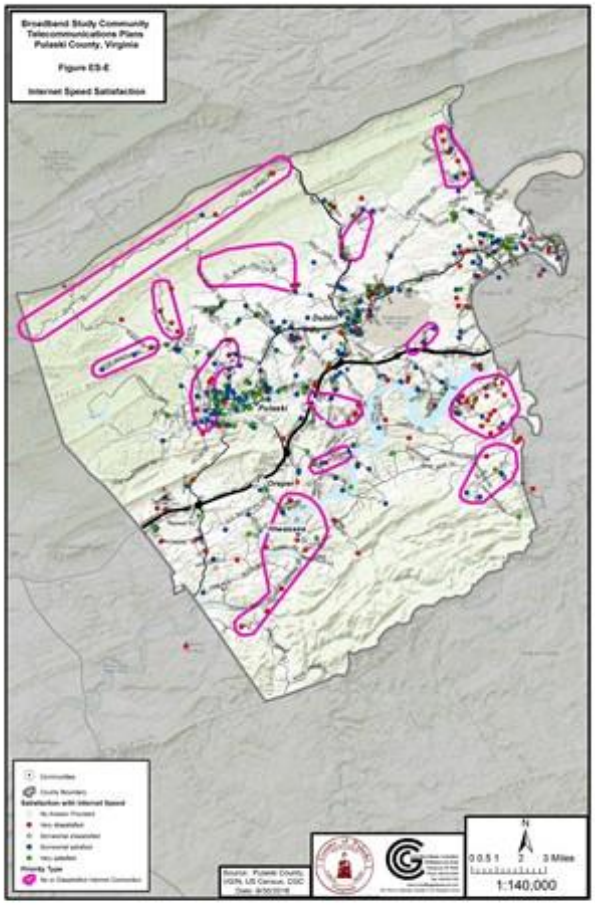
County of Pulaski, VA Community Broadband Telecommunications Strategic Plan

September 30, 2016



Submitted by the Pulaski County Broadband Initiative Project Management Team
Assisted by:

COMMUNICATIONS CONSULTING SERVICES

The Telecommunications Division of

Consulting Gateway Corporation

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September 30, 2016

TRANSMITTAL LETTER

Mr. Peter Huber
Pulaski County Administrator
143 Third Street, NW
Pulaski, Virginia 24301

Board of Supervisors
Pulaski County
143 Third Street, NW
Pulaski, Virginia 24301

RE: Pulaski County, VA Community Broadband Telecommunications Strategic Planning Project

Dear Mr. Huber and Pulaski County Board of Supervisors:

Consulting Gateway Corporation (CGC) and Dewberry are pleased to provide the Community Broadband Telecommunications Planning Project study report for Pulaski County, VA. This report provides guidance to meet the established project milestones and expectations of the County while fulfilling the requirements of the Commonwealth of Virginia Rural Broadband Planning Initiative funded through the Department of Housing and Community Development (DHCD) consisting of 1) Analyzing Existing Conditions, 2) Setting Broadband Goals, and 3) Identifying Needed Action to Achieve Goals.

After examining the options and roles for the County to consider, it is our recommendation that the County can best meet their stated goal of enhancing and encouraging high speed Internet connectivity throughout the county by partnering with private sector providers in implementing a variety of proposed solutions presented in the report. Such a partnership is intended to use funds in a fiscally responsible manner, take advantage of the typical funding opportunities while minimizing the need for other long term funding. Four (4) options are presented for consideration that are not exclusive of each other and it is believed the most impactful solution may be a combination of some of the solutions presented. Details on these options are outlined in the study report.

Last Mile Connectivity Solutions	Considerations	Information Provided
Option No. 1: Marketing Existing & Potential Sites	Least Risk, Effort, Expense, Impact & Time	Six (6) Primary Sites have been Identified for Potential Wireless Solutions
Option No. 2: Pulaski Internet Initiative-Communication Assistance Program	Liaison Between Customer & Service Provider	Significant and Relevant End-User & Provider Information was Collected
Option No. 3: Network Extension Funding - Public Private Partnership	Provides Incentive for Private Borrowing	Numerous Typical Telecom Funding Opportunities Are Presented
Option No. 4: Customer Premise Equipment Last Mile Cost Subsidy	Aids Low to Moderate Income Households	Strategy to Financially Assist Potential Customers get Service

A significant catalyst in arriving at these options was direct input from the service providers providing broadband services within the study area, as well as feedback from the members of the Project Management Team.

Service Provider Input

- *The biggest obstacle stated to achieving connectivity (including Fiber) is the last mile cost and build.*

- The best way the county can assist the service providers in enhancing Internet last mile connectivity is to *share information collected through this study* and *assist in structuring low interest financing and cost sharing or structuring last mile connectivity solution options.*
- A liaison (Pulaski County) between the end-users and the service providers could bridge the gap between lack of communication and/or knowledge of options available between the parties.

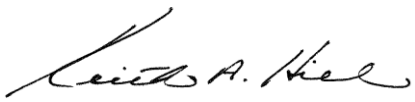
Project Management Team Feedback

- The municipalities would prefer not to own or operate network infrastructure of facilities.
- While the county is probably willing to make some manageable investment into enhancing Internet access within the county, without being a service provider there would be little monetary return on such an investment in the County providing services and Broadband it is just one of many infrastructure projects needing funding.
- *A sliding scale of options* to address enhancing Internet Connectivity should be presented so the elected officials representing the county can consider their comfort level in moving forward.

Other options, such as actual *network building* were not recommended at this time due to several concerns expressed by the Project Management Team members. By partnering with the private sector the County will minimize their investment and risk while meeting the need to address enabling broader service delivery. The most successful solutions will likely consist of the County assuming a liaison role between the service providers and the customers, exchanging service provider commitments of infrastructure investment with commitments by potential customers to take service; as well as the County assisting with funding applications, potential middle and last mile cost subsidy or sharing, and working with service providers to gain access to County owned vertical assets/property perhaps at reduced rates and expedited approvals and permitting. Both wireless and wireline (fiber connectivity) solutions and hybrid of both, such as connecting wireless vertical assets with fiber optic connectivity should be pursued. The County could implement any of the proposed solutions with revising the costs to fit a budget they are comfortable with, and take a 'wait and see' approach as to the effectiveness over the next 1 -2 years. It is not recommended the county proceed with any of the proposed options without getting cooperation and buy-in from the areas service providers. The Commonwealth encourages rural municipalities to establish such partnerships with private providers to enhance broadband service delivery to businesses and citizens. There is a unique funding opportunity coming up (2016 Virginia Acts of Assembly-Chapter 780) in which seed money will be made available towards private sector network construction activity by working with the public sector (County). Pulaski County service providers expressed interest in this opportunity.

Regardless of the elected officials' decision on implementation, the Community Broadband Telecommunications Planning Study has collected, organized and mapped out significant data on the study area end-user perceptions, as well starting discussions with service providers' on potential solutions and increased mapping of their infrastructure that will undoubtedly play a role in enhancing broadband and other telecommunications services in the future. CGC and Dewberry appreciate the opportunity to be an integrated partner in this important initiative and look forward to continuing to assist the County in bringing this vital infrastructure to the County's Communities.

Sincerely,
Consulting Gateway Corporation



Keith A. Hill, President
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Enclosure: Pulaski County, VA Community Telecommunications Broadband Planning Study

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ES Executive Summary

Introduction: VA-DHCD Community Telecommunications Broadband Planning Initiative

With the assistance of the Virginia General Assembly and the Virginia Department of Housing and Community Development (DHCD), Pulaski County has undertaken a comprehensive telecommunications planning effort to identify and develop all elements of a successful community broadband network. Undertaken as part of the Virginia Rural Broadband Planning Initiative (VRBPI), the project is designed to create competitive communities and ensure community sustainability by building and utilizing telecommunications infrastructure.

The VRBPI has laid out a series of tasks which are designed to reach the project goals, consisting of:

1. Needs Assessment and Asset Inventory
2. Broadband Education Development Strategies and End User Application
3. Last Mile Connectivity Options
4. Preliminary Engineering, Design and Cost Estimates
5. Organization and Network Operation Options
6. Funding Strategies

A rural county broadband "Needs Assessment" reviews population and housing density, the locations of business, schools and colleges, hospitals, libraries and other strategic community anchor institutions to target the design of communications infrastructure to provide connectivity to these critical facilities. The assessment also focuses on other quality of life and economic development issues such as household income, unemployment statistics, technology and business training and resources, and much more. Pulaski County has a significant number of existing towers and middle mile wireline - fiber optics communications infrastructure in-place deployed by deployed by the areas service providers such as Verizon, Comcast, Citizens Telephone Cooperative, Lumos Networks and more. In addition, there is significant long haul transportation fiber optic cabling along main transportation routes and interstates such as Windstream. The problem is pockets of unmet needs and where there is no significant communication infrastructure currently, including lack of last mile infrastructure. By reviewing the responses to the end-user surveys, Internet connectivity has been fairly well addressed when in school, health care facilities and businesses or living in the more populated communities, but the greatest problem is when the students and teachers go home, in ability to conduct telemedicine applications outside the health care facilities, when workers go home, and for the residents and businesses in the more rural communities.

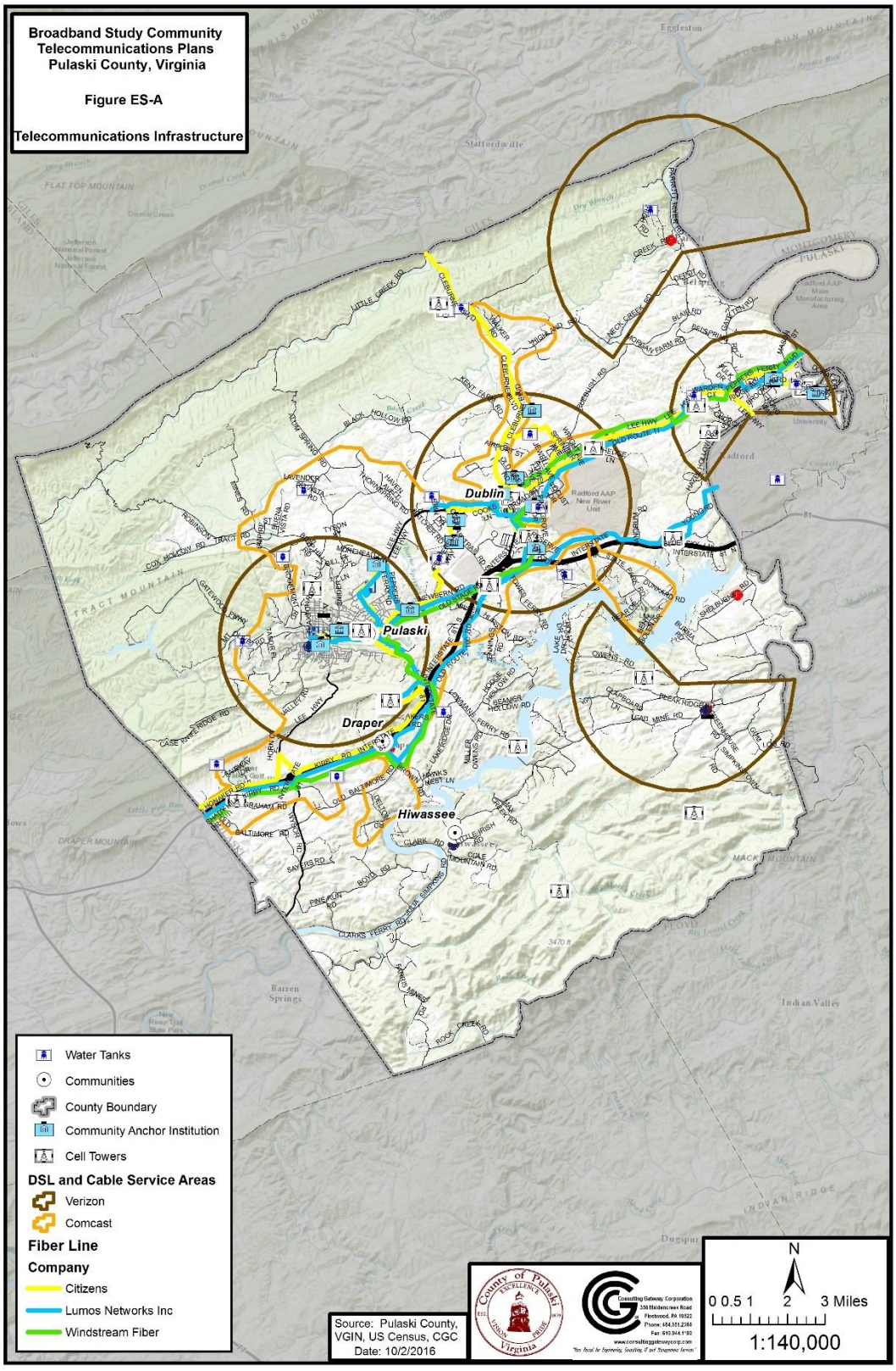
ES1.0 Needs Assessment and Asset Inventory

Region-Wide Data and Maps

The Needs Assessment was completed using existing data such as Comprehensive Plans, Zoning Maps and other information provided, as well as new data collected through an on-line and hardcopy end-user survey. The data collected was then mapped to create pictures of current conditions and determine where need for action exists. In addition, data from complimentary projects in the Geographic Information System (GIS) of Pulaski County, VA such as existing towers, water tank sites, other vertical assets, county owned land, etc. were also mapped. In other words, the regional maps generally demonstrate best estimated current conditions based on actual and analyzed data, where next step action should be focused.

See **Figure ES-A: Cell Telecommunications Infrastructure**

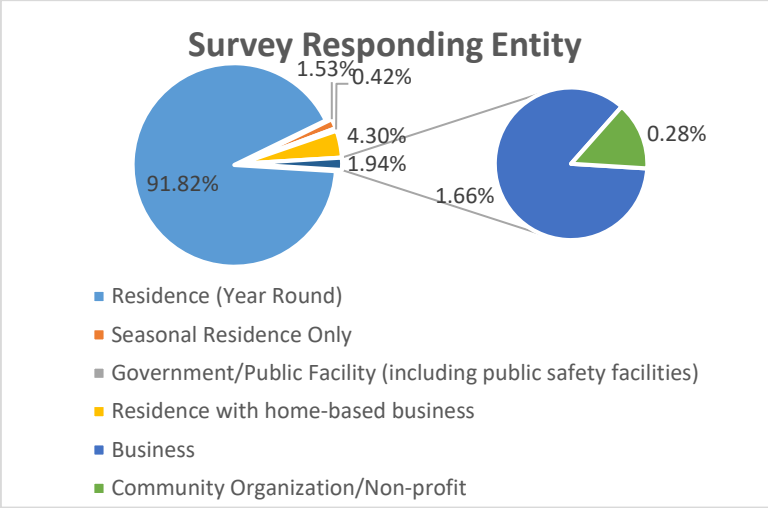
Figure ES-A: Telecommunications Infrastructure



ES1.1 Highlights of Survey Response in the Study

The following is the breakdown of survey responses were received:

Answer Choices	Responses	
Residence (Year Round)	91.82%	662
Seasonal Residence Only	1.53%	11
Government/Public Facility (including public safety facilities)	0.42%	3
Residence with home-based business	4.30%	31
Business	1.66%	12
Community Organization/Non-profit	0.28%	2
Total		**721**



Due to Business responses only being 1.66% of total entities responding, and similarly since the other entities responding representing less than 10% of responses even when including businesses, separate highlighting of the surveys by type entity was not warranted. In addition, 8 surveys were near, but outside the county and Pulaski County. Therefore, all survey responses received (721) as of the date when survey data was closed by the consultants are included in the survey analysis to provide the most comprehensive picture of existing conditions, needs and perspectives in and adjacent to the Pulaski County region.

- **See Figure ES-B: Internet Connection User Type**

See Section 1.1 Study Findings for the majority of responses to the survey questions. The following tables provides an abbreviated summary of the more Internet related survey responses with maps for the study area regarding Internet Speed, Customer Satisfaction, and Overall Internet Satisfaction:

All Surveys

Q4 Name of company providing your Internet connection?

Answered: 721 Skipped: 0

Answer Choices	Responses	
AT&T	1.11%	8
HughesNet	4.44%	32
TDS	0.00%	0
Citizens	0.00%	0
Lingo (MGW)	2.50%	18
T-Mobile	0.00%	0
Comcast	28.71%	207
Lumos Networks	0.14%	1
US Cellular	1.39%	10
Dish Network	2.08%	15
NRVUnwire (New River Valley)	4.30%	31
Verizon	30.24%	218
CenturyLink	0.14%	1
nTelos	1.53%	11
WildBlue	0.83%	6
DirectTV	0.42%	3
Shentel	7.35%	53
Exede	2.08%	15
Sprint	0.55%	4
No Internet	7.49%	54
I don't know	0.83%	6
Other (please specify)	3.88%	28
Total		**721**

- **See Figure ES-C: Internet Service Providers**

Figure ES-B: Internet Connection User Type

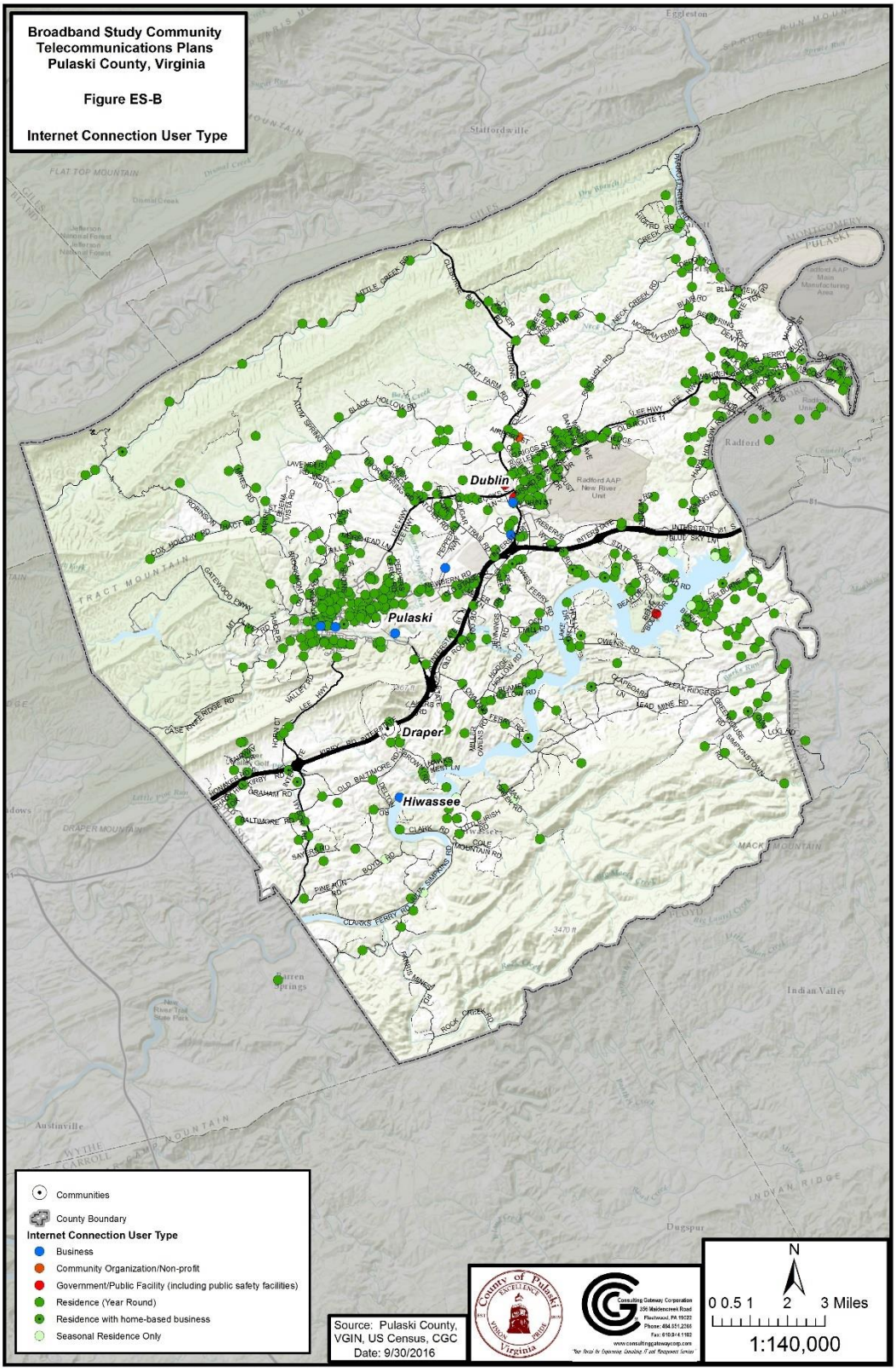
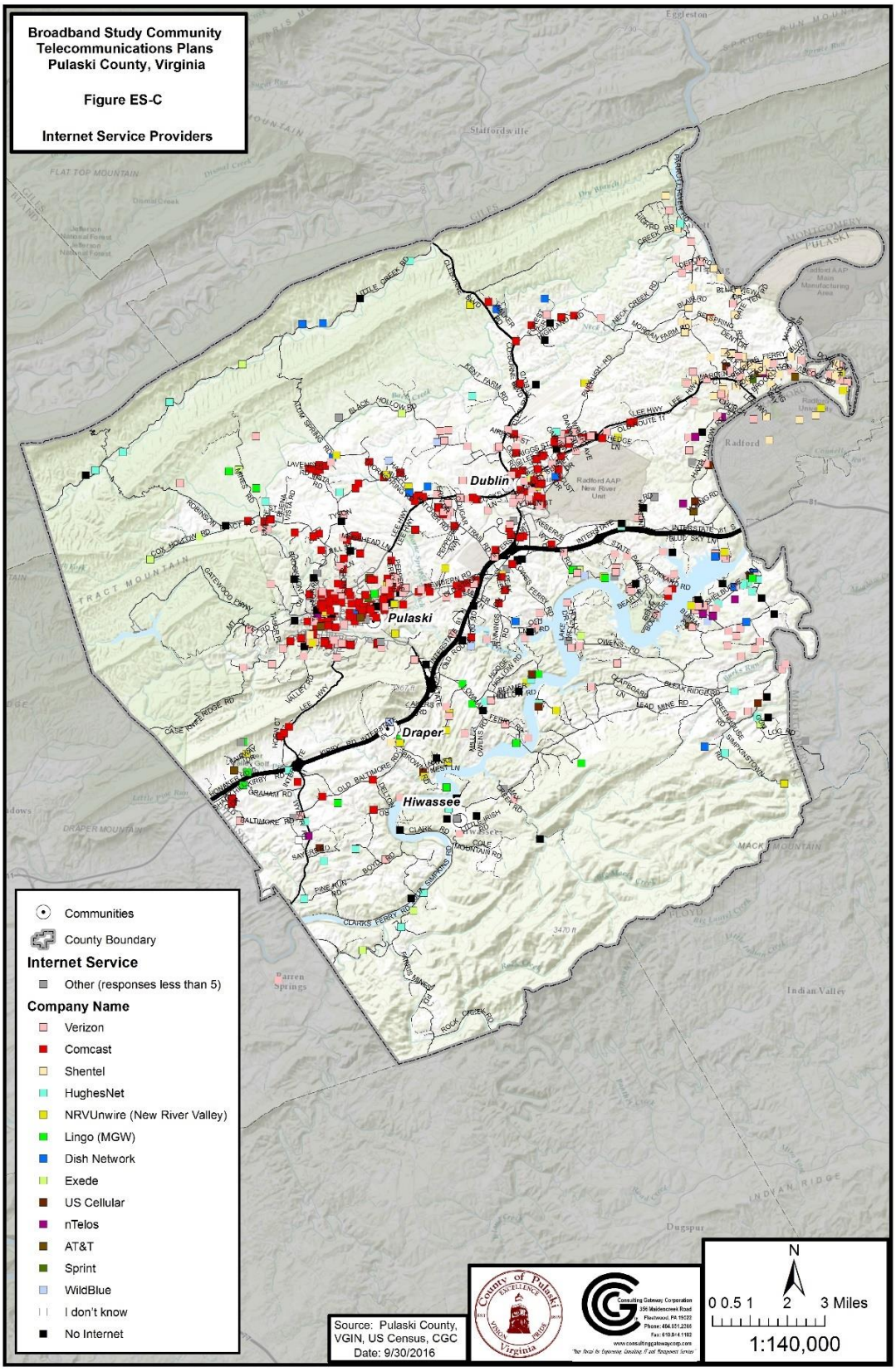
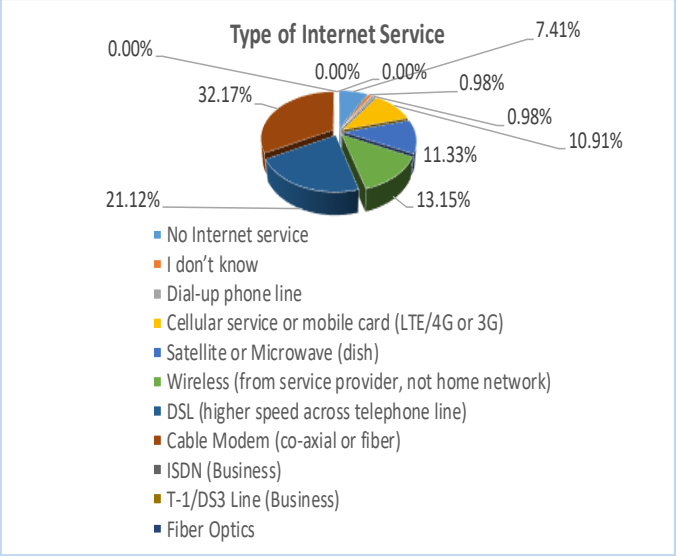


Figure ES-C: Internet Service Providers



Q5 Which of the following best describes the type of Internet service you subscribe to at this location?
Answered: 715 Skipped: 6

Answer Choices	Responses	
No Internet service	7.41%	53
I don't know	0.98%	7
Dial-up phone line	0.98%	7
Cellular service or mobile card (LTE/4G or 3G)	10.91%	78
Satellite or Microwave (dish)	11.33%	81
Wireless (from service provider, not home network)	13.15%	94
DSL (higher speed across telephone line)	21.12%	151
Cable Modem (co-axial or fiber)	32.17%	230
ISDN (Business)	0.00%	0
T-1/DS3 Line (Business)	0.00%	0
Fiber Optics	0.00%	0
Other (please specify)	1.96%	14
Total		**715**



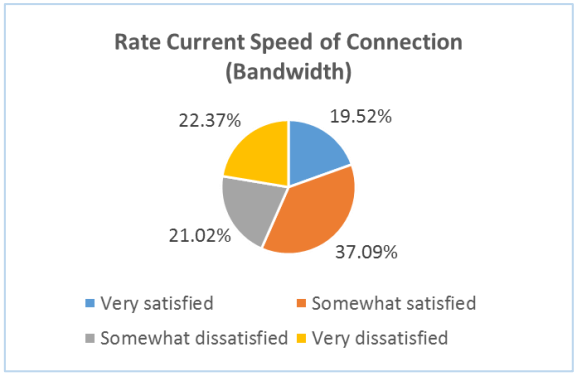
- **See Figure ES-D: Internet Connection Type**

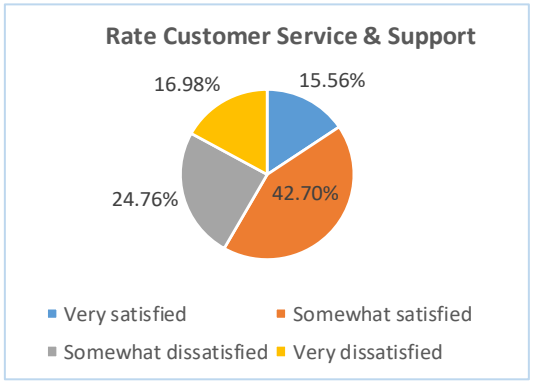
Q12 Please rate your current speed of connection (bandwidth): Answered: 666 Skipped: 55

Answer Choices	Responses	
Very satisfied	19.52%	130
Somewhat satisfied	37.09%	247
Somewhat dissatisfied	21.02%	140
Very dissatisfied	22.37%	149
Total		**666**

Q13 Please rate the customer service and support from your provider: Answered: 630 Skipped: 91

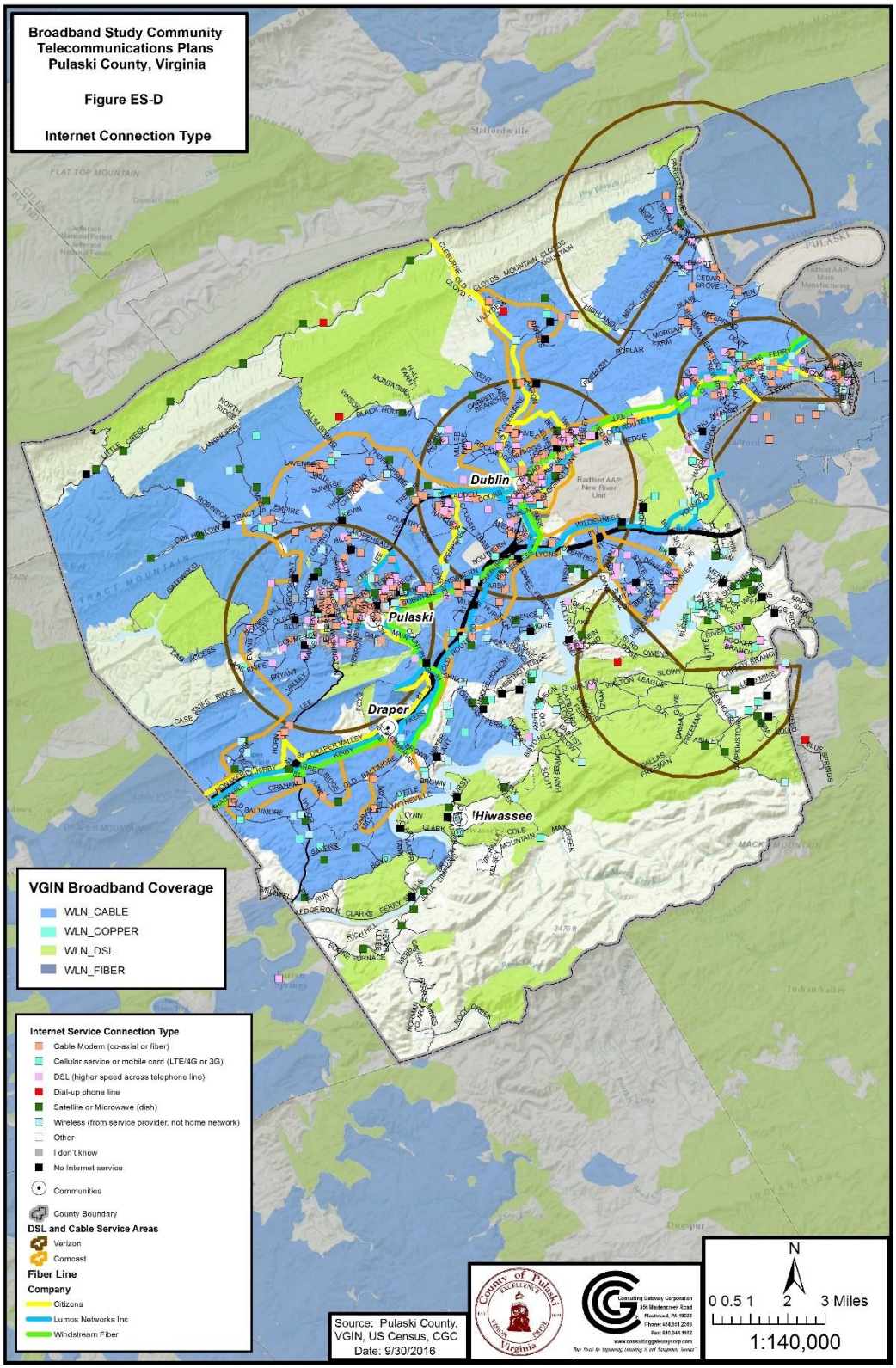
Answer Choices	Responses	
Very satisfied	15.56%	98
Somewhat satisfied	42.70%	269
Somewhat dissatisfied	24.76%	156
Very dissatisfied	16.98%	107
Total		**630**





Internet	Speed	Customer Service	Overall Satisfaction
Very Satisfied	*19.52%*	*15.56%*	*11.01%*
Somewhat Satisfied	*37.09%*	*42.70%*	*43.60%*
	56.61%	***58.26%***	***54.61%***
Very Dissatisfied	*22.37%*	*16.98%*	*21.43%*
Somewhat Dissatisfied	*21.02%*	*24.76%*	*23.96%*
	43.39%	***41.74%***	***45.39%***

Figure ES-D: Internet Connection Type



Q14 How would you describe your overall satisfaction with your current Internet service

Answered: 672 Skipped: 49

Answer Choices	Responses	
Very satisfied	11.01%	74
Somewhat satisfied	43.60%	293
Somewhat dissatisfied	23.96%	161
Very dissatisfied	21.43%	144
Total		**672**

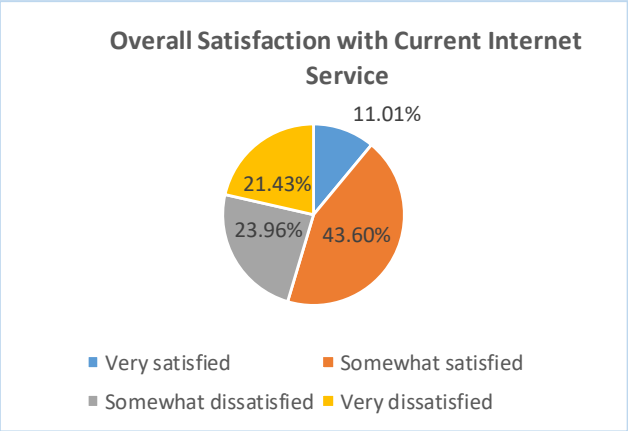
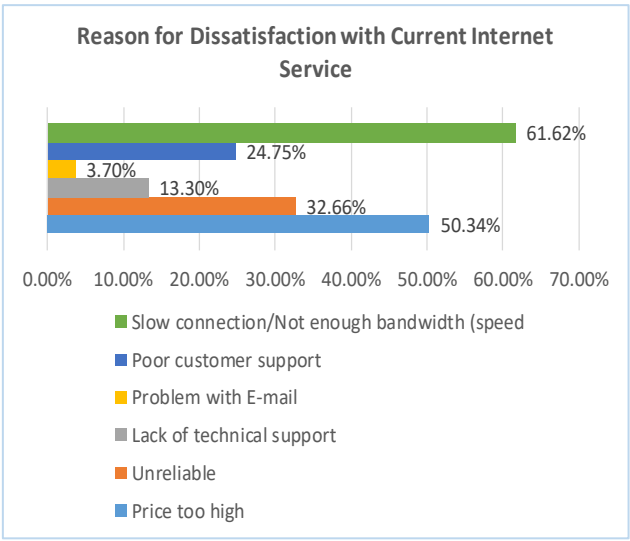


Figure ES-E "Internet Speed Satisfaction" and Figure ES-F "Internet Quality Satisfaction" The number of Somewhat or Very Dissatisfied users with Speed of Connection is over 43%, Customer Service & Support is almost 42% with Overall Dissatisfaction with current Internet Service at over 45%

- **See Figure ES-E: Internet Speed Satisfaction**
- **See Figure ES-F: Overall Internet Satisfaction**



Reasons for Internet Dissatisfaction

Major reasons for Overall Internet dissatisfaction is the slow connection/not enough bandwidth speed (~62%), Price too high (~50%). Almost 1/3 of users dissatisfied w/unreliable service (Almost 33%), and almost ¼ indicate poor customer service at 24.75%.

Q15 Reason for dissatisfaction?

Answered: 594 Skipped: 127

Answer Choices	Responses	
Price too high	50.34%	299
Unreliable	32.66%	194
Lack of technical support	13.30%	79
Problem w/E-mail	3.70%	22
Poor customer support	24.75%	147
Slow connection/Not enough bandwidth (speed)	61.62%	366
Total		**594**

Internet Priority Areas

Priority Areas were established where service gaps were identified where reported no service was available and/or service was slow or unreliable (unserved and/or underserved).

When defining priority areas, isolated responses of either having no service or dissatisfaction of service were not used, but rather where many such responses were given and were clustered. Obviously expressing a level of satisfaction is subjective and the reason a response was provided as no service would have to be explored further as to the reasoning; i.e., not available, decided to take service due to cost or some other reason, do not need, etc.

Figure ES-E: Internet Speed Satisfaction

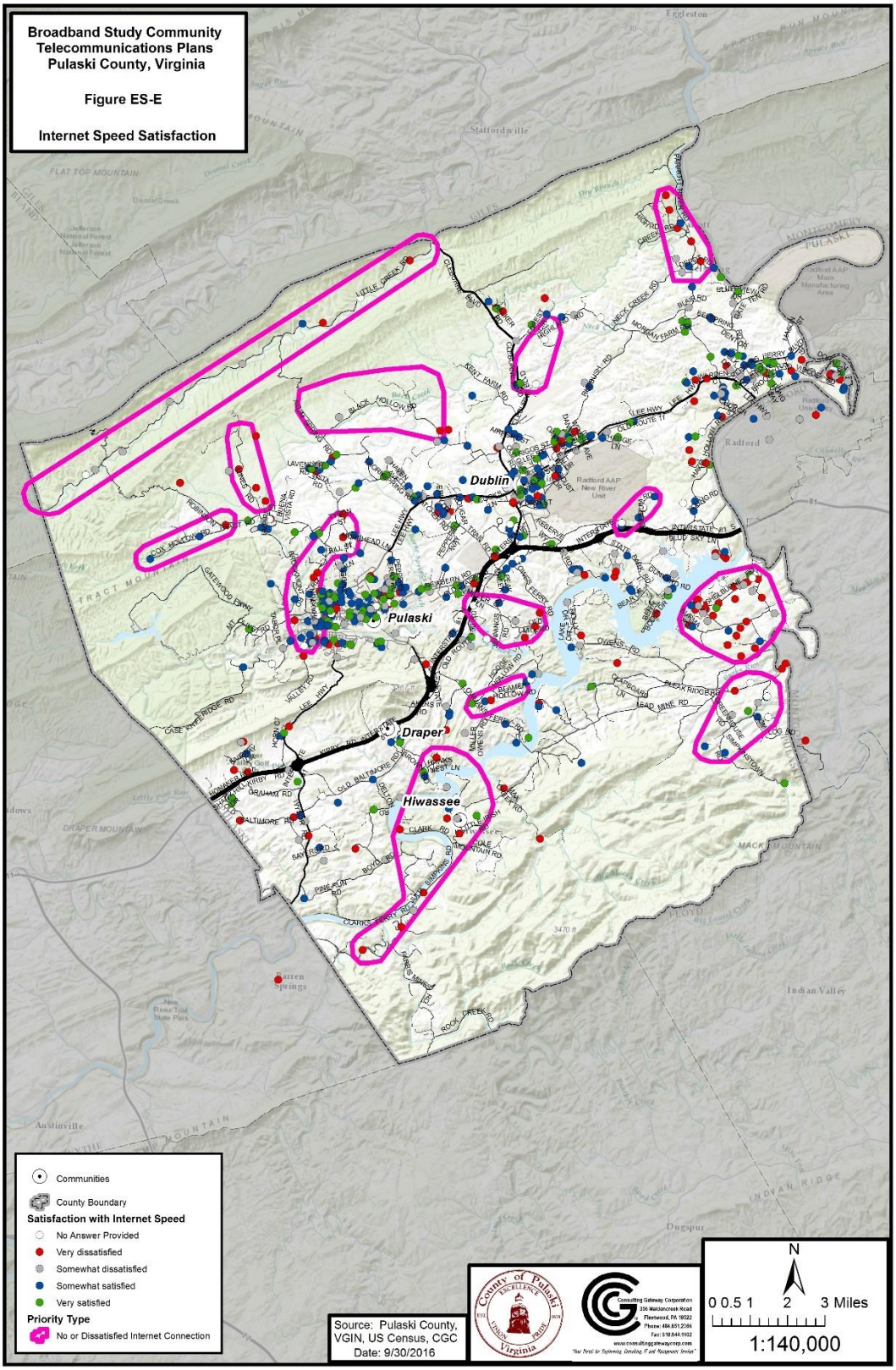
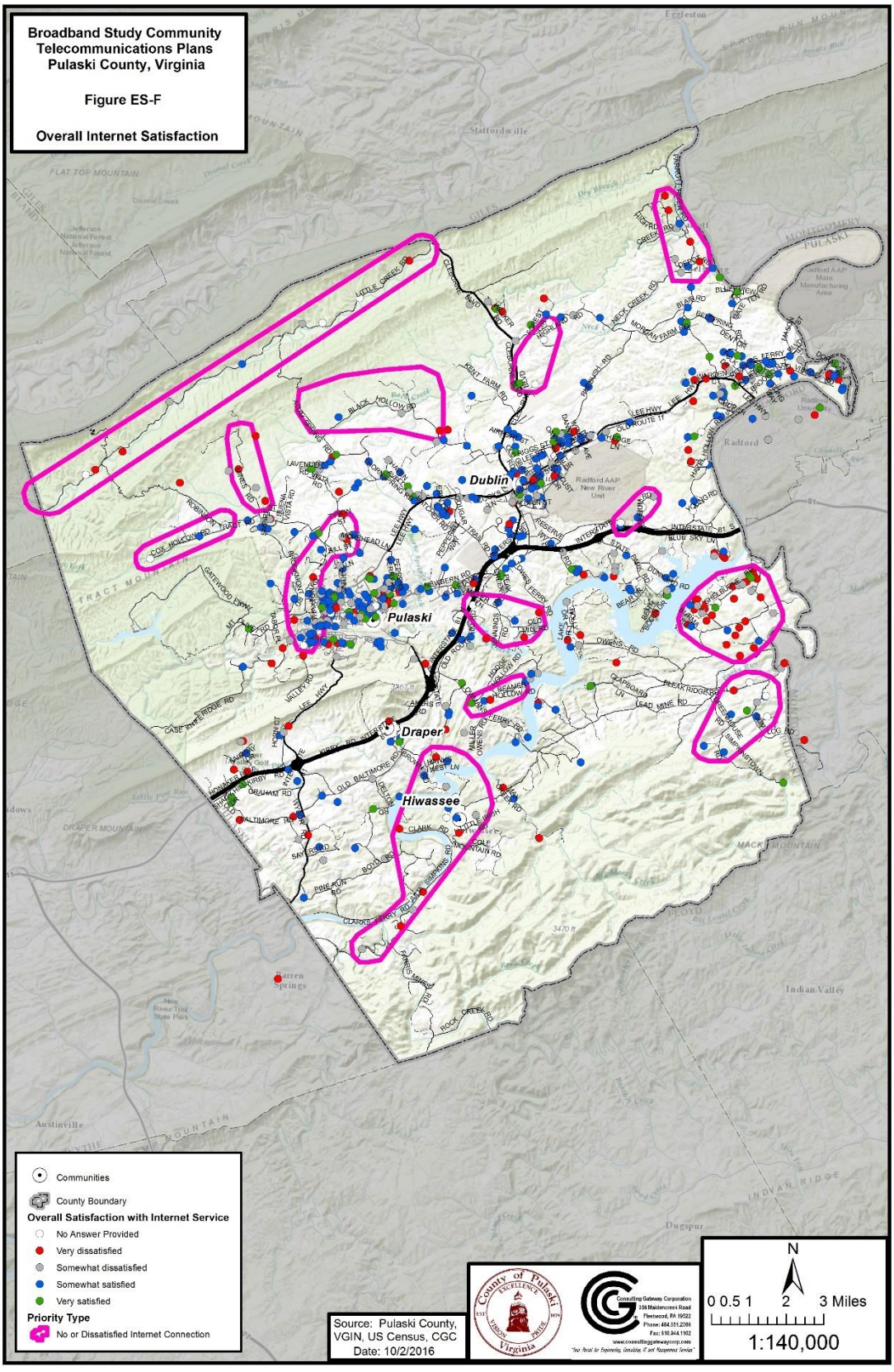


Figure ES -F: Overall Internet Satisfaction



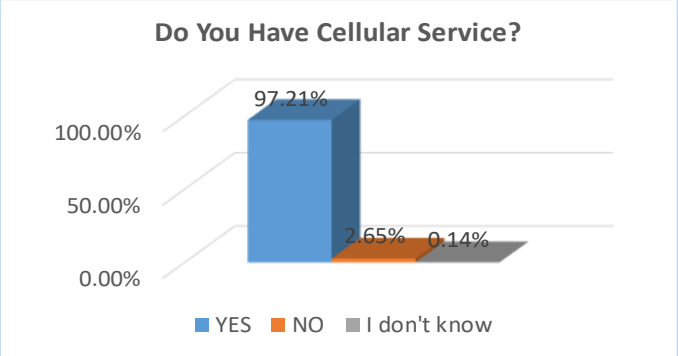
Cellular Service or Mobile Card

Cellular service or mobile card, reported at 10.91% type of Internet service subscribed to continues to gain in popularity as a main stream Internet Connection. Cable Modem were at 32.17% and DSL type connections at 21.12%. Wireless from a service provider is at 13.15% and Satellite or Microwave (dish) was reported at 11.33%. In recent years, project team members have expressed that having good cellular service is equally as important has having a reliable and high speed Internet Connection.

Q17 Do you have cellular phone service?

Answered: 716 Skipped: 5

Answer Choices	Responses	
Yes	97.21%	696
No	2.65%	19
I don't know	0.14%	1
Total		**716**



Q18 Name of the company providing your cellular service?

