completed*
A. Organize and Conduct Community Meetings #1 & 2	Brandy Rosser	Martha Shickle	March 31, 2010	March 31, 2010
B. Release Engineer Solicitation Document	Doug Stanley/Brandy Rosser	Matt Fitzgerald	December 10, 2010	December 10, 2010
C. Proposals Due	Doug Stanley/Brandy Rosser	Matt Fitzgerald	January 25, 2011	January 25, 2011
D. Develop Contract for Engineer	Doug Stanley/Brandy Rosser	Management Team/Matt Fitzgerald	February 15, 2011	August 29, 2011
E. Submit Contract to DHCD for approval	Doug Stanley/Brandy Rosser	Matt Fitzgerald	February 15, 2011	September 6, 2011
F. Hold Facilitated Planning Session with DHCD	Matt Fitzgerald	Brandy Rosser	August 10, 2010	August 10, 2010
G. Coordinate Management Team Meetings, Placing Minutes in File & Forwarding Copy to DHCD	Brandy Rosser	Doug Stanley	On going	On going
H. Draft Management Plan & Distribute to Team for Comments	Brandy Rosser	Doug Stanley	August 10, 2010	August 10, 2010
I. Submit Management Plan & Performance Budget to DHCD	Brandy Rosser	Doug Stanley	November 22, 2010	November 22, 2010
J. Submit Draw Down Request #1	Brandy Rosser	Doug Stanley	April 1, 2011	
K. Milestone 1 – Needs Assessment:	Consultant	Management		

Task	*Person Solely Responsible*	*Person(s) Providing Support*	*Scheduled Completion Date*	*Date Completed*
Review Current Communication Technology Conditions		Team/Brandy Rosser		
1a. Compile Asset Inventory	Consultant	Management Team/Brandy Rosser		
1b. Complete demand aggregation mapping that identifies large users	Consultant	Management Team/Brandy Rosser		
L. Milestone 2 – Broadband Education Development Strategies	Consultant	Management Team/Brandy Rosser		
2a. Investigate current programs available in the community and inventory current resources	Consultant	Management Team/Brandy Rosser		
2b. Denote training gaps	Consultant	Management Team/Brandy Rosser		
2c. Research and identify potential training partners to provide additional broadband education programs	Consultant	Management Team/Brandy Rosser		
2d. Identify common and customer specific broadband uses and applications and assist the community in developing a strategy for expanding their availability	Consultant	Management Team/Brandy Rosser		
M. Milestone 3 – Last Mile Connectivity Solutions	Consultant	Management Team/Brandy Rosser		

Task	*Person Solely Responsible*	*Person(s) Providing Support*	*Scheduled Completion Date*	*Date Completed*
3a. Provide a variety of options for achieving last mile connectivity based on community needs and tie-in to the areas of economic development potential, education, and health care.	Consultant	Management Team/Brandy Rosser		
3b. Provide recommendations to reach outlying areas of remote sites along with descriptions of capabilities of existing technologies.	Consultant	Management Team/Brandy Rosser		
3c. Delineate coverage areas for fiber optic connection and the means to delivery service beyond fiber connections.	Consultant	Management Team/Brandy Rosser		
3d. GIS mapping of a) existing telecomm infrastructure, b) areas of need, and c) proposed infrastructure routes of "Last Mile" solutions (base mapping provided)	Consultant	Management Team/Brandy Rosser		
3e. Develop preliminary design of a broadband telecommunications network	Consultant	Management Team/Brandy Rosser		
3f. Identify rights-of-way	Consultant	Management Team/Brandy Rosser		
3g. Identify network electronics specifications	Consultant	Management Team/Brandy Rosser		
3h. Include preliminary cost estimate for construction of	Consultant	Management Team/Brandy		

Task	*Person Solely Responsible*	*Person(s) Providing Support*	*Scheduled Completion Date*	*Date Completed*
proposed solutions		Rosser		
L. Milestone 4 – Organization and Network Operation Options	Consultant	Management Team/Brandy Rosser		
4a. Provide presentation of possible organizational/ownership structures	Consultant	Management Team/Brandy Rosser		
4b. Address potential staffing requirements, legal requirements, maintenance, and budget estimate	Consultant	Management Team/Brandy Rosser		
4c. Identify Internet Service Providers in community & investigate their willingness to be a provider on future network projects	Consultant	Management Team/Brandy Rosser		
4d. Research federal, state, and local regulations and legal issues. Evaluate guidelines for standards and rules	Consultant	Management Team/Brandy Rosser		
4e. Develop a Business Plan	Consultant	Management Team/Brandy Rosser		
M. Milestone 5 – Funding Strategies for Future Implementation Projects	Consultant	Management Team/Brandy Rosser		
5a. Information on availability and relevance of potential funding sources	Consultant	Management Team/Brandy Rosser		
N. Milestone 6 – Required Process	Brandy Rosser	Doug Stanley		

Task	*Person Solely Responsible*	*Person(s) Providing Support*	*Scheduled Completion Date*	*Date Completed*
Elements				
6a. Public hearing	Brandy Rosser	Doug Stanley		
6b. Monthly meetings with project management team	Brandy Rosser	Doug Stanley		
6c. Weekly updates against project milestones	Brandy Rosser	Doug Stanley		
6d. Provide the end product to be the property of the locality	Brandy Rosser	Doug Stanley		

Task to be Completed	*Estimated Funding Needed*	*Funding Source*
Milestone 1 - Needs Assessment/Review Current Communication Technology Conditions	$2,500	VDHCD
Milestone 2 - Broadband Education Development Strategies	$2,500	VDHCD
Milestone 3 - Last Mile Connectivity Solutions	$5,000	VDHCD
Milestone 4 - Organization and Network Operation Options	$5,000	VDHCD
Milestone 5 - Funding Strategies for Future Implementation Projects	$5,000	VDHCD

Milestone 6 – Required Process Elements	$1,000	VDHCD
Preliminary Designs/Cost Estimates	$4,000	VDHCD
Total Project Funding:	**$25,000**	**VDHCD**