Answered: 692 Skipped: 29

Service Provider	AT&T	Sprint	Tracfone	Net10	Straight Talk	Verizon	nTelos	T-Mobile	US Cellular	I don't know	No Cellular Service	Total
	7.23%	5.06%	4.77%	0.14%	8.38%	48.27%	3.18%	0.72%	20.38%	0.29%	1.59%	
	50	35	33	1	58	334	22	5	141	2	11	**692**

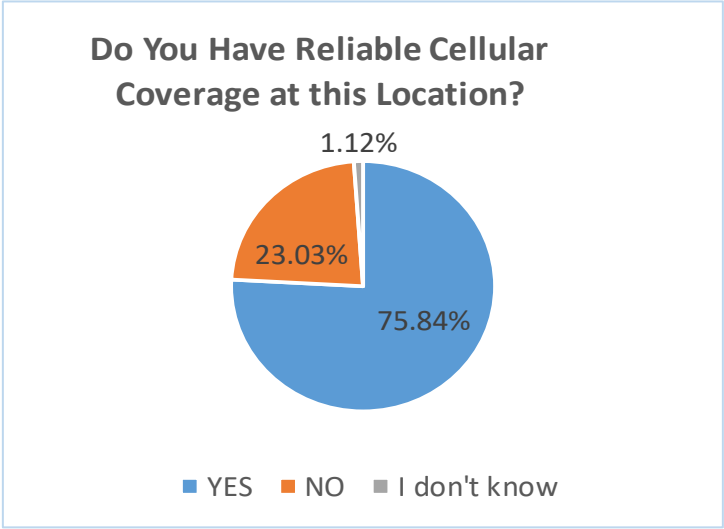
- **See Figure ES-G: Cellular Service Coverage and Service Provider**

Cellular priority areas were also identified based on responses of no service or unreliable service. Again, when defining priority areas, isolated responses of either having no service or unreliable service were not used, but rather where many such responses were given and were clustered.

Q19 Do you have reliable cellular coverage when using it at this location?

Answered: 712 Skipped: 9

Answer Choices	Responses	
YES	75.84%	540
NO	23.03%	164
I don't know	1.12%	8
Total		**712**



- **See Figure ES-H: Cellular Service Reliability**

Figure ES-G: Cellular Service Coverage and Service Provider

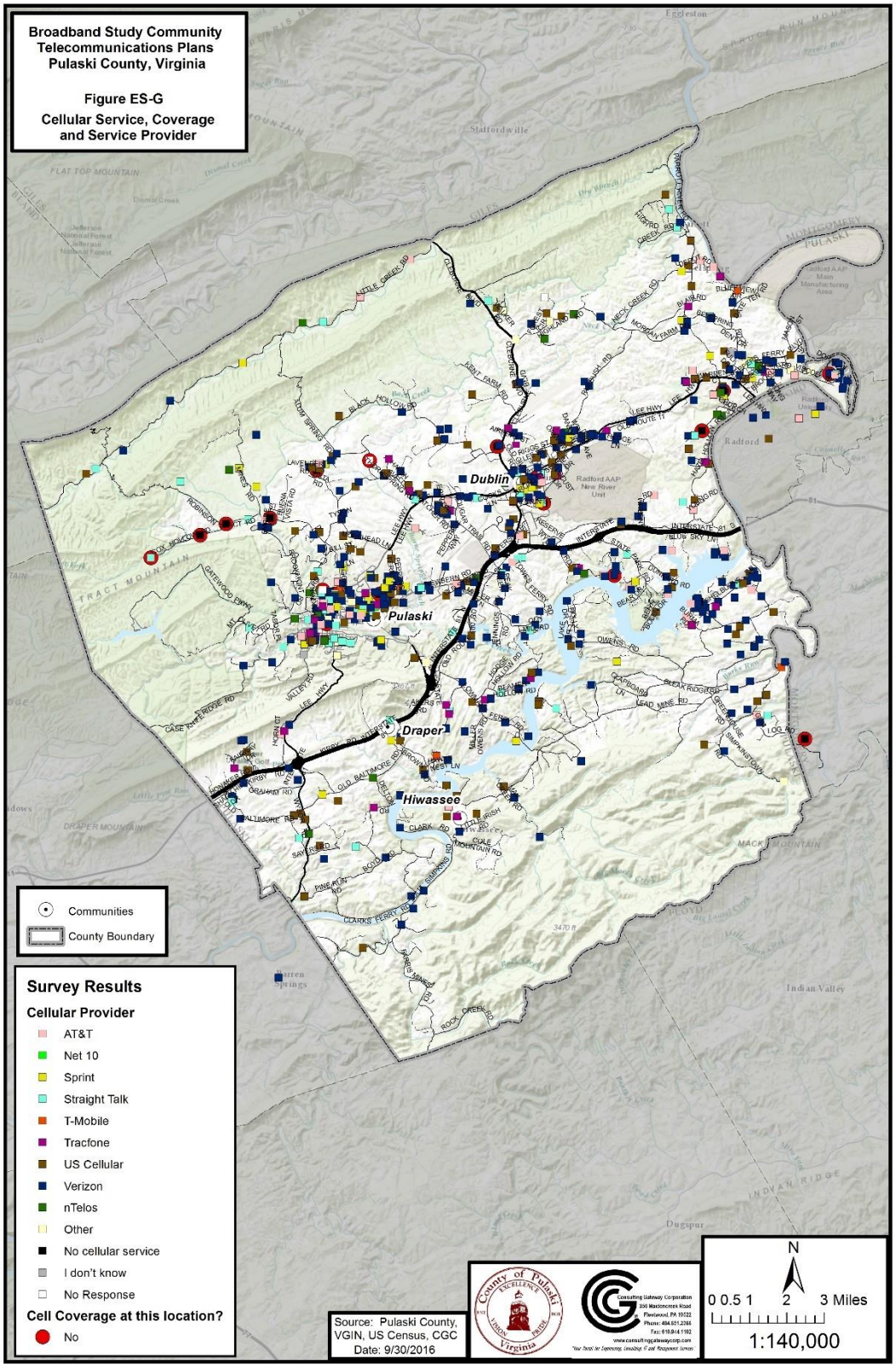
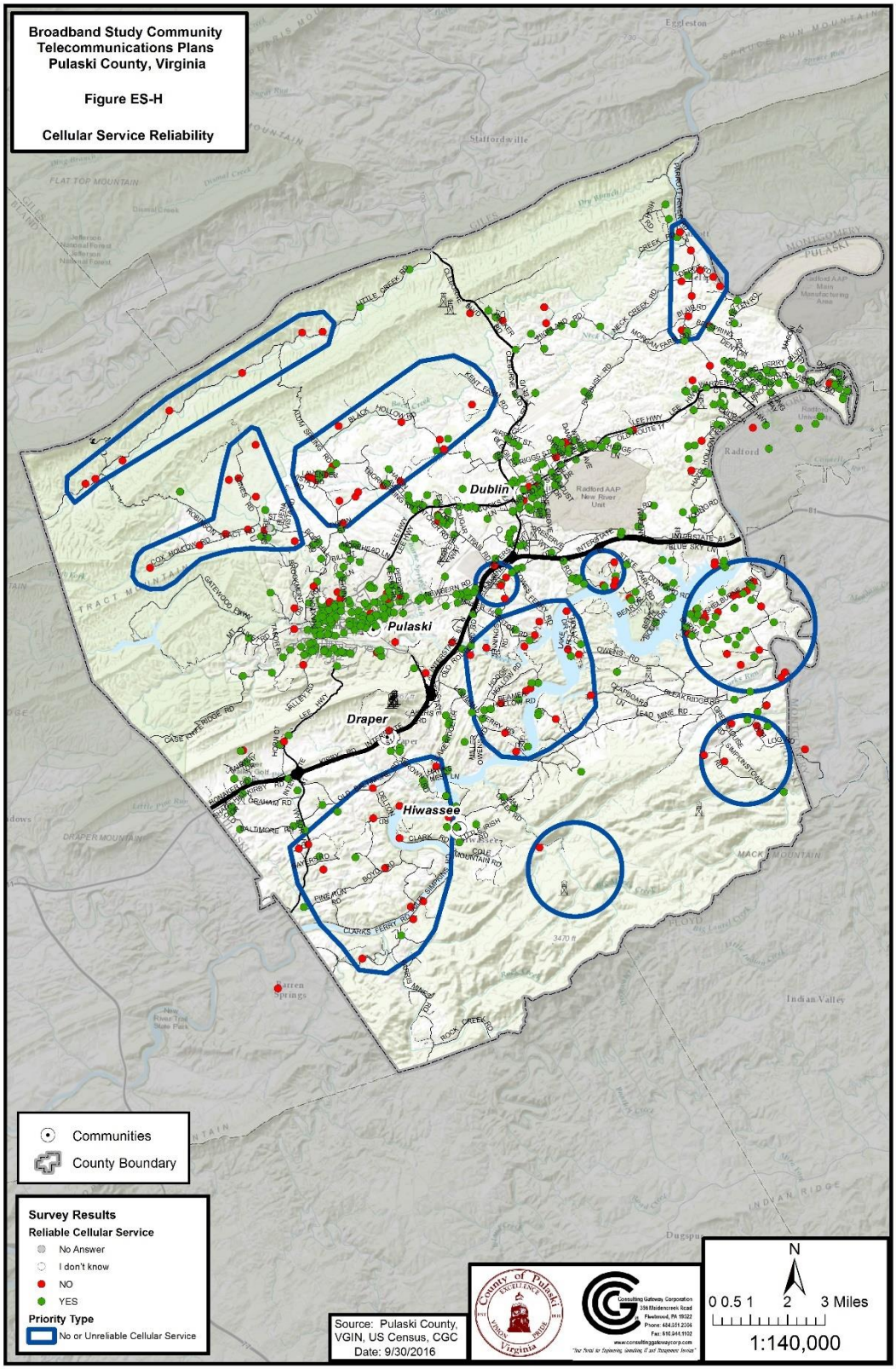


Figure ES-H: Cellular Service Reliability



ES2.0 Broadband Education Development Strategies and End User Application

ES2.1 Gap Analysis with Broadband Education Development and Strategies

A gap analysis was performed to address community needs such as job training; education, businesses and the local economy, community facilities (library, local government and public safety response organizations), and broadband education needs. The following sections briefly summarizes each of these important quality of life issues, observed gaps and suggested strategies to address deficiencies. A more comprehensive review is addressed later in the report.

ES2.1a Local and State Technology Training and Resources

Virginia recognizes the value of reliable, cost-effective high speed communication technology and the resulting impact on economic development and quality of life for its residents. Technology is a focus in all areas of State oversight and on opportunities for incorporating technology into the daily lives of citizens. Aside from setting standards for technology use within government, technology training standards are a core education requirement in public schools.

ES2.1b K-12 Schools

Biggest Education Problem: It has been reported be members of the Project Team, as well as educational member stakeholders that when people are at work or school, most locations have some type of high speed Internet connection, but many students and teachers at home lack necessary high speed Internet connections – Almost 58% of survey respondents indicated no one in their household uses Internet to complete school assignments or job training. Without high speed Internet, teachers may not be able to access online courses at home and through the school system providing instruction on implementing technology into classroom learning. Teachers are proficient in basic computer knowledge and classroom applications, and typically have been provided technology tools for presenting material to students and measuring comprehension. All teachers have completed basic technology instruction courses and could continue to receive further instruction using online resources. The *solution* to the biggest obstacle facing education is to focus on addressing high speed connectivity issues at the homes of the students and teachers.

ES2.1c Adult Education

Through the Commonwealth's Race to GED program, classes, materials and pre-testing are free to any adult that has not graduated from high school. Online classes and streaming video is available for those unable to attend traditional classes. The PBS Literacy Link website[1] offers interactive lessons and activities as part of their Pre-GED and GED Connection program. eLearn Virginia is another online option for adults who wish to work towards GED completion, enhance job skills, or earning a Career Readiness Certificate[2]. These programs further assist with job placement.

ES2.1d Higher Education

Distance-learning classes are offered through the Virginia Community College System throughout the Commonwealth. The VA Community College System offers an extensive variety of courses available through online access.[3] Distance learning provides the opportunity for students to complete courses not available through traditional instruction at the colleges and complete degree programs, while remaining close to family and work.

[1] http://litlink.ket.org/wesged.aspl
[2] Program details available online at www.crc.virginia.gov

[3] The Virginia Community College Online Resource for Students; http://www.vccs.edu/vccsonline/index.html

When students are forced to leave their communities to pursue higher education, many do not return to apply their knowledge locally. The out-migration of young adults reduces a community's ability to maintain a skilled, 'technology-literate' workforce and attract new businesses to the area. Classes are web-based and require independent study. Access to the Internet and basic technology skills are required such as understanding of computer fundamentals, web browsing, email use, and word processing applications. The access to advanced learning opportunities provided by the community higher education partners enable students to get the training and certification they need, while keeping them close to home and saving on education expenses.

ES2.1e Growing Business

Virginia has numerous resources available to businesses for growing and competing digitally. One-on-one assistance is available from regional agencies such as the Virginia Employment Commission and the Center for Business and Workforce Development. Additionally, small/medium businesses and individuals have access to many online resources for e-commerce education and financial assistance through the Virginia Electronic Commerce Technology Center (VECTEC).

Another example of Virginia's pro-business focus is the Virginia Department of Business Assistance (VDBA). This department's goal is to connect businesses with the resources they need to meet challenges and realize market opportunities. "Since almost 99% of Virginia businesses are defined as small and they create the majority of new jobs, there is a special emphasis on building the capacity of these bold entrepreneurs."[4] The State maintains a resource directory for businesses at business.virginia.gov. Additional resources for technology education and implementation are available from the Virginia Center for Innovative Technology (CIT). CIT's mission is to accelerate Virginia's next generation of technology and technology companies.

ES2.1f Public Library

Typically, Library Internet access connections are shared between public users and staff to the library circulation system. The speed and quality of access within each library is subject to several factors: 1) the numbers of users accessing a single Internet connection, 2) the types of applications using the Internet bandwidth, 3) often slow processing capabilities of aging computers, and 4) location of the library facility (most in-town libraries have good Internet high-speed connections while more rural libraries struggle). As new applications, programs, and social media applications continue to grow, bandwidth can become strained and in need of updated faster computers.

Library hours *can limit access* by patrons who have no computer or Internet access at home, particularly students who need access to complete school assignments and job seekers. One *solution* to investigate is the possibility of libraries being able to piggyback on government reduced pricing or arrangements with service providers for enhanced service.

ES2.1g Public Safety Education Resources

The need and study to address Emergency/Public Safety Radio Communications issues in the County are a separate initiative, but it was reported that there are some gaps in having strong public safety response communications in the more rural areas of the County. The need to address Public Safety Communications needs could provide

[4] Louisa M. Strayhorn, Director, Virginia Department of Business Assistance, *Connecting Businesses with Resources;* http://www.dba.state.va.us/about/default.asp

potential funding or cost sharing opportunities associated with communication towers or other vertical assets. The synergies between Broadband and Public Safety needs is addressed in more detail later within the report.

ES2.1h Healthcare

The hospital in Pulaski County is located in the Town of Pulaski. It has been reported that the problem is not at the hospital but rather the *biggest obstacles* to healthcare related issues is in adequate bandwidth for remote diagnoses and consultation between medical professionals and doctor-patient, as well as keeping up with developing, storing and protecting the privacy of electronic medical records. The *solution* to Healthcare gaps is implementing overall better communications infrastructure, offering higher speed and more reliable bandwidth that can handle video imaging & large data transfer. Use of the Internet in the past 6 months included searching for health or medical information with 76.42%, ranked as the seventh highest use.

- **See Figure ES-I: Education, Public Safety, Health Care and Major Employers**

County Growth

All of these quality of life issues, schools and education, learning resources (libraries and distant learning), technology training and resources, growing businesses and job opportunities, and healthcare impact whether a region or County will grow and be prosperous or struggle and be stagnant or loss families and businesses. When reviewing the Comprehensive Plan and future growth maps of Pulaski County, it is no surprise that typically growth occurs and is planned where public water and sewer treatment services exist, along major transportation routes, and employers have their facilities (essentially job centers and opportunities). Having high speed Internet and reliable cellular phone service are equally as important as these more traditional services in being attractive to both new businesses and families.

Pulaski County recognizes that planning for high speed Internet and reliable cellular phone service must be a priority just as transportation and public services.

- **See Figure ES-J: Growth and Development Areas**

Figure ES-I: Education, Public Safety, Health Care and Major Employers

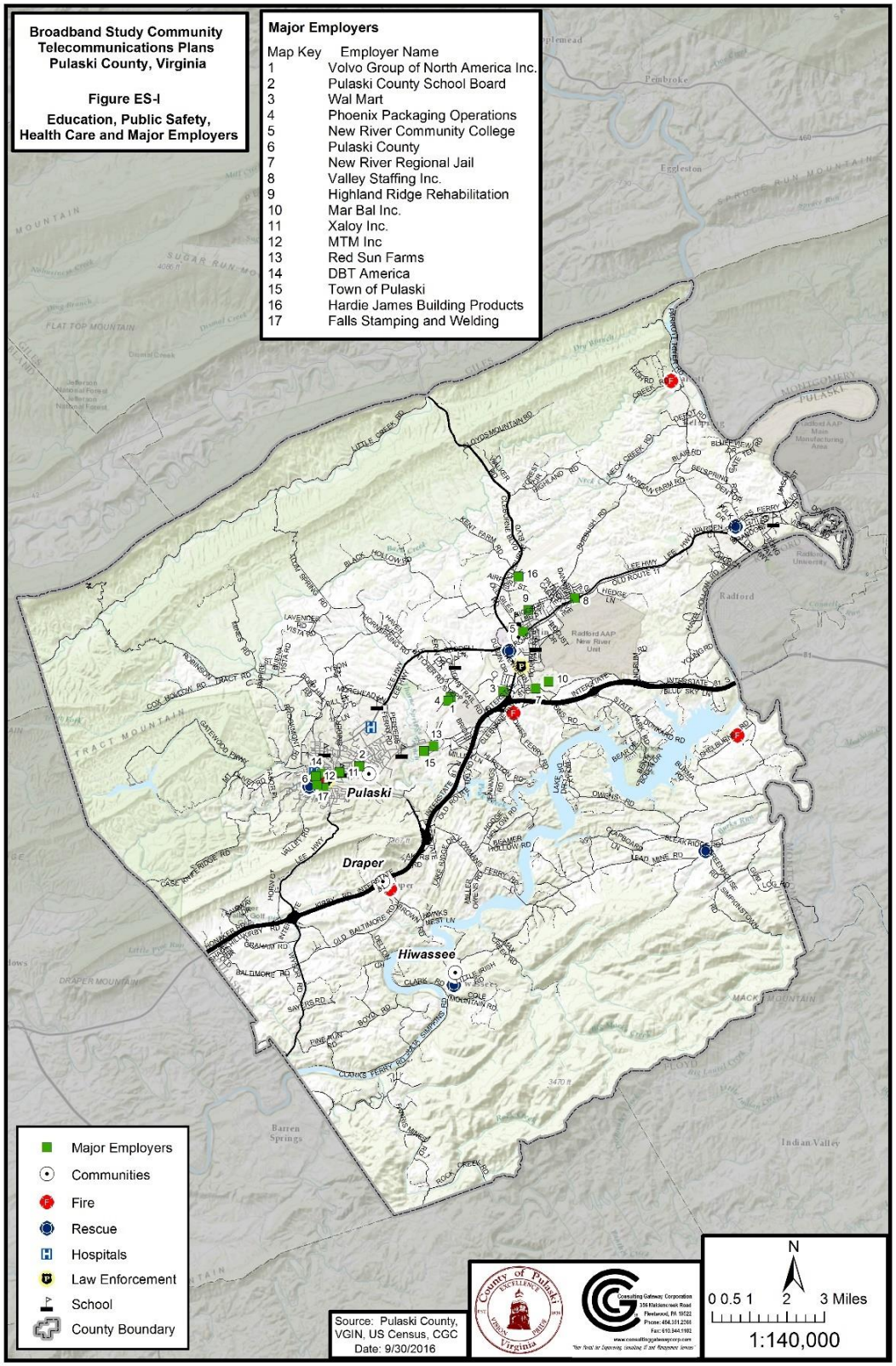
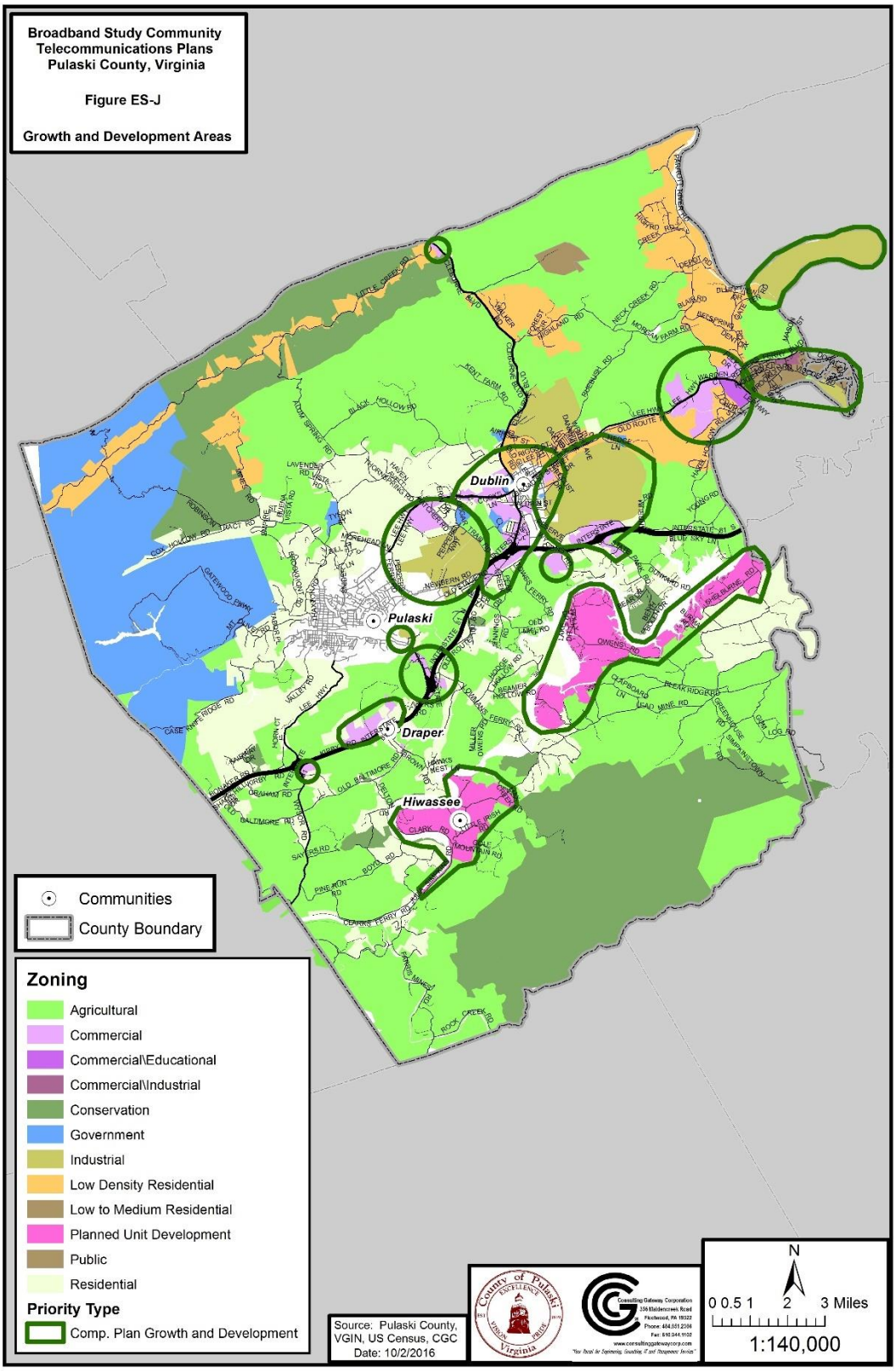


Figure ES-J: Growth and Development Areas



ES2.2 Additional Strategies to Consider

ES2.2a Community Intranet 'Portal'

Local information is still most commonly communicated by word-of-mouth, followed by radio and community newspapers. While this is typical for small towns in years past, it is inadequate today. A community network ('Portal') is a one-stop resource in an information age, whereby residents can access all community information. The county should have one portal, and all local governments should be encouraged to participate and update information frequently. Citizens should be encouraged to utilize their county portal as their start page, where they can get instant news and information. Opportunities for training, seminars and workshops should be featured along with upcoming community events. Key to the network's success are links to the school districts, community health providers, online learning sites, and local businesses, enticing users to explore and frequent the site. These sites should serve as the entrance to Economic Development information vital to those considering the county for a new business location. The County portal should be maintained by one entity, eliminating the need for each contributing source to possess the required technical capabilities. All local businesses should be represented and links to their web sites provided. Marketing is a critical component of a portal's success – locally and beyond. The current Eastern Shore Portal in VA (www.**virginiaeasternshoreportal**.com) is a good example to an intranet for access to community information.

ES2.2b E-Government

Large number of residents are turning to the Internet for news (86.61%), performed bank transactions (84.57%), purchases (93.16% and 75.25% Major Purchases), travel (81.95%), followed social media (86.90%), and downloaded/watched video online (70.60%) in past 6 months, as well as 74.53% have visited a government site. This represents an opportunity to promote e-government services. All municipalities should have a web presence, accessible from the community portal providing access to forms, online payments, meeting minutes, and contact information.

ES2.2c E-Commerce

Some portions of Pulaski County are somewhat isolated geographically and do not have the benefit of commerce from those 'passing through'. It is critical for the region's businesses to be proactive in marketing their products and services. The Internet offers a tremendous opportunity to reach those who may never happen upon their business. Using the Internet for e-mails still remains the greatest use at 97.67%.

The community portal would provide a starting point for businesses to begin advertising online, with additional efforts aimed at educating businesses on the value of having their own website with a link from the portal. Home-based businesses should also be included on the portal in that the portal itself operates as a business incubator.

ES2.2d Training on Internet Use

Many residents and businesses are using the Internet without realizing the full advantages the Internet offers. There is sufficient interest among both residents and businesses to support training classes on selling goods and services on the Internet. Training should include hands-on workshops to actually place an item for sale on an online auction. Training should be aimed at businesses as to where and how to market their business online. A variety of computer and technology job skill training is available today at very low costs compared to private training providers. Entry level training should continue to be low to no-cost to encourage as many as possible to participate, and to reach many segments of the population. Libraries should organize opportunities for training classes that are Internet specific such as selling online and using search engines to conduct research. Volunteers are a critical component to filling training needs in the libraries or community centers, and municipal support is needed to advertise for trainers.

ES2.2e Lead by Example

Local businesses that have established websites are conducting commerce via the Internet, and those that have embraced technology are perfect spokespersons for educating others on the advantages of technology. Opportunities for business leaders to assist can be organized by the Chambers of Commerce, promoted through economic development workshops and marketed through the community portal. Local networking groups provide support for business success, and additional groups should be encouraged throughout the region. Networking groups are becoming popular among young business people who have become accustomed to social networking.

ES2.2f The Broadband Experience

Those who are subscribing to a broadband method of Internet access such as cable modem or DSL could not imagine going back to dial-up. Many residents were first introduced to the Internet at the workplace, and adopted Internet access at home primarily for email communication with family and friends. Many moved beyond applications such as email, to transferring digital pictures, and now online video. As the applications continue to evolve and more information becomes readily accessible, a greater value is placed on the speed of the connection.

In some areas of the country, municipalities who have led the way arranging for higher speed Internet access networks in their communities have made kiosks available in city halls/public buildings, local shopping mall exhibits, and at events for their citizens to see, feel and experience 'broadband'. Partnerships with local service providers should seek to create such opportunities for public demonstration to encourage broadband adoption where technology currently is available.

ES2.2g Encourage Local Provider Service Marketing

Too many businesses do not understand the value of Internet applications beyond email and research. Voice over Internet service offers an affordable alternative and few businesses with Internet access are taking advantage of this service today. It appears many businesses are aware of the security feature of using VPN (virtual private network) for remote access to their networks and sensitive information (20.67% reported using an VPN for employees to work from home). Many businesses are also interested in video conferencing, which functions optimally with a broadband connection. Local Internet providers offer services to support these applications. Service providers should tailor marketing of these products towards the region's businesses, with emphasis on the value these applications can potentially provide to the business.

ES2.3 Areas of Unmet Needs and/or Lack of Adequate Communication Infrastructure

There were a number of areas within Pulaski County that were reported unmet needs and/or lack of adequate communication infrastructure. With cellular or mobile card service growing as a main stream access connection to the Internet, it is not surprising that many reports of no or unreliable cellular service and no or dissatisfied Internet overlapped.

Generally speaking, the areas of greatest needed focus in Pulaski County consisted of the regions:

- Along Little Creek Road along the north boundary of the County
- Along Cox Hollow Road and Mines Road, as well as along Alum Spring Road and Black Hollow Road in the northwest quadrant of the County (Northwest of Dublin)
- Northwest just outside the Town of Pulaski
- Hiwassee Area
- South of Interstate 81 north of Draper near the intersection of Lowerman Ferry Rd. and Chestnut Ridge Rd.
- South of Interstate 81 north of Draper along Beamer Hollow Road and in the Miller Lane/Jennings Road/Old Mill Road intersections area (Pea Creek Region)

- Southeast quadrant of the County in the Shellburne Road and Burma Road area, as well as Simpkinstown Road/Greenhouse Road/Gum Log Road area
- Near Interstate 81 at Cleburne Blvd. and also just south of State Park Road
- Just north of Interstate 81 in the Landrum Road off Wilderness Road area
- Small area in the northeast quadrant of the County along Forrest Circle and Highland Road
- Parrott River Road in the Northeast corner of the County
- It was also reported that the Boy Scout Property area near the southern end of the County has little to no high speed Internet connection and little to no cellular service reception

The more populated town centers have access to the higher broadband speeds. Businesses and residents located outside of the town limits in the more rural sections report having unreliable service, service not available or too expensive, or no choice other than satellite and dial-up.

Proposed Wireline - Fiber Optic Cabling Solution Consideration

Because Citizens Telephone Cooperative received a BTOP grant from the federal government to connect Community Anchor Institutions coming south on Cleburne Blvd. into the Town of Dublin and extending east towards Radford University, as well as south out of Dublin into the Town of Pulaski and eventually running south along Interstate 81 consideration of placing additional fiber optic cable to connect to Citizens Telephone Cooperative network could address many unserved/underserved areas. Fiber is preferred by cellular carriers to feed and backhaul towers and therefore where feasible, any existing tower where there is no fiber or new potential tower build should be assessed to determine if fiber could be built to the site. While it is doubtful Pulaski County will desire to build any significant fiber, approximately 32 miles of potential fiber locations to further investigate were identified.

- **See Figure ES-K: Strategy Map with Potential Wireline - Fiber Solutions**

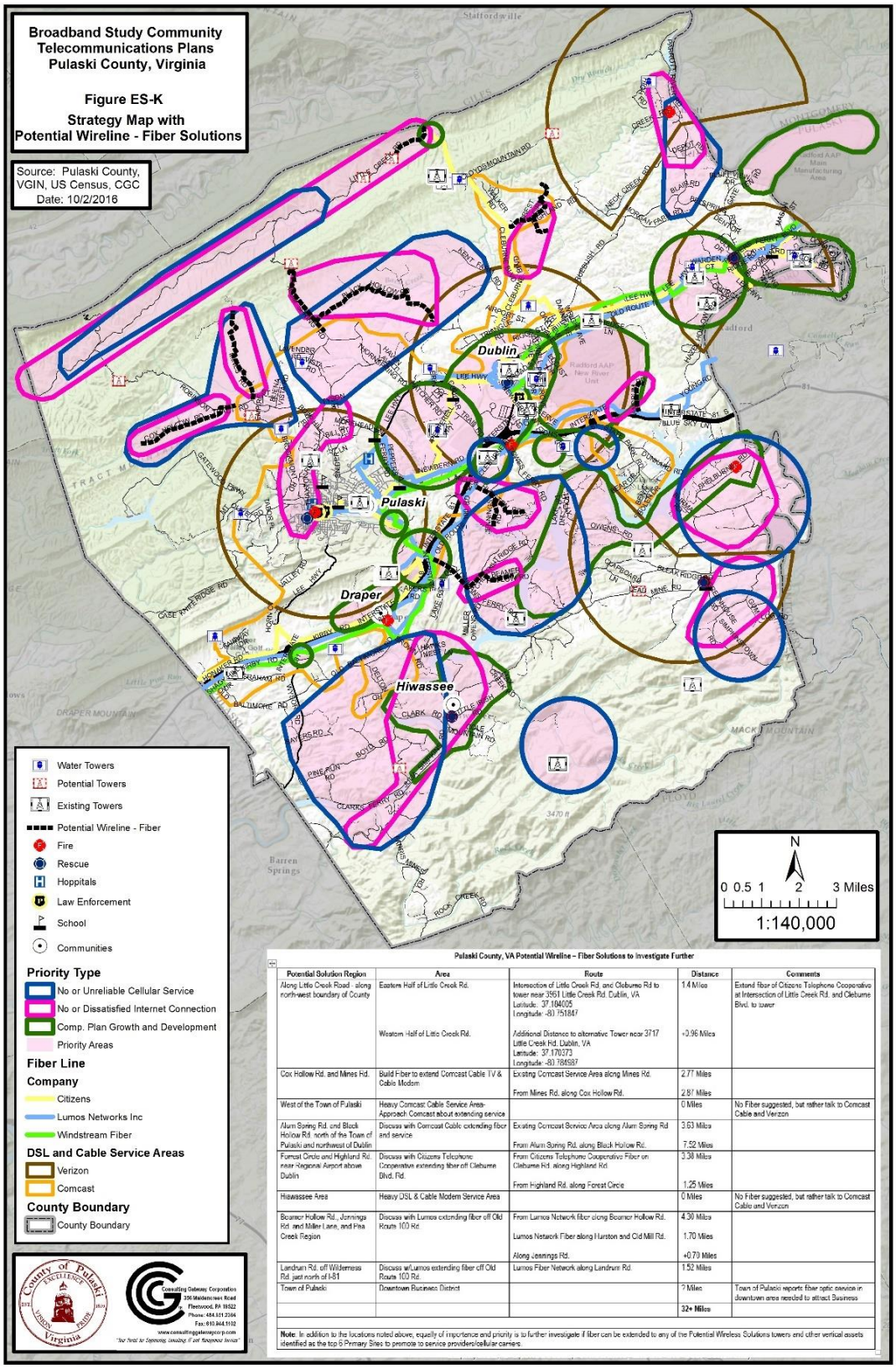
Proposed Wireless Solutions for Consideration

After investigating tower applications and permits, construction activity, and discussing vertical assets with the Project Management Team members, some additional potential tower sites were identified. Sites warranting investigation would include property owned by the County and non-private party organizations such as water tank sites, school campuses, fire stations facilities, etc. Many times, but not in all circumstances, trying to attach antennae arrays or other equipment directly on tanks, buildings, or existing radio towers can create more problems than perhaps just building a new tower on the property of such facilities. Where wireless equipment should be located will have to be decided on a case-by-case basis.

On first pass, the potential sites warranting further investigation are listed on the following map. The proposed approach was to narrow down the list to a reasonable and more likely list of sites to pursue a model for implementation. Dewberry engineers who specialize in wireless technologies and towers investigated and conducted a preliminary assessment/feasibility review of each of the potential sites identified considering ingress/egress (access road conditions and length for new road if needed), number of housing units served on a conservative 2 mile radius of service, topology, distance to fiber, whether the property is privately or publicly owned, whether there is an existing vertical asset including water tank, etc. As a result, the original list of 27 sites was reduced to 6 primary sites to pursue interest in from service providers/cellular carriers.

- **See Figure ES-L: Solution Map with Potential Wireless Solutions**

Figure ES-K: Strategy Map with Potential Wireline - Fiber Solutions

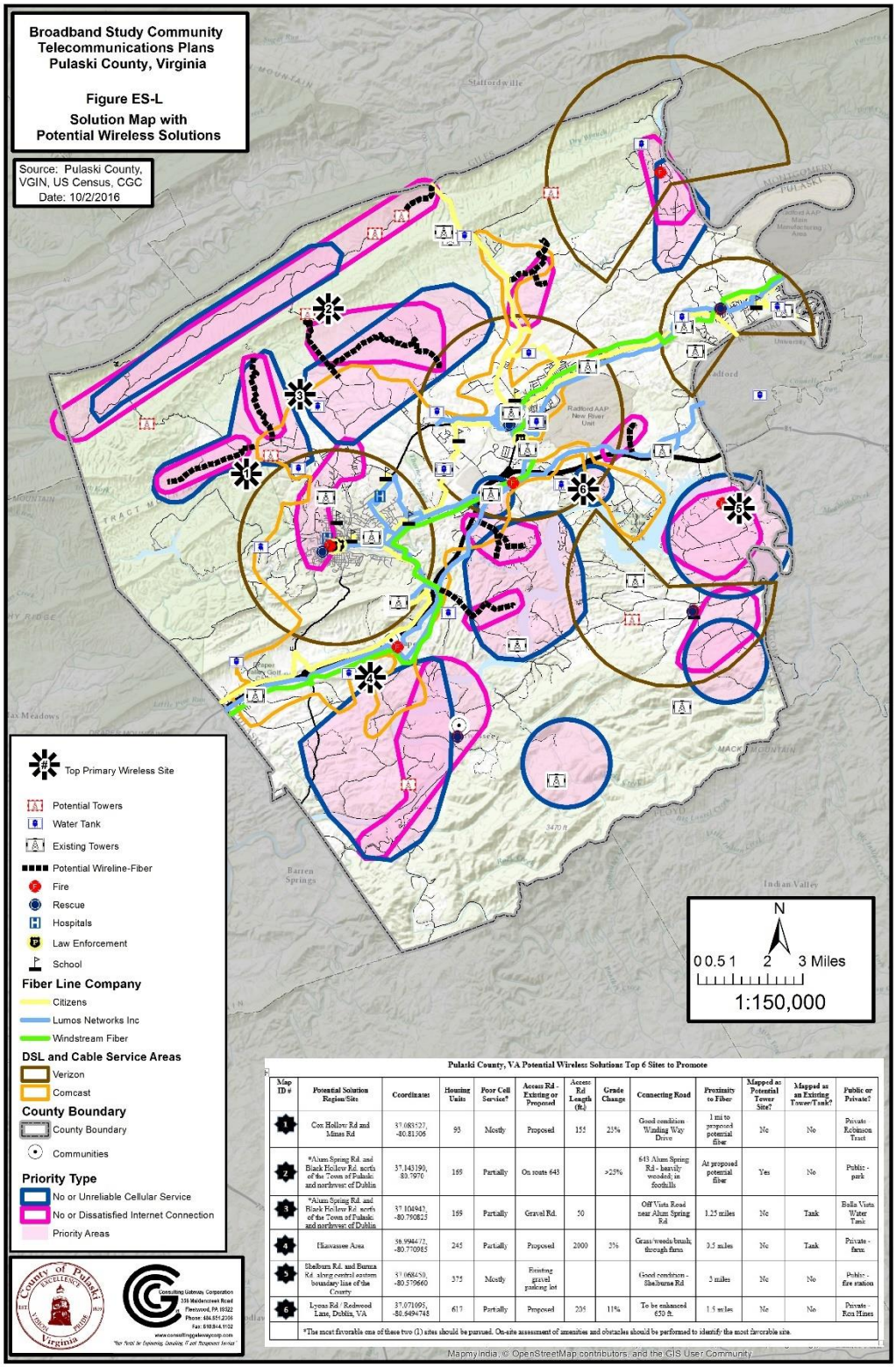


Pulaski County, VA Potential Wireline - Fiber Solutions to Investigate Further

Potential Solution Region	Area	Route	Distance	Comments
Along Little Creek Road - along north-west boundary of County	Eastern Half of Little Creek Rd. Western Half of Little Creek Rd.	Intersection of Little Creek Rd, and Cleburne Rd to tower near 3961 Little Creek Rd. Dublin, VA Latitude: 37.184005 Longitude: -80.751847 Additional Distance to alternative Tower near 3717 Little Creek Rd. Dublin, VA Latitude: 37.170373 Longitude: -80.784987	1.4 Miles +0.96 Miles	Extend fiber of Citizens Telephone Cooperative at Intersection of Little Creek Rd. and Cleburne Blvd. to tower
Cox Hollow Rd. and Mines Rd.	Build Fiber to extend Comcast Cable TV & Cable Modem	Existing Comcast Service Area along Mines Rd. From Mines Rd. along Cox Hollow Rd.	2.77 Miles 2.87 Miles	
West of the Town of Pulaski	Heavy Comcast Cable Service Area-Approach Comcast about extending service Heavy DSL Service Area – Approach Verizon about installing DSLAM		0 Miles	No Fiber suggested, but rather talk to Comcast Cable and Verizon
Alum Spring Rd. and Black Hollow Rd. north of the Town of Pulaski and northwest of Dublin	Discuss with Comcast Cable extending fiber and service	Existing Comcast Service Area along Alum Spring Rd From Alum Spring Rd. along Black Hollow Rd.	3.63 Miles 7.52 Miles	
Forrest Circle and Highland Rd. near Regional Airport above Dublin	Discuss with Citizens Telephone Cooperative extending fiber off Cleburne Blvd. Rd.	From Citizens Telephone Cooperative Fiber on Cleburne Rd. along Highland Rd. From Highland Rd. along Forest Circle	3.38 Miles 1.25 Miles	
Hiawassee Area	Heavy DSL Service Area – Approach Verizon about installing DSLAM Heavy Comcast Cable Service Area		0 Miles	No Fiber suggested, but rather talk to Comcast Cable and Verizon

Beamer Hollow Rd., Jennings Rd. and Miller Lane, and Pea Creek Region	Discuss with Lumos extending fiber off Old Route 100 Rd.	From Lumos Network fiber along Beamer Hollow Rd. Lumos Network Fiber along Hurston and Old Mill Rd. Along Jennings Rd.	4.30 Miles 1.70 Miles +0.70 Miles	
Landrum Rd. off Wilderness Rd. just north of I-81	Discuss with Lumos extending fiber off Old Route 100 Rd.	Lumos Fiber Network along Landrum Rd.	1.52 Miles	
Town of Pulaski	Downtown Business District		? Miles	Town of Pulaski reports fiber optic service in downtown area needed to attract Business
			32+ Miles	
Note: In addition to the locations noted above, equally of importance and priority is to further investigate if fiber can be extended to any of the Potential Wireless Solutions towers and other vertical assets identified as the top 6 Primary Sites to pursue interest in with service providers/cellular carriers.				

Figure ES-L: Solution Map with Potential Wireless Solutions



Pulaski County, VA Potential Wireless Solutions Top 6 Sites to Promote

Map ID #	Potential Solution Region/Site	Coordinates	Housing Units	Poor Cell Service?	Access Rd - Existing or Proposed	Access Rd Length (ft.)	Grade Change	Connecting Road	Proximity to Fiber	Mapped as Potential Tower Site?	Mapped as an Existing Tower/Tank?	Public or Private?
1	Cox Hollow Rd and Mines Rd	37.083527, -80.81306	93	Mostly	Proposed	155	25%	Good condition Winding Way Drive	1 mi to proposed potential fiber	No	No	Private Robinson Tract
2	*Alum Spring Rd. and Black Hollow Rd. north of the Town of Pulaski and northwest of Dublin	37.143190, -80.7970	169	Partially	On route 643		>25%	643 Alum Spring Rd - heavily wooded; in foothills	At proposed potential fiber	Yes	No	Public - park
3	*Alum Spring Rd. and Black Hollow Rd. north of the Town of Pulaski and northwest of Dublin	37.104943, -80.790825	169	Partially	Gravel Rd.	50		Off Vista Road near Alum Spring Rd	1.25 miles	No	Tank	Bella Vista Water Tank
4	Ekawassee Area	36.994472, -80.770985	245	Partially	Proposed	2000	3%	Grass/weeds/brush; through farm	0.5 miles	No	Tank	Private - farm
5	Shelburn Rd. and Burma Rd. along central eastern boundary line of the County	37.068430, -80.579660	375	Mostly	Existing gravel parking lot			Good condition - Shelburne Rd	3 miles	No	No	Public - fire station
6	Lyons Rd / Redwood Lane, Dublin, VA	37.071095, -80.6494748	617	Partially	Proposed	205	11%	To be enhanced 650 ft.	1.5 miles	No	No	Private - Ken Hines
	*The most favorable one of these two (1) sites should be pursued. On-site assessment of amenities and obstacles should be performed to identify the most favorable site.											

Pulaski Co. Potential Wireless Solutions *(Search in Vicinity of Coordinates)* __Potential Tower may help 2 locations (Both sides of mountain ridge); __Top Six (6) Potential Wireless Solution Sites After Analysis to Promote									
Potential Solution Region	**Site**	**~ Latitude**	**~ Longitude**	**General Description**	**Comments**	**Housing Units**	**Poor Cell Service?**	**Access Rd. Length**	**Grade Change**
Along Little Creek Rd. - Western half along north-west Co. boundary	• (Try and find Potential Tower Site)	37.095632 37.170373	-80.876967 -80.784987	Along Robinson Tract Rd. 3717 Little Creek Rd. Dublin			Partially Partially		
Along Little Creek Road - Eastern half along north-west Co. boundary	• Feed Tower site using Citizens Tel. Coop. fiber at Intersection of Little Creek Rd/Cleburne Blvd.	37.184005	-80.751847	3961 Little Creek Rd. Dublin			No		
Cox Hollow Rd. and Mines Rd.	• (Try and find potential tower site)	37.083527 37.095632	-80.81506 -80.876967	Intersection of Winding Way Drive and Brookmont Rd. Along Robinson Tract Rd.	Robinson Tract; 1 mi to Potential Fiber	93	Mostly	Proposed 155'	23%
West of the Town of Pulaski	• Investigate Private Radio System Tower • Investigate Town of Pulaski Water Tank Site Prop.	37.065633 37.079009	-80.783322 -80.799910	3570 Robinson Tract Rd.	Ex. WBLB Radio Stat. Pulaski Water Tank		No Mostly	650'	13%
Alum Spring Rd. and Black Hollow Rd. north of the Town of Pulaski and northwest of Dublin	(Try and find potential tower site) Existing Water Tank Site	37.143190 37.104942 37.184005	-80.7970 -80.790825 -80.784987	Along Alum Spring Rd.; Top of Mtn. Better Range Off Vista Rd. near Alum Spring Rd 3961 Little Creek Rd. Dublin	Public Park; At Potential Fiber Bella Vista Water Tank	169	Partially	On Rt. 643	›25%
Forrest Circle and Highland Rd. near Regional Airport above Dublin	• Investigate Potential Tower Site on Landfill Property	37.196081	-80.668876	Pulaski County Landfill; Good Connect Rd-Cloyds Mtn. Rd	Make sure not in airport flight path		No	Depends ›100'	Depends
Hiawassee Area	• Investigate Rescue Property and Elementary School property for potential tower site • Investigate Potential Tower Site at open field property located behind parcel at 4793 Clarks Ferry Rd. Hiwassee, VA • Investigate Potential Tower Site at Farm Silo property at 4092 Lead Mine Rd. Hiwassee, VA • Investigate Water Tank property for potential tower site • Investigate Draper Volunteer Fire Department location for potential tower site	36.969161 36.948406 37.018985 36.994472 37.004871	-80.713530 -80.739081 -80.623147 -80.770985 -80.746549	Snowville Rescue and Elementary School Investigate 34 acres' farm site; ½ unreliable cell service Farm with Silo Property High Density area not in poor cell area	Pub. Owned Land; Med.high density ‹1mi Property Owner expressed Property Owner expressed interest Private Farm; Within 0.5 mi. of Pot. Fiber	245	Half Half No Partially Half	Proposed 2000'	3%
Boy Scout Camp East of Hiwassee to County Boundary	• Investigate State Police Tower along southern boundary of County	36.951631	-80.662567	State Police Tower	May have Line of Site into camp & School in Snowville		Yes		
Green House Rd., Gum Log Rd. and Simpkinstown Rd. along south-eastern boundary line of County	• Investigate Fire/Rescue Site for potential tower • Reported Snowville site (nTelos) already being used for Microwave Transmission	37.023720	-80.593500	Fire/Rescue Site Property	Talk to nTelos		Mostly		

Shelburne Rd and Burma Rd. along central eastern boundary line of County	• Investigate Fire Station Site for potential tower • Investigate Montgomery Co. Water Tank Prop.	37.068450 37.113821	-80.579660 -80.561850	Fire Station Property 516 Rock Rd West in Radford	Pub.-Fire Stat.; Within 3 mi of Potential Fiber Pot. N-S Line of Site	375	Mostly	Existing Gravel Lot	
Beamer Hollow Rd., Jennings Rd. & Miller Lane in center of Co., S of I-81	• Investigate Water Tank prop. for potential tower • Investigate Existing Tower for Colocation	37.020405 37.004779	-80.720228 -80.683695	2989 Lake Ridge Drive 3103 Farmer Drive, Pulaski			Partially Half		
Pea Creek area	• Investigate Existing Tower for Colocation	37.070139	-80.699930	5051 Newburn Rd. Dublin	Upgrade Ex. Gravel Rd.		Partially	500'	6%
Parrott River Rd. in Northeast corner of County	• Investigate Fire Station Property • Investigate Water Tank prop. for potential tower	37.205640 37.217050	-80.615850 -80.626219	Twin Comm. Vol. Fire Dept.	Only ½ range in Pulaski ‹ ½ of range in Pulaski; Min. in poor cell		Partially Partially		
Area near State Park Road, S of I-81	• Investigate Water Tank prop. for potential tower	37.074824	-80.663557				Partially	Prop. 275'	15%
Lyons Rd./Redwood Lane, Dublin	• (Try and find potential tower site)	37.071095	-80.6494748	Captures med.-high density area w/poor cell service + portions of other w/low cell	Priv.-Ron Hines; With-in 1.5 mi. of Pot. Fiber; Enhance Conn. rd. 650'	617	Partially	Proposed 205'	11%
Totals	**15 Towers Sites + 7 Water Tank Properties + 5 Fire/Rescue Sites = 27 Sites Total**								

Common sense would dictate that it is impractical to believe so many vertical asset sites would be developed and therefore these Potential Wireless Solution sites were evaluated against typical site engineering criteria to narrow-down the list and arrive at the top sites where there would be the largest return on investment (not necessarily just monetary return, but where there would be lower costs to develop, more housing units served, good elevation and/or Line of Site (less interference), close proximity to fiber, etc. The list of sites was evaluated based on the following criteria and considerations:

- Number of dwelling units served on a conservative 2-mile radius of service
- Is it currently in a poor service area?
- Access road conditions for new and/or existing
- Access road length for a new road
- Topography
- Condition of existing main road to the property
- Distance to fiber
- Is the property already publicly owned?
- Is there an existing water tank to be used for collocation in lieu of constructing a new tower?

Upon completion, the top sites to continue to pursue interest in from service providers/cellular carriers were identified and prioritized (See the following table). While implementation of potential solutions and goals is not within the scope and purpose of this study, the following actions are recommended to achieve identified goals and continue to investigate and implement proposed solutions recommended:

Wireless Potential Solutions

1. Tour each of the sites to identify list of amenities and obstacles to development
2. Take the list of top potential wireless sites and develop a simple one-page site features specification so service providers can quickly preview if the site may have interest to them in pursuing.
3. Determine what role the County will play and what expense the County is willing to make.
4. Include incentives such as a site being non-privately owned (County or fire department/rescue owned); County willingness to construct a simple and short distance access road; considerations of zoning variances where practical and needed; perhaps the County cost sharing in other areas such as environmental assessment, permitting, fiber build, lighting, co-location facility is available, etc.).
5. Work with tower site brokers and others (such as tower management firms) to promote and solicit interest from service providers regarding the sites.
6. Invite Service Providers to tour the sites with the County.
7. Investigate and pursue the legal avenue to establish a formal (if need be) or informal Public-Private-Partnership (i.e., public procurement, entering into agreement, funding opportunities, etc.).

Wireline Solutions (Including Fiber Optic Locations)

1. Determine what role the County will play and what expense the County is willing to make.
2. Continue to investigate where and what is would take to get the service providers to extend DSL and cable modem service.
3. Look into building/arranging/swapping/leasing fiber to towers and other vertical assets where there is interest.
4. Discuss with service providers locations where a small fiber connection would push a project to go further that otherwise would not.
5. Pursue funding opportunities for middle and last mile fiber build projects.

Pulaski County, VA Potential Wireless Solutions Top 6 Sites to Promote

Map ID #	Potential Solution Region/Site	Coordinates	Housing Units	Poor Cell Service?	Access Rd - Existing or Proposed	Access Rd Length (ft.)	Grade Change	Connecting Road	Proximity to Fiber	Mapped as Potential Tower Site?	Mapped as an Existing Tower/Tank?	Public or Private?
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	*The most favorable one of these two (1) sites should be pursued. On-site assessment of amenities and obstacles should be performed to identify the most favorable site.											

ES3.0 Last Mile Connectivity Options

ES3.1 Service Provider Meeting Input:

From the service provider data, maps and meetings the following relevant input was obtained:

- **Number 1 obstacle to offering or significantly improving Broadband service is enhancing last mile connectivity technology and last mile cost and build.**
- While some fiber locations are shown on the maps, undoubtedly there is more fiber within the study area than found.
- Some service providers are either currently or planning to construct additional fiber in the County.
- At least two (2) retail services providers serving within the study area (Lingo Networks and Citizens Telephone Cooperative), expressed interest in potentially partnering with the County on preparing and submitting a funding application for infrastructure construction related costs.
- There was some discussion regarding whether a wireless solution will have potential interference issues, as well as doubt whether wireless solutions will be able to keep-up with the ever changing broadband speed requirements for broadband of the Federal Communications Commission (FCC).
- Some of the Internet services providers within the study area indicated future business plans includes offering Fiber-to-the-Home (FTTH)/Fiber-to-the-Premise (FTTP) service, however in most areas building FTTX technology is years away because of cost to both the service provider and end-user and limited access options.
- A liaison (Pulaski County) between the end-users and the service providers could bridge the gap between lack of communication and/or knowledge of options available between the parties.
- There was some discussion by Wireless Internet Service Providers (WISP) that their biggest obstacle was getting permission for equipment location/attachment and buying bandwidth at more reasonable pricing.
- The best way the county can assist the service providers in enhancing Internet last mile connectivity is to ***share information collected through this study*** and ***assist in structuring low interest financing and cost sharing or structuring last mile connectivity solution options.***
- The County should also look at existing regulations and relationships to assist the WISP address their concerns of getting permission for equipment location/attachment and buying bandwidth at more reasonable pricing.

Service Provider Response as to Ways the County Can Help Expedite Improvement:

Low Interest Financing Options – *Assist in structuring low interest financing*

Strategies:

a) Use county resources to help service providers prepare program funding applications.

b) Discuss with the Commonwealth issuing bonds to underwrite telecommunications implementation programs.

c) Seek cost sharing and cost shifting solutions such as offering colocations, antennae mounting facilities, tower construction, fiber builds, etc.

Middle Mile Connectivity – *Assist in cost sharing or structuring middle mile connectivity solution options*

d) Leverage the Emergency Radio Communications Improvements Initiative to cost share a tower site. Perhaps also cost share the expense of attaching broadband communications equipment on other towers being utilized and being built. Today, most Emergency Response personnel want more than radios to communicate including texting, cell phones, use of tablets, etc.

e) Investigate the merits of partnering with a service provider to accomplish using County owned land at two (2) water tank sites near I-81 (near Draper) for potential tower sites which the tower could be served by fiber off I-81 to serve the Hiawassee area and better serve the Town of Pulaski area (northwest of town).

Last Mile Connectivity – *Assist in cost sharing or structuring last mile connectivity solution options*

Strategies

f) Assist the Service Providers and end-users communicate and enter into discussion regarding potential service options and arrangements. At least one service provider indicated if they knew which survey responses indicated no service or dissatisfied service in their service territory, they could reach out to those end-users. The County and consultants do not release or share survey respondent names, addresses or the surveys themselves, but the County could set up an office or assign a person to assist in getting the end-user and service provider into discussions using the maps and data collected, if requested by the end-user.

g) Establish a limited time CPE (Customer Premise Equipment) and/or Last Mile Connection cost supplementation (subsidy) program in exchange for service contract commitment.

h) Work with the electric and telephone cooperatives, as well as service providers to establish middle mile and last mile networks' interconnection locations.

Service Provider Meeting Observations Towards Potential Last Mile Solution Consideration:

- Electric and/or Telephone Cooperatives are Non-Profit Organizations created to benefit the members.
- Because cooperatives are owned by the members its serve, it is very difficult politically to disproportionately offer certain type services within one area of the cooperative and not others.
- Citizens Telephone Cooperative has expressed interest in having further discussions with Pulaski County to discuss potential solutions.
- Lingo Networks (MGW) expressed interest in potentially partnering with the County on preparing and submitting a funding application for infrastructure construction related costs to better serve the Hiawassee and Town of Pulaski better.
- Some service providers expressed a yearly pole use fee (typically $30-$40 per year) would greatly impact the return on any aerial investment made.

ES3.2 County Meetings Observations Leaning Towards Potential Last Mile Solution Consideration

- The County would prefer not to own or operate network infrastructure of facilities.
- While the County may be willing to make some manageable investment into enhancing Internet access within the County, without being a service provider there would be little monetary return on such an investment and Broadband it is just one of many infrastructure projects needing funding.
- ***A sliding scale of options*** to address enhancing Internet Connectivity should be presented so the elected officials in the county can consider their comfort level in moving forward.

ES3.3 Collaboration Partners and Projects

There are several reasons for the private sector to consider a collaboration with the public sector on projects including:

Monetary Incentives

- Access to Government Funding
- Enhanced Funding for Regional Projects
- Cost Sharing in Design and Construction in Expanding Infrastructure

Regulatory Incentives

- North American Electric Reliability Corporation (NERC) as the Electric Reliability Organization (ERO) Energy Policy Act of 2005 **Reliability Standards – Critical Infrastructure Protection** (CIP Standards 001 through 009) security of cyber assets essential to the reliable operation of the electric grid using fiber for:
  - ✓ SCADA Systems (Remote Monitoring & Control) and Smart Grid Applications

- ✓ Cameras and Motion Detection Security Enhancements
- ✓ RFID Access/Retina Scan Access to Facilities

Infrastructure Assets

- Expanding infrastructure use through dark fiber leasing, co-location,

Service Enhancements

- Extending Carrier's Carrier Services (Long-Haul, Back-Haul Transport)
- Addressing Service Provider Reliability and Redundancy Needs
- Offering New or Improving Existing Wholesale and Retail Voice, Video and Data Services

ES3.4 Last Mile Connectivity Considerations

Some service providers indicated their long range business plan includes a FTTX solution, and what was requested by the consultants of the service providers with only limited response was to provide a map of their service area, infrastructure and indicating where cabinets can be placed (or exist) for the interconnection point in all the neighborhoods being served or planned to be served between the service provider distribution network and the customer FTTH/FTTP customer last mile access connection network, as well as what last mile connection average price point if paid by customer/other would expedite the schedule for more FTTH/FTTP service. Because there was limited response to such a request, the strategy of potentially building interconnection points between the middle mile and last mile networks was eliminated as a potential strategy. If in the future if there is interest by a service provider on such a proposal, whether the last mile when constructed is aerial (from pole line) or underground, cabinets placed on the ground to avoid service provider facilities on pole lines would probably more favorable to the ISPs. Since the cooperatives are nonprofit and exist to the benefit of its members, perhaps the customers themselves through the Cooperatives would have more success in getting last mile access to the property off the poles (at no or much more reduced attachment fees) than for-profit service providers**. Since in many locations it will be years before the service providers build FTTH/FTTP last mile access, then perhaps the County may want to seek funding to expedite some type of wireless last mile solution, perhaps with (or without) a small fiber build to feed and backhaul off the towers.**

While the County would prefer the service providers build the access network and the County not own and operate infrastructure, they may be unwilling to wait years with an unknown, uncommitted timeline for such build to occur. **What is being proposed is the County and service providers cooperate and work together to address the most difficult obstacles identified, enhancing wireless middle mile and/or last mile connectivity technology.** When and if the County finds itself participating in infrastructure costs, the consultants recommend the County's money be invested in the long-term service life of infrastructure, such as fiber, towers, etc. It is recommended the County not invest in electronic equipment that has to be replaced every 5-7 years. The one exception to not investing in electronic equipment may be some form of cost subsidy program in Customer Premise Equipment (CPE) to help low to moderate income families receive a wireless solution. Perhaps the County could participate in or apply resources to seek initial funding of such a program. Some Counties default to owning towers on County owned land (or just being the landlord with another party owning the tower), and not the equipment on the tower. Reasonable revenues can be realized if tower site lease agreements and/or co-location agreements are properly negotiated.

In lieu of participating in construction costs, there are other roles and areas of infrastructure the County could play such as a funding application partner/administrator, help offset engineering assistance, expedite plan review approval and permitting, help mitigate environmental review costs, participate in land lease identification and discussions with property owners, and more. Regardless of what solution if any the County would decide to pursue, the information

collected, analyzed, and reported within this document can be used provide credibility as to need, priorities, potential solutions and to expedite seeking funding to aid the service providers in building the last mile.

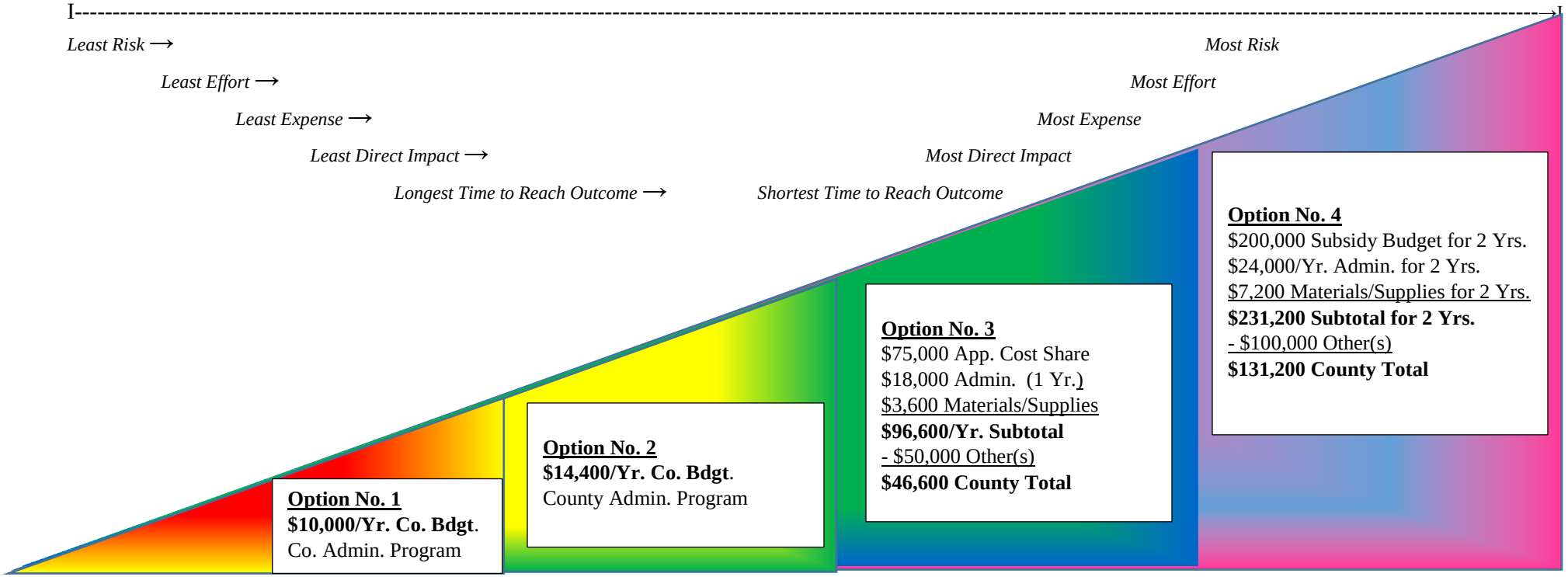
ES3.5 Last Mile Connectivity Solutions

From both service provider input, as well as feedback from the Pulaski County Project Management Team, the following summarizes the basis for forming the recommendations for connectivity solutions.

ES3.5a Middle Mile/Last Mile Solution – Ten (10) Step Summary

1) Create the Pulaski Internet Initiative County Assistance Program *(Pulaski Internet Initiative CAP)* to be the liaison between the end-use customer and service provider.
2) Encourage extension of existing infrastructure to capture more customers or improve existing service such as DSL/DSA, cable modem areas, wireless or fiber FTTX service.
   (a) Pursue further discussions with Citizens Telephone Cooperative (1 of 2 service providers) who expressed interest in having further discussions with the County.
   (b) Pursue further discussions with Lingo Networks/(MGW) (2 of 2 service providers who stepped up with a specific request and proposed project) who expressed interest in partnering with the County to address an infrastructure project. Shentel often works with MGW and also indicated they would probably be willing to participate where MGW needs Shentel services. [There is a unique funding opportunity coming up (2016 Virginia Acts of Assembly-Chapter 780) in which seed money will be made available towards private sector network construction activity by working with the public sector (County)].
3) Set-up both financing application assistance programs for service providers and cost subsidy programs for customers' equipment and/or middle/last mile connection.
4) The County should also look at existing regulations and relationships to assist the WISP address their concerns of getting permission for equipment location/attachment and buying bandwidth at more reasonable pricing.
5) If the County's existing Wireless Broadband Authority can't get adequate funding, the formation of a Telecommunications Cooperative could be investigated to leverage funding opportunities, focus on interested parties willing to make an investment in their telecommunications services, and take a more active role where limited and allowed of municipalities.
6) Continue to pursue the wireless towers identified as needed and continue to work with the Wireless Internet Service Providers (WISPs), perhaps through some form of Public-Private-Partnership (see King and Queen County, VA initiative) to attach equipment and/or cost share expense.
7) Continue to discuss with cellular service providers potential use of the wireless towers (existing or proposed) to enhance cellular service and broadband from these providers through the issuance of a Request for Proposal (RFP).
8) If the service providers do not step up to build last mile connectivity solutions, then the County's existing Wireless Broadband Authority could build such solutions on a case-by-case basis to allow middle mile and last mile network solutions.
9) If the County ends up building and owning infrastructure, the County should develop a Network Governance Doctrine to address network use issues and ensure a level playing field.
10) Endorse and support any one or combination of the above options that the County are comfortable with in order to continue action in the community for improving Internet, Emergency Response Communications, Cellular Coverage Service and overall telecommunications service applications in the communities.

ES3.5b Pulaski County, VA Menu of Solution Options



Market Existing and Potential Sites	Pulaski Internet Initiative CAP	Network Extension Funding PPP	CPE/Last Mile Cost Subsidy
Marketing Sites & Other Assets	*Communication Assistance Program*	*Get Middle/Last Mile Where Not Existing*	*Assisting Connecting Customers*
Promote/Seek Interest from Service Providers	*Liaison Between Customer & Provider*	*DSL/DSA, Wireless, Fiber Extension*	*Cost Subsidy for Eligible Applicants*
1. Hire Consultant for Assistance/Negotiations	1. Take & Investigate Service Claims	1. Aggregate Demand	2. Discuss Funding w/VA, ARC, etc.
2. Develop Marketing Portfolio of Assets	3. Work w/Provider on Solution	2. Encourage to Extend Middle/Last Mile	2. Establish Eligibility Criteria
3.Hire tower broker-solicit interest from Providers	1. Work with Customer on Contract	3. Define Scope & Return on Investment	3. Verify Credibility of Cost
4. Determine what role if any County would play	5. Assess Price Fairness	4. Cost Share Funding Applications	4. Determine Provider Share
5. Prepare RFP to incorporate provisions	2. Recommend Eligibility for Other Solutions	5. Plan for Future Technology	5. Determine Customer Share
6. Solicit/Award RFP	3. Secure Commitments from all Parties	6. Evaluate Formal vs. Informal PPP	6. Design Refunding Formula
7. Administer Arrangement	8. Provide Assistance with Other Solutions	7. Ensure Commitment for Muni $	7. Administer Program
Project Management Team	**County/Proj. Mgmt. Team**	**Co./Proj. Mgmt. Team**	**Co./Proj. Mgmt. Team**

ES4.0 Preliminary Engineering, Design & Cost Estimates
(Design & Cost details addressed in Section 1.4)

ES4.1 Proposed Last Mile Connectivity Solutions with Preliminary Cost Estimates

ES4.1A - OPTION NO. 1: MARKET EXISTING & POTENTIAL SITES/ASSETS

Premise: Marketing Sites and Other Assets in the County

Description: Promote and seek Interest from Service Providers of existing and potential sites and assets

Approach: As part of the grant for this study, the County was required to have a matching share towards these planning efforts. Experience of the consultants from similar projects is that it is difficult for the County to communicate directly with large cellular carriers (Verizon, Sprint, AT&T, etc.) regarding if there is any interest in existing and potential tower/vertical asset sites, as well as to communicate with wireline connection service providers (cable modem, DSL, FTTX, WISP, etc.). Recognizing that significant and important information has been collected, analyzed, displayed, discussed and reported on, the next logical step would be to distribute, market and more formally seek interest from these types of service providers. There are firms that act like brokers of sites and assets to service providers that can get the attention of these companies that is difficult to get by the County or even engineering consultants. These broker like companies deal directly with service providers, tower management companies, field engineers and others that have direct input in the decision process of the service providers.

ES4.1B - OPTION NO. 2: PULASKI INTERNET INITIATIVE CAP

Premise: Pulaski Internet Initiative Communications Assistance Program

Description: Liaison between Customer & Service Provider

C3 Approach:

Some end-users are claiming there is no Internet access to them and/or too expensive while some service providers are stating Internet access is available in their service area. Pulaski County should develop an Internet Initiative ***Communications Assistance Program*** (CAP) to assist the end-user or service provider recognize their position is incorrect and whichever party is incorrect, take steps to document there is a real commitment by the party to move forward with either service sign-up or infrastructure build.

Challenge	• Investigate End-User claims no Internet access option is immediately available. • Investigate Service Providers claim Internet access options are available at speeds advertised in their service areas.
Commitment	• Document commitments from property owners claiming no Internet access option exists to subscribe to service if made available. • Push to get a fixed timeline for providing Internet access to end-users with no Internet access option, as well as a fixed timeline for providing FTTX throughout from the service providers.
Control	• If immediate access is not available or service providers are unwilling to make an acceptable good faith commitment, then Pulaski County should take control to address the shortcoming.

ES4.1C - OPTION NO. 3: *NETWORK EXTENSION FUNDING PPP*

Premise: Getting middle mile/Last Mile where not existing or improving where exists

Description: Extending DSL/DSA, Wireless, Fiber where not existing

Approach

Service Providers indicated two (2) actions the County could take to assist in enhancing broadband service in the County is assist in securing lower interest or better terms financing, and assist in overcoming the middle mile and/or last mile and connectivity obstacles. The County has access to potential financing sources that the service providers may not have and/or the County could provide resources and/or help cost share a funding application if the return on such an investment is worthwhile. The return on investment to the County would not likely be monetary, but rather increased number of residents and businesses able to get connected.

Shortly (before end of year) the Commonwealth will be opening applications for the Virginia Telecommunications Initiative 2016 Virginia Acts of Assembly – Chapter 780. The Virginia Department of Housing and Community Development (DHCD) will be implementing the Virginia Telecommunications Initiative (VATI). The goal of VATI is to create strong, competitive communities throughout the Commonwealth by preparing those communities to build, utilize, and capitalize on telecommunications infrastructure. Consistent with the enabling legislation, DHCD will award the $1.25 million appropriation to eligible applicants to provide Last-Mile services to Unserved areas of the State. However, there is no specific maximum dollar amount attributable to FY 2017 funding and the DHCD reserves the flexibility to award any amount, depending entirely on the quality and quantity of applications received. **The primary objective of the VATI is to provide financial assistance to supplement construction costs by private sector broadband service providers to extend service to areas that presently are unserved by any broadband provider. Applications must be submitted by a unit of government (Towns, Cities, Counties, EDA/IDA, Broadband/Wireless Authorities, Planning District Commissions, etc.) with a private sector provider(s) as a co-applicant.**

Being that the County has received interest from Citizens Telephone Cooperative (1 of 2 service providers) to continue discussions with the County looking at potential solutions, and interest from MGW (2 of 2 service providers who stepped up with a specific request and proposed project) in partnering with the County to address an infrastructure project, the County should continue to pursue such a funding application PPP. Shentel often works with MGW and also indicated they would probably be willing to participate where MGW needs Shentel services. The MGW proposed project is intended to address the Hiawassee and area northwest of the Town of Pulaski.

ES4.1D - OPTION NO. 4: *CPE/LAST MILE COST SUBSIDY*

Premise: Assisting customers get connected by partially subsidizing a portion of the Customer Premise Equipment (CPE) or last mile connection cost.

Description: Develop parameters for participation and provide cost subsidy for eligible applicants.

Approach

Two (2) big reasons for no Internet connectivity occurring is cost of customer equipment and last mile build. This option is intended to assist in providing a partial subsidy to eligible county residents faced with financial challenges and/or unusual CPE and/or last mile connectivity costs in exchange for a multiyear service contract commitment.

ES4.1E -*FIBER AND/OR WIRELESS NETWORK BUILD*

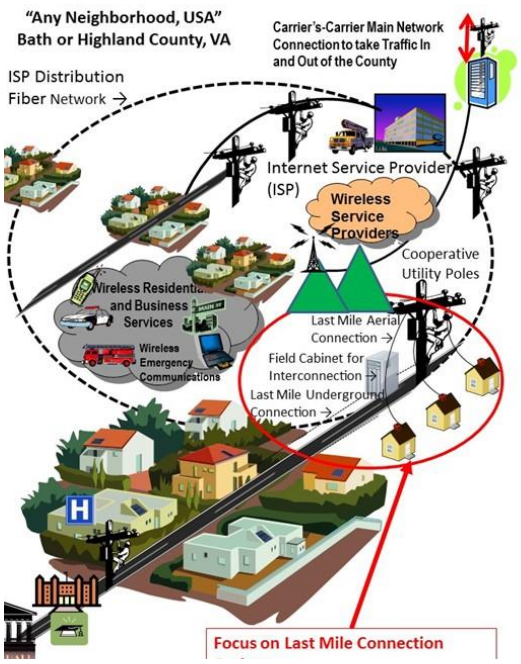
While a *Network Build Option* is discussed for informational purposes only, it is not being recommended at this time based upon concerns expressed by the Project Management Team members including risk, limited funding, lack of experience, regulatory oversight and compliance, etc.

Premise: Because not having middle and last mile access is the number one obstacle to service providers, if the County wants to expedite arranging for high speed bandwidth which has become integral with quality of life needs and applications, then on a case-by-case basis, the County may want to consider financing and building the last mile and/or middle mile network for Internet Service Providers (ISP) to use in serving the customers. An investment in this option may address to some extent the following multiple objectives: (i) Enhancing broadband service and availability; (ii) Improving emergency response radio communications; (iii) Playing a future role in Public Safety Data Network (PSDN) applications; (iv) Improving cellular service coverage.

Description: Typically, a Request for Proposal (RFP) is issued seeking a Wireless Internet Service Provider (WISP) and/or Wireline Internet Service Provider to become a Public-Private-Partner (PPP) with the County to cost share in the construction, management and operation of vertical tower sites or other vertical assets, independent or along with fiber build to feed and backhaul off towers or interconnect with middle mile networks, at strategic locations, and then once the infrastructure is built, issue a secondary Request for Proposal (RFP) to other providers for co-location (such as Cellular Service Providers and WISP) and to locate equipment on the towers to improve coverage and service or to lease fiber. If fiber is to be built, the County should first confirm that a middle mile owner Internet service provider will connect to a last mile fiber network and at what particular location should the aggregation of last mile fibers be located (cabinet). [This type of fiber build and lease of the network for access to the customer by the middle mile fiber owner has been referred to as **"Homes with Tails".]** If fiber is to be built to serve a tower location, also confirm bandwidth availability.

Approach

There was little to no interest expressed by the County Project Management Team regarding this solution. At the same time, it is the understanding of the consultants that there may be isolated gap areas existing in the County regarding Emergency response/Public Safety communications requiring additional vertical assets be located or built at a strategic location. Therefore, this option is intended to leverage each other in an attempt to improve many different objectives. The trend in the cellular service industry seems to favor companies being more willing to submit a proposal to attach to existing towers (especially with a fiber feed) rather than get involved assisting other parties in locating and cost sharing the build of towers.



ES4.2 Last Mile Connectivity Solutions Assessment

The consultants are not recommending the County implement any of the proposed solutions without getting cooperation and buy-in from the areas service providers. The options are not exclusive of each other and it is believed the most impactful solution may be a combination of some of the options. The consultants are also not suggesting the County incur significant debt service especially that associated with *a Fiber and/or Wireless Network Build.* The County will most likely not recover all the capital and operating expenses associated with significant network build projects. If however pursued, minimal administration and operations and maintenance expense may be a potential if repair and routine maintenance of the fiber and facilities would be outsourced to a service provider utilizing the infrastructure as part of the PPP negotiations.

Fiber and/or Wireless Network Build is addressed to demonstrate the significant expense that the middle and last mile connectivity obstacle costs. When looking at such expense, it is more understandable why the service providers themselves are struggling with a FTTX or wireless last mile connectivity solutions. A network build option would best be evaluated on a cost share model, where the expense and savings is distributed among multiple parties. General costs were demonstrated using examples of where additional middle mile could be built, as well as existing fiber. However, during a recent Project Management Team meeting, it was mentioned that just recently some construction activity was occurring in the County. Also the proposed fiber build locations of the study may not necessarily be where fiber would capture the most houses within a 0.1mile fiber distance (near maximum distance for FTTP connectivity), but be the location where addressing broadband, cellular communications needs, and an identified growth/development area. This fiber build could alternatively be used for a tower feed and backhaul. If a network build option was pursued, additional discussions with the service providers and planning would be needed and therefore the costs at this time can't be refined because the service providers need to be more engaged in the solution discussion. Also, some service providers have already committed to serving some areas FTTH/FTTP over the next several years with additional fiber planned, but not shown.

Option No. 3: Network Extension Funding PPP is addressed because the County has the unique opportunity of having interested service providers with specific projects identified willing to partner and/or discuss potential solutions with the County to achieve implementation. In addition, Comcast is interested in reaching out to those survey responses within their service area to discuss either no service or dissatisfied service comments. There is not much detailed information included in this report regarding these projects because of the service providers wanting some confidentiality and no detailed disclosure regarding these projects in the public at this time. The service providers do understand if the County and service providers PPP does move forward, action by the County's elected officials and expenditure of funds will need to be discussed and taken in public with more details outlined. Depending on what is included in the final scope of these projects, they could also potentially be leveraged for enhancing cellular service. As previously stated, some service providers expressed concern that a wireless will have interference and topology challenges, and doubt that wireless technology will be able to keep up with the ever changing and increasing speed used by the Federal Communications Commission (FCC) to define broadband. However, there was some interest in the project from a Wireless Internet Service Providers (WSIP) that did not express concerns over interference, but rather getting permission to locate on vertical assets and the challenge to buy bandwidth at a reasonable price. The scope of this study did not include wireless signal propagation modeling. Radio Frequency (RF) engineering consultants should be involved if wireless solutions are pursued. There are a number of wireless technologies that may be considered including use of licensed and unlicensed spectrum.

The County could implement any one or all of the four (4) solution options, revise costs to fit a budget they are comfortable with, and take a 'wait and see' approach as to the effectiveness over the next 1 -2 years. Depending on continued progress in discussions with service providers and the ability to secure funding, a modified solution of

any of the proposed options may have merit. At this time, it is doubtful the County would get all needed parties in agreement in order to continue pursuing a *Fiber and/or Wireless Network Build.* There could also be some relevant and contributing issues in the near future that come about as the federal government continues to pursue the FirstNet initiative (interconnecting local networks for homeland security and emergency related issues).

ES5.0 Organization and Network Operation Options

When evaluating a solutions impact to the municipal organization and best role of government to play in network operations, the first focus must be on what Virginia law allows. The Commonwealth of Virginia is a Dillion state, essentially meaning the Commonwealth must explicitly grant powers to municipalities in order for them to be authorized to carry out such activities. References to the applicable Virginia law on allowances and prohibitions of local government involvement can be found in Section 2.1. A quick reference as to whether a Wireless Broadband Authority would need to be involved can be found under each of the options presented can be found at the bottom of the Menu of Solution Options for Pulaski County, VA at ES-3.5B. In short, it is felt that a Wireless Broadband Authority would need to be involved under *a Fiber and/or Wireless Network Build option.* It was reported that Pulaski County already has formed a Wireless Broadband Authority. It was reported that currently Augusta County does not have a Wireless Broadband Authority.

ES6.0 Funding Strategies

The following provides an outline of typical funding resources previously used in strategies for financing telecommunications network initiatives.

1. USDA-RUS Telecommunications Funding Programs

- ❖ Community Connect Grants
- ❖ Distance Learning & Telemedicine Grants
- ❖ Expansion of Rural 911 Service Access Loans & Loan Guarantees
- ❖ Farm Bill Broadband Loans & Guarantees
- ❖ Public TV Digital Transition Grants
- ❖ Telecommunications Infrastructure Loans & Guarantees

2. CDBG – Local Innovation Funding
   - ✓ Up to $200,000/Project with 50% Match in 2015
   - ✓ Up to $300,000/Regional Project with 25% Match in 2015

3. Community Connect Grant Program
   - ✓ Minimum Award $100,000; Maximum is $3,000,000 in 2015

4. VA Dept. of Business Assistance through the Worker Retraining Tax Credit Program (Local businesses that take an active role in workforce training are eligible for funding assistance)

5. **VA-DHCD – 2016 Virginia Acts of Assembly - Chapter 780**. Shortly (before end of year) the Commonwealth will be opening applications for the Virginia Telecommunications Initiative 2016 Virginia Acts of Assembly – Chapter 780. The Virginia Department of Housing and Community Development (DHCD) will be implementing the Virginia Telecommunications Initiative (VATI). The goal of VATI is to create strong, competitive communities throughout the Commonwealth by preparing those communities to build, utilize, and capitalize on telecommunications infrastructure. Consistent with the enabling legislation, DHCD will award the $1.25 million appropriation to eligible applicants to provide Last-Mile services to

Unserved areas of the State. However, there is no specific maximum dollar amount attributable to FY 2017 funding and the DHCD reserves the flexibility to award any amount, depending entirely on the quality and quantity of applications received. **The primary objective of the VATI is to provide financial assistance to supplement construction costs by private sector broadband service providers to extend service to areas that presently are unserved by any broadband provider. Applications must be submitted by a unit of government (Towns, Cities, Counties, EDA/IDA, Broadband/Wireless Authorities, Planning District Commissions, etc.) with a private sector provider(s) as a co-applicant.**

6. FEMA, Dept. of Homeland Security (such as COPS FAST), U.S. Fire Administration and the VA Dept. of Emergency Management

7. FirstNet Initiative - DOJ-Homeland Security: Possible Funding in the Future

8. Appalachian Region Commission (ARC) – Focuses on Last Mile Connectivity

9. Public-Private Partnership (PPP) Cost-Sharing (conventional loans, municipal bonds, tax assessment, etc.)

ES7.0 Next Steps

The elected officials must decide if enhancing Broadband service to the communities is a high enough priority to the constituents to warrant committing county resources such as staff time and money towards continuing efforts including how much money (cash without borrowing or incurring long-term debt), as well as the following:

1. What will be the end goal or measure of success, i.e., 15%, 35%, 55% or more for increased connectivity?
2. What timeline is reasonable?
3. Will the County go it alone, together and/or in some form of Public-Private Partnership?
4. What role will the County play (lead role, support role or no role)?
5. Where is the comfort level of the Options provided, i.e., least risk, effort, expense, impact and timeliness or most risk, effort, expense, impact and timeliness?
6. How should the Options be modified to meet budget and time constraints?
7. What type of Organization Structure will be needed, i.e., continue working with the Project Management Team or working through a Wireless Broadband Authority?

There are certainly other concerns and issues to investigate, such as obtaining success in getting available funding, but the first question that must be answered is another question of "Do we need to plan Next Steps and work towards an Implementation Plan or is the County going to take a wait and see approach?" Within short time of completing the study report, the County's consultants were notified of the draft language of the *VA-DHCD – 2016 Virginia Acts of Assembly - Chapter 780* for consideration of funding construction activity. **Given this unique opportunity, this issue will probably be an early next step to address.**

ES8.0 Closing

Not all regions of the study area have ubiquitous broadband. Once accomplished, competition typically drives service offerings and price. True competition in broadband only occurs when there is more than one choice of providers. If towers are constructed, perhaps more Wireless Internet Service Providers (ISPs) will take interest in providing services. To date there has been some expressed interest from WISP (see their concerns previously addressed).

Telecommunications initiatives must address both the supply and demand side. Now that a comprehensive assessment of broadband availability has been completed, continued monitoring and tracking of the market at both a local and regional level will be necessary in order to measure progress. As a separate initiative, the County should leverage their GIS and use it as a management tool over the broadband issues. GIS creates map layers of data sets to visually display the data in separate or in composite layers, stores the data, and can be used to measure and analyze data to assist in determining needs, solutions and what-if scenarios. The GIS systems will allow continual tracking of progress and assist in near and long-term solution planning to meet the identified needs of this broadband assessment. Now that the Pulaski County Project Management Team has this valuable data, it is recommended that planning include making this data readily available to parties that can assist the County in accomplishing its goals. Today, web-enabled GIS is popular as an information resource for many different entities to access. Web-enabled GIS can be static or dynamic with interactive mapping, data queries, data manipulation and downloading capabilities.

Even though Pulaski County is fortunate to have a significant amount of fiber with extensive existing wireless communications infrastructure and services to build upon, it is only being leveraged in select locations, the ***important question to be answered is, "will it deliver the needed and desired services of the future universally to all parties?"*** Eventually, to accommodate and go beyond the newer bandwidth applications and beyond, **the focus will need to shift to much more than "better than dial-up speed" or even low end Mbps bandwidth speeds** in order to be prepared for widespread adoption of some current and many future applications. The definition of broadband by the FCC for delivery of increased bandwidth changes from time to time and currently the definition of Broadband by the FCC is 25 MB down and 3 Mb up. It will be up to the County to ensure broadband availability, reliability and affordability meet the needs of the future for the businesses, communities and residents they represent.

Like it or not, investment in technology infrastructure follows demand. How well the technology and services is marketed will have a direct impact on economic growth and leveraging the opportunities in a competitive international marketplace. A stated objective of the Pulaski County Community Broadband Telecommunications Study is**:** to increase access throughout the **project study area**, to advance telecommunications services that provide for high speed transmission of data, voice, and video over the Internet and other networks to foster the development of distance learning, e-commerce, e-government, telemedicine, and overall economic development and enhancement of quality of life. The County is best positioned to work with service providers and pursue state and federal implementation funding. It was determined that the best approach to address these findings should be left up to the county elected officials where they and other community stakeholders understand their unique needs and are in the best position to implement a solution.

The more specific purposes of pursuing this type of broadband assessment project is to provide information to economic development leaders, the County, service providers and funding agencies for improving the telecommunications infrastructure, for better marketing of the region's technology advantages, and to provide data for plans and grant applications aimed at highlighting the region's strengths and mitigating local weaknesses. In addition, the findings can be used in the development of marketing materials encouraging companies to locate their operations in Pulaski County. Regardless of the outcome of the decision of the elected officials, the Community Broadband Telecommunications Planning Study has collected, organized and mapped out data on the study area end-user perceptions, as well as service providers' telecommunications infrastructure that will undoubtedly play a role in enhancing broadband and other telecommunications services in the future

1.0 Study Approach

1.01 Understanding Broadband's Impact on Community and Economic Development

New communication technologies are changing every aspect of our lives including work, education, healthcare, and entertainment and access to Broadband and information technology is no longer a convenience, but a necessary part of growing, prospering, and improving the overall quality of life in the community. The initiative is a response to the recognition that broadband has risen to the level of necessary infrastructure to the Region's ability to effectively compete in a global market.

"Community connectivity" is an often used expression that refers to having affordable high speed voice, video and data network infrastructure available to enhance local government, maximize teaching and learning opportunities, attract economic development and improve the overall quality of life. The Internet is here to stay and the World-Wide Web is our entertainment, City Hall, marketplace, and classroom. Without adequate, easily accessible and affordable bandwidth, municipal services are less effective and marketplaces are less competitive, fewer opportunities exist for training adults in their chosen vocations, for educating children, and for maintaining a highly skilled workforce that can compete in a global economy. Its absence is an impediment to progress.

Community telecommunications initiatives have different objectives than private, for-profit initiatives. Communities generally enter into telecommunications initiatives with the objective of improving government services and maximizing teaching and learning opportunities. They also focus on attracting economic development to retain or grow businesses thereby providing an increased tax base, additional employment opportunities and new revenue sources. Basically, they improve the overall quality of life for families in the community. Unlike the private sector business model, communities do not necessarily need to recover their investment in telecommunications' infrastructure in a short 3-5 years, and may wish only to cover expenses and investment while minimizing risk to the community.

It is expected that over time, technological innovation will help reduce the minimum broadband demand size necessary to make rural deployment more economically feasible. If our rural communities are expected to wait until years after urban America has broadband and are excluded from high-speed connectivity technology, how many jobs will be in rural areas a decade from now?

1.02 Study Milestones

The approach used for the broadband assessment study included the following milestones:

- Completing a **Needs Assessment** utilizing existing data and reports, as well as use of a hardcopy and on-line end-user survey designed for residential and business entities, as well as Government/Public Safety Facilities and Community/Non-Profit organizations.
- **Educating residents and stakeholders** on broadband and public/private service business models, and review of technology programs for shortcomings and recommendations for improvements through a gap analysis.
- **Developing Last Mile Connectivity Options** that are cost feasible with feedback from the communities
- **Performing Preliminary Engineering, Conceptual Design and Cost Estimates** to review with the elected officials and stakeholders' options being proposed for consideration
- **Review Possible Organization Structures and Network Operation Options** allowed by Virginia Law
- **Encourage collaboration** with service providers, local organizations and other intergovernmental partnerships by sharing findings of the study, telephone interviews, face-to-face meetings, and inquiring as to the level of interest to work with the communities on network related projects.

- **Identify funding sources** from federal, state and county/local resources, as well as foundations, nonprofit organization, institutional, private, grants and special interest groups.

A "funnel-down" approach was used to assist in analyzing the study area to locate underserved areas and examine current conditions. Essentially all the data that was developed or supplied was put figuratively into the "funnel" and graphically represented where possible, overlaid and analyzed.

The enormous volume of data collected was reviewed and pertinent features were identified for mapping. The focus on conditions and needs progressed as follows:

1. Created region-wide study area maps showing
    - Community Anchor Institutions (CAI) such as Schools (Education Institutions), Public Safety Agencies, Health Care Facilities, and Government Buildings
    - Economic Development Features, typically including locations of Major Employers, Industrial/Commercial Parks, Business districts, Growth Corridors, and if available where Water and Wastewater Infrastructure exists (Pulaski County prefers to keep water and sewer infrastructure data confidential)
    - Type of Internet Connection
    - Service Providers and Facilities
    - Internet Speed and Quality Satisfaction, as well as Wireless Interest
    - Population and Housing Density
    - Cellular Service, Coverage and Provider
    - Priority Service Areas in Relation to CAI, Economic Development Features and Proposed Solutions
2. Some of the above maps include existing data and responses from the end-user surveys to identify where discrepancies and agreement occur.
3. ***In-Field Assessment*** (Review existing conditions)
4. ***Preliminary Cost Estimates and Engineering*** (Conceptual Solution Options)
5. ***Research of Applicable Laws*** for Organizational Structuring

6. ***Business Model Roles that Municipalities Consider in Community Broadband Telecommunications Initiatives***
7. ***Discussion of Implementation Assessment/Decisions for use in Funding Applications***
   - ✓*Selecting Last Mile and Main Network Connectivity Solution(s)*
   - ✓*Determine Extent of Network Architecture Design/Cost Estimate*
   - ✓*Create and Apply for Funding Plan*
   - ✓*Establish Timeline, Service Provider Agreements Needed, Etc.*

1.1 Study Findings

1.1.1 Community Needs Assessment and Asset Inventory

One objective of the broadband assessment is to document the availability of communication technologies throughout the study area and to assess the amount of demand by residential and business end-users. Typically, in such assessments communication technologies include any form of Internet access, pay TV, and telephone delivered by any medium.

The use of some mailed surveys, advertising in the solid waste newsletter and supported by an on-line copy, allowed for a greater percentage of the population to be polled, including those that would potentially be reluctant to respond to telephone solicitations for surveying. The overwhelming popularity of the national 'Do Not Call' list and the increasing use of caller ID to screen out unwanted calls substantiate use of written and on-line survey as the preferred means to obtain community input from the largest number of respondents. Additionally, as stated, the survey collection process included an online version of the survey for the convenience of those using the Internet regularly.

In addition to validating service availability by geographic area, end users provided valuable input to evaluate demand for advanced technologies such as higher speed and wireless Internet access, phone service that uses the Internet as a transmission medium, and number of devices in the household accessing the Internet for use. This information is valuable to service providers contemplating the deployment of new services or to areas not presently served. Government leaders can use this knowledge as a tool for measuring how their community compares to others in relation to technology adoption by citizens, and for developing broadband education strategies.

1.1.2 Survey Methodology

A simple to complete survey (see Appendices) polled basic demographic data, Internet usage habits, method of access (e.g. dial-up, DSL, Satellite, etc.), satisfaction with current providers, monthly cost of access to the Internet, and much more. As stated before, mailed surveys were augmented by an online survey version. The on-line survey was an exact replica of the hardcopy survey available for easy online entry. The results of the online survey were combined with the hardcopy survey results. The combination of hardcopy and online surveying was to ensure that all County citizens were afforded the opportunity to provide input for the market assessment.

The new survey was designed as one survey for:

- Residence
- Business
- Residence with home-based business,
- Government/Public Facility (including Public Safety facilities),
- Community Organization/Non-Profit
- Seasonal Residence

1.1.3 Survey Distribution and Response

Surveys were mailed during the 2nd quarter of 2016. Hard copies of the survey had been collected from drop-off locations and online surveys had been recorded. The responses to the hardcopy surveys were data input into the electronic survey database with a combined total response of 721 surveys collected.

The successful response was attributed to the efforts of the Pulaski County staff and Project Management Team in promoting the online survey and distributing additional copies throughout the County. The responses were geocoded and mapped to show areas of demand and technology in use. See the Executive Summary for some of the more immediate responses of interest to the survey questions. The subject matter previously addressed in the Executive Summary were questions regarding:

- Cell Towers and Infrastructure
- Type Entity completing the survey
- Internet Connection User Type
- Type of Internet Connection
- Internet Service Providers
- Satisfaction with Internet Speed, Customer Support and Overall Satisfaction
- Cellular Service Reliability
- Cellular Service Coverage and Providers

1.1.4 End-User Input

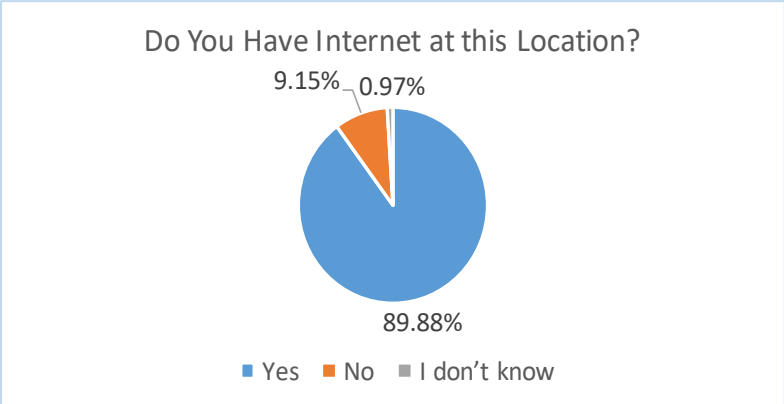
End-user input was provided from the mailed, on-line, and dropped off (hardcopy) surveys. Due to Business responses only being 1.66% of total entities responding, and similarly since the other entities responding representing less than 10% of responses even when including businesses, separate highlighting of the surveys by type entity was not warranted. The small number of responses by businesses likely represents a reasonable satisfaction by the majority of the business sector. In addition, 8 survey responses were near, but outside Pulaski County. Therefore, all survey responses received (721) as of the date when survey data was closed by the consultants are included in the survey analysis to provide the most comprehensive picture of existing conditions, needs and perspectives in and adjacent to the Pulaski County region.

The following results are from the remaining survey questions not addressed in the Executive Summary.

Q3 Do you have Internet access at this location?

Answered: 721 Skipped: 0

Answer Choices	Responses	
Yes	89.88%	648
No	9.15%	66
I Don't Know	0.97%	7
Total		**721**

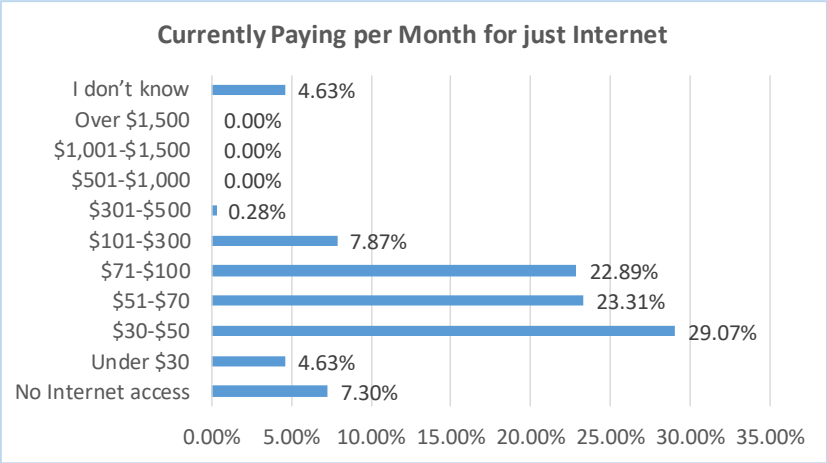


Almost 90% of Responses have Internet Access & almost 83% consider Internet Access Very Important or Critical

Q6 To the best of your knowledge, how much are you currently paying per month just for Internet access (unbundled)

Answered: 712 Skipped: 9

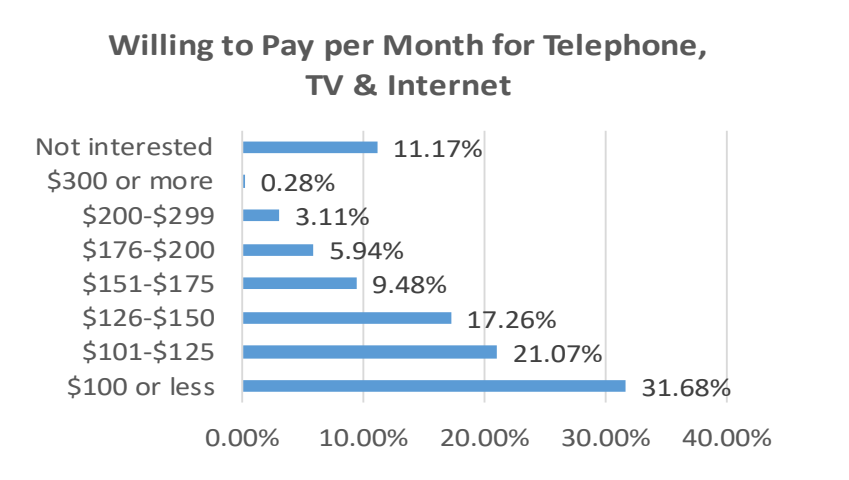
Answer Choices	Responses	
No Internet access	7.30%	52
Under $30	4.63%	33
$30-$50	29.07%	207
$51-$70	23.31%	166
$71-$100	22.89%	163
$101-$300	7.87%	56
$301-$500	0.28%	2
$501-$1,000	0.00%	0
$1,001-$1,500	0.00%	0
Over $1,500	0.00%	0
I don't know	4.63%	33
Total		**712**



Q7 Thinking about your current communications expenses, how much would you be willing to pay per month for a combination package of high-speed Internet, telephone and pay TV services?

Answered: 707 Skipped: 14

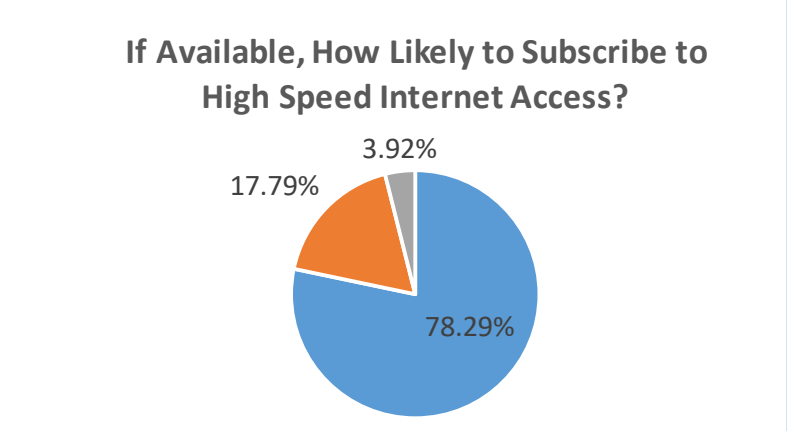
Answer Choices	Responses	
$100 or less	31.68%	224
$101-$125	21.07%	149
$126-$150	17.26%	122
$151-$175	9.48%	67
$176-$200	5.94%	42
$201-$299	3.11%	22
$300 or more	0.28%	2
Not Interested	11.17%	79
Total		**707**



Q8 If affordable wireless high-speed Internet access was available in your community, how likely would you be to subscribe to this service?

Answered: 714 Skipped: 7

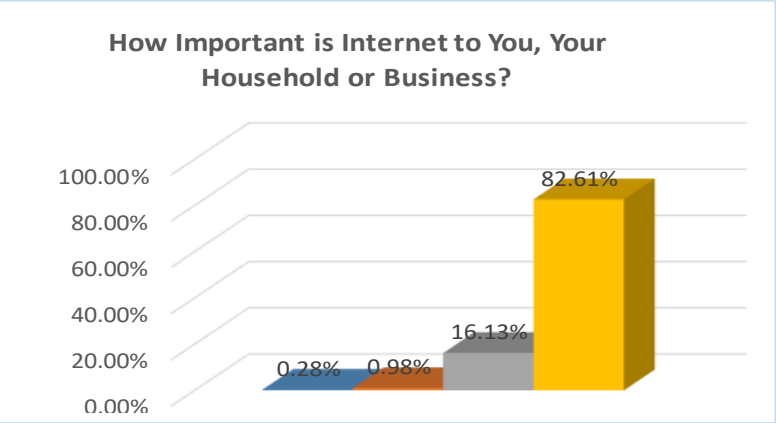
Answer Choices	Responses	
Very likely	78.29%	559
Somewhat likely	17.79%	127
Not likely	3.92%	28
Total		**714**



Q9 How important is Internet access to you/your household or business?

Answered: 713 Skipped: 8

Answer Choices	Responses	
No opinion	0.28%	2
Not important	0.98%	7
Somewhat important	16.13%	115
Very important or critical	82.61%	589
Total		**713**



Q10 How many computers, tablets, iPads, wireless phones, and/or other devices utilize an Internet service at this location?

Answered: 706 Skipped: 15

No. of Devices	0	1	2	3	4	5	6	7	8	9	10	More than 10	Total
	1.84%	3.12%	8.07%	11.76%	17.42%	15.72%	12.18%	8.07%	8.22%	3.40%	5.67%	4.53%	
	13	22	57	83	123	111	86	57	58	24	40	32	**706**

Q11 In the past 6 months, which of the following activities have you performed online and/or conducted at this location? (Check all that apply)

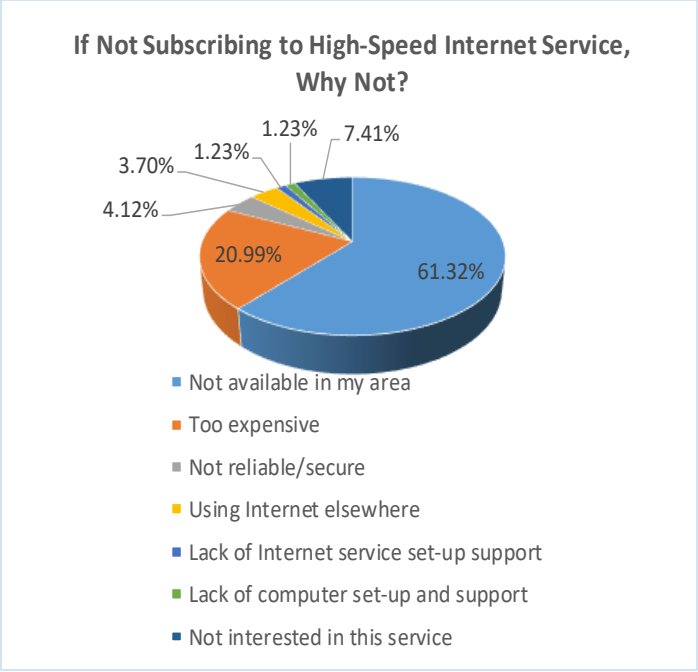
Answered: 687 Skipped: 34

Answer Choices	Responses	
Searched for travel related info	81.95%	563
Completed school assignments	35.37%	243
Searched health or medical info/Telemedicine	76.42%	525
Used E-mail	97.67%	671
Purchased products or services	93.16%	640
Followed social media (Facebook, Twitter, etc.)	86.90%	597
Sold products or services	24.75%	170
Visited a News website	86.61%	595
Employment Functions (Teaching, Buying/Selling Stocks, etc.)	37.99%	261
Researched a major purchase	75.25%	517
Communicated with a teacher	31.30%	215
Searched for a job	36.39%	250
Took an online course/Distant Learning/Telestudent	27.07%	186
Visited government website	74.53%	512
Searched info related to school	36.83%	253
Performed bank transaction	84.57%	581
Download/watched video online	70.60%	485
Total		**687**

Q16 If you do not subscribe to a high-speed Internet service (faster than dial-up over the telephone line), why not?

Answered: 243 Skipped: 478

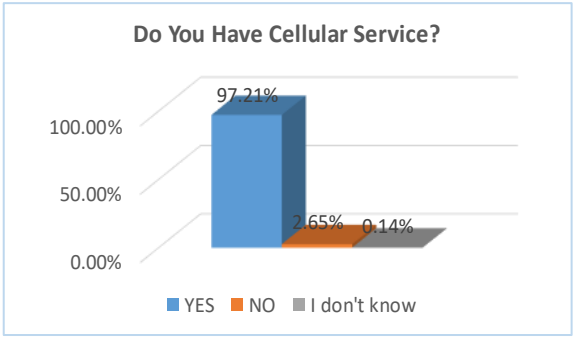
Answer Choices	Responses	
Not available in my area	61.32%	149
Too expensive	20.99%	51
Not reliable/secure	4.12%	10
Using Internet elsewhere	3.70%	9
Lack of Internet service set-up support	1.23%	3
Lack of computer set-up and use support	1.23%	3
Not interested in this service	7.41%	18
Total		**243**



Q17 Do you have cellular phone service?

Answered: 716 Skipped: 5

Answer Choices	Responses	
Yes	97.21%	696
No	2.65%	19
I don't know	0.14%	1
Total		**716**



Q18 Name of the company providing your cellular service?

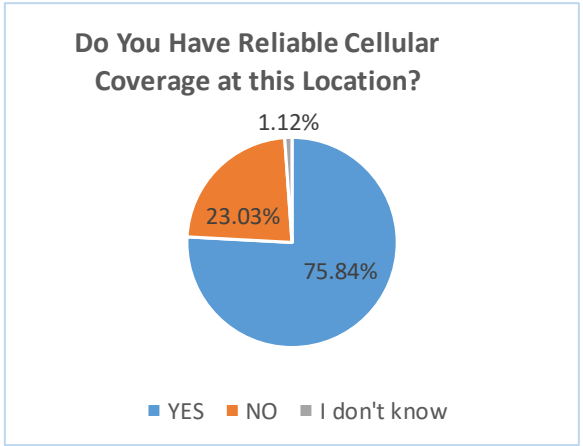
Answered: 692 Skipped: 29

Answer Choices	Responses	
AT&T	7.23%	50
Sprint	5.06%	35
Tracfone	4.77%	33
Net 10	0.14%	1
Straight Talk	8.38%	58
Verizon	48.27%	334
nTelos	3.18%	22
T-Mobile	0.72%	5
US Cellular	20.38%	141
I don't know	0.29%	2
No cellular service	1.59%	11
Total		**692**

Q19 Do you have reliable cellular coverage when using it at this location?

Answered: 712 Skipped: 9

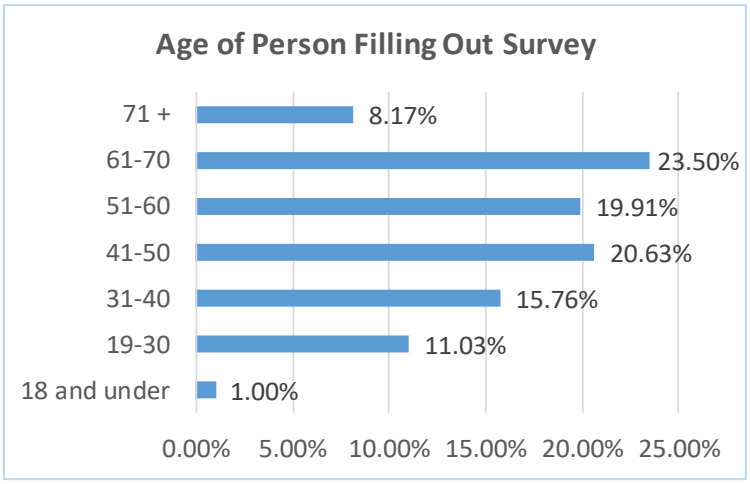
Answer Choices	Responses	
YES	75.84%	540
NO	23.03%	164
I don't know	1.12%	8
Total		**712**



Q20 What is your age? (the person actually filling out the survey)

Answered: 698 Skipped: 23

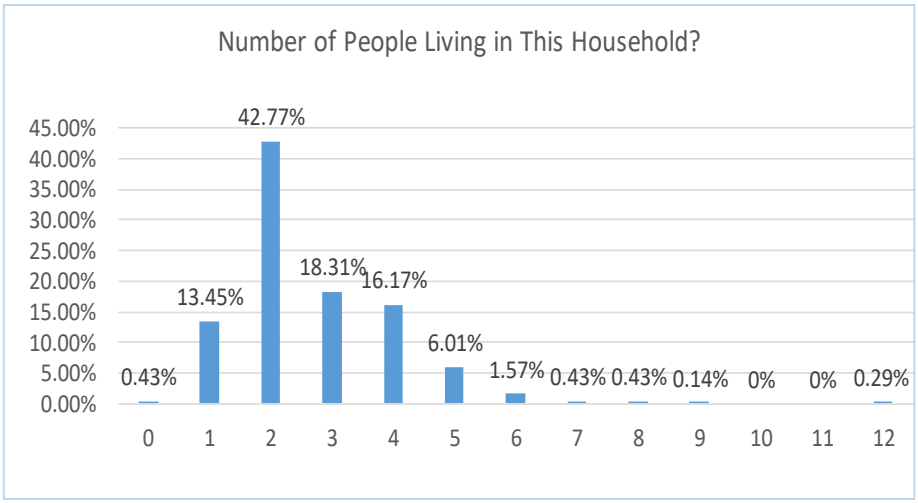
Answer	Responses	
18 and under	1.00%	7
19-30	11.03%	77
31-40	15.76%	110
41-50	20.63%	144
51-60	19.91%	139
61-70	23.50%	164
71+	8.17%	57
Total		**698**



Q21 What is the number of people living in this household?

Answered: 699 Skipped: 22

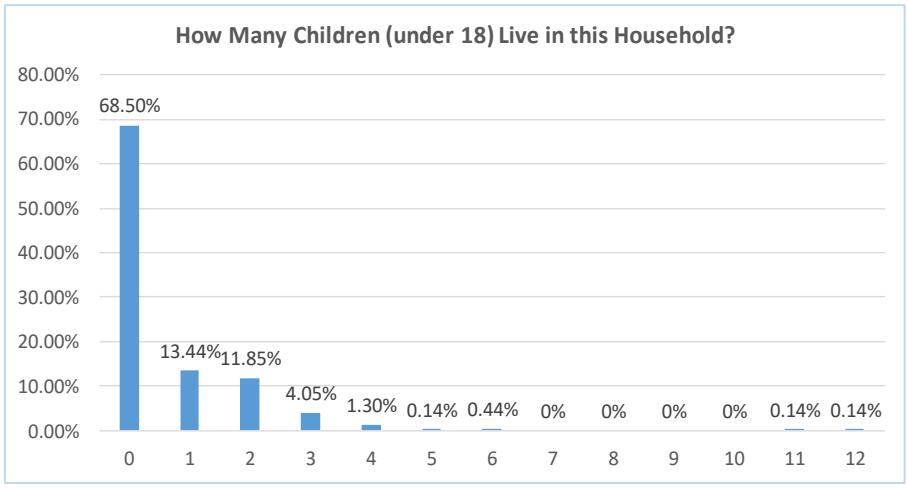
Answer	Responses	
0	0.43%	3
1	13.45%	94
2	42.77%	299
3	18.31%	128
4	16.17%	113
5	6.01%	42
6	1.57%	11
7	0.43%	3
8	0.43%	3
9	0.14%	1
10	0%	0
11	0%	0
12	0.29%	2
Total		**699**



Q22 How many children (under 18) live in this household?

Answered: 692 Skipped: 29

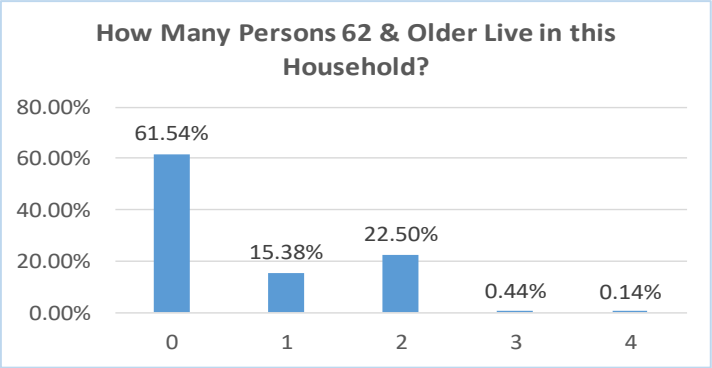
Answer	Responses	
0	68.50%	474
1	13.44%	93
2	11.85%	82
3	4.05%	28
4	1.30%	9
5	0.14%	1
6	0.44%	3
7	0%	0
8	0%	0
9	0%	0
10	0%	0
11	0.14%	1
12	0.14%	1
Total		**692**



Q23 How many persons 62 and older live in this household?

Answered: 689 Skipped: 32

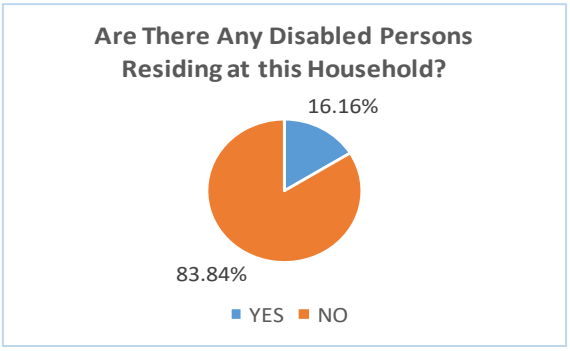
Answer	Responses	
0	61.54%	424
1	15.38%	106
2	22.50%	155
3	0.44%	3
4	0.14%	1
Total		**689**



Q24 Are there any disabled persons residing at this household?

Answered: 693 Skipped: 28

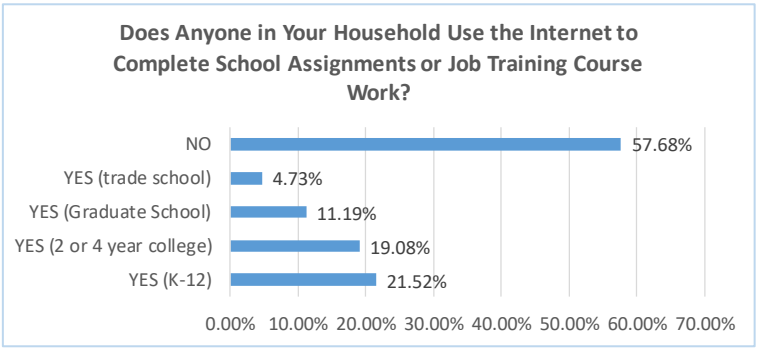
Answer Choices	Responses	
Yes	16.16%	112
No	83.84%	581
Total		**693**



Q25 Does anyone in your household use the Internet to complete school assignments or job training course work?

Answered: 697 Skipped: 24

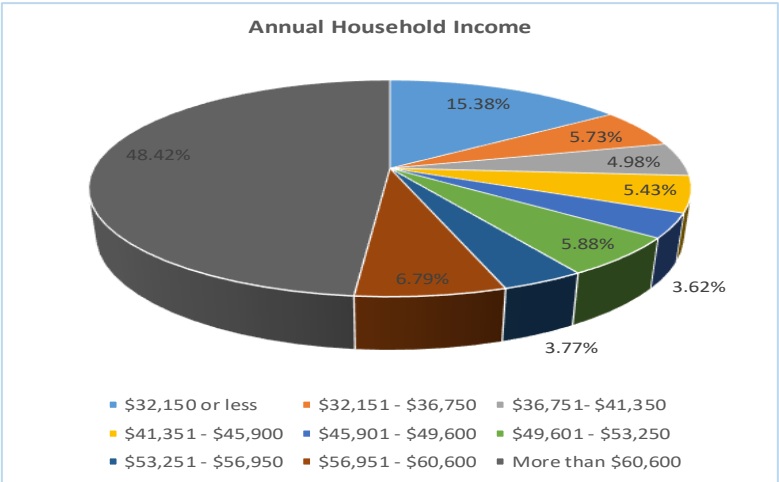
Answer Choices	Responses	
YES (K-12)	21.52%	150
YES (2 or 4-year college)	19.08%	133
YES (Graduate School)	11.19%	78
YES (trade school)	4.73%	33
NO	57.68%	402
Total		**697**



Q26 ANNUAL HOUSEHOLD INCOME: Household income is defined as income of all adult (18 and older) household members received from all sources such as wages, salaries, interest income, investment income, social security, public assistance, or other sources.

Answered: 663 Skipped: 58

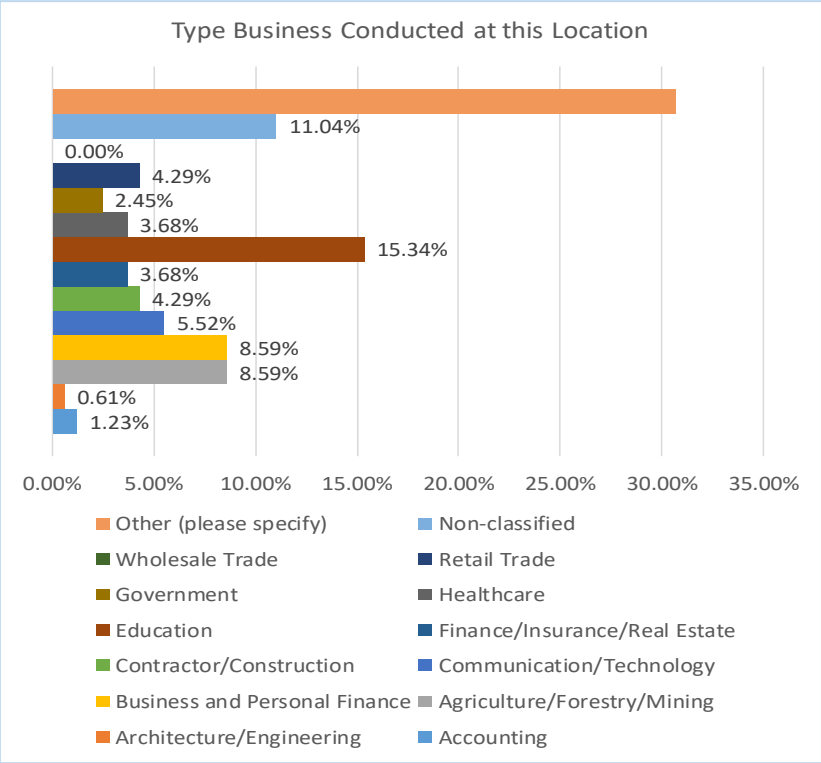
Answer Choices	Responses	
$32,150 or less	15.38%	102
$32,151 - $36,750	5.73%	38
$36,751- $41,350	4.98%	33
$41,351 - $45,900	5.43%	36
$45,901 - $49,600	3.62%	24
$49,601 - $53,250	5.88%	39
$53,251 - $56,950	3.77%	25
$56,951 - $60,600	6.79%	45
More than $60,600	48.42%	321
Total		**663**



Q27 Please check the type of business conducted at this location (Check one):

Answered: 163 Skipped: 558

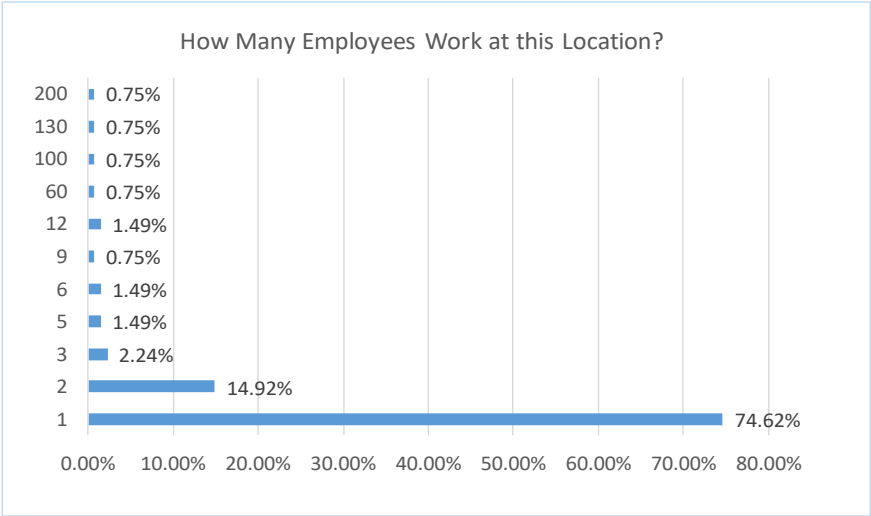
Answer Choices	Responses	
Accounting	1.23%	2
Architecture/Engineering	0.61%	1
Agriculture/Forestry/Mining	8.59%	14
Business and Personal Finance	8.59%	14
Communication/Technology	5.52%	9
Contractor/Construction	4.29%	7
Finance/Insurance/Real Estate	3.68%	6
Education	15.34%	25
Healthcare	3.68%	6
Government	2.45%	4
Retail Trade	4.29%	7
Wholesale Trade	0.00%	0
Non-classified	11.04%	18
Other (please specify)	30.67%	50
Total		**163**



Q28 How many employees work at this location?

Answered: 134 Skipped: 587

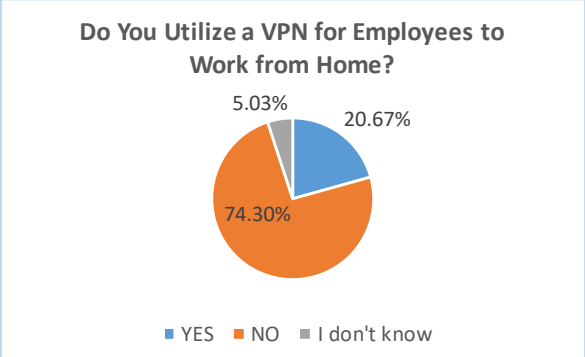
Answers	Responses	
1	74.62%	100
2	14.92%	20
3	2.24%	3
5	1.49%	2
6	1.49%	2
9	0.75%	1
12	1.49%	2
60	0.75%	1
100	0.75%	1
130	0.75%	1
200	0.75%	1
Total		**134**



Q29 Do you utilize a VPN (Virtual Private Network) for employees to work from home?

Answered: 179 Skipped: 542

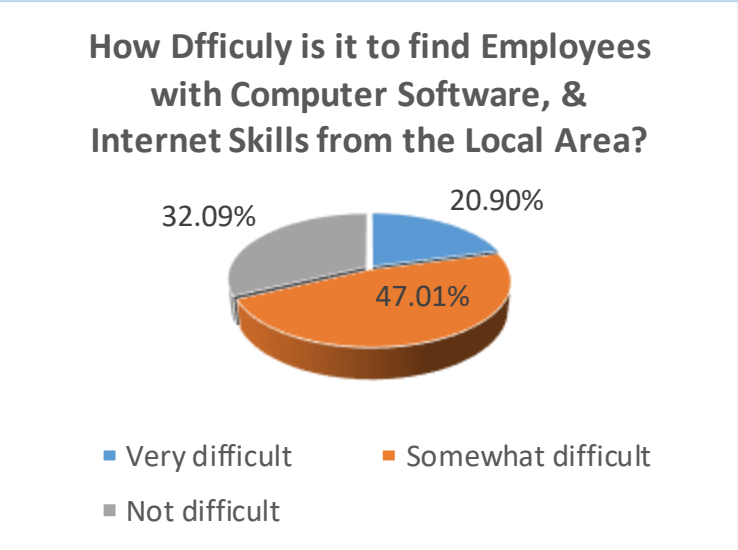
Answer Choices	Responses	
Yes	20.67%	37
No	74.30%	133
I don't know	5.03%	9
Total		**179**



Q30 How difficult is it to find employees with computer, software, and Internet skills from the local area?

Answered: 134 Skipped: 587

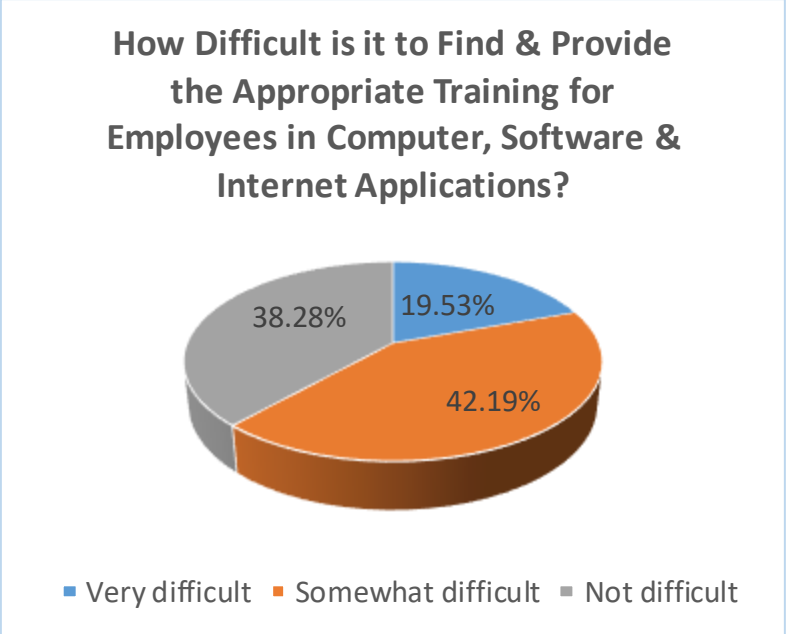
Answer Choices	Responses	
Very difficult	20.90%	28
Somewhat difficult	47.01%	63
Not difficult	32.09%	43
Total		**134**



Q31 How difficult is it to find and provide the appropriate training for employees in computer, software, and Internet applications?

Answered: 128 Skipped: 593

Answer Choices	Responses	
Very difficult	19.53%	25
Somewhat difficult	42.19%	54
Not difficult	38.28%	49
Total		**128**



1.2 Gap Analysis with Broadband Education Development and Strategies

1.2.1a Local and State Technology Training and Resources

Adults seeking to become proficient in using computers and technology applications have many choices for learning, with flexible programs aimed to reduce potential barriers such as distance, time, and cost.

1.2.1b K-12 Schools

The Standards of Learning (SOL) for Virginia Public Schools include computer/technology as a core standard, with the goal of producing "Technology Literate" students that "possess technology skills that support learning, personal productivity, decision making, and daily life."[5] The skills learned during childhood lay the foundation for continuous learning and encourages adoption of new technologies and applications throughout adulthood.

Computer applications and Internet research are introduced early in grammar school, integrated in all content areas rather than one specific course. Students are tested at various grades to ensure competency. By the end of grade 5, students should understand computer principles and technology, be able to process, store, retrieve, send electronic information, and communicate using software. By the end of grade 8, students should become more skilled at communication using computer software, networks, and telecommunications; and practice processing, storing, retrieving, and transmitting electronic information. Throughout high school, students are expected to use technology and computer applications to collaborate with peers, express ideas, perform Internet research, and possess an understanding of basic technology operations and concepts. Upon graduation, students will be prepared to enter college or workforce skilled at using technology for research, problem-solving, decision-making, and communication.

Pulaski County High School (Virginia) is Pulaski County's sole high school. The school is located in Dublin, Virginia and has around 1500 students. High school students have additional opportunities for study through State and District-approved online classes. Online classes, completed during students' time outside of normal school hours, allow for college-credit courses (Advanced Placement or AP) to be completed prior to graduation for students that have the aptitude for advanced learning. Additionally, some AP classes are available through traditional classroom instruction.

Pulaski County public schools have a Tablet Take Home Program where information is uploaded to the cloud and pushed onto the tablets. Other observations regarding the County's schools include:

- In the past 6 months, Survey Responses indicated 35.37% used the Internet to complete school assignments and 31.30% to communicate with a teacher; 27.07% took an on-line course /Distant Learning/Telestudent and 36.83% searched information related to school; **Internet heavily used for Education**
- Gig Transport (7 of 8 school locations); New elementary school is somewhat limited
- **Biggest Ed Problem:** It has been reported that a good number of Students at Home Lack Necessary High Speed Internet Connections
- The solution to the biggest obstacle facing Education in Pulaski County is addressing High Speed Connectivity issues at the homes of the students and teachers where inadequate

1.2.1c Adult Education

Many regional community colleges partnered with the Southwest Regional Adult Education program to create an innovative GED technology program entitled 'PlugGED In'. This curriculum was created through a partnership of educational and governmental institutions in response to the current adult literacy crisis and the increased need to

[5] *Six-Year Educational Technology Plan for Virginia, 2003-2009; Computer/Technology Standards of Learning*

prepare adults for jobs in the technology-driven economy. It provides learners who have not completed high school, with a GED course that incorporates information technology skills essential for entry-level employment in global, knowledge-driven, technology-rich jobs. These skills include specialized technology reflected in earned Microsoft certifications and "soft skills" such as communication, workplace ethics, collaboration and innovation.

Adult Education at New River Community College/GED Classes General Educational Development (GED) Tests measure the outcome of a high school education. Adults who earn a GED prove they have acquired skills equivalent to those of high school graduates. The test is divided into five sections: mathematics, science, social studies, writing, and reading. It is highly recommended that GED candidates prepare rigorously for the test through careful study and by completing official practice tests. Candidates who enroll in GED Preparation classes and obtain professional guidance increase their chances of success. The NRCC Adult Education program offers classes to adults in Floyd, Giles, Pulaski counties, and the City of Radford. The classes are designed to meet the needs of students at various educational attainment levels. NRCC Adult Education P.O. Box 1127/Dublin, VA 24084 Contact Adult Education office at (540) 674-3652 or toll free 866 462-6722, ext. 3652.[6]

Literacy Volunteers of the New River Valley – (LVNRV) The Literacy Volunteers of the New River Valley is a means for individuals, organizations, businesses, and governmental agencies to connect with providers of adult literacy tutoring services. We are an issue driven group and are only involved with literacy and literacy related issues. We provide tutoring in both basic literacy (reading and writing) and English as a second language (conversational and basic English skills) to adults in the New River Valley. What we do: • Provide free, confidential, individualized tutoring in reading and writing to adults who read below a fifth grade level. • Offer English for Speakers of Other Languages for adults who seek to improve their English speaking and writing skills. 195 West Main Street/Christiansburg, VA Phone: 540–382–7262 Hours: Monday - Friday 9 a.m.- 5 p.m.

1.2.1d Higher Education

New River Community College is Pulaski County's closest school of higher learning within the county lines. New River Community College (NRCC) is a comprehensive community college located in the New River Valley of Virginia with the school physically located in Dublin, Virginia. Other significant institutions of higher learning located in the region are Wytheville Community College located in the nearby city of Wytheville, Virginia; Radford University, a four-year public, state-funded university located in Radford, Virginia and Virginia Tech, which is a public land grant polytechnic university in Blacksburg, Virginia.

Typically, higher education institutions not only design their academic/vocational programs to meet state and industry wide mandates and certifications, but also many higher institutions offer some degree of customized curriculum and internships or apprenticeships to meet local employer needs. Specialized training and certification programs and public/private partnerships for workforce development training through outreach sites are identified as target industries for economic development. One objective of such initiatives is to help prevent what is often referred to as "brain drain", the migration of, young people from the area to pursue careers elsewhere. High quality education is a factor along with other quality of life issues influenced by bandwidth availability, considered by young professionals and craftsman when making a decision on where to live and work.

It is common for higher education institutions to make an effort to become integrated with the local community, partnering, to some degree, on mutually beneficial initiatives. Typically, the higher education partners work with

[6] http://www.nrvcs.org/wp-content/uploads/2015/04/Pulaski-County-Resources-2-11-15-edited-2.pdf

the local school district, providing opportunities for students to receive academic and technical training to ensure an effective transition from high school to college and/or the workplace.

Counties that have a higher education facility located in the community report an increase in the numbers of students transitioning from tech and career prep programs to college, and from two-year to four-year degree programs. Students participating in dual enrollment scenarios are graduating high school with a year or more of college completed. Not only does the student gain the advantage of earning a degree at a faster rate, but overall college tuition expenses are reduced as well. Dual enrollment options increase the numbers of students transitioning to higher education.

1.2.1e Growing Business

Virginia has numerous resources available to businesses for growing and competing digitally. One-on-one assistance is available from regional agencies such as the Virginia Employment Commission and the Center for Business and Workforce Development. Additionally, small/medium businesses and individuals have access to many online resources for e-commerce education and financial assistance through the Virginia Electronic Commerce Technology Center (VECTEC). VECTEC is a tenant in the Richlands' Business Incubator. Another example of Virginia's pro-business focus is the Virginia Department of Business Assistance (VDBA) whose goal is to connect businesses with the resources they need to meet challenges and realize market opportunities. "Since almost 99% of Virginia businesses are defined as small and they create the majority of new jobs, there is a special emphasis on building the capacity of these bold entrepreneurs."[7] The State maintains a resource directory for businesses at business.virginia.gov. Additional resources for technology education and implementation are available from the Virginia Center for Innovative Technology (CIT). CIT's mission is to accelerate Virginia's next generation of technology and technology companies.

Pulaski County Chamber of Commerce

4440 Cleburne Blvd.

Dublin, VA 24084

O: 540-674-1991; F: 540-674-4163

For more than 63 years, the Pulaski County Chamber of Commerce has championed economic growth and quality of life in Pulaski County. The Chamber works to maximize potential for Pulaski County and the entire New River Valley by nurturing our future workforce, growing the tourism industry, and playing a prominent role in the growth of small business. The Pulaski Chamber of Commerce serves a diverse membership of small, medium and large businesses as well as numerous non-profits.[8]

The following is a list of typical Chamber of Commerce primary functions:

- Community support
- Economic development
- Information resource
- Educational partnerships
- Regional partnerships
- Networking opportunities
- Legislative lobbying

1.2.1f Small Business Development Center

The Virginia Small Business Development Center (SBDC) serves Virginia counties. The center offers free counseling services, business planning, seminars and training events, and provides information and other services to new and existing small and medium-sized businesses. The SBDC is the best resource for aspiring entrepreneurs to

[7] Louisa M. Strayhorn, Director, Virginia Department of Business Assistance, *Connecting Businesses with Resources;* http://www.dba.state.va.us/about/default.asp

[8] http://www.pulaskichamber.info/

gain knowledge on the requirements for going into business, financial management issues, marketing issues and techniques, business plan development and implementation, and the qualifications for obtaining start-up funds. The center also serves the experienced owner who wants to expand a business, solve business problems, do strategic planning, develop new ideas, enter new markets, or access expansion capital. Seminars and appointments with counselors are held at the Center; current seminars for businesses include Business Planning Basics for Starting a Small Business. The SBDC also works in concert with SCORE volunteers reaching out to offer experience and advice to new and existing businesses. A new program of peer advisory groups has recently launched called "Business Advantage Circles".

The SBDC offers consultation by appointment for new as well as established businesses. The Small Business Development Center can offer free or low-cost workshops in Pulaski County. The Start Smart workshop series is a particularly good series for new business owners. To learn more about Start Smart and all SBDC resources, visit the SBDC Website at www.ValleySBDC.org. To schedule an appointment, call the SBDC's main office in Harrisonburg at 540-568-3227 and specifically ask for an appointment at the Pulaski County Government Center

1.2.1g SCORE

The service corps of retired executives (SCORE), a non-profit association, aims to mentor to aspiring entrepreneurs and foster the growth of new businesses. Retired executive volunteers present low-cost seminars and free business consulting as a resource partner with the Small Business Administration. One particular seminar is aimed at educating businesses on how to market and sell on the Internet. By researching on-line, the location of the nearest SCORE classes can be found. SCORE also reaches out to businesses by offering 6 Online Business Workshops:

* Developing a Business Plan * Creating a Profit and Loss Statement * Creating a Competitive Advantage
* Promoting Your Business * Pricing Products and Services * Building a Web Site

1.2.1h Business Training Resources

Virginia Employment Commission

About VEC

Our Vision
Virginia's First Choice for Workforce Services

Our Mission	Our Values
To promote economic growth and stability by delivering and coordinating workforce services to include: • Policy development • Job Placement • Temporary income support • Workforce information • Transition and training services To accomplish our mission, we will: • Partner with our stakeholders • Develop and empower staff • Improve our processes	Ethical Conform to professional standards of conduct. Achieving Make a worthwhile contribution to society. Meet the needs of customers. Purposeful Have a clear sense of purpose. Evaluate results and activities compared to established goals, objectives, and performance measures. Fulfilling Create an environment for meaningful work, where individual, team, and VEC contributions are recognized, valued, and rewarded.

• Embrace innovative solutions and technologies • Continually renew our organization	Balanced Concern for the needs of communities, customers, employees, and other stakeholders. Secure Provide a safe and secure work environment

VEC Office Serving Pulaski County
800 East Main Street, Suite 200
Wytheville, VA 24382
Phone: (276) 228-4051; **Fax:** (276) 228-7399

Virginia Cooperative Extension of Pulaski County

The Pulaski County office of Virginia Cooperative Extension is your local connection to Virginia's land-grant universities, Virginia Tech and Virginia State University. Virginia Cooperative Extension brings the resources of Virginia's land-grant universities, Virginia Tech and Virginia State University, to the people of the commonwealth.

Understanding that knowledge is power, the Extension places that power in the hands of Virginians and help them learn how to use it to improve the quality of their lives. The Extension agents and specialists form a network of educators whose classrooms are the communities, homes, and businesses of Virginia, where they bring research-based solutions to the problems facing Virginians today.

To better utilize resources, the Extension forms collaborations with hundreds of public and private partners and volunteers, who help reach larger and more diverse audiences and also leverage the impact of work performed. The Extension is a product of cooperation among local, state, and federal governments in partnership with tens of thousands of citizens, who, through local Extension Leadership Councils, help design, implement, and evaluate needs-driven programs.

The Extension is a dynamic organization that stimulates positive personal and societal change, leading to more productive lives, families, farms, and forests as well as a better environment. The mission of Virginia Cooperative Extension is to enable people to improve their lives through an educational process that uses scientific knowledge focused on issues and needs. Areas of emphasis are: agriculture and natural resources, 4-H youth development, and family & consumer sciences. 4-H is a comprehensive youth development program for youth between the ages of 5 and 18 engaged in hands-on learning experiences under the guidance of adult or teen 4-H volunteers trained by 4-H agents. 4-H members learn how to: make decisions, manage resources, work with others, and utilize effective communication skills.

Programming efforts in agriculture and natural resources address a broad range of problems from traditional agricultural management and production issues in livestock and crops, to farm business management, farm labor, soil and water conservation, environmental issues, pesticide applications, forestry and other natural resources, commercial and consumer horticulture, water quality, and skin cancer prevention. Family and Consumer Sciences programming is focused around three broad areas: nutrition and wellness; financial management, housing and consumer education; and family and human development.

Virginia Cooperative Extension is an educational outreach program of Virginia's land-grant universities: Virginia Tech and Virginia State University, and a part of the National Institute for Food and Agriculture, an agency of the United States

Department of Agriculture. Extension programs are delivered through a network of faculty at two universities, 107 county and city offices, 11 agricultural research and Extension centers, and six 4-H educational centers. Our system incorporates the expertise of faculty in the Virginia Tech College of Agriculture and Life Sciences, College of Natural Resources and Environment, Virginia-Maryland Regional College of Veterinary Medicine, and the Virginia Agricultural Experiment Station; as well as the College of Agriculture at Virginia State University.

Virginia Cooperative Extension (Pulaski County Office)

143 3rd Street, NW #3 Pulaski, VA (P:540-980-7761)

Employment Agencies/Information and Workforce Development[9]

Bright Services Bright Services has been in operation since 1981. They serve more than 1,000 corporate clients annually. We are the largest independently owned, locally managed firm, within the geographical region. The average Bright Services "temporary" employee works 37.33 hours weekly. Thousands of employees have obtained permanent jobs through Bright Services. Many people choose to work as temporary help because of flexible hours, immediate income, or to become familiar with area companies. This is one of the best routes to permanent employment. Bright Services provides its temporary employees with a benefits package, which can be tailored to client companies' specifications Pulaski/Radford 1026 East Main Street Pulaski, VA 24301 Phone (540) 980-1423 Fax (540) 980-1906

New River Community College Workforce Development The Center for Workforce Development fosters economic growth and development by providing a variety of services, including skills upgrading and career development programs, retraining, pre-employment workshops, video conferencing, and state-of-the art technology training. The Center develops customized training programs and delivers management workshops upon request. P.O. Box 1127 Dublin, VA 24084 Phone: (540) 674-3613 Fax: (540) 674-3634

The New River/Mount Rogers Workforce Investment Board Supported by federal and state funds and local service agencies, the NRV/MR WIB shows its commitment to the region's quality of life by helping people find jobs and train for better careers. Qualified adults and youths can visit the One-Stop Centers for training, job and career counseling, and other job-related information. 6580 Valley Center Drive, Suite 119 Radford, Virginia 24141 Website: www.nrmrwib.org 540-633-6764

Valley Staffing, Inc. Valley Staffing, Inc. has been proudly meeting the New River Valley's staffing needs for over six years now. Conveniently located on Wright Avenue in Dublin, Virginia, Valley Staffing offers the hardworking people of our community an opportunity to get a foot into the doors of the region's most sought after and promising employers. 6003 Wright Avenue/Dublin, Virginia 24084 www.valleystaffingjobs.com/540-674-3103

Workforce Development Center Dublin/Goodwill Industries of the Valley Offers Work Investment Act (WIA) Youth and Adult programs and services. The Youth Program provides training, employment and educational opportunities to eligible in and out of school youth ages 14 to 21. The Adult Program offers assistance with job search and placement, and educational opportunities. 103 Duncan Lane Radford, VA 24141 Phone: (540) 639-9027 Fax: (540) 639-3517

[9] http://www.nrvcs.org/wp-content/uploads/2015/04/Pulaski-County-Resources-2-11-15-edited-2.pdf

@Work Personnel Services For over a decade, @WORK Personnel Services has built upon its core foundation of meeting and exceeding the needs and expectations of people seeking employment opportunities as well as clients seeking a full service partner to assist with their company's staffing needs. By providing temporary, temp-to-hire, pay rolling and full time placement services, @WORK Personnel Services is committed to offering flexible employment solutions and the highest level of service available today. 504 Newbern Road PO Box 1584 Dublin, VA 24084 Email: mmarcum@atworkpersonnel.com Phone: 540.674.1118 Fax: 540.674.6666

1.2.1i Public Library

Pulaski County Library

The Mission of Pulaski County Library System is to provide information and library materials for ALL citizens of Pulaski County. The Library System takes pride in providing excellence in its provision of services and programs. The vision of Pulaski County Library System is to continuously provide free, friendly service and access to timely materials that educate, inspire and entertain the entire community.[10]

Pulaski County Library
60 West Third Street
Pulaski, VA 24301
540-980-7770
Fax: 540-980-7775

Charles & Ona B Free
Memorial Library
300 Giles Avenue
Dublin, VA 24084
540-674-2856
Fax: 540-674-2907

Sally Warburton
Library Director

Citizens without computers or home Internet access and visitors to the County can access the Internet at no charge. Patrons with laptop computers can access the Internet wirelessly.

As new applications, programs, and social media applications continue to grow, bandwidth can become strained and in need of updated faster computers. Library hours can limit access by patrons who have no computer or Internet access at home, particularly students who need to access to complete school assignments and job seekers

One potential solution to investigate in aiding libraries is to research the possibility of being able to piggyback on government reduced pricing or arrangements w/service providers for enhanced service

1.2.1j Public Safety Education Resources

APCO (Association of Public Safety Communication Officials) offers extensive training courses for public safety and emergency personnel. Training options consist of traditional instructor-led classes hosted by public safety agencies to online courses and web seminars. Through a partnership with Jacksonville State University and the Institute for Emergency Preparedness, public safety employees can receive certification and degrees without leaving the County. Numerous other training courses are available online through agencies such as FEMA, Department of

[10] http://pclibs.org/index.htm

Homeland Security, US Fire Administration, and the Virginia Department of Emergency Management. To complete online courses, a student need only be skilled with basic computer knowledge to go online and use a web browser such as Internet Explorer. Accessing mission-critical training online seeks to close the preparedness gap between rural and urban public safety entities.

1.2.1k Healthcare

Health-Medical related use of Internet is the 7th highest use over the past 6 months. The Hospital is located in the Town of Pulaski with a number of Health outpatient/urgent care facilities in the County.

Medical/Dental Clinics and Programs

FAMIS/Family Access to Medical Insurance Virginia's program that helps families provide health insurance to their children. Health insurance is important to make sure that kids are able to get all the help they need to grow up healthy. Website www.famis.org 1-866-873-2647

Free Clinic of Pulaski County Primary medical care and medications to income eligible and uninsured Pulaski residents. Also makes referrals to other medical providers. Call for appointment 412 N. Jefferson Ave. Pulaski, VA 24301 540-980-0922

Lewis Gale Hospital 2400 Lee Highway Pulaski, VA Website www.pulaskicommunityhospital.com 540-994-8100

Carilion Hospice, NRV Hospice focuses on caring, not curing, and in most cases, care is provided in the patients home. Hospice care is also provided in freestanding hospice centers, hospitals, nursing homes, and other long term care facilities. Hospice services are available to patients of any age, religion, race or illness. Hospice care is covered under Medicare, Medicaid, and most private insurance plans, HMO's and other managed care organizations. 707 Randolph Street, Suite 251 Radford, Virginia 24141 540-633-9370

Deaf & Hard of Hearing Services Center, Inc. DHHSC – New River Valley c/o NRCC – Center for the Deaf and Hard of Hearing at Rooker Hall Attn: Drema Bagley, DHHSC Outreach Specialist PO Box 1127 Dublin, VA 24084 3rd Wednesday each month, 10:00 am to 2:00 pm (appointments only) Phone: 540-342-0031 (voice, TTY) Videophone: 540-585-4724 Toll Free: 800-552-7917 (voice or TTY) Fax: 484-924-0031 Email: NRV@deafhh.org

CHIP (Children's Health Improvement Partnership) Provides access to primary health care to pregnant women and families with children age's birth to seven. Parent education and support for family goals is provided through home visiting case management services. 412 N. Jefferson Ave, Pulaski, VA 24301 Phone 540-994-9200 Fax 540-994-9334

Medicaid Information www.virginiamanagedcare.com 1-800-643-2273

Medicaid Transportation Need to have Medicaid number, pick up and drop off address, name, phone and address of doctor. Call 48 hours in advance Medallion: 1-866-386-8331 Virginia Premier: 1-888-338-4579 ext. 1164

Medicare Information A federal system of health insurance for people over 65 years of age and for certain younger people with disabilities www.Medicare.gov 1-800-633-4227

Med-Ride Med-Ride provides non-emergency medical transportation to qualified individuals in the New River Valley of Virginia. Med-Ride offers demand responsive, volunteer transportation to the lower income, uninsured and under insured citizens of the New River Valley. Med-Ride operates on a fee-for-service basis; however, no one is denied due to an inability to pay. 540-980-0754

New River Community Action The mission of New River Community Action, Inc. (NRCA) is to promote and support the well-being and self-reliance of individuals, families and communities. Community Action Agencies are well known proponents of self-sufficiency. "A Hand Up, Not A Hand Out" is our motto. We strive to achieve our purpose through community organization and empowerment, i.e., helping local communities to recognize and address their own poverty conditions. NRCA has developed a variety of programs that prevent and alleviate poverty and improve the lives of low-income individuals and families. 412 N. Jefferson Ave, Pulaski, VA 24301 Hours: 9-11:30am; 1-3:30pm, Monday-Friday Phone 540-980-5525

NRV Medical Center 2900 Lamb Circle Christiansburg, VA 24073 Website www.carilion.com/cnrv/ 540-731-2000 Pulaski Health and Rehabilitation Center 2401 Lee Highway Pulaski, VA 24301 540-980-3111

Telemedicine applications in rural areas (i.e., viewing higher resolution radiology images) requires higher

bandwidth access. The biggest obstacles to healthcare related issues is in adequate bandwidth for remote diagnoses and consultation between medical professionals and doctor-patient, as well as keeping up with developing, storing and protecting the privacy of electronic medical records.

Schools & health care providers are aware of the benefits that broadband communications bring to their tasks, but the biggest problem is not at the schools and health care facilities, but rather not having broadband at home for students, teachers, patients and health care professionals.

The solution to Healthcare gaps is an overall better communications infrastructure in the county, offering higher speed and more reliable bandwidth that can handle video imaging & large data transfer

1.3 Service Provider Input

A communication for Request of Interest was mailed and e-mailed to numerous service providers and/or network managers to attend a September 13th meeting to review the Broadband Assessment and Proposed Network Planning Strategies, collect feedback and suggestions, as well as address potential collaboration through a Public-Private Partnership (PPP). Two (2) service providers, Citizens Telephone Cooperative and Lingo Networks/(MGW) followed up discussions with the project consultants. Citizens Telephone Cooperative expressed a willingness to continue to discuss with the County potential solutions. Lingo/MGW discussed a specific infrastructure project they were interested in further exploring with Pulaski County. Shentel also indicated they would support MGW on their project. Follow-up face-to-face meetings were held with Citizens Telephone Cooperative and Lingo/MGW and a telephone conference call with Lumos Networks. In addition, Comcast followed up via e-mails regarding survey respondents in their service area of Pulaski County. Finally, Wireless Internet Service Providers (WISP) addressed their concerns of getting permission for equipment location/attachment and buying bandwidth at more reasonable pricing.

Lingo/MGW and Citizens Telephone Cooperative during the follow-up meetings provided input and basic information regarding their service territory, products and infrastructure and facilities. Additional information on all existing service providers identified in the surveys can be gleaned from the end-user survey results and maps. These have been compiled to serve as an aid in discussions with providers to extend service to underserved areas.

A reluctance on the part of incumbent cellular telephone service companies to participate with localities presents an impediment to the broadband assessment. A major concern expressed from the surveys and Project Management Team was unreliable cellular service or no cellular phone service in some parts of the county. The survey responses were intended to be used for more than just capturing a snapshot of the state of telecommunications today from a service provider's viewpoint, but also used to verify and investigate responses from the end-user surveys and customers of the service providers. If a firms do not get involved, it is difficult to identify the firm as part of the solution.

The project consultants appreciate the efforts of the service providers that responded to the request for information and interest. Such collaboration should continue and expand in working with the county and other grass root initiatives on expediting and implementing broadband solutions throughout their member service areas and proposed new areas, as improving communities and quality of life in Virginia is everyone's business.

1.4 Preliminary Engineering, Network Design and Cost Considerations

Last Mile Network Strategies

The end-user survey responses played a large role in delineating current conditions and was used to supplement the telecommunications data provided by the service providers. Priority Areas (focus areas) were established based on the areas of greatest need to allow a phased in approach if warranted. The existing service providers and their infrastructure were included on these maps to know who to talk to and what infrastructure exists to work from.

Finally, once the most cost feasible last mile connectivity options were determined, preliminary engineering of conceptual designs of the proposed solutions with cost estimates were created and the maps refined to show only the relevant information remaining.

Some of the study findings regarding service provider infrastructure and facilities had to be interpreted due to the current regulatory and legal inability to compel its production. The service providers were requested to note any incorrect information presented at the service provider meeting. Most readily available data is received from State

regulatory filings, such as regulated antennae structures through the FCC and other Internet searches. In addition, it is probable that fiber exists in more locations than shown on the maps because service providers will normally not disclose all their infrastructure locations or only under a Non-Disclosure Agreement (NDA).

Once the service provider facility, infrastructure maps and coverage area maps were created, the economic development data collected from Comprehensive Plans, on-line data research, and data collected from the face-to-face meetings with service providers was mapped and overlaid with the coverage area data including type Internet connection. Less attention was given to those areas identified as being well served and where a majority of survey responses indicated current Internet service was adequate, and the remaining non-adequate Internet Service, underserved areas or no service areas were focused on with the economic development data, facility/infrastructure data, and service provider data used to identify which areas to prioritize (focus on), what technologies are in the area, and what service providers should be talked to for expanding service areas. If an area was identified as an adequate Internet service area, but considerable survey response data indicated Internet access was inadequate or not available, then regardless some portions of areas of adequate service area were identified as a priority area. Priority areas were delineated where clusters of no or dissatisfied or unreliable service was noted. Isolated disgruntled responses were ignored if a majority of adjacent responses were satisfied or positive. Delineation was somewhat subjective since the breakdown between satisfied and dissatisfied or no service and service was within +/- 10% of a 50%/50% distribution. One area warranting further investigation is where infrastructure was indicated existing, but many surveys indicated service was not available. Option No. 2 for Last Mile Solution connectivity suggests creating a Network Assistance Program to investigate and resolve such contradictions.

Implementation Criteria

Since one result the Assessment Study wants to accomplish is sustainability of funded projects, selection of **Priority of Future Implementation Projects** in the non-adequate Internet service areas, underserved areas or no Internet service areas is often made using the following parameters:

- **Criteria** – Greatest potential for return of investment resulting in new or increased employment opportunity and/or tax base; i.e., Economic Development Features
  - Zoning-Industrial/Commercial Parks and Downtown Business Districts (i.e., Incorporated Areas)
  - Major Employers
  - Enterprise Opportunity Zones (Tax Incentive Sites/Zoning)
- **Criteria** – Greatest aggregation of demand per capita; i.e.,
  - Urban and suburban communities (Housing and Population Density)
  - Growth Corridors
- **Criteria** – Strategic end users, specialty needs areas; i.e.,
  - Community Anchor Institutions (CAI) such as schools/vocational centers and libraries
  - 911 Emergency Response Agencies, Hospitals
  - Municipal Facilities, Public Works Buildings, Water Towers, Maintenance Garages, Treatment Plants
- **Criteria** – Remaining rural areas not addressed
  - Towns, Villages, Strip Malls, etc.

Major employers, schools and health care facilities are important end-users and must be considered in the quality of life concerns. Feedback from these facilities indicated that while many had adequate service at the location, the bandwidth and speed is still inadequate at the homes of the employees, students or patients to meet their applications adequately. There was some discussion by Wireless Internet Service Providers (WISP) that their biggest obstacle was getting permission for equipment location/attachment and buying bandwidth at more

reasonable pricing. Wireless Service Facilities Providers interests include both towers and anchored antennae facilities (such as roof top) and Interior Wi-Fi hotspots and facilities. While attaching antennae arrays on water tanks and schools can sometimes create problems, building a tower on County owned or non-private land such as water tank sites, fire station/rescue sites or school sites can make tower construction more cost feasible and/or attractive to service providers, particularly if the site is or could be served with fiber.

The location of "Telecommunications Infrastructure" of Figure ES-A is qualitative because of the reluctance of fiber owners to pinpoint all routes or locations with great detail. The greatest benefit of applying the data layer on the county maps is to identify owners of fiber and vertical assets in the area. These providers should be contacted when investigating build-out, connectivity and transport options for broadband services.

1.4.a OPTION NO. 1: MARKET EXISTING & POTENTIAL SITES/ASSETS

Premise: Marketing Sites and Other Assets in the County

Description: Promote and seek Interest from Service Providers of existing and potential sites and assets

Approach: While generalized and abbreviated, the overall approach recommended is to hire a consultant to work with the Project Management Team to identify and work with these companies to solicit interest from service providers. An asset portfolio should be developed including any incentives the County is willing to offer to make the solicitation more attractive (such as funding/cost offset or assistance with funding applications, expedited approval and permitting, use of County owned land, co-location sites, cost sharing, etc.). Along with creating incentives, the County will need to determine what role, if any, it is willing to offer to play in the arrangement (i.e., landlord or assistance with property owner negotiations, tower builder/owner, tower fiber build, etc.). Depending on response from the site broker firm and role of the County if any, an RFP may be needed to comply with public procurement requirements to address the proposed provision of the arrangement. If an RFP is required, the County will then have to solicit, receive, analyze, and award a contract. If the County is involved in some aspect, it is likely such an arrangement will be multiyear in term and will have some minor administration responsibilities involved.

1.4.b - Option No. 2: *Pulaski Internet Initiative - Communications Assistance Program (CAP)*

Premise: Pulaski Internet Initiative Communications Assistance Program

Description: Liaison between Customer & Service Provider

BHT-NAP Structure

Start by continuing to support and operate the Pulaski Internet Initiative Project Management Committee

1. Design an Internet Service Application to collect data from potential end-users including, but not limited to why end-user is making a claim of no service available or poor service or too expensive; location of service desired; steps taken in attempting to get service in the past; document conversations held with service providers; cost data; speed or service desired; qualifying data for low to moderate income subsidies programs, and much more.
2. Take and investigate service applications:
    - From property owners claiming no option for Internet access to property.
    - From property owners claiming paying too much or access too expensive. Assess price fairness.
    - From property owners claiming Internet connection is unreliable.
3. Take above claims to incumbent or applicable Internet service provider for response to report back to end-user (investigate if misleading advertising exists of availability, speed, cost, etc., and report findings).

4. Determine if applicant would be eligible for other solution options such as CPE/Last Mile Cost Subsidy.
5. Work with customer and service provider to mitigate cost details, service contract issues, timeline, etc.
6. Provide assistance with other available last mile solution options.

Basis of Estimated Cost

a) It is recommended the county appoint a staff person to assist in the administration of the service applications, liaison with the service providers, providing maps, etc. The estimated cost to the county is $1,000 per mo. or $12,000 plus $2,400 for materials and supplies for the first year after which the success and effectiveness of the program can be evaluated if warranted to be renewed.

Pulaski Internet Initiative CAP					
Cost Item	***Amount***	***Subtotal***	***Total Cost***		***Comment***
Administration of Program	$1,000/Mo. x 12 mos.	$12,000 per Year			Create an office and/or appoint a staff person to administer
Materials/Supplies/Overhead	$200/Mo. x 12 mos.	$2,400 per Year			Map Printing, phone calls, fax, mileage, etc.
Pulaski Internet Initiative CAP Total			**$14,400/Yr.**		← Program Cost for the County; Does not include cost for outside assistance

1.4.c - Option No. 3: *NETWORK EXTENSION FUNDING PPP*

Premise: Getting middle mile/Last Mile where not existing or improving where exists

Description: Extending DSL/DSA, Wireless, Fiber where not existing

Structure

1. Aggregate Demand.
2. Encourage Service Providers to extend middle mile/last mile infrastructure.
3. Define the scope of the project, roles of the parties, and return on investment if the county were to contribute resources to the cost of a middle mile build funding application.
4. Assist in completing a funding application.
5. Plan for future technology. While DSL is a major technology being used, with FTTH/FTTP planned, implement technology to accommodate future plans such as using fiber in lieu of copper for extensions.
6. Determine and evaluate if a formal PPP would be required to secure financing or can an informal PPP be utilized. While possible, it is doubtful that a Wireless Broadband Authority would need to be formed for this option.
7. Negotiate and ensure the commitment of municipal resources will result in the ability for x-number of end users to get connected to high speed Internet access.

Basis of Estimated Cost

a) Funding applications, such as the USDA-RUS Telecommunications Loans and Grants, quite often cost $50,000 or more to prepare and provide all the required information for submittal. Certainly the county should not shoulder the entire cost, but perhaps consider cost sharing this expense with a service provider(s) who commits to x-number of end users to being able to get connected to high speed Internet access, perhaps at discounted cost. Therefore, the estimated cost includes a $46,600 cost share from the county towards 1 or 2 funding applications plus $50,000 from service provider(s) for a total of $96,600.

b) The county and their staff would help in the administration of the funding applications providing maps, survey results, demographic data, etc. The administrative budget is an estimated cost of $18,000 for the first year after which the success and effectiveness of this option can be evaluated if warranted to be renewed.

NETWORK FUNDING EXTENSION - PPP					
Cost Item	***Amount***	***Subtotal***	***Total Cost***		***Comment***
1. Application-Service Provider Share	$50,000	$50,000			1-2 Applications (Depending on Funding Source)
2. Application - County's Share	$25,000	$25,000			1-2 Applications (Depending on Funding Source)
3. Administration of Program	$1,500/Mo. x 12 mos.	$18,000/Yr.			No outside assistance included for support to county staff
4. Materials/Supplies	$300/Mo. x 12 mos.	$3,600/Yr.			Map Printing, phone calls, fax, mileage, etc.
NETWORK FUNDING EXTENSION - PPP Total			**$96,600/Yr.**		← Program Cost for the County; Does not include outside support services if needed

1.4.d - Option No. 4: *CPE/LAST MILE COST SUBSIDY*

Premise: Assisting customers get connected by partially subsidizing a portion of the Customer Premise Equipment (CPE) or last mile connection cost.

Description: Develop parameters for participation and provide cost subsidy for eligible applicants.

Structure

1. Seek a funding source, such as the Virginia Housing & Community Development Office (VAHCD) or Appalachian Region Commission (ARC), say $100,000.
2. Establish eligibility criteria (requirements may be tied to a funding source) such as low to moderate income families or families with children on the subsidized school lunch program, job creation businesses, etc.
3. Develop an application and advertise its basic purpose and criteria, as well as its availability.
4. Verify the credibility of the unusual cost for CPE or last mile connectivity build and that the situation meets all eligibility criteria established.
5. Negotiate with service provider portion of cost to be covered by provider based on service commitment by customer.
6. Determine the balance remaining for the customer's share and portion to be subsidized by the program.
7. As part of the above negotiations with service providers, negotiate a refunding formula (such as a small % of monthly service cost for a limited period of time or flat amount) that will go back into this option funding availability to extend and offer the program to other eligible applicants.
8. Administer the program.

Basis of Estimated Cost

a) The cost estimate for this option also assumes a matching share requirement from the county. Since this option is a cost subsidy program to the customer, it is anticipated the likeliest funding source might be the Virginia Housing and Community Development (VAHCD) Office. Another possible source would be the Appalachian Region Commission (ARC). It is anticipated that approximately $100,000 might be secured from an outside funding agency for each county to be matched by local shares from the county, say $100,000 for a total county program of $200,000. If $100 was an average subsidy allowance, this program could fund 2,000 applications in each county without a refunding formula and much more with one.

b) The estimated cost is $12,000 per year or $24,000 for the anticipated 2-year program after which the success and effectiveness of this option can be evaluated if warranted to be refunded. Materials and supplies was estimated at $300/mo. or $7,200 for the 2-year program.

CPE/LAST MILE COST SUBSIDY					
Cost Item	***Amount***	***Subtotal***	***Total Cost***		***Comment***
1. Subsidy-Outside Funding Share	$100,000	$100,000 over 2 Yrs.			@ $100 avg. Subsidy = 1,000 Hook-ups
2. Subsidy-County's Share	$100,000	$100,000 over 2 Yrs.			@ $100 avg. Subsidy = 1,000 Hook-ups
3. Administration of Program	$1,000/Mo. x 12 mos.x2 yrs.	$24,000/2 Yrs.			(Only County cost addressed)
4. Materials/Supplies	$300/Mo. x12 mos.x2 yrs.	$7,200/2 Yrs.			Map Printing, phone calls, fax, mileage, etc.
CPE/LAST MILE COST SUBSIDY Total			**$231,200/2-Yrs.**		← Program Cost for the County; Does not include cost for outside assistance if needed

1.4.e - *Fiber and/or Wireless Build*

While a *Network Build Option* is discussed for informational purposes only, it is not being recommended at this time based upon concerns expressed by the Project Management Team members including risk, limited funding, lack of experience, regulatory oversight and compliance, etc.

Wireless Network Build

Premise: An investment in this option may address to some extent the following multiple purpose objectives: (i) Enhancing Broadband Service and availability; (ii) Addressing current problems with the Emergency Response Land, Mobile, Radio (LMR) communications; (iii) Playing a role in future Public Safety Data Network (PSDN) applications; (iv) Improving cellular service coverage.

Description: Typically, a Request for Proposal (RFP) is issued seeking a Wireless Internet Service Provider (WISP) to become a Public-Private-Partner (PPP) with the county to cost share in the construction, management and operation of vertical tower assets at strategic locations, and then once the towers are built, issue a secondary Request for Proposal (RFP) to Cellular Service Providers to located equipment on the towers to improve coverage and service.

Structure

1. Seek tower siting, design and construction finance options and develop a funding plan.
2. Develop a Request for Proposal (RFP) for Wireless Internet Service Providers (WISP) or other type wireless communications providers to respond to as a Public-Private-Partner with a Wireless Broadband Authority formed by the County.
3. Negotiate a win-win arrangement with a service provider addressing issues such as roles, responsibilities, and other terms and conditions.
4. Support tower construction and backhaul solutions.
5. Address the colocation of equipment on the towers.
6. Solicit responses to an RFP from Cellular Service providers to collocate equipment on the towers.
7. Lease/maintain the towers if that becomes a role of the county in the PPP.

Basis of Estimated Cost

a) Since the number of towers sites would not yet have been finalized, the cost estimate for this option is intended to represent an average cost per tower site, not a total cost to the county. The actual costs to the county would also depend on the RFP to the service providers and the amount the county would decide to undertake to entice a Public-Private-Partner. Given the rural region, minimum number of homes/premises, and competition by wireline service providers, and the fact that a much more robust tower construction meeting cellular service specifications would have to be built to be attractive for cell service providers to consider, it is anticipated the county would have to fund a significant amount of total expense, some of which may be offset by grants. Hopefully some of the cost could be offset by a cost share from a wireless Internet service provider (WISP).

The cost estimate is very tentative because needs of Emergency Radio communications has not been reviewed, as well as no determination and finalization of the number and location of the towers, design, and extent of site work needed, etc. During the study there have been a number of potential tower sites discussed for which preliminary data had been collected, but no field verification, wireless signal propagation modeling or Radio Frequency (RF) engineering has been performed because of being outside the scope of this broadband study. These discussions are for information only.

Typically, a new 200 ft. Monopole tower alone costs nearly $80,000 just for the tower, but when you add expense for foundation, site work, ingress/egress, power, equipment sheds, security fencing, backhaul arrangements, environmental issues and more, new tower construction can cost between $350,000 to $450,000 depending on site specific location and conditions. **In the average suggested cost of $420,000 per tower site**, there is no budget allowance for radio communications, broadband service, bandwidth or other operational and maintenance expense included because of relying on others to address this expense, but some party will have to cover such expense.

While towers could easily have a much longer life than fifteen (15) years, it is difficult to get lending agencies to amortize funding for more than 15 years for telecommunications assets, not to mention technology is changing rapidly. Therefore 15 years is suggested to be used for the amortization period at say 5% interest (may not be able to use municipal tax free bonds if private sector gains benefit), and 15 years used for administration and Operation & Maintenance (O&M) expense. Another 10% of the subtotal is recommended to be used for closing and soft costs of the financing, permitting, environmental studies, cost overrun, and miscellaneous other expense.

While tower use and future colocation fees will help offset some of the monthly debt service (probably not more than $1,000 - $3,000 per/tower/month depending on service provider, and most likely not all towers built would be used by others), this option should be viewed as a means to an end, particularly since the emergency communications must be addressed regardless of any revenue source, there are no current wireless Internet service providers that expressed interest, and the priority given for improving cellular service. An average of $1,750/mo. for the first 4 years for one carrier increasing $1,250 (lower rate for second positioning) for a second carrier after 4 years to $3,000/mo. total seems reasonable. There is the potential for more than 2 carriers, but again a number of years may pass before additional carriers attach and later positioning typically comes with a lower cost.

Just Some Wireless Options

FCC Allows Operators to Apply On-line for non-exclusive use of "lightly licensed" spectrum in the 50 MHz band from 3650 MHz to 3700 MHz.

WiMAX supports this special spectrum which operates at higher power levels compared to license exempt bands and affords superior non-line-of-site (NLOS) propagation compared to higher frequencies (visit: http://wireless.fcc.gov/services/index ; htm?job-licensing&id=3650_3700 for link to FCC's online Universal Licensing System (ULS)

- In rural areas that are devoid of any wireless communications infrastructure, and therefore unlikely to experience RF interference, WiMAX also supports license-exempt spectrum

WiMax operates on licensed frequency

- Licensed Spectrum Examples: 2.3 GHz, 2.5 GHz (Incl. Colleges**)**, 4.9 GHz (4.9 GHz Public Safety Use Only)
- Non-Line of Sight (NLOS)
- (Portable) Plug in modem and connect to Internet anywhere in the entire service area
- Typical speeds offered are Up to 2 Mbps download and 256 Kbps uploads

Wi-Fi WLAN: 2.4 GHz 802.11b/g Radio (Commercial Wireless) and 5.8 GHz 802.11a Radio

- Can be vulnerable to scanning and packet interception
- Only Available in "hot-spots"

Wireline (Fiber Optics) Network Build

Premise: On a case-by-case basis, be prepared to finance and build the last mile network for middle mile Internet Service Providers (ISP) to connect to and peer through the access network to serve the customer.

Description: Confirm a middle mile owner Internet service provider will connect to a last mile fiber network and at what particular location should the aggregation of last mile fibers be located (cabinet), finance and build the last mile network either aerially if the electric cooperative plays a role or underground direct fiber to the home/premise.

Structure

1. Confirm provider participation &strategic location to locate the aggregated fibers to the homes/premises.
2. If there is interest, form a Wireless Broadband Authority to have legal standing on building and owning a network.
3. Discuss with electric and phone cooperatives use of existing poles for aerial drops of fiber to the homes or business premises. Since the customers, or members of the cooperatives would gain the benefit of service, negotiate mitigation of annual pole fees against use of the fiber by the cooperatives, or some other arrangement.
4. Determine if the last mile will be aerial or underground.
5. Finalize the location of point of interconnection.
6. Publicly procure the services of a contractor to construct the last mile network.
7. If need be, some middle mile fiber may be needed to centrally locate interconnection points or meet existing fiber.
8. Administer the network and lease fees.

Basis of Estimated Cost

a) The cost estimate for this option is also generalized because depending on type construction, aerial or underground, boring or direct burial, presence of congestion (other utilities), geology and topography, whether conduit is used, amount of make ready work, permitting and right-of-way work involved, environmental requirements, whether prevailing wages apply, engineering and inspection costs, and much more, costs can vary tremendously. As a quick general rule of thumb, an estimate can be based on $25,000 - $50,000 per mile for aerial construction or $50,000 - $75,000+ per mile for underground construction.

While fiber use lease fees (and/or access to the customer if a last mile network) will help offset some of the monthly debt service and capital expense, a last mile network is not a complete network that can operate on its own without middle mile and therefore unlike a full municipal network from Central Office/Point of Presence (POP)/Headend to the customer, revenue potential will be limited because of not offering services. Lease revenue will also be less than a network providing triple play services (voice, video and data). Because of these shortcomings, on many instances there is not enough opportunity to recover the investment, even with aerial construction to make this option feasible. One possible way to warrant continuing to look at the aerial construction of last mile connectivity, would be to approach the network build from a multi-party cost share approach involving the electric and telephone cooperatives due to owning poles, the county, grant funding agencies, and perhaps the home owner contributing towards the last mile build. Without these other parties, this debt service and network build is not only too expensive, but too risky.

1.41 Strategic Recommendations

Strategic recommendations are designed to bring choices to the more rural areas, generally provide increased competition, and educate consumers on high-speed options available to them.

The county is fortunate to have service providers with some existing telecommunications fiber optics infrastructure to build upon. One contrasting problem to the existence of having some current telecommunications fiber infrastructure, is that the survey results indicate dissatisfaction and reports of current Internet service inadequacy to meet their needs in many areas of the region. As a result, where there is significant reports of dissatisfaction and/or current Internet service inadequacy, these areas were identified as Priority Areas. Last Mile Connectivity solution options were prepared for consideration.

Another area needing to be addressed is broadband education. Businesses and residents are not leveraging use and applications of the Internet to the degree available and utilized elsewhere where adequate Internet services exist.

Current and Near-Term Recommendations in Addition to Last Mile Connectivity Solutions to be Considered

1. Enhance the region's Economic Development efforts with utilizing a Community Intranet Portal.
2. Continue to promote a "Broadband for all" policy to foster economic development activities and increase community awareness.
3. Remove municipal obstacles to provider deployment (Update ordinances and resolutions to address right-of-way, standardize permits and fees, allow attachments to water towers, etc.)
4. Seek out strategic collaboration partners and projects and continue to seek funding
5. Educate residents and businesses on Broadband options
6. Stay involved in regulatory policy
7. Encourage the expansion of DSL and cable modem services and FTTH/FTTP connectivity solutions into the rural areas.
8. Create Wireless Service Incentive Programs, particularly if new towers are constructed as a result of Emergency Radio Communications efforts.
9. Encourage the spread of new technologies to provide additional options for consumers and increased competition.

Long-Term Recommendation in Addition to Last Mile Connectivity Solutions to be Considered

1. Continued expansion of long-haul/back-haul fiber
2. Explore options to increase Network Access Points (NAPs)
3. Centralize telecommunications data, maps, site select information on one site with links to the county
4. Strive for Megabit-Gigabit per second bandwidth benchmark

The primary need to develop affordable broadband across the area will be to encourage infrastructure development, particularly last mile solutions, in the more rural areas; talk to service providers about the dissatisfaction and reports of current Internet service inadequacy to meet current needs, and facilitate projects that will improve service and speed, educate your citizens, businesses and elected officials on the available options for obtaining broadband services and the importance the Internet plays in day to day activities and quality of life issues; and continue to strive to obtain not just adequate services and broadband speed for today, but next generation applications and technologies for tomorrow.

These additional recommendations may need to be changed as new technologies evolve. What we currently know is a significant number of end-users are utilizing DSL and cable modem to access the Internet, outside of a satellite and a few unique and fortunate customers that have a fiber-to-the-home (FTTH)/fiber-to-the-premise (FTTP) connectivity. Service providers attempt to maximize the use of their existing infrastructure. The major exception to this is the FTTH/FTTP technologies that are being installed over all fiber optic networks. Wireless technologies and products have evolved and become more efficient in the use of spectrum and as a result, many different transmissions

coexist. Wireless technologies have some advantages and disadvantages in serving rural areas. They need not develop an entirely new wired outside plant infrastructure, but also face interference and technology challenges, struggle with reliability and to keep up with the ever increasing definition of broadband by the FCC, as well as the need for vertical assets to deploy from. The future requirements and changes to recommendations will be driven by the applications that become "must have" across the landscape.

1.5 Organization and Network Operation Options

The organization structure of local government and best way to operate a network involved with a municipality depends on the role the municipality intends to play. Virginia is a Dillon Rule State whereby the State must explicitly grant powers to municipalities. Virginia allows local governments to provide communications services, but with restrictions. See Section 2.1 for applicable sections of the VA Code stating allowances, as well as prohibitions.

There are number of roles a municipality can consider in an Open Access Telecommunications Initiative:

Option A "Dark Fiber Network": The municipality does not invest in electronic equipment and generates revenue by leasing dark fibers, collocation fees & through savings by owning the network serving its own facilities. This model can also include the municipalities building towers & leasing space for equip.

Option B "Hybrid Fiber Network": The municipality owns and operates the network providing only lit services (municipality buys the equipment and content [i.e., bandwidth, voice services, etc.]) to only serve the municipality facilities itself. The municipality also leases dark fiber, collocation space, etc. to private providers to service the other end-use customers on the network

Option C "Wholesale Fiber Network": The municipality builds the middle mile and last mile networks where intended to serve & lights the network (electronic equipment) and sells bandwidth and/or access to providers for all customers on the network. Typically, service providers buying access provides content.

Option D "Retail Fiber Network": The municipality owns and operates the network as a service provider providing retail services to the end-use customers.

Option E "Hosted Network": The municipality is not a service provider, but rather a promotional entity to endorse a wholesale transport/open-access network. **Note: VA Law does not allow** the locality or authority be involved in marketing or promoting the services of the lessee or purchaser of a Network

There are other models including slight variations to the above, but these are the most popular. Input from the County's Project Management Team Meetings played a role in arriving at the proposed solutions with the consideration of the type organization that would be needed including:

- Municipalities would prefer not to own or operate network infrastructure of facilities
- While the county is willing to make some manageable investment into enhancing Internet access within the county, without being a service provider there would be little monetary return on such an investment and Broadband it is just one of many infrastructure projects needing funding.

Of the five Last Mile Connectivity solutions presented, it is felt that formation of a Wireless Broadband Authority may only be warranted under Option No. 5 - Fiber or Wireless Network Build

1.6 Funding Strategies and Resources for Future Implementation Projects

Typical telecommunications funding resources were provided in Section ES6.0. The best funding resource to pursue often depends on answers to the following questions or requirements:

a. Who will own and operate the asset(s) being funded?
b. How much is intended to be borrowed and for how long (amortization of the debt)?
c. What are the applicant eligibility requirements?
d. Are there matching funds or must all of the debt service be underwritten?
e. Is there historical performance and financial data available to support an application or only pro-forma data?
f. Does the applicant have the expertise to successfully carryout and manage the operations?

There are much more criteria that needs to be considered, but the answers to the questions above start to narrow down who should be the applicant for what proposed project. For example, Option No. 3 – Network Extension Funding through a Public-Private Partnership (PPP) probably lends itself to the private sector service provider being the applicant while Option No. 4 – CPE/Last Mile Cost Subsidy program will likely be more successful for the public sector (local government) to be the applicant. Some of the advantages for service providers and local government to consider a Public-Private-Partnership were provided in section ES3.3.

The decision to move forward by elected officials typically requires other decisions that have to be made including:

1. **Select Last Mile and Main Connectivity Solution(s)**
   - Continuing Face-to-face meetings with the service providers regarding requirements.
   - Location for construction and cost, as well as what type of Main Network Connection is needed.
     - Distribution NAPs • POP and NOC location(s) • Detailed rt. planning to minimize make-ready
     - Equip choices (impacts extent of fiber) • Fiber count • Connections to wholesale Internet providers

2. **Extent of the Fiber and Network Architecture Conceptual Design /Cost Estimates**
   - Ultimate decisions of how extensive a network to build based on cost & comfort level of financing and:
     - Extent of Provider Interest and Customer Interest (Bandwidth Aggregation)
     - Business Model: Who will Provide/Operate Various Components of Network?

3. **Select the Organizational Governance and Structure of the Network**
   - VA Law and Federal Law each play a major part (investigate legal steps necessary to set-up Authority)
     - Document justification for recommending the most appropriate ownership model
     - Provide Pro-forma data outlining near/long-term revenues/expense estimates
     - Planning for utilization by schools, hospitals and municipals (anchor customers)
     - Document preliminary interest of service providers (Letters of Intent/Understanding)

4. **Create a Funding Plan**
   - Discussions with financing consultants, bond underwriters/counsel, bank tax credit programs, capital lenders

5. **Create an Implementation Plan**
   - Development of agreements for network access with providers-incorporate equipment needs
   - Pole attachment agreements • Maintenance Agreements • Design, Specs, Bidding Docs.
   - Operations Mgmt. Agreements • Content Acquisition Agreements • Solicitation & Award of Bid
   - Marketing Program • Project Timetable • Testing, Punch List, Start-up

2.0 Project Input

In May 2016, Pulaski County, VA hired a telecommunications consultant to lead the county through the development of the comprehensive Strategic Community Broadband Telecommunications Plan that will serve as a guide in determining the areas with the most need, and the type(s) of broadband technology that is most feasible for serving them. These efforts and the work of the consultant are being funded by a grant from the Virginia Department of Housing and Community Development.

From the Kick-off Meeting held on May 9, 2016 and County response to the consultant's Data Request Form of the Pulaski County, VA Community Broadband Telecommunications Plan Project, it quickly became evident Pulaski County has made broadband enhancement a high priority of County government over the past several years. The following previous efforts had been undertaken in working towards accomplishing this priority and some of the results are referenced throughout this summary in support of discussions, but are not intentionally reiterated within this report to avoid redundancy, but rather to serve as a foundation from which the Strategic Broadband Plan can build upon.

2.1 Previous Broadband Telecommunications Planning Efforts

(Author & Credit Source provided in Attachments)

The following documents previous efforts of Pulaski County regarding Broadband Telecommunications Planning:

- April 29, 1997 Pulaski County, VA Facts and Amenities (Attachment "A")
- April 29, 1997 Pulaski County Internet Connection to Eight (8) Public Access Sites (Attachment "B")
  - Pulaski County Internet Connection Power Point Presentation
  - Pulaski County Internet Connection Scope of Service to Internet Service Providers
  - Pulaski County Internet Connection Grant Expenditures 1997-1999
- October 13, 2009 Pulaski County, VA Comprehensive Plan (Attachment "C")
- May 11, 2010 Letter to Comcast Cable re: Closing of Local Cable Office in Pulaski (Attachment "D")
  - Comcast Franchise Changes
- 2010 Cable Television Franchise Renewal Resolution with Jet Broadband (Attachment "E")
  - June 28, 2010 Franchise Agreement Transfer from Jet Broadband to Shentel Cable
- April 19, 2012 Memo re: Alternatives for Reestablishing The Citizen Service Office (Attachment "F")
- October 26, 2015 Pulaski County Unified Development Ordinance (Attachment "G")
- Pulaski County, VA Official Zoning Map (Attachment "H")
- Pulaski County Data Request, Including GIS Data & Maps (Attachment "I")

2.2 Observation of Existing County Data

The following observations were made from the documents supplied to the consultants in response to the Telecommunications Study Information Request:

April 29, 1997 Pulaski County, VA Facts and Amenities

Shortly after the turn of the century a group of progressive Pulaski County citizens organized the "Pulaski Board of Trade". This Board was created to seek diversified industries for Pulaski, including woodworking plants, furniture factories, overall and pants factories, cotton and woolen mills, and an ice plant. The "Board of Trade" became the Chamber of Commerce in 1952.

Through the efforts of improving broadband, Pulaski County continues to seek diversified industries wanting to keep what currently exists and attract new technology industries. New challenges are faced in encouraging the growth of existing firms and recruiting new industries and businesses to Pulaski County, as the national economy moves toward imports under free trade legislation. Again, Pulaski County worked with her sister counties in the formation of the New River Valley Economic Development Alliance in 1987 to jointly market the New River Valley and Virginia's First Industrial Facilities Authority in 1998 to jointly build industrial parks and share in the resulting tax revenues. This legislation and its implementation was a first in the Commonwealth and continues the tradition of Pulaski County citizens being hardworking, honest and willing to work with their neighbors.

Education

In addition, for the need to offer high speed robust and scalable broadband, education and training which is also bandwidth hungry needs to prepare the workforce for these new industries. Five fully accredited schools provide opportunities in winning sports programs, a state championship theater program, nationally competitive vocational programs, and an academic education which strives to meet a variety of abilities. In 1974, the Dublin and Pulaski High Schools merged to become Pulaski County High School located at the center of the county near Dublin. A new elementary school, Critzer Elementary, was also built and occupied in the 1970's. Improvements to Pulaski County High School, as well as renovations to Snowville Elementary and Critzer Elementary Schools, were major accomplishments in the mid 1990's for the county citizens and its school children.

The county public school system operates eight (8) elementary schools, two (2) middle schools, one (1) high school, one (1) alternative school, and one (1) governor's school. The School Board members are elected by the voters every four years.

The Pulaski County School System is also host to the Southwest Virginia Governor's School for Math and Science offering advanced learning experiences for students throughout the region. Educational achievement by County students results in the award of well over $1.5 million in scholarships every spring. With Virginia Tech and Radford University close by, those scholarships can be well utilized without having to leave the New River Valley. Indeed, students from other localities are doing likewise and Virginia's New River Valley has become one of the major centers for higher education in Virginia, with college students accounting for over 25% of the region's population.

In the fall of 1970 New River Community College (NRCC) opened. This two-year state supported school is located just north of Dublin and serves students from the surrounding counties and the City of Radford. Indeed, NRCC students can begin their education through the Early Learning Center, starting as early as age three. While attending high school, students can get college level credit through NRCC for classes taught at the Southwest Virginia Governor's School, as well as at Pulaski County High School through the Dual Enrollment program.

When students leave area high schools, they can continue their education through a variety of two-year programs provided by the College. NRCC also serves as one of Old Dominion University's Teletechnet sites which offer bachelor, master and doctoral level educational opportunities in many fields of study (business, communication, criminal justice, education, engineering technology, and health sciences). New River Community College supports and complements the outstanding educational offerings provided by neighboring Radford University and Virginia Tech. The end result is that Pulaski County residents have the opportunity to begin learning at age three, attend a great public school system, continue their education at four institutions (NRCC, RU, VT and ODU) to obtain their choice of an associate, bachelor's, master's, or doctoral degrees, then continue with computer and vocational

classes, such as learning the thrill of riding a motorcycle safely or flying a plane through the private pilot ground school without ever having to leave Pulaski County.

Business

The 1970's brought a number of changes to the county's economy. Construction activity grew as formerly agricultural land was developed into industrial parks, housing developments and highways. Despite a decrease in total acreage, the agricultural economy also grew and beef production reached an all-time high in the early 1980's. Also, a number of small shopping facilities sprung up with large chain stores experiencing the bulk of the merchandising business during this time period.

With three of Virginia's Enterprise Zones, federal designation as a HUB Zone, and an activated Foreign Trade Zone, business incentives are readily available. Those wishing to go into business for themselves can get a head start at the New River Valley Competitiveness Center and those who successfully grow their businesses have plenty of room to grow at the 700- acre New River Valley Commerce Park. With the Commerce Park located adjacent to the New River Valley Airport, charter flights from abroad can directly clear customs through the local U.S. Customs at the NRV Airport and businesses can have their containers clear customs through the friendly service provided by the local office.

In 1974 White Motors built a new truck building facility at Dublin near the county high school. This heavy duty truck manufacturing facility became one of the largest employers in Pulaski County. Through various mergers and other means, this facility is known as the New River Valley Truck Assembly Plant in which both Volvo and Mack trucks are built. The assembly plant currently employs approximately 1,700 individuals. The NRV Truck Assembly Plant attracted a number of supplier industries and other existing firms expanded.

Pulaski County worked with her sister counties in the formation of the New River Valley Economic Development Alliance in 1987 to jointly market the New River Valley and Virginia's First Industrial Facilities Authority in 1998 to jointly build industrial parks and share in the resulting tax revenues. This legislation and its implementation was a first in the Commonwealth and continues the tradition of Pulaski County citizens being hardworking, honest and willing to work with their neighbors

Day-to-Day Services and Quality of Life

Broadband plays an ever increasing role in the day-to-day activities of providing government services, education opportunities, healthcare management, the basis of maintaining a competitive business environment including tourism, and overall quality of life for residents such as recreation events. Pulaski County's history highlight steps taken to put in place the infrastructure and resources to meet such demands:

- *Government Regionalization:* In the 1990's the county continued to grow and develop and the need to regionalize facilities proved economically prudent for the taxpayer. A new regional jail facility was built in Dublin and opened in April 1999.
- *Libraries:* In 1989 a new branch library was constructed and opened in the Town of Dublin. The library was named the Charles & Ona B. Free Memorial Library. There are also two public libraries within the county with one being located within the Town of Pulaski and the branch library located within the Town of Dublin.
- *Healthcare:* The county has one (1) medical hospital, Pulaski Community Hospital, four (4) nursing homes, and one (1) mental health facility.
- *Tourism:* In October 2002 a newly constructed Pulaski County Visitors Center opened in Pulaski County. Located off Interstate 81, this facility was built to promote tourism and showcase Pulaski

County. The facility also houses the Pulaski County Chamber of Commerce. The Visitor Center is open seven (7) days per week and just recently celebrated its first full year of operation

While the Internet can fundamentally be accessed from even a phone dial-up connection, today's challenge in the provision of such services from these facilities is to have the speed and connection technology able to handle the application demands of these services, or in other words broadband speed and connectivity. Traditionally telecommunications services have been addressed by the private sector, not local government, but today many communities must work side-by-side assisting the private sector in recognizing where investment of infrastructure should be expanded first to provide the best return and meet the greatest demand allowing the collection of new revenue to progressively fund the next phase and so on until one-day broadband access is universal. Such a collaboration is often referred to as Public-Private -Partnerships (PPPs).

Utilities

April 29, 1997 Pulaski County Internet Connection to Eight (8) Public Access Sites

- **Pulaski County Internet Connection Power Point Presentation**
  In 1997, County created the Pulaski County Internet Connection (PCIC), a joint local government effort to provide information and services to the citizens of Pulaski County. The emphasis was to provide public access and training necessary to encourage use of internet by citizens to access local government information. Originally the following Public Access Sites were identified as the highest priority:

Public Access Sites at which Computers are to be Installed (Grant Funding)

Dublin Town Hall	New River Community College	Pulaski Municipal Building
Pulaski County Library	Pulaski Senior Center	Dublin Library
Dalton Computers in Fairlawn	YMCA	Hiwassee Grocery Store
Snowville Fire Station		

Grant Funding was obtained for:

- ACCESS
- CIT 15,000
  Computers, phone service and connection time for 9 public access sites
- TRAINING
- ARC 12,500
  Training through Southwest Virginia Governor's School for 420 residents each committed to train 10 others

Next Steps: After the initial funding and priorities was completed the following Next Steps were identified:

- Continue to implement public sites
- Develop logo for display at entrances to public sites
- Enhance information on PCIC homepage
- Research effectiveness

- **Pulaski County Internet Connection Scope of Service to Internet Service Providers**
  Scope of Services sent to Internet Service Providers: I-plus, Citizens Internet Service, US-Internet, Bell Atlantic

1. Provide a homepage listing Pulaski County businesses, non-profit organizations and civic organizations. Development of this home page must be in consultation with the PCIC committee. This homepage be linked exclusively to the PCIC homepage (http://pulaskicounty.org) by the Southwest Virginia Governor's School.

2. Establish links to individual homepages as part of this listing. It is anticipated that this linking service would be at no charge to the PCIC committee or to the individual businesses wishing to submit a link. The successful proposer would be the only internet service firm directly linked to the PCIC homepage.

3. Maintain and establish individual homepages as a paid service to local merchants, non-profit organizations and civic groups. The successful proposer may establish charges for this service and should include a rate schedule in the proposal.

4. Proposers are encouraged to offer real-time information such as job openings for major employers, pricing of specials, a calendar of events, etc. in the development of the homepage.

5. Services being procured under this proposal would extend for a period of three years assuming continued operation of PCIC.

Evaluation Criteria.

1. Experience of firm;
2. Familiarity with Pulaski County businesses;
3. Pricing policies for development of individual homepages;
4. Willingness and ability to provide the above scope of services; and
5. Bandwidth to and capacity of internet server.

Outcomes

- ✓ PCIC Homepage – maintained by SWVGS
- ✓ PCIC links – Local government, weather, news, educational institutions
- ✓ Electronic Village Homepage – businesses, non-profit organizations and civic groups
- ✓ Links to specific sites established by proposer and/or others

- **Pulaski County Internet Connection Grant Expenditures 1997-1999**

CIT EXPENDITURES		
020-1227		Amount
Total		$9,912.18
Budget		$15,000.00
Balance		$5,087.82
Fy 1998-99		$54.22

ARC EXPENDITURES		
020-1226		Amount
Total		$8,750.00
Budget		$12,500.00
		$3,750.00

Pulaski County Internet Connection (PCIC) Committee (April 29, 1997) www.swvgs.k12.va.us/public/pcic.html
Homepage maintained by Southwest Virginia Governor's School
PCIC Links – Local government, weather, news, educational institutions
Electronic Village Homepage – businesses, non-profit organizations and civic groups

May 11, 2010 Letter to Comcast re: Closing of Local Cable Office in Pulaski

Comcast Franchise Changes

Comcast Cable: Wanting to close office in Pulaski, VA- County threatened breach claim and assessing liquidated damages under Section 10. Exchanged for list of other requirements including free high speed Internet service to all County and Town within Comcast service area. Free high speed Internet service to Fine Arts Center, YMCA, Pulaski Theater (and Municipal Building, the Raymond F. Ratcliffe Museum, the Train Station and Calfee Park) and other non-profit, non-religious, non-governmental organizations in Town and County. Also reduction in standards for extension of new service from 30 dwellings per mile to 20 dwellings per mile.

2010 Cable Television Franchise Renewal Resolution with Jet Broadband

- **June 28, 2010 Franchise Agreement Transfer from Jet Broadband to Shentel Cable**

Cable TV Franchise: Jet Broadband, VA, LLC – 10 Year term commencing on April 26, 2009 ending April 25, 2019. **Request by Shentel Cable to transfer Jet Broadband to Shentel.** Shentel agreed to dedicate and provide to the County on an exclusive, full time basis (24/7) at no cost to County or respective users thereof, one PEG (public educational and government) access channel for use on a shared use basis by (a) members of the public (e.g., individuals, groups, organizations or entities) residing in or otherwise located in or affiliated with the County, (b) the public schools and public institutions of higher learning principally located or headquartered in or otherwise serving the County (including, without limitation, New River Community College, County Government).

October 13, 2009 Pulaski County, VA Comprehensive Plan

- While the Comprehensive Plan is an extensive community planning document, there was very little direct reference to "broadband" or "telecommunications" contained in the narrative, but rather within the Volume 1: Goals and Objectives, identified for important aspects of Policy Planning Areas for which broadband high speed Internet and reliable cellular service with mobile broadband are dependent. The Goals and Objectives contained in the County's Plan that typically rely on dependable and adequate high speed Internet to accomplish stated goals include:

Pulaski County Comprehensive Plan Goals, Objectives & Policies Subject Matter Dependent on Broadband to Accomplish

Address County's Medical Service Needs	Encourage Installation of Best Available Storage & Monitoring Technologies	Implement & Maintain all Permissible Technologies Including Emergency Awareness Systems & Updates E-911 Systems	Pursue Implementation of Community-Based Initiatives
Agricultural Programs Promotion	Encourage Land Development that is Energy Efficient & Utilizes Green Technologies	Initiate Programs Targeted at Increasing Achievement Test Scores	Revitalize Pulaski & Dublin
Apply for State & Federal Funding for Infrastructure Necessary to Support Development	Encourage Public-Private Initiatives & Partners, as well as Small Business Development	Initiate Large Scale Adult Education Campaign to Significantly Increase Scholl Systems' Literacy & Adult Program Offerings	Set Higher Academic Standards for both College Preparatory & Vocational Programs

Assist Emergency Medical Services Council to Coordinate Providing Necessary Equipment & Facilities to Rescue Squads	Establish Public Information & Educational Programs	Maintain an Active Grantsmanship Program	Set Examples for Quality, Appearance & Functionality of County Projects
Build Accessible Housing for Disabled Citizens	Encourage & Support New River Community College in Implementation of Workkeys Assessment of Students & Labor Force to Evaluate Training Needs/Have Jobs Evaluated	Make Information Related to Medical Services Provided by County, State & Federal Governments & Non-Profits & Private Businesses Available to All Citizens	Support & Facilitate Developing a Comprehensive Training Program for All Fire Response Personnel
Conduct Citizen Surveys of Relevant Topics	Expand Information Systems	Maintain a Diverse Inventory of Available Commercial & Industrial Land & Buildings	Support Educational & Mentoring Programs for Advancement of Newer Technologies
Consolidate Services to Provide Information Regarding Low Income Housing Programs	Explore Alternative Partnerships	Monitor Key Areas-Education, Health Care, Retail Services, Recreation, Hospitality, Housing	Support Development of Events Calendars, Listing of Community Organizations, Publicizing Events & Educational Opportunities & Additional Programs
Continue Planned Equipment Replacement Program	Facilitate Incorporation of Urban Development Area	Participate in Surveys to Provide a Database	Track Economic Development Indicators & Related Information (Facilities & Services)
Cooperate in Developing Education Campaign with the New River Community College & County Business Community	Fund a Community College Adult Literacy Program	Promote Location of Bio-Technical & Green Industries in Addition to Manufacturing	Track the Occurrence of Trends in Complaints as to Type Service, Frequency and Location
Coordinate Inter-Agency & Inter-Department Communication & Cooperation	Facilitate Additional Utilities such as High Speed Broadband through Private-Public Partnerships to Provide Low Cost Service for Citizens	Promotion of Job Training Opportunities	Tourism Destination Promotion (including Claytor Lake & New River Trail State Park)
Coordinate Site Development & Related Information with other Industrial Development Organizations	Government Cooperation on Service Delivery	Promotion & Support of County-Wide Economic Development & Programs	Training & Retraining the Work Force (through New River Community College, Local Universities & School Board)
Develop Services & Utilities	Have Broad Notification Program Prior to Opportunities for Public Comment	Promote & Encourage Students to Participate & Achieve in Academic Contests, Honors, SAT Testing, Merit Scholarships & Other Academic Programs	Undertake Program Focusing on Increasing Number of GED Diplomas
Development & Support of Entrepreneurial Local Agricultural, Economic, Educational Activities and Energy Efficient Economies	Increase Retail & Commercial Business Development	Provide Information to Farming Community	Utilize High School & Vocational School Programs to Encourage Small Business Development as part of their Educational Program
Development of Regional Industrial Park	Industrial, Commercial, Residential & Rural Development Expansion	Provide Public Works Facilities at Most Efficient Scale & Plan Together with Citizen Choice & Participation/Maximize Total Benefits	Update Information to New & Expanding Businesses such as Financial Assistance
Encourage Joint use of School & Public Libraries by General Public	Identify & List Community Projects Needed	Pursue Education Recommendations / Support Local Spending on Elementary & Secondary Education	Work on Revitalization Efforts

April 19, 2012 Memo re: Alternatives for Reestablishing The Citizens Service Office

This memorandum underscores the Town of Pulaski considering customer service and high speed Internet an expected priority of a service provider. It is not uncommon for a franchise agreement to include free or deeply discounted high speed Internet to government facilities, schools and community organizations.

October 26, 2015 Pulaski County Unified Development Ordinance (UDO)

The UDO combines the zoning and subdivision authority of Pulaski County into one document. The regulations established have been made in accordance with a comprehensive plan to promote and improve, in accordance with present and future needs, the health, safety, convenience, and welfare of County citizens, to implement the Pulaski County Comprehensive Plan, and carry out the purposes of the "Code of Virginia" and other relevant statues. Just as addressed in the Comprehensive Plan, sections of the UDO with broadband having a role in meeting the described specific purpose include:

1. Encourage economic growth, development, and redevelopment in a manner that is consistent with the social, economic, community design, and environmental goals of the County that provide desirable employment and enlargement of the tax base;

2.3 Planning Goals and Criteria Set by the County Used to Rank Areas of Priority

Targeted Development Areas

According to the Unified Development Ordinance, Comprehensive Plan, Zoning Map and Future Land Use Map, it is the intention of these planning documents to encourage as much development as possible to take place in the Light Industrial, Industrial, Planned Industrial, and Planned Unit Development areas.

Pulaski County, VA Official Zoning Map

Within the Zoning designations, while certainly broadband plays a huge role in residential quality of life issues including education and training, typically the business model of broadband service providers first establishes a presence within business zoning districts from which the revenues can help support broadband expansion into residential areas, starting with dense and multi-dwelling unit residential neighborhoods and then expanding into the more rural areas of the county. Specific applications of broadband within business environments are somewhat touched on in the following Statement of Intents:

Light Industrial (LI) (formerly Transitional Industrial, I-0)

A. **Statement of Intent:** The intent of this district is to provide for light industrial, research and development, assembly, high technology production, precision manufacturing, commercial, and tourism-related development. This district can be used to integrate a number of mutually supportive uses to create employment centers, mixed commercial, and development that supports tourism. Specifically, this district is designed to fulfill the following objectives: 1. Provide for mixed industrial, commercial, and tourism development of a nature that limits impacts on adjacent properties; 2. Encourage economic diversification of the County and provide primary jobs; 3. Allow for a mixing of compatible uses that can create a unique environment for development; and 4. Encourage development and property uses that support a variety of employment types.

Industrial (I)

A. **Statement of Intent:** The intent of this district is to provide for heavy industrial development, high-intensity land use, and primary job centers. This district includes development that may not be suitable in close proximity to residential development due to negative impacts of light, noise, odor, heavy

equipment, long hours of operation, and traffic. Specifically, this district is designed to fulfill the following objectives: 1. Provide for industrial development, production, assembly, storage, distribution centers, and other uses commonly associated with industrial development; 2. Encourage economic development of the County and provide primary jobs for citizens; 3. Protect those locations in which a variety of compatible industrial uses may be located against encroachment from other uses that may impede industrial development; and 4. Provide sufficient space in appropriate locations for industrial development, while affording protection to surrounding properties from potential nuisance factors and pollution.

Planned Industrial (PID)

A. **Statement of Intent:** The intent of this district is to allow for greater flexibility in development than could otherwise be achieved through strict application of this Ordinance and that will result in improved design, character, and quality of industrial developments. Specifically, this district is designed to fulfill the following objectives: 1. Provide for design flexibility in laying out master planned industrial developments; 2. Encourage preservation of natural and scenic features of open space; 3. Allow for higher density development in suitable areas; and 4. Encourage high-quality industrial parks that support primary job creation for Pulaski County residents.

Planned Unit Development (PUD)

A. **Statement of Intent:** The intent of this district is to allow for greater flexibility in development than could otherwise be achieved through strict application of this Ordinance and that will result in innovative design, improved character, and enhanced quality of residential and mixed-use developments. Specifically, this district is designed to fulfill the following objectives: 1. Provide for design flexibility in laying out master planned residential and mixed use developments; 2. Encourage preservation of natural and scenic features of open space; 3. Allow for higher density development in suitable areas; and 4. Encourage high-quality developments that improve the standards of living for Pulaski County residents.

2.4 Existing Conditions Assessment

Now that existing County data was collected and Planning Goals and Objectives Set by the County have been identified, the power of electronic mapping, data storage and analysis using Geographic Information Systems (GIS) is used to visualize existing end-users and non-existing end-users, prioritize the study areas, as well as existing technology available to consider in developing a strategic plan. One objective in developing the strategic plan is to prioritize areas to be addressed (from highest or primary to lower priority or secondary, tertiary, etc.) by not having to focus on existing areas already being adequately served (reduce study area to a manageable area) and identifying those areas underserved or with no service (areas needing to be prioritized). From the available data, the following layers will be combined on the following maps:

Wireless	**Wireline**	**Land Use**
• Fixed Wireless	• Fiber	• Comprehensive Plan (Existing & Future Land Use)
• Mobile Wireless	• DSL Wireline	• Zoning
• Vertical Assets	• Cable Wireline	• Population Density
• 4G Coverage	• Copper Wireline	• Housing Density

- **See Figure 2.4-A: Population by Census Block**

2.5 Findings of Existing Conditions Assessment

In reviewing the above maps with multiple data layers, the following observations were made:

- According to VGIN data, Pulaski County is almost entirely served with wireless LTE (Long Term Evolution) services with small pockets of 4G (4th Generation) services
- Approximately 17 towers exist in the County with the greatest voids being the NW, NE and SW corners of the Count
- VGIN data suggests there is significant cable infrastructure running through the middle portion of the County from south boundary line (South of Draper) to the north boundary line (up to Radford AAP Main Manufacturing area)
- DSL appears to be predominate in the south 1/3 of the County (from Hiwassee to the mountain ranges); also pockets east and south of Pulaski and isolated areas along the south and east side of Radford AAP-New River Unit
- Small pockets of copper infrastructure are shown north of Hiawassee/east of Draper and between Pulaski and Dublin
- The majority of Commercial and Industrial zoning appears along and within several miles off Interstate 81 from Draper to the north boundary line of the County
- Planned Unit Development seems to be targeted along the southern edge of the river including surrounding Hiwassee

- **See Figure 2.5-A: Housing Units by Census Block**

2.6 Next Steps

New data collection and analysis is used to not only confirm suspected existing data assessment of conditions, but also to work towards potential solutions to consider from answering the following questions:

- ✓ What technology is best used where?
- ✓ What is the most feasible and likely solution to be implemented?
- ✓ Who might be interested in participating in a Public-Private-Partnership (PPP) with the County to implement solutions?
- ✓ How will the solutions be funded?
- ✓ What impact to County Government would occur (i.e., role, organization structure, staffing, etc.)?
- ✓ Where should implementation efforts occur first and when?
- ✓ What Broadband Education and Training is needed?

In order to address these questions and more, in addition to new data collection and analysis, future milestones to complete of the Strategic Community Broadband Telecommunications Plan include:

- ❖ Last Mile Connectivity Solutions
- ❖ Recommendations for Implementation with Preliminary Engineering, Design & Cost Estimates
- ❖ Broadband Education Development Strategies and End User Identification
- ❖ Partnerships and Funding Strategies including seeking interest from Service Providers
- ❖ Organization and Network Options
- ❖ Identification of Obstacles, Challenges and Successes
- ❖ Receiving Feedback from the Public and Elected Officials on the resulting Pulaski County, VA Strategic Community Broadband Telecommunications Plan

Figure 2.4-A: Population by Census Block

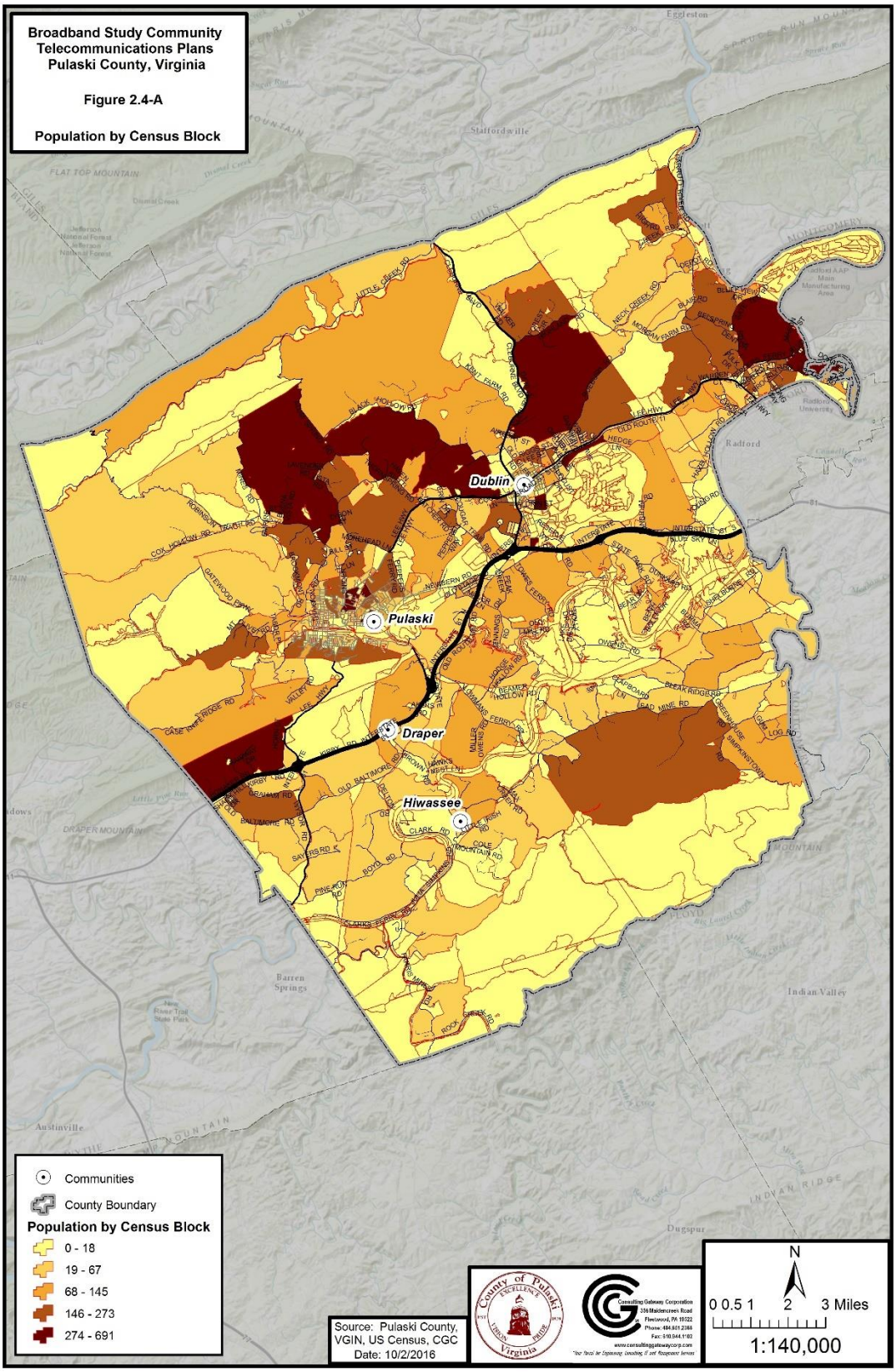
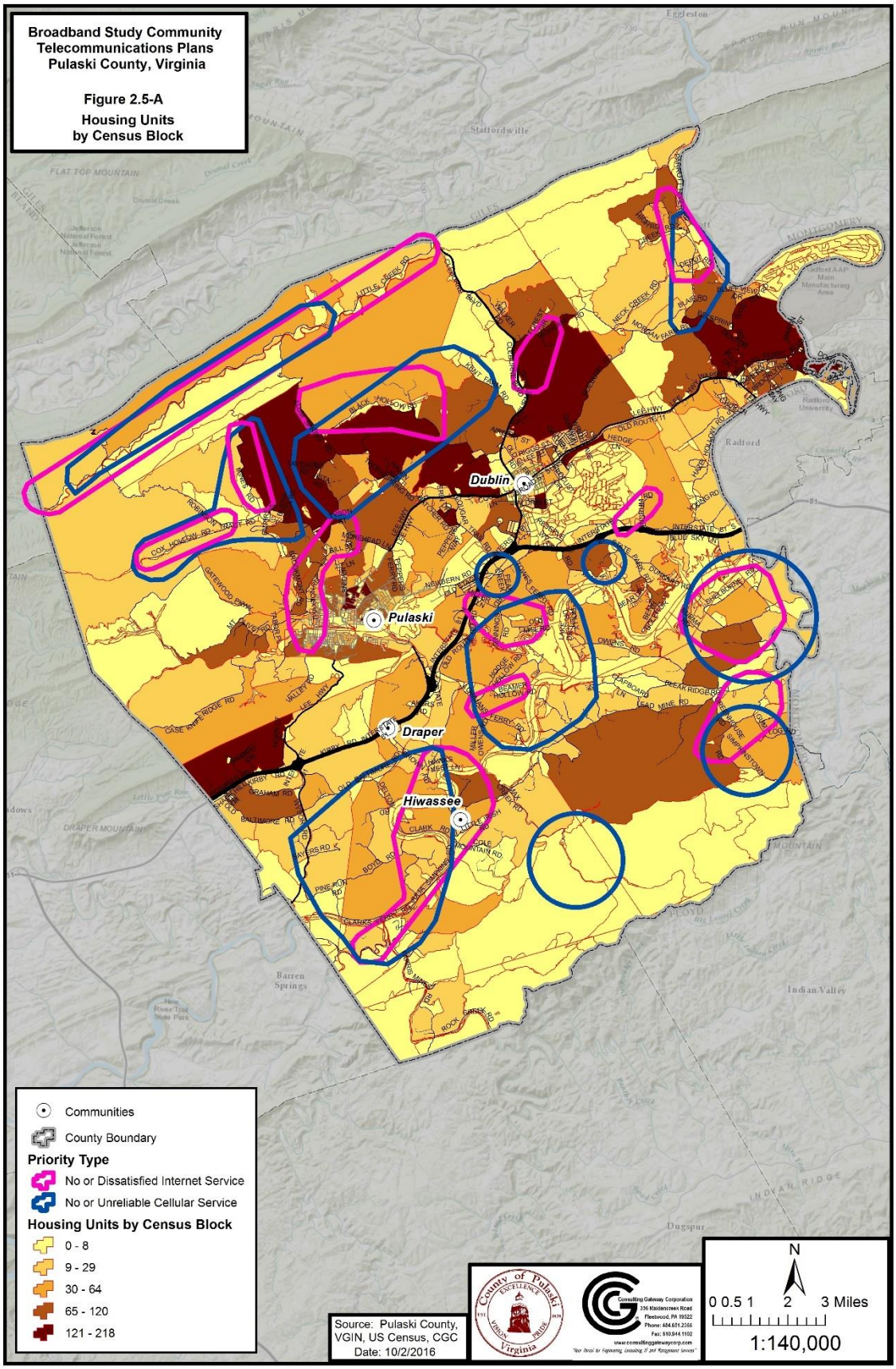


Figure 2.5-A: Housing Units by Census Block



2.6 VA Legislative Policy

VA is a Dillon Rule State, whereby the State must explicitly grant powers to municipalities. VA does allow local governments to provide communication services, but with restrictions

VA Code § 15.2-1500

- Locality can build a network and provide services to its departments, boards, agencies, etc. and to adjoining locality's so long as the charges for equipment, infrastructure, and/or services do not exceed the cost of providing same.
- The network infrastructure and equipment can be sold, and the locality may receive communication services from the purchaser (to be used solely for internal use) in full or partial consideration for the sale.
- Dark fiber can be leased by any locality, electric commission or board, industrial development authority, or economic development authority.
- Under no circumstances can the locality or authority be involved in marketing or promoting the services of the lessee or purchaser

VA Code § 56-484.7.1

- Virginia State Corporation Commission (SCC) allows "any county, city, town, electric commission or board, industrial development authority, or economic development authority" to provide "qualifying communication services" only as long as there are not more than three separate private businesses making "functionally equivalent" telecommunications services generally available in the community.
- Qualifying communication services do not include cable TV and video services. Prices for services cannot be lower than any incumbent provider of a functionally equivalent service.

VA Code §§ 15.2-2108, 15.2-2160, 56-265.4:4, 56-484.7.1

- Municipal electric utilities (does not apply to counties or other political subdivisions) are permitted to become certified municipal local exchange carriers (MLEC) and offer all communications services. In doing so they are prohibited from cross-subsidizing services, must impute costs that private sector providers typically would incur, and must comply with procedural, financing, reporting and other requirements.

VA Code § 15.2-5431

- The VA Wireless Services Authority Act authorizes a locality to "convey or lease to [an] authority, with or without consideration, any systems or facilities for the provision of qualifying communications services" and "contract, jointly or severally, with any authority for the provision of qualifying communications services."
- Localities are still held to the requirements of the "qualifying communication services" and service gap provisions (not more than three providers). This legislation provides the method by which projects can be financed by an authority.

VA Code § 15.2-1500

- A locality, electric commission or board, industrial development authority, or economic development authority, may lease dark fiber. For purposes of this section, "dark fiber" means fiber optic cable that is not lighted by lasers or other electronic equipment. The locality, electric commission or board, industrial development authority, or economic development authority, shall not be involved in the promotion or marketing of the lessee as the provider of the services.

2.7 Pulaski County, VA Community Telecommunications Broadband Planning Initiative

As previously discussed, the approach consisted of collecting existing data as well as new data. Representatives of Pulaski County were given the following information requests.

1. Any previous telecommunications survey and results solicited by the communities and any other party the communities are aware of and feel relevant.
2. The following documents/information if available:
    - Comprehensive Plans
    - Zoning Maps and Requirements
    - Definitions used for urban, suburban and rural community classifications.
    - Subdivision and Land Development Ordinances
    - Economic Development studies, statistics and/or other information
    - Transportation Studies
    - Current Land Development Applications for institutional, commercial, manufacturing, or other industrial development
    - Any telecommunications proposals, plans, and existing infrastructure and service areas
    - Any Geographic Information System (GIS) data/maps associated with:

      <u>Background data</u>
        - Transportation Routes/Local Roads/Railroads
        - Municipal Boundaries
        - Parcels
        - Streams/ Other Water Bodies

      <u>Economic Data</u>
        - Major Employers
        - Growth Corridors/Areas and What Type of Growth
        - Tax Incentive Development Zones
        - Industrial/Commercial Parks
        - Hospitals and Other Health Care Facilities
        - Schools, Colleges and Vocational Institutions
        - Libraries
        - Police/Fire/Emergency/911 Centers (PSAPS)
        - Airports/Heliports
        - Shipping Ports
        - Municipal Facilities; i.e., Wastewater Treatment Plants, Water Plants, Town Halls/Garages, etc.
        - Business Districts
        - Utility Service Areas/Districts

      <u>Communication's Infrastructure</u>
        - Fiber Optic Lines and Providers
        - Central Office and Remote Cabinet Locations and whether DSL enabled
        - Cable Franchise Areas and where Cable Modem is Offered
        - Wireless Towers/Antennae Locations/Service Areas
        - Call Centers or Data Storage Facilities
    - Telecommunications related studies

- Telecommunications and other voice, video and data access rates, availability and affordability information
- Names, addresses and phone numbers where available of residents and business properties in the communities (mailing lists/databases if available)

3. Area telecommunications service listings and rates (voice, video and data), provider names and contact information, TV channel line-ups
4. Area utility service provider's names and contact information, services and rates
5. County elected and appointed official's names, association/organization position or title, contact information (including e-mail addresses)
6. Community officers and staff associated with project
7. Community stakeholders associated with this telecommunications initiative
8. Existing arrangements for telecommunications services; i.e., provider, connectivity bandwidth, rates, etc. for voice, video and data services
9. Cable TV Franchise Agreements
10. Area demographic information not found in the 2000 US Census data
11. What GIS coordinate system/projection is the county using e.g. State Plane NAD 83 South feet.

The county was fortunate in that some of the requested data was being maintained by the county in Geographic Information System (GIS) software. Other data, such as location of infrastructure was estimated from hardcopies or from input from community stakeholders. Therefore, while the mapped data serves planning and assessment purposes in this report, the exact location and accuracy of the data would need to be further confirmed if needed to be relied upon for other than the purposes used in this study.

2.8 Study Area History

Historical Features (***From*** Pulaski County Website)

Today, the words **VISION, PRIDE, AND EXCELLENCE** form the core of the County seal. These words, penned over 10 years ago, summarize the history of Pulaski County and exemplify the spirit of its citizens as they work to create a strong community for future generations.

History

Creation & Early Years: The County of Pulaski was created from portions of Montgomery and Wythe Counties on **March 30, 1839 when Pulaski County became the 87th county of the Commonwealth of Virginia**. The County was named in honor of Count Casimir Pulaski, an exiled Polish nobleman who came to America and joined George Washington's army in 1777. After becoming a brigadier-general and chief of cavalry in the Continental Army, Count Pulaski gave his life in the cause of American Freedom when he was mortally wounded at Savannah in October 1779.

On May 9, 1839 sixteen (16) gentlemen justices, newly commissioned by the Governor of Virginia, met at James Tiffany's Tavern in Newbern to hold court and set up the new county government. One of the first actions taken by these gentlemen was the appointment of Benjamin R. Floyd, son of past Virginia Governor, as the county's first commonwealth attorney. Shortly thereafter, **the court divided the county into four districts, Northeastern, Northwestern, Southeastern and Southwestern.**

In 1886 the Town of Pulaski was incorporated under the name of "Pulaski City". The future county seat rapidly developed into a manufacturing center and railroad town. The Norfolk & Western Railroad made a valuable

contribution to the new town in its early days by building the Maple Shade Inn. **The county seat remained at Newbern until the courthouse was completely destroyed by fire on November 27, 1893**. A big controversy subsequently developed between Newbern, Pulaski and Dublin as to where the county seat should be located after the burning of the Courthouse. Elections were held twice to determine the final location of the county seat. The second election finally wound up in the State Court of Appeals. **In March 1895, the court ruled in favor of the Town of Pulaski as the new county seat.**

Shortly after the turn of the century a group of progressive Pulaski County citizens organized the **"Pulaski Board of Trade".** This Board was created to seek diversified industries for Pulaski, including woodworking plants, furniture factories, overall and pants factories, cotton and woolen mills, and an ice plant. **The "Board of Trade" became the Chamber of Commerce in 1952.**

In 1905 the Pulaski Mining Company's plant was completed on a site lying between the Pulaski Iron and Dora Furnace. This was Pulaski's fourth heavy industry. This industry, known locally as the "Acid Plant", was contemporary with the Bertha Zinc Company, Pulaski Iron Company, and Dora Furnace. However, the Acid Plant outlived them all by many years. The Acid Plant was one of Pulaski's larger industries employing an average of over 250 men. During World Wars I and II the plant's production reached its peaks.

Farming in the early 1900's continued to be the basic industry of Pulaski County and had been developed to a high degree by generations of industrious and progressive farm families. Pulaski County gained a reputation for producing some of the finest cattle, horses, and sheep in America.

In 1934 at long last the great depression was loosening its grip on the county. Preliminary work had begun in preparation for the construction of Appalachian Electric Power Company's $11,000,000 hydro-electric dam on New River and construction of the Lowman's Ferry Bridge had been approved by the State Highway Commission. In addition, many young Pulaski County men were employed through federal programs such as the Works Progress Administration (WPA). Through the WPA, a number of relief works projects were completed, including highway and bridge building projects, landscaping, sanitation projects, distribution of surplus commodities, camps for the underprivileged children, and many other activities.

The 1950's brought prosperity to the county. The Pulaski County Livestock Market in Dublin had grown into one of Virginia's largest livestock markets. Most of the manufacturing plants of the 1930's continued to operate with expanding production at this time. In addition, Radford Army Ammunition Plant, located in nearby Montgomery County, provided many jobs for Pulaski County citizens. The New River Valley Airport and Piedmont Aviation provided daily passenger service utilizing the new airport. The Airport became the first of several regional initiatives to locate in Pulaski County and remains as a long standing example of regional local government cooperation.

In 1958 the new Courthouse was built behind the Old Courthouse facing Third Street in the Town of Pulaski. In addition, a **new Library was constructed and opened on Third Street in the Town of Pulaski in the late 1950's**. In 1965 Interstate Highway System 81 was completed through Pulaski County. Also during this same year, the **Ruritan National headquarters were moved from Wakefield, Virginia to Newbern.**

A **county building inspection department was also created in mid-1973. During 1974-75** the Board of Supervisors **converted the "Old Central School Building" into the County Administration Building** housing county offices and several state offices. The County Administration Building has since been renovated again and still serves as the local governing body's office building.

Topography (***From*** Pulaski County Comprehensive Plan, Volume 1 October 13, 2009)

The land area of Pulaski County is 327 square miles. Located on a plateau in southwest Virginia, the County is bordered by Bland, Carroll, Floyd, Giles, Montgomery, and Wythe Counties, and the City of Radford. The County lies within the Valley and Ridge and the Blue Ridge physiographic provinces. Pulaski County's elevation ranges from 1,800 to 2,850 feet above sea level. The area is drained by the New River which was dammed by Appalachian Power Company (American Electric Power) to form Claytor Lake.

Topographic information is important in planning because slope and topographic relief affect the suitability of land for development. Topography influences the type and cost of development, controls the direction and rate of water runoff, influences the weather and climate, and affects the type of vegetation and wildlife. Slope, then, can indicate those areas of the County which are best suited for particular types of development.

2.9 Study Area Key Demographics & Socioeconomics

Demographic & Socioeconomics Features (***From*** Pulaski County Comprehensive Plan, Volume 1 October 13, 2009)

Historic Population Growth

Pulaski County entered the twentieth century with a population of 14,609, and it steadily rose through the 1940s until the 1950s, when it began experiencing a slight decrease that would last until 1970. The 1970s was a time for resurgence in the population base which lasted into the early and mid-1980s, but began to decline in the late 1980s and lasted into the 1990s. From that time on the Population for Pulaski County has stayed steady in the area of 35,000 people. Table 6 contains historical and current population data of Pulaski County, the New River Valley, adjacent counties, and Virginia.

TABLE 5

POPULATION COMPARISONS WITH OTHER NRV COUNTIES

Jurisdiction	1920	1930	1940	1950	1960	1970	1980	1990	2000	2007*
Pulaski County	17,111	20,566	27,767	27,758	27,258	29,564	35,229	34,496	35,127	34,306
Floyd County	13,115	11,698	11,967	11,351	10,462	9,775	11,563	11,965	13,874	15,017
Montgomery County	18,595	19,605	21,206	29,780	32,923	46,813	63,516	73,913	83,629	88,983
Radford City	6,000	7,000	12,000	9,026	9,371	11,597	13,225	15,940	15,859	15,418
Giles County	11,901	12,804	14,635	18,956	17,219	16,741	17,810	16,366	16,657	16,294
New River Valley	65,349	70,900	77,565	96,871	97,233	114,818	141,343	152,680	165,164	170,018
Virginia	2.3M	2.4M	2.6M	3.3M	4.0M	4.7M	5.3M	6.2M	7.1M	7.4M

* Population Estimate
Source: US Census and Weldon Cooper Center

Table 7 presents data relating to the average annual change in population growth for Pulaski County, adjacent counties, the New River Valley region, and Virginia. Between 1920 and 1960, Pulaski County's population increased at an annual rate of 1.48 percent. This rate was slightly higher than the New River Valley as a region and adjacent localities. The only other county in the New River Valley region with a higher annual average growth rate for the same period was Montgomery County, which experienced an annual rate of 1.93 percent. Virginia's rate of growth for the same time period was 1.85 percent.

Between 1970 and 1980, Pulaski County's population grew at a rate faster than the state's population, 1.92 percent compared to 1.28 percent, yet slightly slower than the New River Valley 2.31 percent rate of growth between 1970 and 1980. The New River Valley's annual rate of growth was slightly skewed by an annual rate of growth of 3.57 percent in

Montgomery County. The adjacent localities also experienced their largest respective annual growth rates during the period.

From the 1990's to 2009 the population has remained constant in the area of 35,000 people. This is evidenced on Table 7 and Housing Data Tables.

TABLE 6
AVERAGE ANNUAL PERCENTAGE
CHANGE IN POPULATION GROWTH

Jurisdiction	1920-1960	1960-1970	1970-1980	1980-1990	1990-2000
Pulaski County	1.48	0.85	1.92	-0.21	1.79
Floyd County	-0.51	-0.66	1.83	0.35	13.74
Montgomery County	1.93	4.22	3.57	1.63	11.62
Radford City	1.40	2.38	1.43	2.03	-0.50
Giles County	1.12	-0.28	0.64	-0.81	1.70
New River Valley	1.22	1.81	2.31	0.80	7.56
Virginia	1.85	1.75	1.28	1.70	12.68

Source: US Census

Race

In 1990, 91.71 percent of the population in Pulaski County was White, 5.7 percent was Black, 0.20 percent was American Indian, and 0.31 percent of the population was Asian Pacific Islander. By 2007 the racial demographics for Pulaski County had changed. 92.2 percent of the population was identified as White (including Hispanic populations), 6.3 percent was identified as Black, 0.17 percent was American Indian, and 0.42 percent of the population was Asian-Pacific Islander.

Age Groups

Between 1970 and 1980, there was an overall population increase of 16 percent for the County. During this time period, the largest gains were found in ten out of fourteen age groups, with losses in four age groups. The largest increases were in the following four groups: "25 to 29" (30.83%); "30 to 34" (86.76%); "35 to 39" (54.64%); and "65 and Over" (34.49%). The two significant population decreases were in the "Under 5" (8.34%) and "45 to 49" (9.43%) age categories.

Between 1980 and 1990, nearly every age group decreased except four; "35 to 44", "45 to 54", "65 to 74", and "75 +". Again, the age group "75 +" lead all increases for the time period with a percent rate of change of 58 percent. From 1990 to 2000 data shows that the those aged 45 and above all have population increases. While the majority of those younger had decreases in population. These noticeable increases among the older population segments can be attributed to medical advances, healthier living styles, and immigration increases, and decreases continue trends. This data can be utilized to understand the challenges facing Pulaski County from a growth perspective and also

highlight the need for providing services to an older population. Table 8 contains data regarding Pulaski County population for 1990 and 2000

TABLE 7

PULASKI COUNTY AGE AND GENDER POPULATION

1990 Data	Total Population	Percentage	2000 Data	Total Population	Percentage
Male	16,688	48.4	Male	17,334	49.3
Female	17,768	51.6	Female	17,793	50.7
Under 5 years	2,019	5.9	Under 5 years	1,937	5.5
5 to 9 years	1,890	5.5	5 to 9 years	2,032	5.8
10 to 14 years	2,129	6.2	10 to 14 years	2,059	5.9
15 to 19 years	2,666	7.7	15 to 19 years	1,922	5.5
20 to 24 years	2,502	7.3	20 to 24 years	1,849	5.3
25 to 34 years	5,101	14.8	25 to 34 years	4,957	14.1
35 to 44 years	5,767	16.7	35 to 44 years	5,293	15.1
45 to 54 years	4,253	12.3	45 to 54 years	5,584	15.9
55 to 59 years	1,655	4.8	55 to 59 years	2,297	6.5
60 to 64 years	1,766	5.1	60 to 64 years	1,864	5.3
65 to 74 years	2,963	8.6	65 to 74 years	2,887	8.2
75 to 84 years	1,168	3.3	75 to 84 years	1,875	5.3
85 years and over	454	1.3	85 years and over	571	1.6

Source: US Census

Population Projections

Table 9 contains population projections for Pulaski County and NRV localities from 2007 through 2050. New River Valley and State data provide additional comparison. This information should be utilized and updated periodically to provide information for residential development and other land use considerations.

TABLE 8

POPULATION PROJECTIONS

	US Census		New River Valley Projected Populations						
Evaluation	**2002**	**2007**	**2008**	**2009**	**2010**	**2020**	**2030**	**2040**	**2050**
Population	165,200	170,018	172,104	175,260	179,059	196,905	216,728	233,740	252,633
Eligible	79637	84692	87654	91325	96035	109172	124091	138942	155221
Employment	76342	17466	83797	87307	91809	104369	118631	132829	148391
Unemployed	3295	67226	3857	4018	4226	4804	5460	6113	6830
% Workforce	48.21	49.81	50.93	52.11	53.63	55.44	57.26	59.44	61.44
% Pop Inc.	NA	2.92%	1.23%	1.83%	2.17%	9.97%	10.07%	7.85%	8.08%
	US Census		Pulaski County Projected Populations						
Evaluation	**2002**	**2007**	**2008**	**2009**	**2010**	**2020**	**2030**	**2040**	**2050**
Population	34,400	34,306	34,391	34,500	35,250	38,500	42,000	44,500	47,560
Eligible	17114	18253	18915	19665	20445	22715	25200	28035	30914
Employment	16292	17466	18083	18800	19545	21716	24091	26801	29554
Unemployed	822	787	832	865	900	999	1109	1234	1360
% Workforce	49.75	53.21	55.00	57.00	58.00	59.00	60.00	63.00	65.00
% Pop Inc.	NA	-0.27%	0.25%	0.32%	2.17%	9.22%	9.09%	5.95%	6.88%
	US Census		Giles County Projected Populations						
Evaluation	**2002**	**2007**	**2008**	**2009**	**2010**	**2020**	**2030**	**2040**	**2050**
Population	16,600	16294	16,518	16,737	16,956	17,550	18,165	18,800	19,458
Eligible	7978	8442	8755	9038	9326	10004	10717	11468	12259
Employment	7456	8053	8369	8640	8915	9563	10246	10963	11719
Unemployed	522	389	385	398	410	440	472	505	539
% Workforce	48.06	51.81	53.00	54.00	55.00	57.00	59.00	61.00	63.00
% Pop Inc.	NA	-1.84%	1.37%	1.33%	1.31%	3.50%	3.50%	3.50%	3.50%
	US Census		Floyd County Projected Populations						
Evaluation	**2002**	**2007**	**2008**	**2009**	**2010**	**2020**	**2030**	**2040**	**2050**
Population	14,400	15017	15,094	15,593	16,093	16,897	17,742	18,629	19,560
Eligible	6664	7046	7245	7641	8047	8786	9581	10432	11345
Employment	6389	6802	6926	7304	7692	8400	9159	9973	10846
Unemployed	275	244	319	336	354	387	422	459	499
% Workforce	46.28	46.92	48.00	49.00	50.00	52.00	54.00	56.00	58.00
% Pop Inc.	NA	4.28%	0.51%	3.31%	3.21%	5.00%	5.00%	5.00%	5.00%
	US Census		Montgomery County Projected Populations						
Evaluation	**2002**	**2007**	**2008**	**2009**	**2010**	**2020**	**2030**	**2040**	**2050**
Population	84,400	88983	90,517	92,550	94,584	106,974	120,988	133,086	146,395
Eligible	40629	43654	45259	47201	50130	58836	68963	78521	89301
Employment	39301	42261	43267	45124	47924	56247	65929	75066	85372
Unemployed	1328	1393	1991	2077	2206	2589	3034	3455	3929
% Workforce	48.14	49.06	50.00	51.00	53.00	55.00	57.00	59.00	61.00
% Pop Inc.	NA	5.43%	1.72%	2.25%	2.20%	13.10%	13.10%	10.00%	10.00%
	US Census		Radford City Projected Populations						
Evaluation	**2002**	**2007**	**2008**	**2009**	**2010**	**2020**	**2030**	**2040**	**2050**
Population	15,400	15418	15,584	15,880	16,176	16,984	17,833	18,725	19,660
Eligible	7252	7297	7480	7781	8088	8832	9630	10486	11403
Employment	6904	7014	7151	7439	7732	8443	9206	10025	10901
Unemployed	348	283	329	342	356	389	424	461	502
% Workforce	47.09	47.33	48.00	49.00	50.00	52.00	54.00	56.00	58.00
% Pop Inc.	NA	0.12%	1.08%	1.90%	1.86%	5.00%	5.00%	5.00%	4.99%

Source: Central Pulaski Transportation and Land Use Master Plan

Changes in Employment Sectors

Between 1980 and 1990, the total number of agricultural jobs in the local economy decreased by 38 percent, or 155 jobs. In 1980, Manufacturing accounted for 44 percent of the County's total employment base (6,621 manufacturing jobs). In 1990, manufacturing employment fell to 37 percent of the local employment base, down to 5,783 jobs. This shift represents a decrease of nearly 13 percent (838 jobs). From 1990 to 2007 there was a decrease of 1,686 manufacturing jobs from 5,783 to 4,097 or a 41 % decrease in the employment sector. Table 10 contains employment by sector data for the 2007.

TABLE 9

2007 INDUSTRY WORKFORCE ESTIMATES

	Estimate	Margin of Error	Percentage	Margin of Error
Civilian employed population 16 years and over	**15,650**	**+/-745**	**100%**	**(X)**
Agriculture, forestry, fishing and hunting, and mining	215	+/-104	1.4%	+/-0.7
Construction	887	+/-232	5.7%	+/-1.5
Manufacturing	4,097	+/-448	26.2%	+/-2.6
Wholesale trade	375	+/-170	2.4%	+/-1.1
Retail trade	1,779	+/-369	11.4%	+/-2.2
Transportation and warehousing, and utilities	665	+/-230	4.2%	+/-1.5
Information	129	+/-81	0.8%	+/-0.5
Finance and insurance, and real estate and rental and leasing	624	+/-267	4.0%	+/-1.7
Professional, scientific, and management, and administrative and waste management services	1,152	+/-334	7.4%	+/-2.1
Educational services, and health care and social assistance	3,146	+/-487	20.1%	+/-2.9
Arts, entertainment, and recreation, and accommodation, and food services	724	+/-262	4.6%	+/-1.7
Other services, except public administration	948	+/-313	6.1%	+/-1.9
Public administration	909	+/-294	5.8%	+/-1.8

Source: US Census

Manufacturing is still the main employment sector for County residents, followed by educational services. This is a major change from previous decades. As a result, increasing the Industrial base of the County should be encouraged as well as increasing other sectors of employment to help offset additional losses. As Table 11 demonstrates the Majority of those aged 16 and over are in the labor force but this percentage is still much lower than the state average of 67.1% for the same time.

TABLE 10

2007 EMPLOYMENT ESTIMATES

	Estimate	Margin of Error	Percentage	Margin of Error
Population 16 years and over	28,886	+/-209	100%	(X)
In labor force	16,919	+/-752	58.6%	+/-2.5
Civilian labor force	16,900	+/-750	58.5%	+/-2.5
Employed	15,650	+/-745	54.2%	+/-2.5
Unemployed	1,250	+/-341	4.3%	+/-1.2
Armed Forces	19	+/-33	0.1%	+/-0.1

Source: US Census

Significance of Tourism

Tourism is an active part of Pulaski County's economy. With I-81 traversing the County, the presence of the New River, Jefferson National Forest, Claytor Lake State Park, and the New River Trail (which is advertised in a national bicycling magazine), and numerous historic attractions, tourism can continue as a growth industry in Pulaski County. Table 12 contains information on the amount of tourist dollars expended, tourism-related jobs, and local and state revenue generated by the tourism industry.

TABLE 11

2003-2007 TRAVEL INDUSTRY IMPACT ON PULASKI COUNTY

	2003	2004	2005	2006	2007	Percent Change
Population	34,748	34,748	34,688	34,789	34,998	0.6%
Travel Impacts						
Expenditures	$30,474,704	$33,488,496	$35,992,035	$40,354,507	$44,317,459	9.8%
Payroll	$7,699,929	$8,097,588	$8,384,318	$8,840,976	$9,283,960	5.0%
Employment	509	521	534	549	574	4.7%
State Tax Receipts	$1,472,808	$1,616,748	$1,715,882	$1,827,335	$1,340,446	7.5%
Local Tax Receipts	$961,885	$1,056,084	$1,135,365	$1,226,428	$1,340,446	9.3%
Excise Tax Collection						
Lodging Excise Tax	$228,880	$242,642	$258,290	$297,469	$315,437	6.0%
Food Service Excise Tax	$639,264	$732,778	$812,610	$825.952	$9,32,953	13.0%
Excise Tax Rates						
Lodging Excise Tax Rate	5.0%	5.0%	5.0%	5.0%	5.0%	n/a
Food Service Excise Tax Rate	4.0%	4.0%	4.0%	4.0%	4.0%	n/a

Source: Virginia Tourism Corporation

Income

In 2007, the Median Household Income for Pulaski County was $36,397. In 2000 this amount was $33,873. Incomes continue to increase over time in Pulaski County as the employment base has shifted from agriculture to manufacturing toward the service and trade sectors. Median Household Incomes increased by 96 percent between 1970 and 1980, and then increased by 73 percent between 1980 and 1990. In 1990 Median Household Income was $23,319. The increase from 1990 to 2000 was approximately 31 percent with an expected lower increase from 2000-2010 based on 2007 data found in Table 13.

TABLE 12

2007 COUNTY HOUSEHOLD INCOME DATA

	Estimate	Margin of Error	Percentage	Margin of Error
Total households	14,887	+/-484	100%	(X)
Less than $10,000	1,401	+/-341	9.4%	+/-2.3
$10,000 to $14,999	1,359	+/-322	9.1%	+/-2.1
$15,000 to $24,999	2,351	+/-470	15.8%	+/-3.1
$25,000 to $34,999	2,043	+/-404	13.7%	+/-2.8
$35,000 to $49,999	2,553	+/-421	17.1%	+/-2.8
$50,000 to $74,999	2,715	+/-424	18.2%	+/-2.8
$75,000 to $99,999	1,387	+/-254	9.3%	+/-1.7
$100,000 to $149,999	916	+/-261	6.2%	+/-1.7
$150,000 to $199,999	135	+/-95	0.9%	+/-0.6
$200,000 or more	27	+/-27	0.2%	+/-0.2
Median household income (dollars)	36,397	+/-2,489	(X)	(X)
Mean household income (dollars)	44,380	+/-2,369	(X)	(X)

Source: US Census

Pulaski County Economic Adjustment Strategy

During 2008 Pulaski County prepared its Economic Adjustment Strategy: “Pulaski a Community of Opportunity.” The Economic Adjustment Strategy was designed to analyze the County’s economic assets and develop a clear strategy for increasing employment with new job creation and retention. Historical data is presented along with analysis of similar Counties. That data combined with comparative modeling was conducted to develop the strategy.

Multiple Goals and Objectives were identified in the Economic Adjustment Strategy and are as follows

Vision: Business, We will be ready to meet the needs of 21st Century business and industry

- Goal 1Put Fully Developed Infrastructure in Place
- Goal 2 Streamline the development process
- Goal 3 Streamline the incentive process

• Goal 4 Create an integrated, streamlined workforce development process
• Goal 5 Develop a strategy to create technology infrastructure to capture future opportunities in business
• Goal 6 Develop/Implement customized small business assistance programs

Vision: Education, We will be a first class location for learning.
• Goal 1 Replace outdated facilities
• Goal 2 Develop a center for Excellence
• Goal 3 Enhance and market available apprenticeship programs
• Goal 4 Establish great counseling for career pathing

Vision: Recreation, We will be a destination place for recreation
• Goal 1 Develop one entity to develop/coordinate the promotion/marketing of recreation assets/events
• Goal 2 Develop/Implement consistent recreation marketing strategy and themes for all 3 jurisdictions
• Goal 3 Develop/Implement a strategy to ensure that planned development preserves our natural resources
• Goal 4 Develop/Implement more diversified recreation activities so that the Pulaski area has appeal for all types of consumers
• Goal 5 Develop infrastructure and support activities

The Goals and implementation strategies found in the Economic Adjustment Strategy have been incorporated into the Comprehensive Plan for a complete and balanced approach to development in the County.

Virginia's Nanotechnology Park

The Virginia Nanotechnology Park would feature a 58,280-square-foot, multi-tenant building for lease to energy, environmental and medical companies using nanotechnology. The 935-acre New River Valley Commerce Park in Pulaski County, which is owned by authority members is currently vacant. The vision is to put up nine buildings with a combined size of about 500,000 square feet on 35 of its acres.

FIGURE 7
NANOTECHNOLOGY PARK LAYOUT

HOUSING

The purpose of the housing component in the Comprehensive Plan is to aid in the promotion of efficient and rational development decision-making that stimulates the local economy and provides affordable and safe housing for all residents. The housing component should address policy issues which address and meet future housing needs.

Existing Housing Stock

As highlighted by Table 14 from 2004-2007 there were generally 114 Single Family Housing Units (SFH) constructed. This trend may continue but will not be noticeable for some time a result of the 2008 Subprime Mortgage Crisis and the effects that it had on the National Housing Markets. It is believed that eventually the market as a whole will stabilize and continue to grow with an increasing national population.

TABLE 13

PULASKI COUNTY SINGLE FAMILY HOUSING CONSTRUCTION

Year	Single Family Housing Units
2003	48
2004	117
2005	119
2006	101
2007	118
2008	61

Source: Pulaski County

Housing Quality

One method of determining housing quality in a community is to calculate the number of people per room in a dwelling, the presence of kitchen and bathroom facilities, and whether or not it meets local and state building standards, i.e. the soundness of the dwelling unit. Pulaski County has not conducted a recent survey of these housing structure characteristics to estimate the number of substandard housing units in the urban and rural parts of the County. Such a study is necessary to define target areas for rehabilitation, as it will be necessary to determine the areas of concentrated substandard housing to pursue state and federal funding. Table 15 examines Housing Units and Occupation Types. This information is useful because it allows a community to monitor the growth in the population and housing stock, the household size, the occupation status of a household (owner versus renter occupied), and the number of units lacking plumbing facilities.

TABLE 14

PULASKI COUNTY HOUSING

Type of Housing Unit	1990	2000	2005-2007
All Housing Units	14,740	16,325	17,034
Owner-Occupied	9,746	10,794	10,652
Renter-Occupied	3,603	3,849	4,235
Total Occupied Units	13,349	14,643	14,887

Source: U.S. Census Bureau

Cost of Housing

The value of housing is dependent on several general variables. The first of which is the supply of housing, the second variable is demand, and the third is location. In a tight housing market, the supply of housing is reduced, which creates a relative increase in housing costs in proportion to the demand. Of course, there are other factors, or sub variables, which must be included when considering a community's housing costs. Some of these 'sub-variables' include economic conditions, vacancy rate, housing location, housing quality, style, and community facilities such as public water/sewer, distance to schools, etc.

Contract rent in Pulaski County is relatively comparable to select localities in and around the New River Valley. In 2007 the average contract rent in the County was $413 per month compared to $753 for the State average. These figures include all housing unit types.

Throughout the decade housing prices nationally, have increased. Table 16 describes the 2000 housing values in Pulaski County in contrast to other localities. This comparison is beneficial as recent data from the U.S. Census Bureau indicates that Housing values have remained similar in many of these jurisdictions.

TABLE 15
2000 COMPARISON OF MEDIAN HOUSING VALUE

Locality	Median Housing Value
Pulaski County	$80,000
Bland County	$71,500
Carroll County	$68,900
Floyd County	$79,700
Giles County	$69,200
Montgomery County	$114,600
Radford City	$95,100
Wythe County	$77,300
Virginia Average	$125,400
United States Average	$119,600

Source: U.S. Census Bureau

Housing rehab

The County and Town of Pulaski are currently involved in projects that will replace and repair dilapidated housing. The goal of this program is to beautify a blighted area and also provide affordable housing. The County should strive to work with the municipalities to increase infill development and utilize multiple revenue streams to complete additional rehabilitation projects.

The County is currently preparing a Comprehensive Community Development Planning Grant for the Department of Housing and Community Development. The anticipated project area consists of the area between Baskerville, Cooks, and Dublin streets, known as the Baskerville neighborhood, an area of approximately 36.5 acres and bordering the Town of Dublin. This neighborhood contains 74 homes, with many well over 50 years old and in dire need of assistance.

The Baskerville project will focus on rehabilitating homes in the neighborhood, upgrading infrastructure, and acquiring and demolishing deteriorated structures to replace them with new, affordable homes to be sold to income-qualified homeowners. In addition, the project hopes to build a community playground for the neighborhood children.

The project will be able to leverage financing through the New River Valley HOME Consortium, Rural Development loans and grants, weatherization improvements funds, and in-kind leverage the County, and possibly other jurisdictions will provide with neighborhood infrastructure improvements.

The Town of Dublin provides the Baskerville community with public water service. The known age and type of these water lines have far exceeded their designed service life expectations and will be examined further for possible replacement. The Town of Dublin also provides public sewage collection services which due to age will most likely need to be improved as well.

Source: United States Census Bureau http://www.census.gov/quickfacts/table/PST045215/51155

QuickFacts

Pulaski County, Virginia

What's New & FAQs
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Table

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Quick linksPULASKI COUNTY, VIRGINIA

PEOPLE	
Population	
iPopulation estimates, July 1, 2015, (V2015)	34,332
iPopulation estimates, July 1, 2014, (V2014)	34,322
iPopulation estimates base, April 1, 2010, (V2015)	34,859
iPopulation estimates base, April 1, 2010, (V2014)	34,861
iPopulation, percent change - April 1, 2010 (estimates base) to July 1, 2015, (V2015)	-1.5%
iPopulation, percent change - April 1, 2010 (estimates base) to July 1, 2014, (V2014)	-1.5%
iPopulation, Census, April 1, 2010	34,872
Age and Sex	
iPersons under 5 years, percent, July 1, 2014, (V2014)	4.8%
iPersons under 5 years, percent, April 1, 2010	4.9%
iPersons under 18 years, percent, July 1, 2014, (V2014)	18.4%
iPersons under 18 years, percent, April 1, 2010	19.5%
iPersons 65 years and over, percent, July 1, 2014, (V2014)	20.6%
iPersons 65 years and over, percent, April 1, 2010	17.9%
iFemale persons, percent, July 1, 2014, (V2014)	49.9%
iFemale persons, percent, April 1, 2010	50.6%

Race and Hispanic Origin	
White alone, percent, July 1, 2014, (V2014) (a)	92.4%
White alone, percent, April 1, 2010 (a)	92.5%
Black or African American alone, percent, July 1, 2014, (V2014)(a)	5.3%
Black or African American alone, percent, April 1, 2010 (a)	5.0%
American Indian and Alaska Native alone, percent, July 1, 2014, (V2014) (a)	0.2%
American Indian and Alaska Native alone, percent, April 1, 2010(a)	0.2%
Asian alone, percent, July 1, 2014, (V2014) (a)	0.6%
Asian alone, percent, April 1, 2010 (a)	0.5%
Native Hawaiian and Other Pacific Islander alone, percent, July 1, 2014, (V2014) (a)	0.0%
Native Hawaiian and Other Pacific Islander alone, percent, April 1, 2010 (a)	Z
Two or More Races, percent, July 1, 2014, (V2014)	1.5%
Two or More Races, percent, April 1, 2010	1.4%
Hispanic or Latino, percent, July 1, 2014, (V2014) (b)	1.5%
Hispanic or Latino, percent, April 1, 2010 (b)	1.2%
White alone, not Hispanic or Latino, percent, July 1, 2014, (V2014)	91.1%
White alone, not Hispanic or Latino, percent, April 1, 2010	91.7%
Population Characteristics	
Veterans, 2010-2014	3,077
Foreign born persons, percent, 2010-2014	1.0%
Housing	
Housing units, July 1, 2014, (V2014)	17,263
Housing units, April 1, 2010	17,235
Owner-occupied housing unit rate, 2010-2014	73.0%
Median value of owner-occupied housing units, 2010-2014	$134,300
Median selected monthly owner costs -with a mortgage, 2010-2014	$1,094
Median selected monthly owner costs -without a mortgage, 2010-2014	$346
Median gross rent, 2010-2014	$603
Building permits, 2014	45
Families and Living Arrangements	
Households, 2010-2014	15,125

iPersons per household, 2010-2014	2.23
iLiving in same house 1 year ago, percent of persons age 1 year+, 2010-2014	88.7%
iLanguage other than English spoken at home, percent of persons age 5 years+, 2010-2014	1.9%
Education	
iHigh school graduate or higher, percent of persons age 25 years+, 2010-2014	82.7%
iBachelor's degree or higher, percent of persons age 25 years+, 2010-2014	16.4%
Health	
iWith a disability, under age 65 years, percent, 2010-2014	12.3%
iPersons without health insurance, under age 65 years, percent	⚠ 14.7%
Economy	
iIn civilian labor force, total, percent of population age 16 years+, 2010-2014	58.0%
iIn civilian labor force, female, percent of population age 16 years+, 2010-2014	56.5%
iTotal accommodation and food services sales, 2012 ($1,000)	53,370
iTotal health care and social assistance receipts/revenue, 2012 ($1,000)	108,827
iTotal manufacturers shipments, 2012 ($1,000)	2,861,262
iTotal merchant wholesaler sales, 2012 ($1,000)	35,997
iTotal retail sales, 2012 ($1,000)	352,657
iTotal retail sales per capita, 2012	$10,152
Transportation	
iMean travel time to work (minutes), workers age 16 years+, 2010-2014	23.4
Income and Poverty	
iMedian household income (in 2014 dollars), 2010-2014	$45,635
iPer capita income in past 12 months (in 2014 dollars), 2010-2014	$24,722
iPersons in poverty, percent	⚠ 14.7%
BUSINESSES	
iTotal employer establishments, 2014	629
iTotal employment, 2014	11,384
iTotal annual payroll, 2014	423,319
iTotal employment, percent change, 2013-2014	4.3%
iTotal nonemployer establishments, 2013	1,478

iAll firms, 2012	2,082
iMen-owned firms, 2012	892
iWomen-owned firms, 2012	790
iMinority-owned firms, 2012	103
iNonminority-owned firms, 2012	1,885
iVeteran-owned firms, 2012	175
iNonveteran-owned firms, 2012	1,679

GEOGRAPHY	
iPopulation per square mile, 2010	109.0
iLand area in square miles, 2010	319.86
iFIPS Code	51155

- **1**. Independent city of Bedford, Virginia (51515) changed to town status and was added to Bedford County (51019) effective July 1, 2013.

⚠ This geographic level of poverty and health estimates are not comparable to other geographic levels of these estimates

Some estimates presented here come from sample data, and thus have sampling errors that may render some apparent differences between geographies statistically indistinguishable. Click the Quick Info icon to the left of each row in TABLE view to learn about sampling error.

The vintage year (e.g., V2015) refers to the final year of the series (2010 thru 2015).
Different vintage years of estimates are not comparable.

- **(a)** Includes persons reporting only one race
- **(b)** Hispanics may be of any race, so also are included in applicable race categories
- **(c)** Economic Census - Puerto Rico data are not comparable to U.S. Economic Census data

- **D** Suppressed to avoid disclosure of confidential information
- **F** Fewer than 25 firms
- **FN** Footnote on this item in place of data
- **NA** Not available
- **S** Suppressed; does not meet publication standards
- **X** Not applicable
- **Z** Value greater than zero but less than half unit of measure shown

QuickFacts data are derived from: Population Estimates, American Community Survey, Census of Population and Housing, Current Population Survey, Small Area Health Insurance Estimates, Small Area Income and Poverty Estimates, State and County Housing Unit Estimates, County Business Patterns, Nonemployer Statistics, Economic Census, Survey of Business Owners, Building Permits.

3.0 Broadband Technologies

Service providers come in many different flavors. For example, telephone companies, cable television companies and Internet Service Providers are all offering broadband. Different categories of service providers include:

3.1 Service Provider Descriptions

Incumbent Local Exchange Carriers (ILECS)

The incumbent telephone company that, prior to deregulation of the industry had the exclusive rights to provide ordinary local voice-grade telecommunications service within a specified service area.

Competitive Local Exchange Carriers (CLECS)

A company providing common carrier communications service in competition with the incumbent telephone company.

Competitive Access Provider (CAP)

A company that provides exchange access services in competition with an established U.S. telephone local exchange carrier. Private network links, independent of Local Exchange Carriers, are provided between the Inter-exchange carrier or Internet Service Provider and the end-use customer.

Long Distance Provider Interchange Carrier

A network owner that carries long distance telephone service from interchanges across that network between the Local Exchange Carriers and outside the Local Access Transport Areas.

Local Phone Company

Normally, the incumbent telephone company is referred to as the local phone company.

Regional/Alternative Competitive Phone Company

A competitive local exchange carrier as alternative service to the incumbent local exchange carrier serving within a region.

Cellular or Wireless Internet Service Provider (WISP)

A company that provides voice, video and data services using cellular or other type of wireless access technologies (handheld computers/telephones) through radio frequency (RF) signals rather than through hard-wire communication lines.

Cable Companies

A company that provides television programming over coax cable. Some cable companies provide cable modem Internet service which uses a modem box that connects a computer to a television cable for access to the Internet with connectivity 24 hours a day.

Internet Service Providers (ISPs)

A company that provides customer access to the largest internet, or largest network of networks, functioning as a gateway for online services and electronic information exchange between provider or source and receiver or user.

Satellite Service Provider

Satellite service communications is provided via one or more satellite relays and their associated uplinks and downlinks between earth and satellites in space.

3.2 Service Provider Technologies (Just some Technologies)

Phone Modem
xDSL (Digital Subscriber Line)
ISDN (Integrated Services Digital Networks)
Cable Modem
Optical Fiber
FWA (Fixed Wireless Access)/WISP (Wireless Internet Service Provider)
3G Wireless/4G Wireless
Optical Wireless
Consumer (MPEG) Broadband
Wi-Fi and WiMax
WLAN (Wireless Local Area Networks)
Ultra-Wideband
BPL (Broadband over Power Lines)
Satellite

The following brief technological summaries are provided to help the decision makers understand these technologies better and what options they have in meeting their objectives and leveraging existing networks and service providers

(Note: Information for the following definitions not footnoted was obtained and can be found at www.webopedia.co).

Phone Modem

A phone modem enables a computer to transmit data over a telephone line. Information is transmitted in the form of analog waves. Computer information is stored digitally. The modem converts the data between these two forms. Typical speeds of phone modems are 28.8-33.6 Kbps without data compression and 56.6 Kbps with data compression.

Digital Subscriber Line (DSL)

This technology works best when the user is located near the local phone switch. Data may then be received at rates up to 6.1 Mbps out of a theoretical 8.448 Mbps, enabling continuous transmission of motion video, audio and 3-D effects. The copper telephone network was originally designed only to transmit analog voice conversations. Early modems transmitted at 300 bps. Modem speeds increased until reaching the current maximum of 56 Kbps. More speed can be tweaked from copper telephone lines by using Digital Subscriber Line (DSL) technology.

ADSL is the most commonly deployed types of DSL in North America. Short for ***a**symmetric **d**igital **s**ubscriber **l**ine* ADSL supports data rates of from 1.5 to 9 Mbps when receiving data (known as the downstream rate) and from 16 to 640 Kbps when sending data (known as the upstream rate). ADSL requires a special ADSL modem. SDSL is still more common in Europe. Short for ***s**ymmetric **d**igital **s**ubscriber **l**ine*, a technology that allows more data to be sent over existing copper telephone lines (POTS). SDSL supports data rates up to 3 Mbps. SDSL works by sending digital pulses in the high-frequency area of telephone wires and cannot operate simultaneously with voice connections over the same wires. SDSL requires a special SDSL modem. It supports the same data rates for upstream and downstream traffic.

In the past, most major DSL deployments by the incumbent phone companies and competitive local exchange carriers had been in large cities, limiting broadband telecommuting. In recent years more Central Office (CO) locations have been DSL enables and the use of remote cabinets are being installed to deploy DSL in smaller and midsize community locations and where warranted, further into rural areas of the counties especially along roads that connect communities.

Integrated Services Digital Network (ISDN)

An ISDN is an integrated digital network in which same time-division switches & digital transmission paths are used to establish connections for sending voice (telephone), video & data (including electronic mail, facsimile) over digital tele- phone lines & POTS lines. ISDN is an international communications standard with typical speeds 64 Kbps to 128 Kbps.

Broadband over Power Lines (BPL)

Often referred to as power line communications, BPL uses the electric utility power grid as the medium for broadband communications. In theory, plugging a computer device into a power outlet would connect the end-user to the Internet. Speeds have been advertised up to 3.5 Mbps.

Cable Modem

In theory, the top cable modem speed is between approximately 512 Kbps to 52 Mbps, but a more realistic expectation is about up to 10 - 20 Mbps. Uploading is somewhat slower. Cable television networks are generally constructed as a fiber optic cable backbone with coaxial cable into neighborhoods and homes. Coaxial cables can carry multiple channels of video signals. Advanced cable systems can transmit 135 channels of analog video signals over a single cable. By converting to digital transmission technology, cable operators can use compression techniques to squeeze additional programs into each channel, thus providing consumers with hundreds of channels to choose from. Many cable companies have decided that the provisioning of Internet access is lucrative enough to devote at least one transmission channel to such use. A single analog cable channel, when devoted to digital transmission, has a 27 Mbps capacity. However, this must be partitioned between upstream and downstream use and shared by multiple cable subscribers.

In 2002, the FCC ruled that Internet service provided via a cable modem was determined to be an Information Service, not a Cable Service. Therefore, cable operators are not be held to the line sharing requirements that phone companies are currently held to for providing DSL Internet access. Cable operators do not have to open their lines to competing companies. Although most city cable franchise agreements are non-exclusive, competition among cable companies is generally seen only in large metropolitan areas. Consumers have little choice in providers of Internet via cable. The Internet access is provided via cable modem over coaxial cable lines, the same lines that transmit cable television signals. Cable modem speeds are generally faster than DSL speeds, but it is a distributed medium, in that access is shared by other subscribers on the same node or distribution box. Downstream (to the user) speeds are generally sufficient, but during peak hours of use the upstream speeds are diminished greatly. Upstream speed can be just as critical as downstream speeds, particularly for those accessing corporate VPNs (virtual private networks); the typical upstream speeds of most cable modems are woefully insufficient for this access.

Consumer (MPEG) Broadband (Direct Broadcast Satellite and Terrestrial Television)

MPEG **(**Moving Pictures Experts Group) entertainment-based broadband services such as digital video, audio and data can be delivered over a variety of digital TV networks, including cable, satellite or terrestrial broadcast systems. DBS (Direct broadcast Satellite) provides 52 Mbps bandwidth, fully digital content and support for interactive purchases and content selection. Digital terrestrial television holds tremendous promise. Over seven million digital television sets were sold in 2004 with the number expected to grow at fifty percent per year. The numbers may be greatly accelerated by recent FCC decisions.

Optical Fiber to the Customer

Fiber optic cable uses hair thin filaments of transparent glass or plastic for transmitting digital voice, video and data signals using light pulses at very high speeds. Systems that provide services via a fiber optic connection from a central equipment point directly to the customer are typically referred to as Fiber-to-the-Home (FTTH) or Fiber-to-the Premise FTTP. An FTTH.FTTP system uses fiber optic cabling for the “last mile” (common term for distance from the curb or last distribution pole in a network to the customer). Currently this technology probably provides the fastest, most secure transport and delivery system of services to the customer, but requires expensive laser equipment at the network operating center (NOC) and demarcation units on the premise.

Fixed Broadband Wireless (FBW) Access

Originally called "wireless cable", FBW often refers to LMDS (local Multipoint Distribution Service), as well as MMDS. LMDS operates in the 28 GHz and 31 GHz bands with theoretical data rates up to 1.5 Gbps to 2 Gbps downstream; more realistic speeds average around 38 Mbps. Generally, frequencies above 10 GHz are known as LMDS. MMDS operates in the 2.5 GHz band, reaches speeds up to 27 Mbps over unlicensed channels or 1 Gbps over licensed channels. Other frequencies are the 24 GHz, 26 GHz, 38 GHz and 39 GHz bands.[11]

Satellite Access

Advertised maximum speeds are typically in the range of 128 Kbps to 256 Kbps upstream and 512 Kbps to 1.5 Mbps downstream, but because of shared networks, the average data throughput may be significantly less. Data transmission and reception over satellite is not new; very small aperture terminal (VSAT) providers have been providing data connections to businesses, such as banks, for many years. Internet access via satellite is usually more costly than either cable modem or DSL, sometimes experiencing interference with severe weather, but possibly the only choice for rural consumers.

Optical Wireless (Free-Space Optics)

Optical wireless technology or free-space optics facilitates broadband communication through the atmosphere using line of sight optical signals up to distances of a few kilometers. Compared to optical fiber and fixed microwave systems, optical wireless is an inexpensive solution which is quick and easy to install.[12]

Mobile (e.g. Third Generation Mobile – 3G and 2.5G)

Unlike DSL, Cable and fixed wireless, which are still relatively computing-centric, 3G wireless combines high-speed data access with the mobility of handsets. 3G provides over 384 Kbps of bandwidth when a device is stationary or moving at pedestrian speed, 128 Kbps in a car, and 2 Mbps in fixed applications. Recognized data transfer speeds are up to 2 Mbps with download speeds. 3G technologies include CDMA2000 and Wideband CDMA (W-CDMA). CDMA2000 is digital spread-spectrum cellular standard with data rates ranging from 384 Kbps for mobile applications to well over 2 Mbps for stationary applications. W-CDMA is the evolutionary path for GSM, the standard with the majority of worldwide cellular subscribers. W-CDMA data rates compare to CDMA2000, 384 Kbps – over 2 Mbps. Both CDMA2000 and W-CDMA are shared resource technologies, meaning that these transmission levels are shared across all users within one RF carrier per sector.[13]

Mobile (e.g. Fourth Generation Mobile – 4G)

Short for fourth generation, 4G is an ITU specification for broadband mobile capabilities. 4G technologies enable IP-based voice, data and streaming multimedia at higher speeds and offer at least 100 Mbit/s with high mobility and up to 1GBit/s with low mobility (nomadic). 4G is an IP-based and packet-switched evolution of 3G technologies (such as WCDMA, HSDPA, CDMA2000 and EVDO) that uses voice communications. A number of technologies considered to be 4G standards include Long Term Evolution (LTE), Ultra Mobile Broadband (UMB) and the IEEE 802.16 (WiMAX) standard. While 3G is defined by ITU as IMT-2000, IMT-Advanced is being studied by ITU as 4G. IMT is now used as the generic name for 3G and 4G. 3G and 4G technologies are c0-extensive with cellular networks advertised to cover almost 96% of the U.S. population.

Wi-Fi

[11] Source of some info.: Moving Towards Broadband Ubiquity in U.S. Business Markets, April 2001, Cahners In-Stat Group 2001.
[12] Future Delivery of Broadband in Ireland, September 19, 2002, Office of the Director of Telecommunications Regulation, Dublin Ireland
[13] Source of some information: Moving Towards Broadband Ubiquity in U.S. Business Markets, April 2001, Cahners In-Stat Group 2001.

Wi-Fi is short for *wireless fidelity* and used generically when referencing any type of 802.11 network. 802.11 refers to specifications developed by IEEE, and accepted in 1997, for wireless technology. An 802.11 network specifies an over-the-air interface between a wireless end-user and a base station or between two wireless end-users. There are several specifications that applies to wireless LANs (Local Area Networks) which includes 802.11 which provides 1 or 2 Mbps transmission in the 2.4 GHz band (using frequency hopping spread spectrum or direct sequence spread spectrum); 802.11a which is an extension to 802.11 and provides up to 54 Mbps in the 5 GHz band (using orthogonal frequency division multiplexing encoding); 802.11b which is an extension to 802.11 and provides 11 Mbps transmission with a fall back to 5.5, 2 and 1 Mbps in the 2.4 GHz band (uses only direct sequence spread spectrum); and 802.11g provides 20 up to 54 Mbps in the 2.4 GHz band.

WiMAX

WiMAX is an acronym for Worldwide Interoperability for Microwave Access. Products are certified if passing compatibility and interoperability tests for IEEE 802.16 standards, specializing in point-to-multipoint broadband wireless access (BWA) networks. 802.16 wireless connection technology is expected to enable multimedia applications with a range of up to 30 miles. There is a wireless industry coalition to advance IEEE 802.16 standards and develop and certify devices for the industry. 802.16a provides up to 75 Mbps.

WLAN (Wireless Local Area Network)

WLAN uses high-frequency radio waves between nodes rather than wires to communicate.

Ultra-Wideband (UWB)

UWB transmits ultra-low power radio signals with very short electrical pulses across all frequencies at once. Ultra-Wideband is a wireless technology that can transmit data at speeds between 40-60 Mbps, eventually up to 1 Gbps. Ultra-Wideband spans license and unlicensed frequencies and can be used indoors and underground.

3.3 Technical Obstacles

Some technologies require significantly more time and cost to implement then others. Some technologies are more future-proof than others. The following discussions touch on just some of the technical obstacles service providers and communities face when searching for the best solutions.

DSL (Digital Subscriber Line) **-** With DSL, line performance degrades with end-user distance from the telephone company's central switching office (CSO). Performance limitations result in provider's reluctance to deploy beyond about 15,000 feet, and therefore most potential DSL applications are looked at by establishing a 3-mile buffer zone around a CSO location[14].

ISDN Line (Integrated Services Digital Network) – ISDN has a basic rate of 128 Kbps and carries voice and data over the same line by sharing two channels A and B. A third channel, D, carries the call set-up information. If the phone is used, one channel drops resulting in 64 Kbps. Primary rate ISDN is the same technology, but uses 24 channels. Primarily used by businesses that relies on video-conferencing and/or downloading large files. It is relatively expensive for unlimited use[15].

[14] Source of information: Moving Towards Broadband Ubiquity in U.S. Business Markets, April 2001, Cahners In-Stat Group 2001.

[15] Source of information: Worwetz Education Systems, Inc. 2000-2001, Jacksonville, Florida

Cable Modem – The difference in delivery speed between theory and actuality is rather extreme and the majority of cable systems were designed only for one-way data transport, to send video to the home[16].

Fixed Wireless – Traditionally, fixed broadband services have been slow to develop partially because of challenges associated with the need for greater standardization in technology among hardware manufacturers[17].

Satellite-Because of shared networks, average data throughput may be significantly less than perceived purchased speed.

3G Wireless – Third-Generation technology data rates received by a user in heavy trafficked areas could be substantially less than perceived purchased speed. Speeds will also typically slow down as the mobile user's speed increases. The highest data rates will be available to stationary users.[18]

Further Discussion Regarding Wireless Service

One area of high interest throughout the United States is wireless broadband service. Over the past few years, wireless has been expanding rapidly from a LAN (local area network) technology to a quick-build, cost affordable WAN (wide area network) service offering in those expensive to reach and build rural areas and urban areas where it is hard to justify overbuilding of existing infrastructure. Wireless technology today does not provide the high bandwidth applications of IPTV, nor provide high quality VoIP with five nines reliability standards of lifeline support technology[19], nor bandwidth that is expected to be needed in years to come. This is a technology that is evolving rapidly, however, and much hope and investment is being invested in future generations of wireless to deliver very high bandwidth voice, video and data applications. Wireless technologies are usually an improvement over dial-up.

Four (4) significant trends energizing municipal Wi-Fi deployments are:

- Many local governments wish to deploy municipal broadband networks for public safety – as well as increased government efficiency.
- Alternative ISPs see mesh networking as a method to compete with incumbent service providers.
- Wireless mesh networking is seen as an efficient and cost-effective means of proving broadband access to underserved areas. This is true as the municipal Wi-Fi trend moves from larger cities into smaller towns.
- Potentially, wireless mesh networking technology can serve as a competitive tool for cable operators." [20]

The traditional argument that public funds should not be put at risk is diminishing because most cities are putting the onus of deployment, operation and management of the networks on third parties. Today, cellular broadband or sometimes called mobile broadband usually is referred to when discussing wireless technologies. Mobile broadband is still not utilized to any large extent as a main stream home or business facility broadband connection, but its popularity has significantly grown over the past few years. It is still often thought of a convenience technology for sales people and other professionals who are on the road traveling and needing access to the Internet

[16] Source of information: Moving Towards Broadband Ubiquity in U.S. Business Markets, April 2001, Cahners In-Stat Group 2001.
[17] Source of information: Moving Towards Broadband Ubiquity in U.S. Business Markets, April 2001, Cahners In-Stat Group 2001.
[18] Source of information: Moving Towards Broadband Ubiquity in U.S. Business Markets, April 2001, Cahners In-Stat Group 2001.

[19] The concept of five nines (99.999% uptime) was developed by Bellcore, now Telcordia as the standard for the portion of the elapsed time that devices such as local telephones should be operational. Five nines service corresponds to a down time of approximately 315 seconds/year.
[20] March 22, 2006 e-article by eMarketer Inc. (www.emarketer.com)

Pulaski County, Virginia

Today, the words **VISION, PRIDE, AND EXCELLENCE** form the core of the County seal. These words, penned over 10 years ago, summarize the history of Pulaski County and exemplify the spirit of its citizens as they work to create a strong community for future generations.

History

Creation & Early Years: The County of Pulaski was created from portions of Montgomery and Wythe Counties on **March 30, 1839 when Pulaski County became the 87th county of the Commonwealth of Virginia**. The County was named in honor of Count Casimir Pulaski, an exiled Polish nobleman who came to America and joined George Washington's army in 1777. After becoming a brigadier-general and chief of cavalry in the Continental Army, Count Pulaski gave his life in the cause of American Freedom when he was mortally wounded at Savannah in October 1779.

On May 9, 1839 sixteen (16) gentlemen justices, newly commissioned by the Governor of Virginia, met at James Tiffany's Tavern in Newbern to hold court and set up the new county government. One of the first actions taken by these gentlemen was the appointment of Benjamin R. Floyd, son of past Virginia Governor, as the county's first commonwealth attorney. Shortly thereafter, **the court divided the county into four districts, Northeastern, Northwestern, Southeastern and Southwestern.**

In 1886 the Town of Pulaski was incorporated under the name of "Pulaski City". The future county seat rapidly developed into a manufacturing center and railroad town. The Norfolk & Western Railroad made a valuable contribution to the new town in its early days by building the Maple Shade Inn. **The county seat remained at Newbern until the courthouse was completely destroyed by fire on November 27, 1893**. A big controversy subsequently developed between Newbern, Pulaski and Dublin as to where the county seat should be located after the burning of the Courthouse. Elections were held twice to determine the final location of the county seat. The second election finally wound up in the State Court of Appeals. **In March 1895, the court ruled in favor of the Town of Pulaski as the new county seat.**

Shortly after the turn of the century a group of progressive Pulaski County citizens organized the **"Pulaski Board of Trade".** This Board was created to seek diversified industries for Pulaski, including woodworking plants, furniture factories, overall and pants factories, cotton and woolen mills, and an ice plant. **The "Board of Trade" became the Chamber of Commerce in 1952.**

In 1905 the Pulaski Mining Company's plant was completed on a site lying between the Pulaski Iron and Dora Furnace. This was Pulaski's fourth heavy industry. This industry, known locally as the "Acid Plant", was contemporary with the Bertha Zinc Company, Pulaski Iron Company, and Dora Furnace. However, the Acid Plant outlived them all by many years. The Acid Plant was one of Pulaski's larger industries employing an average of over 250 men. During World Wars I and II the plant's production reached its peaks.

Farming in the early 1900's continued to be the basic industry of Pulaski County and had been developed to a high degree by generations of industrious and progressive farm families. Pulaski County gained a reputation for producing some of the finest cattle, horses, and sheep in America.

In 1934 at long last the great depression was loosening its grip on the county. Preliminary work had begun in preparation for the construction of Appalachian Electric Power Company's $11,000,000 hydro-electric dam on New River and construction of the Lowman's Ferry Bridge had been approved by the State Highway Commission. In addition, many young Pulaski County men were employed through federal programs such as the Works Progress Administration (WPA). Through the WPA, a number of relief works projects were completed, including highway and bridge building projects, landscaping, sanitation projects, distribution of surplus commodities, camps for the underprivileged children, and many other activities.

The 1950's brought prosperity to the county. The Pulaski County Livestock Market in Dublin had grown into one of Virginia's largest livestock markets. Most of the manufacturing plants of the 1930's continued to operate with expanding production at this time. In addition, Radford Army Ammunition Plant, located in nearby Montgomery County, provided many jobs for Pulaski County citizens. The New River Valley Airport and Piedmont Aviation provided daily passenger service utilizing the new airport. The Airport became the first of several regional initiatives to locate in Pulaski County and remains as a long standing example of regional local government cooperation.

In 1958 the new Courthouse was built behind the Old Courthouse facing Third Street in the Town of Pulaski. In addition, a **new Library was constructed and opened on Third Street in the Town of Pulaski in the late 1950's**. In 1965 Interstate Highway System 81 was completed through Pulaski County. Also during this same year, the **Ruritan National headquarters were moved from Wakefield, Virginia to Newbern.**

A **county building inspection department was also created in mid-1973. During 1974-75** the Board of Supervisors **converted the "Old Central School Building" into the County Administration Building** housing county offices and several state offices. The County Administration Building has since been renovated again and still serves as the local governing body's office building.

Recreation

Claytor Lake was created by Appalachian Power Company in 1939, after the construction of **Claytor Dam.** Today the dame generates 75,000 kW of "green" renewable electricity while holding back 4,475 acres (232,000 acre feet) of water. Its 100 miles of shoreline include gentle pastures, dramatic cliffs and many hidden coves ideal for summertime boat picnics and "jump-overboard" swimming. The shores of Claytor Lake host two of Virginia's most visited state parks. **Claytor Lake State Park** provides camping, hiking, boat rentals, rental cabins and conference room space, while the **New River Trail State Park** provides outstanding opportunities for horseback riding, hiking and bicycling.

The New River, along which the New River Trail parallels on its 52-mile journey to Galax and the historic mill town of Fries, is nationally recognized as one of two American Heritage Rivers in Virginia (the Potomac River is the other).

Located to the south of Claytor Lake is the **16,000-acre Boy Scout reservation** (the largest east of the Mississippi). Second nationwide in size only to the Philmont reservation in New Mexico, Camp Ottari, Camp Powhatan and the Claytor Lake Aquatics Center provide outdoor learning and leadership experiences for approximately 10,000 scouts every summer (see http://www.bsa-brmc.org/camp.htm for further details).

Located along the New River, eight miles downstream of Claytor Lake, is the **Virginia Tech Pete Dye River Course and the Heron's Landing at the River housing development** featured in the July/August edition of the New River Valley Magazine. This golf course, designed by world renowned architect Pete Dye, was selected by

Golf Magazine as one of the best new public access courses in the United States. The Virginia Tech River Course is joined by **three other courses in Pulaski County. The Pulaski Country Club, The Draper Valley Golf Course, 9-hole par 3 Lock Lowman course in Fairlawn.**

Motor Mile Speedway and Dragstrip. Unique in Virginia, the Motor Mile complex includes both a NASCAR sanctioned oval track and an eighth mile IHRA sanctioned drag strip.

Those who enjoy the quieter side of a summer evening might be found fishing, camping or looking for wildlife on **Gatewood Lake.** Or, area residents could just as well be enjoying the wonders of our **solar system at the Wysor Observatory on the campus of Dublin Elementary School**, which offer the personal and public access to a 16-inch telescope with a data base of nearly 65,000 celestial objects. Those with an interest in history can enjoy the **Wilderness Road Regional Museum** located along the original Wilderness Road in Historic Newbern, **the Raymond Ratcliffe Museum** in the restored Pulaski Train Station, the **Back Creek Civil War battlefield and historic areas in Newbern, the Town of Pulaski, Town of Dublin, Snowville and Hiwassee. The Farris Mines area**, located along Big Reed Island Creek, provides a view of what life was like when the area was a **producer of pig iron**. Remnants of the old furnaces and some company housing provide the unique opportunity to step back in history.

The beauty of the New River Valley, and of Pulaski County in particular, is captivated in the work of local and regional artists whose work is displayed and sold at the **Fine Arts Center for the New River Valley in downtown Pulaski.**

In 1998, the county received a donation of some 87 acres from a lifelong resident of the county, Evelyn Alexander. Ms. Alexander requested the land be used for a recreation park for the county citizens. She also requested the name "Randolph" be used in naming the park once it had been built in honor of Ms. Alexander's father, Randolph Alexander**. In 1999 ground was broken for construction of this park and the park officially opened on June 30, 2001. Today, Randolph Park** is a major attraction year round with children and individuals coming from as far as the Roanoke Valley to enjoy the outdoor heated swimming pool/water park, walking trails, playgrounds, and ball fields.

For one week every year, the night sky is filled with merriment when the **New River Valley Fair** gets underway. The celebration of life in Pulaski County takes place throughout the year beginning with the **Claytor Lake Festival** in June, county-wide July 4th events, the Count Pulaski Fest in September and **Newbern Fall Festival** in October. Family recreation is a year-round at **Randolph Park** where residents and visitors enjoy swimming, picnicking, walking, basketball, sand volleyball, tennis, softball and soccer. Since the construction of the **Evelyn Alexander Water Park** in 2000, Randolph Park has become a center for summertime activities regularly attracting over 50,000 visitors per summer from the greater Roanoke, West Virginia and North Carolina region.

Schools

After a summer of outdoor fun, the youth of Pulaski County are welcomed back to school where **five fully accredited schools** provide opportunities in winning sports programs, a state championship theater program, nationally competitive vocational programs, and an academic education which strives to meet a variety of abilities.

In the fall of 1970 New River Community College opened. This two-year state supported school is located just north of Dublin and serves students from the surrounding counties and the City of Radford. In 1974, the Dublin and Pulaski High Schools merged to become Pulaski County High School located at the center of the county near Dublin. A new elementary school, Critzer Elementary, was also built and occupied in the 1970's.

The Pulaski County School System is also host to the Southwest Virginia Governor's School for Math and Science offering advanced learning experiences for students throughout the region. Educational achievement by County students results in the award of well over $1.5 million in scholarships every spring. **With Virginia Tech and Radford University close by**, those scholarships can be well utilized without having to leave the New River Valley. Indeed, students from other localities are doing likewise and Virginia's New River Valley has become one of the major centers for higher education in Virginia, with college students accounting for over 25% of the region's population.

Those wishing to continue to live in Pulaski County can continue their education at **New River Community College (NRCC)**. Indeed, NRCC students can begin their education through the Early Learning Center, starting as early as age three. While attending high school, students can get college level credit through NRCC for classes taught at the **Southwest Virginia Governor's School**, as well as at **Pulaski County High School** through the Dual Enrollment program.

When students leave area high schools, they can continue their education through a variety of two-year programs provided by the College. **NRCC also serves as one of Old Dominion University's Teletechnet sites** which offer bachelor, master and doctoral level educational opportunities in many fields of study (business, communication, criminal justice, education, engineering technology, and health sciences). **New River Community College** supports and complements the outstanding educational offerings provided by **neighboring Radford University and Virginia Tech.** The end result is that Pulaski County residents have the opportunity to begin learning at age three, attend a great public school system, continue their education at four institutions (NRCC, RU, VT and ODU) to obtain their choice of an associate, bachelor's, master's, or doctoral degrees, then continue with computer and vocational classes, such as learning the thrill of riding a motorcycle safely or flying a plane through the private pilot ground school without ever having to leave Pulaski County.

Improvements to Pulaski County High School, as well as renovations to **Snowville Elementary** and **Critzer Elementary Schools**, were major accomplishments in the mid 1990's for the county citizens and its school children.

The county public school system operates eight (8) elementary schools, two (2) middle schools, one (1) high school, one (1) alternative school, and one (1) governor's school. The School Board members are elected by the voters every four years.

Businesses

The 1970's brought a number of changes to the county's economy. **Construction activity grew as formerly agricultural land was developed into industrial parks, housing developments and highways**. Despite a decrease in total acreage, the agricultural economy also grew and beef production reached an all-time high in the early 1980's. Also, a number of small shopping facilities sprung up with large chain stores experiencing the bulk of the merchandising business during this time period.

With **three of Virginia's Enterprise Zones**, **federal designation as a HUB Zone**, and an **activated Foreign Trade Zone**, business incentives are readily available. Those wishing to go into business for themselves can get a head start at the **New River Valley Competitiveness Center** and those who successfully grow their businesses have plenty of room to grow at the **700- acre New River Valley Commerce Park**. With the Commerce Park located adjacent to the New River Valley Airport, charter flights from abroad can directly clear customs through the **local U.S. Customs at the NRV Airport** and businesses can have their containers clear customs through the friendly service provided by the local office.

In 1974 White Motors built a new truck building facility **at Dublin** near the county high school. This heavy duty truck manufacturing facility became one of the largest employers in Pulaski County. Through various mergers and other means, **this facility is known as the New River Valley Truck Assembly Plant** in which both Volvo and Mack trucks are built. **The assembly plant currently employs approximately 1,700 individuals.**

The 1980's also saw significant shifts and a general diversification of the local economy as **defense related employment at the Radford Army Ammunition Plant declined** and local industries began being impacted by competition as products could be manufactured less expensively in other countries. **The closing of AT&T, Burlington Industries, Flow Laboratories, and Lee Jeans all took place in the late 1980's. Thankfully, the economic impact of these closings were buffered somewhat by the location of Bond Cote, BBA Friction, Motion Control, Renfro, and Warner Lambert. In addition, the expansion of the NRV Truck Assembly Plant attracted a number of supplier industries and other existing firms expanded.**

New challenges are faced in encouraging the growth of existing firms and recruiting new industries and businesses to Pulaski County, as the national economy moves toward imports under free trade legislation. Again, Pulaski County worked with her sister counties in the formation of the **New River Valley Economic Development Alliance in 1987 to jointly market the New River Valley and Virginia's First Industrial Facilities Authority in 1998 to jointly build industrial parks and share in the resulting tax revenues.** This legislation and its implementation was a first in the Commonwealth and continues the tradition of Pulaski County citizens being hardworking, honest and willing to work with their neighbors.

Airports

Should entrepreneurs or residents desire to travel, the **New River Valley Airport** is ready to give them wings to fly and a great place from which to take off and land. With the longest runway west of Roanoke and the best approaches west of Lynchburg, the New River Valley Airport offers full instrument landing, a 6,000-foot obstruction free runway, and automated weather observation services.

Water and Sewer

On April 19, 1974 the Pulaski County Public Service Authority supplied water service to its first customer in Pulaski County. A new water treatment plant facility was built in Draper in 1978 to supply the county's water needs. This facility pumps water from Claytor Lake and supplies water to PSA customers, as well as to the Town of Dublin.

In the 1970's local governments addressed national environmental problems by building on the regional model started with the construction of the New River Valley Airport. **Faced with new federal standards for clean water, the Town of Pulaski, the Town of Dublin, Pulaski County, the City of Radford and Montgomery County jointly merged existing sewer treatment plants into the Peppers Ferry Regional Wastewater Treatment plant**.

Solid Waste

This initiative was followed in the 1980's with the **joint utilization and development of landfills between the Town of Dublin, the Town of Pulaski, Pulaski County, and the City of Radford,** as various landfills ran out of space and the problems of locating and citing new facilities faced the various governing bodies. **The New River Resource Authority was formed and subsequently expanded to include Giles County, Montgomery County and other towns in the joint operation of the current landfill presently located on Cloyd's Mountain.**

Government

With three governments operating within Pulaski County, **the issue of consolidation was looked at in the early 1980's.** A consolidation advisory committee was appointed with members serving from all three governments to review the issue and determine advantages, disadvantages, and any cost savings. **A referendum on this issue was defeated by the voters of Pulaski County.** This issue divided many Pulaski County citizens in considering the impact of losing the identity of the two towns becoming shires within Pulaski County.

At the end of the 1980's on December 29, 1989 the Pulaski County Courthouse burned again with only the stone walls left standing. Many Pulaski County citizens were devastated by this fire. As in 1883 with the Newbern Courthouse burning, the issue of moving the county seat was again brought up. However, after much discussion and debate, the **citizens voted by referendum to finance rebuilding the courthouse in the Town of Pulaski.** Just three years later on December 29, 1992, the newly constructed courthouse was reopened to the public. A portion of the courthouse building now features historical exhibits and other artifacts of the county with courthouse tours given periodically.

In the 1990's the county continued to grow and develop. Again, the need to regionalize facilities proved economically prudent for the taxpayer. A new regional jail facility was built in Dublin and opened in April 1999.

According to the 2000 US census, the county's population was 35,127. **There are five (5) magisterial districts (Robinson, Massie, Cloyd, Draper, and Ingles) within the county. Five (5) members of the Board of Supervisors serve as the governing body, each representing one of the above noted respective districts.**

Library

In 1989 a new branch library was constructed and opened in the Town of Dublin. The library was named the Charles & Ona B. Free Memorial Library. There are also **two public libraries within the county with one being located within the Town of Pulaski and the branch library located within the Town of Dublin.**

Healthcare

The county has **one (1) medical hospital, Pulaski Community Hospital, four (4) nursing homes, and one (1) mental health facility.**

Tourism

In **October 2002 a newly constructed Pulaski County Visitors Center** opened in Pulaski County. Located off Interstate 81, this facility was built to promote tourism and showcase Pulaski County. **The facility also houses the Pulaski County Chamber of Commerce.** The Visitor Center is open seven (7) days per week and just recently celebrated its first full year of operation.

Utilities

Cable TV Franchise: **Jet Broadband, VA, LLC** – 10 Year term commencing on April 26, 2009 ending April 25, 2019. **Request by Shentel Cable to transfer Jet Broadband to Shentel.** Shentel agreed to dedicate and provide to the County on an exclusive, full time basis (24/7) at no cost to County or respective users thereof, one PEG (public educational and government) access channel for use on a shared use basis by (a) members of the public (e.g., individuals, groups, organizations or entities) residing in or otherwise located in or affiliated with the County,

(b) the public schools and public institutions of higher learning principally located or headquartered in or otherwise serving the County (including, without limitation, New River Community College, the County Government).

Comcast Cable: Wanting to close office in Pulaski, VA- County threatened breach claim and assessing liquidated damages under Section 10. Exchanged for list of other requirements including free high speed Internet service to all County and Town within Comcast service area. Free high speed Internet service to Fine Arts Center, YMCA, Pulaski Theater (and Municipal Building, the Raymond F Ratcliffe Museum, the Train Station and Calfee Park) and other non-profit, non-religious, non-governmental organizations in Town and County. Also reduction in standards for extension of new service from 30 dwellings per mile to 20 dwellings per mile as called for in paragraph 4.1 of franchise agreement.

Pulaski County Internet Connection (PCIC) Committee (April 29, 1997) www.swvgs.k12.va.us/public/pcic.html
Homepage maintained by Southwest Virginia Governor's School
PCIC Links – Local government, weather, news, educational institutions
Electronic Village Homepage – businesses, non-profit organizations and civic groups

Public Access Sites at which Computers are to be Installed (Grant Funding)

Dublin Town Hall	New River Community College	Pulaski Municipal Building
Pulaski County Library	Pulaski Senior Center	Dublin Library
Dalton Computers in Fairlawn	YMCA	Hiwassee Grocery Store
Snowville Fire Station		

Internet Service Providers

I-plus	Citizens Internet Service	US-Internet	Bell Atlantic

Attachment "B": April 29, 1997 Pulaski County Internet Connection to Eight (8) Public Access Sites

MEMO

TO: Joseph N. Morgan, County Administrator

FROM: Peter M. Huber, Assistant County Administrator

DATE: April 29, 1997

SUBJECT: Pulaski County Internet Connection Update

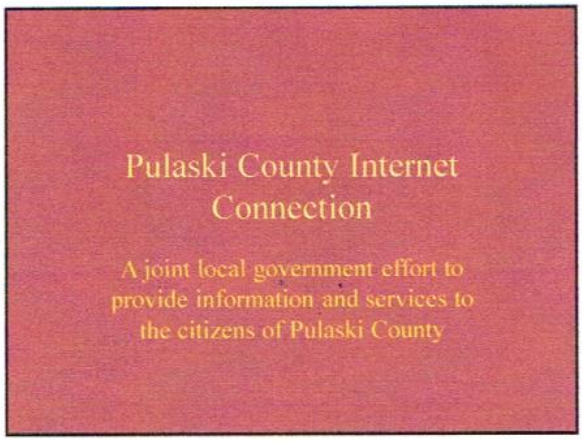
Thank you for your bid on the provision of internet service to the eight public access sites being established by the Pulaski County Internet Connection Committee. As per our conversation the following is a listing of the public access sites at which the computers are to be installed:

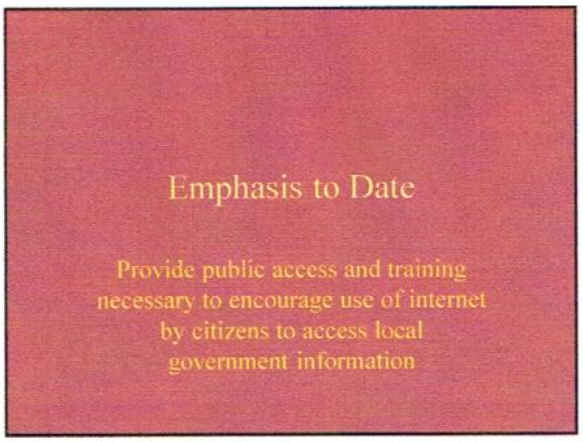
Dublin Town Hall	Gary Elander	674-4731
Pulaski Municipal Building	Barry Matherly	994-8636
Senior Center	Barry Matherly	994-8636
Dalton Computers in Fairlawn	Bob Bolling	639-2901
YMCA	Jack Layhee (sp)	980-3671
Hiwassee grocery store		
Snowville fire station	Bob Stephen	

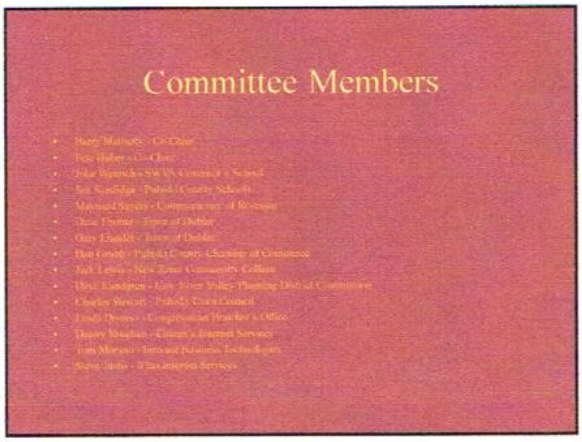
Each of these sites have been asked to arrange to provide a phone line and to contact you to schedule the delivery of the configured computer. Please let me know how I can be of assistance to you in setting up these sites.

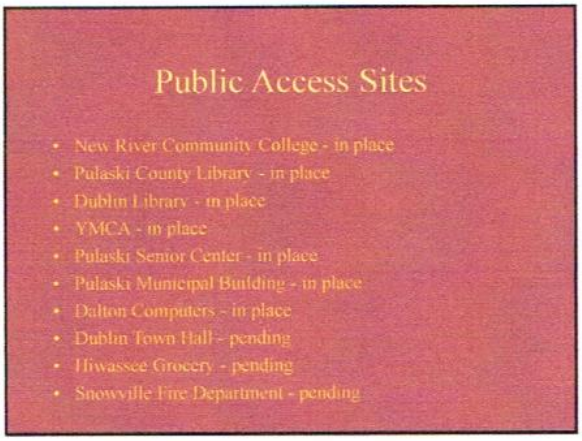
I would like to ask that the computers be setup to default to the PCIC home page which can be found at www.swvgs.k12.va.us/public/pcic.html.

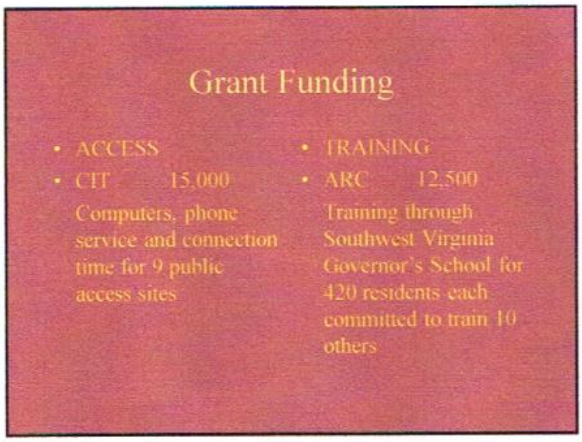
- **Pulaski County Internet Connection Power Point Presentation**











- **Pulaski County Internet Connection Scope of Service to Internet Service Providers**

Send to internet service providers: I-plus, citizens internet service, us-internet, Bell Atlantic, Sherry Vaughan, Aaron Smith, and PCIC committee members.

Scope of Services:

1. Provide a homepage listing Pulaski County businesses, non-profit organizations and civic organizations. Development of this home page must be in consultation with the PCIC committee. This homepage be linked exclusively to the PCIC homepage (http://pulaskicounty.org) by the Southwest Virginia Governor's School.

2. Establish links to individual homepages as part of this listing. It is anticipated that this linking service would be at no charge to the PCIC committee or to the individual businesses wishing to submit a link. The successful proposer would be the only internet service firm directly linked to the PCIC homepage.

3. Maintain and establish individual homepages as a paid service to local merchants, non-profit organizations and civic groups. The successful proposer may establish charges for this service and should include a rate schedule in the proposal.

4. Proposers are encouraged to offer real-time information such as job openings for major employers, pricing of specials, a calendar of events, etc. in the development of the homepage.

5. Services being procured under this proposal would extend for a period of three years assuming continued operation of PCIC.

Evaluation Criteria. Please address each of the following in your proposal.

1. Experience of firm;
2. Familiarity with Pulaski County businesses;
3. Pricing policies for development of individual homepages;
4. Willingness and ability to provide the above scope of services; and
5. Bandwidth to and capacity of internet server.

PCIC Homepage – maintained by SWVGS

PCIC links – Local government, weather, news, educational institutions

Electronic Village Homepage – businesses, non-profit organizations and civic groups

Links to specific sites established by proposer and/or others

- **Pulaski County Internet Connection Grant Expenditures 1997-1999**

CIT EXPENDITURES				
020-1227				
Date		To	Amount	For
2/7/1997		Bell Atlantic	36.05	Internet Access
4/11/1997		Bell Atlantic	26.69	Internet Access
5/9/1997		Bell Atlantic	28.17	Internet Access
6/4/1997		Bell Atlantic	38.58	Internet Access
6/4/1997		Bell Atlantic	26.36	Internet Access
				155.85
2/21/1997		Newland Computers	864.00	Computers
3/14/1997		Bell Atlantic	38.65	Internet Access
3/21/1997		Newland Computers	65.44	Computers
3/28/1997		Newland Computers	6,478.56	Computers
5/16/1997		I-Plus	1,176.00	Internet Access
5/22/1997		Wal Mart	81.36	Computers
6/6/1997		Newland Computers	188.00	Computers
6/16/1997		Citizens Telephone Cooperative	38.44	Internet Access
				8,930.45
7/18/1997		Bell Atlantic	16.46	
8/6/1997		Bell Atlantic	30.47	
1/16/1998		Bell Atlantic	25.56	
2/6/1998		Bell Atlantic	27.25	
2/20/1998		Dalton's TV Service	114.90	
3/13/1998		Bell Atlantic	28.63	
4/10/1998		Bell Atlantic	26.84	
4/10/1998		Fortres Grand Corp	105.00	
5/7/1998		Bell Atlantic	27.34	
6/5/1998		Bell Atlantic	26.45	
6/26/1998		Dalton's TV Service	114.90	
7/10/1997		Citizen's Telephone	25.54	
8/18/1997		Citizen's Telephone	24.95	
8/22/1997		Citizen's Telephone	100.00	
9/18/1997		Network Solutions	50.27	
9/18/1997		Citizen's Telephone	24.95	
10/17/1997		Bell Atlantic	27.54	
11/7/1997		Bell Atlantic	28.83	
				825.88
Total				9,912.18
Budget				15,000.00
Balance				5,087.82
Fy 1998-99		Bell Atlantic	54.22	

ARC EXPENDITURES				
020-1226				
Date		To	Amount	For
6/4/1997		SWVA Governor's School	950.00	Training
6/4/1997		SWVA Governor's School	1,950.00	
1/7/1998		SWVA Governor's School	250.00	
3/13/1998		SWVA Governor's School	700.00	
29-May		SWVA Governor's School		
7/21/1997		SWVA Governor's School	400.00	
7/24/1997		SWVA Governor's School	1,400.00	
12/19/1997		SWVA Governor's School	400.00	
12/19/1997		SWVA Governor's School	1,600.00	
9/18/1997		SWVA Governor's School	950.00	
		SWVA Governor's School	150.00	
		Pulaski County Library		
Total			8,750.00	
Budget			12,500.00	
			3,750.00	

Attachment "C": October 13, 2009 Pulaski County, VA Comprehensive Plan

The following information are related excerpts from the County's Comprehensive Plan found at http://www.XXXXXXXXXXX

County of Pulaski, VA Comprehensive Plan

GOALS AND OBJECTIVES

The primary responsibility of Pulaski County is to promote and protect the health, safety and welfare of the individual citizens of the county. In addressing this responsibility, the County has established the following goals. Subsequent text outlines the actions the County will pursue over the next five years to reach these goals:

Goal 1: Strengthen the county's economy through stabilization and diversification.

Goal 2: Provide adequate housing opportunities for all segments of the community.

Goal 3: Protect the natural environment for the health and benefit of the citizens of the County and provide adequate and varied recreational opportunities.

Goal 4: Provide the best possible distribution of land uses through land use management regulations, education & service provision.

Goal 5: Strengthen the county's education system.

Goal 6: Insure that adequate and efficient public utilities are provided to county citizens.

Goal 7: Improve existing transportation facilities and undertake necessary new road construction in the county.

Goal 8: Provide an Environmental Safe & Cost Effective Solid Waste Management

Goal 9: Provide efficient and effective county government.

Goal 10: Provide high quality and timely emergency response services and promote and strengthen medical services in the County.

Goal 11: Provide Adequate and Varied Recreational Opportunities

COMPONENT GOAL 1:

STRENGTHEN THE COUNTY'S ECONOMY THROUGH STABILIZATION AND DIVERSIFICATION

OBJECTIVE 1.1: Encourage new and expanded agricultural, commercial and industrial activities to increase and diversify the county's economic base.

Recommended Strategies:

1.1-1. The Board of Supervisors should actively support a countywide economic development program to attract new industry to the New River Valley and Pulaski County.

1.1-2. The Board of Supervisors should communicate and continue work with other jurisdictions in the New River Valley to develop a regional industrial park that will enhance the current inventory of available industrial land.

1.1-3. The County should maintain its leadership position in seeking and participation in industrial development opportunities in the New River Valley and beyond as they provide positive impact on the county's economic strength

1.1-4. The County's economic development efforts should promote improved wages and more job training opportunities for the residents of the County.

1.1-6 The County should encourage public and private initiatives that support the local farm industry including local foods programs, agricultural education, and incentives for local farmers to continue active production.

OBJECTIVE 1.2: Encourage the retention and expansion of existing firms.

Recommended Strategies:

1.2-3. The Board of Supervisors and Pulaski Encouraging Progress should encourage existing business to participate in surveys of wages and benefits to provide a database for new location and expansion decisions.

OBJECTIVE 1.3 Provide facilities and services required to attract new plant location and expansion decisions.

Recommended Strategies:

1.3-1. The Board of Supervisors and Pulaski Encouraging Progress should continue to support economic development programs focused on increasing retail and commercial businesses and employment in Pulaski County.

1.3-2. The Board of Supervisors should continue to work with the towns of Pulaski and Dublin in their revitalization efforts.

1.3-3. The County should work with multiple partners in the Public and Private sectors to encourage small business development.

OBJECTIVE 1.4 Support the provision of appropriate resources to allow the location and expansion of business in the county.

Recommended Strategies:

1.4-1. The County and Pulaski Encouraging Progress should update information available to new and expanding businesses on financial assistance from both the public and private sector.

1.4-3 Continue efforts to track economic indicators, and provide current information and assist in the development of facilities and services.

1.4-5. Coordinate site development and related information with other industrial development organizations, including the Virginia Department of Economic Development, New River Valley Economic Development Alliance, Appalachian Power Company, Norfolk Southern Railroad and New River Valley Planning District Commission.

1.4-6. Develop industrial park sites to provide for continued industrial expansion in the County.

1.4-8. The County through the efforts of Pulaski Encouraging Progress and the Industrial Development Authority should maintain a diverse inventory of available commercial and industrial land and buildings.

1.4.9. The County should support the development of commercial and industrial properties by applying for state and federal funding for the infrastructure necessary to support such development.

Objective 1.5: Diversify the County's Economy

Recommended Strategies:

1.5-2. Pulaski Encouraging Progress and the County should work with State agencies and tourism organization to promote Claytor Lake and the New River Trail State Park as tourist destinations.

1.5-3. The Board of Supervisors should promote economic development at a variety of locations throughout the County.

1.5-4. The County should promote the location of Bio-technical and Green Industries in addition to manufacturing.

1.5-5 The County should work with other organizations to develop and support entrepreneurial local agricultural and energy efficient economies and educational activities.

OBJECTIVE 1.6 Support the Agricultural Business Community.

Recommended Strategies:

1.6-1 Provide information related to programs offered by Regional, State, and Federal Agencies to allow additional business opportunities for the farming community.

1.6-2 Explore alternative partnerships to increase the profitability of local farms, including eat local incentives utilizing County produced foods.

COMPONENT GOAL 2

PROVIDE ADEQUATE HOUSING OPPORTUNITIES FOR ALL SEGMENTS OF THE COMMUNITY

OBJECTIVE 2.1: Address housing needs particularly those for low to moderate income families.

Recommended Strategies:

2.1-3. Board of Supervisors, Planning Commission and Public Service Authority should work to develop services and utilities necessary to support a diversity of housing including high-end single family housing within the County,

2.1-4 The Planning Commission and the Board of Supervisors should encourage local builders to build accessible housing for the disabled citizens of Pulaski County.

2.1-5. The County should work with non-profit and government organizations for the consolidation of services to provide accurate information regarding low income housing programs available.

OBJECTIVE 2.2: Promote fair and open housing for all.

Recommended Strategies:

2.2-1. The Housing Office should establish public information and educational programs related to housing. Devise and administer programs designed to inform all citizens about housing and housing related programs that are available at all levels of government, but particularly at the local level.

OBJECTIVE 2.3: Promote energy efficient development in the County.

Recommended Strategies:

2.3-1 The County should encourage land development that is energy efficient and utilizes green technologies.

COMPONENT GOAL 3

PROTECT THE NATURAL ENVIRONMENT FOR THE HEALTH AND BENEFIT OF THE CITIZENS OF THE COUNTY, AND PROVIDE VARIED RECREATION ACTIVIES.

OBJECTIVE 3.1: Protect the County's groundwater resource.

Recommended Strategies:

3.1-2. The County should encourage installation of the best available storage and monitoring technologies for storage of fuels and other toxic materials through cooperative efforts with the Virginia Water Control Board, Pulaski County Building Inspections Department, and the Planning Commission.

COMPONENT GOAL 4

PROVIDE THE BEST POSSIBLE DISTRIBUTION OF LAND USES THROUGH LAND USE MANAGEMENT REGULATIONS, EDUCATION & SERVICE PROVISION

OBJECTIVE 4.3: Place high value on the County's rural character, environment, and quality of life and ensure its long-term protection.

Recommended Strategies:

4.3-1. Pulaski Encouraging Progress Quality of Life Committee or a similar Committee should monitor key areas:

- Education - Health Care - Retail Services
- Recreation - Hospitality - Housing

4.3-2. The Board of Supervisors and County agencies should encourage and undertake:

- Governmental cooperation on service delivery
- Long range planning
- Addressing the County's medical service needs.

OBJECTIVE 4.4: Encourage growth in existing population nodes and focus future development into serviceable areas of the County.

Recommended Strategies:

4.4-4. The County should facilitate the incorporation of Urban Development Areas or areas designated by a locality that are appropriate for higher density development due to proximity to transportation facilities, the availability of a public or community water and sewer system, or proximity to a city, town, or other developed area.

COMPONENT GOAL 5

STRENGTHEN THE COUNTY'S EDUCATION SYSTEM

OBJECTIVE 5.1: Provide an educational program that will allow the children of Pulaski County to be competitive with their peers across the state and nation.

Recommended Strategies:

5.1-1. The County should pursue the education recommendations outlined by the Southwest Virginia Economic Development Commission, including:

- Local governments shall continue to support local spending on elementary and secondary education.
- General Assembly should fund a community college adult literacy program.
- Community colleges should focus on training and retraining the work force.

5.1-2 The County should develop and support educational and mentoring programs for all education levels for the advancement of newer technologies in the County and Region.

OBJECTIVE 5.2: Strive to reach and exceed the national average in measures of academic achievement.

Recommended Strategies:

5.2-1. The School Board and administration should in cooperation with the faculty initiate programs targeted at increasing achievement test scores at the elementary level to at least the 70th percentile.

5.2-4. School system faculty and staff should promote and encourage students at all levels to participate and achieve in academic contests, honors, SAT testing, merit scholar programs, and other academic programs.

OBJECTIVE 5.3: Reduce the school drop-out rate by one-half so that ninety percent of students entering the ninth grade will graduate from high school.

5.3-1. School system faculty and staff should set higher academic standards for both college preparatory and vocational programs of study and adopt a philosophy emphasizing the success of all students.

OBJECTIVE 5.4: Address adult illiteracy and education needs.

Recommended Strategies:

5.4-1. The School Board in cooperation with area industry and businesses should initiate a large-scale adult education campaign, which will significantly increase the school system's literacy and adult program offerings.

5.4-2. The school system should cooperate in developing this education campaign with the New River Community College and County business community.

5.4-3. The School Board in cooperation with area industry and businesses should undertake a program focused on increasing the number of GED (High School Graduate Equivalent Diploma) diplomas awarded in the County.

5.4-4. The School Board and staff should pursue implementation of community-based initiatives.

OBJECTIVE 5.5: Expand and improve communication between parents, teachers, administrators, school board, and superintendent.

OBJECTIVE 5.6: Promote the County library system that provides a learning resource and recreational opportunity for all age groups of Pulaski County's citizens.

Recommended Strategies:

5.6-4. Encourage the joint use of school and public libraries by the general public.

OBJECTIVE 5.7: Encourage the education of the County's young people and labor force in those emerging skills required to maintain their employability in the changing work place.

Recommended Strategies:

5.7-1. Pulaski Encouraging Progress should support training opportunities through New River Community College, local universities and School Board.

5.7-2. Pulaski Encouraging Progress should seek to utilize the high school and vocational school programs to encourage small business development as a part of their educational program.

5.7-3. Pulaski County should encourage and support the New River Community College in the implementation of the Workkeys assessment of students and members of the labor force to evaluate training needs and participate in changing economic conditions.

5.7-4. Provide leadership by having County Government and associated organizations have their jobs evaluated under the Workkeys Program as a model to encourage business and industry within the County to evaluate their jobs to allow the revision of the education and workforce training to support Pulaski County's employee training needs.

COMPONENT GOAL 6

INSURE THAT ADEQUATE AND EFFICIENT PUBLIC UTILITIES ARE PROVIDED TO COUNTY CITIZENS

OBJECTIVE 6.1: Insure that appropriate utilities are coordinated with development and available to the citizens of Pulaski County.

Recommended Strategies:

6.1-4. Provide public facilities at the most efficient scale, and plan for them together with citizen choice and participation, and encourage the provision of such services to maximize total benefits. The interjurisdictional cooperation in developing the Pepper's Ferry Wastewater Treatment facility has been very beneficial to the County. This effort and cooperative efforts with other jurisdictions should be supported.

6.1-7. Facilitate additional utilities such as high speed broadband through private public partnerships, to provide low cost service for citizens.

COMPONENT GOAL 9

PROVIDE EFFICIENT AND EFFECTIVE COUNTY GOVERNMENT

OBJECTIVE 9.1: Plans made in County government should involve citizen participation and input during the entire process.

Recommended Strategies:

8.1-1. All County agencies should conduct citizen surveys on relevant topics.

8.1-2. All County agencies should have a broad notification program prior to opportunities for public comment.

8.1-3. The County staff should continue to involve citizens in Committees guiding County projects.

8.1-4. The Board of Supervisors should continue to provide for citizen comments.

8.1-5. The County staff should continue to support development of events calendars, listings of community organizations, publicizing community events and educational opportunities, and publicizing additional programs.

OBJECTIVE 9.3: Provide government services as efficiently and effectively as possible; maintaining a constant commitment to providing the highest quality of administration and service provision at the lowest cost possible.

Recommended Strategies:

8.3-2. All County agencies should provide timely response to citizen complaints about service; courteous response to such complaints and track the occurrence of trends in complaints as to type service, frequency and location.

8.3-3. Coordinate inter-agency and inter-department communication and cooperation.

8.3-4. Expand Information Systems to improve services to the public and improve efficiency of governmental services.

8.3-6. The County staff should maintain an active grantsmanship program.

OBJECTIVE 9.4: Whenever possible, support government services through rate structures that allows the service to be self-supporting and so that the beneficiaries of the service bear the cost of service provision.

Recommended Strategies:

9.4-1. The Public Service Authority should maintain its mandatory usage policy for water and sewer and solid waste collection.

OBJECTIVE 9.5: Encourage Volunteerism.

Recommended Strategies:

9.5-1. The County staff should identify and list community projects that are needed.

OBJECTIVE 9.6: Balance the need for regulation with resulting costs and delays.

Recommended Strategies:

9.6-2. County projects should set the example for quality, appearance and functionality, so that the citizenry have high quality services and facilities and the development community understands what is expected of them.

COMPONENT GOAL 10

PROVIDE HIGH QUALITY AND TIMELY EMERGENCY RESPONSE SERVICES AND PROMOTE AND STRENGTHEN MEDICAL SERVICES IN THE COUNTY

OBJECTIVE 10.1: All possible efforts should be applied to lowering the ISO ratings in the County.

Recommended Strategies:

9.1-2. The Fire Protection Committee should support and facilitate developing a comprehensive training program for all fire response personnel.

OBJECTIVE 10.2: Insure that emergency services agencies are properly equipped to meet the County's emergency response needs.

Recommended Strategies:

9.2-1. The Board of Supervisors should continue the planned equipment replacement program.

9.2-2. The County Emergency Services Coordinator should assist the Emergency Medical Services Council to coordinate providing necessary equipment and facilities to the County's rescue squads.

OBJECTIVE 10.3: Provide a well prepared and organized emergency response.

Recommended Strategies:

10.3-2 The Emergency Services Coordinator should implement and maintain the all permissible technologies including Emergency Awareness systems and updates E-911 systems.

OBJECTIVE 10.4: Recognize the County's volunteer emergency responders as committed and important individuals to both their communities and the County as a whole.

OBJECTIVE 10.5: Continue to provide and strive for increased access to medical facilities for County Citizens.

Recommended Strategies:

10.5-4 Information related to medical services provided by the County, State, and Federal governments, and non-profit and private business should be available to all citizens in a simple to use and understandable format

COMPONENT GOAL 11

PROVIDE ADEQUATE AND VARIED RECREATIONAL OPPORTUNITIES

OBJECTIVE 11.3: A library system that provides a learning resource and recreational opportunity for all age groups of Pulaski County's citizens.

Recommended Strategies:

11.3-1. Study future expansion of the Pulaski County Library in association with the Public school's library system.

11.3-4. Encourage the joint use of school and public libraries by the general public.

11.3-5. Actively pursue development of an automated circulation and on-line search system.

Attachment "D": May 11, 2010 Letter to Comcast Cable re: Closing of Local Cable Office in Pulaski

County Attorney
P.O. Box 878
Pulaski, VA 24301
(540) 980-1360
(540) 980-5264 (FAX)

Pulaski County
In Virginia's New River Valley

May 11, 2010

Mr. Paul Comes
Director, Government and Community Affairs
Comcast Cable
400 Westfield Road
Charlottesville, VA 22901

Dear Mr. Comes:

I am writing at the request of the Board of Supervisors of Pulaski County, Virginia, with regard to your closing of your local cable office in Pulaski, Virginia.

The Cable Franchise Agreement, which was signed by a representative of your company in January of 2008, states in Section 4.4:

Local Office. Grantee shall maintain an office within the corporate limits of the County with normal operating hours. This office will accept customer payments, customer applications for installations and disconnection of service and reporting of service complaints.

Please be aware of Section 10 of this Franchise Agreement. Mr. Peter M. Huber, the County Administrator, has discussed this with your local manager. Please accept this letter as notice that the County believes removal of the office from Pulaski County is a substantial breach of this Ordinance of Franchise and will begin the procedure for assessing liquidated damages under Section 10 of this Franchise.

I will be glad to discuss this with you as will Mr. Huber. You may contact me at the above address and phone number and Mr. Huber at 143 Third Street, NW, Suite 1, Pulaski, Virginia, 24301, (540) 980-7705.

Sincerely yours,

Thomas J. McCarthy, Jr.
County Attorney

TJM/pl

cc: Mr. Peter M. Huber, County Administrator

- **Comcast Franchise Changes**

Elimination of paragraph 4.4 local office requirement is being offered in exchange for each of the following:

1. Free high speed internet service (including necessary cable modems) and cable TV service to all County and Town (either owned or leased) within the Comcast service area;

2. Free high speed internet service to the Fine Arts Center, the YMCA, the Pulaski Theater and other non-profit, non-religious- non-governmental organizations in the Town and County;

3. Ability to broadcast from Calfee Park and the Pulaski Theater;

4. $20,000 in sponsorships for Town sponsored events to be used as directed by the Town Council;

5. $20,000 in sponsorships for County sponsored events to be used as directed by the Board of Supervisors;

6. Establishment of customer access location in conjunction with a County, Town or local business to allow for citizen pick-up and delivery of cable TV boxes, cable modems and other equipment;

7. Publication of direct access (non-automated answering) phone number for citizen complaints staffed in conjunction with the normal operating hours of Comcast's Blacksburg office. Should the Blacksburg office be closed, non-automated phone service will be provided from 8 a.m. to 5 p.m. Monday through Friday;

8. Reduction in standards for extension of new service from 30 dwelling units per mile to 20 dwelling units per mile as called for in paragraph 4.1 of the franchise agreement; and

9. Elimination of $1.50 surcharge for residents using local payment offices.

10. Reduction of $1 per month in customer billings when compared to rates charged in Blacksburg and Galax both of which are served by customer service center.

It is understood that paragraph 4.4 of the franchise agreement will be automatically reinstated should any of the above performance standards lapse.

Attachment "E": 2010 Cable Television Franchise Renewal Resolution with Jet Broadband

RESOLUTION OF THE COUNTY OF PULASKI, VIRGINIA
APPROVING THE RENEWAL OF THE CABLE TELEVISION FRANCHISE

WHEREAS, JetBroadband VA, LLC ("Franchisee") owns, operates and maintains a cable television system ("System") serving the County of Pulaski, Virginia pursuant to a franchise agreement which expired on April 25, 2009 (the "Franchise") issued by the County of Pulaski, Virginia (the "Franchise Authority"), and Franchisee is the duly authorized holder of the Franchise; and

WHEREAS, Franchisee has requested the consent of the Franchise Authority for the renewal of the Franchise in accordance with the requirements of the Franchise and applicable law; and

WHEREAS, Franchisee has represented that it will comply with the terms and conditions of the Franchise; and

WHEREAS, the Franchise Authority believes that it is in the best interest of the community to approve the renewal of the Franchise granted to Franchisee.

NOW, THEREFORE, BE IT RESOLVED BY THE FRANCHISE AUTHORITY AS FOLLOWS:

SECTION 1. The Franchise Authority hereby approves and consents to the renewal for a term of ten years of the Franchise, all in accordance with the terms of the Franchise and applicable law and Franchisee shall comply with the terms and conditions of the Franchise.

SECTION 2. The Franchise Authority confirms that the renewal term of the Franchise shall be for a term of ten (10) years which shall be deemed to have commenced on April 26, 2009 and will end on April 25, 2019.

SECTION 3. This Resolution shall have the force of a continuing agreement with Franchisee, and Franchising Authority shall not revoke, amend or otherwise alter this

Resolution without the consent of Franchisee.

PASSED, ADOPTED AND APPROVED this _____ day of _____ , 2010.

COUNTY OF PULASKI, VIRGINIA

By: _____

Name: _____

Title: _____

ATTEST:

_____
Clerk:

- **June 28, 2010 Franchise Agreement Transfer from Jet Broadband to Shentel Cable**

From: David Ferguson <David.Ferguson@emp.shentel.com>
To: "phuber@pulaskicounty.org" <phuber@pulaskicounty.org>
CC: "Bill Young " <theyoungs434@verizon.net>
Date: 6/28/2010 4:56 PM
Subject: Franchise Agreement

Mr. Huber,

It was good talking to you today in reference to Shentel's request to transfer Pulaski's cable franchise from Jet Broadband to Shentel Cable. This e-mail will serve as documentation of Shentel's commitment to adhere to Item 2 of the franchise amendment dated June 2, 1997.

As stipulated in the amendment Shentel will agree to dedicate and provide to the County of Pulaski, on an exclusive, full-time basis (i.e., 24 hours per day, seven days per week), at no cost or expense to the County or the respective users thereof, one PEG (public educational and government) access channel for use on a shared use basis by (a) members of the public (e.g., individuals, groups, organizations or entities) residing in or otherwise significantly located in or affiliated with the County, (b) the public schools and public institutions of higher learning principally located or headquartered in or otherwise serving the County (including, without limitation, New River Community College), and/or (c) the County government.

In addition, Shentel will commit to working with the Pulaski County government and New River Community College to engineer an effective way to transport a quality signal for the inclusion of New River Community College programming placement on Pulaski County's PEG channel.

Hopefully the commitments outlined above demonstrate our desire to meet the needs of Pulaski County residents for public, educational, and government programming.

If I can answer any other questions, please do not hesitate to give me a call at 540-984-5263.

David Ferguson
V.P. - Customer Service
Shentel Cable

Attachment "F": April 19, 2012 Memo: re: Alternatives for Reestablishing The Citizen Service Office

TOWN OF PULASKI
Memo

TO: Crystal Gilliam, Manager Government and Regulatory Affairs

FROM: John J. Hawley, Town Manager

DATE: April 19, 2012

RE: Alternatives For Reestablishing The Citizen Service Office

C: David Warburton, Town Attorney
Mayor Worrell and Members of Town Council
Peter Huber, Pulaski County Administrator

Town Council had some questions related to the 4-12-12 email from Peter Huber to you.

1. Is this offer for each year of the franchise agreement?
2. Can you include the Fine Arts Center for free high speed internet as originally proposed?
3. Also, the original request was for high speed internet to Town and County facilities. The Town's facilities that would need high speed internet are the Municipal Building, the Raymond F. Ratcliffe Museum, the Train Station and Calfee Park.

Town Council appears okay with the progress towards resolving this issue pending Comcast's response to these questions.

Please give me a call if you wish to discuss. I look forward to your response.

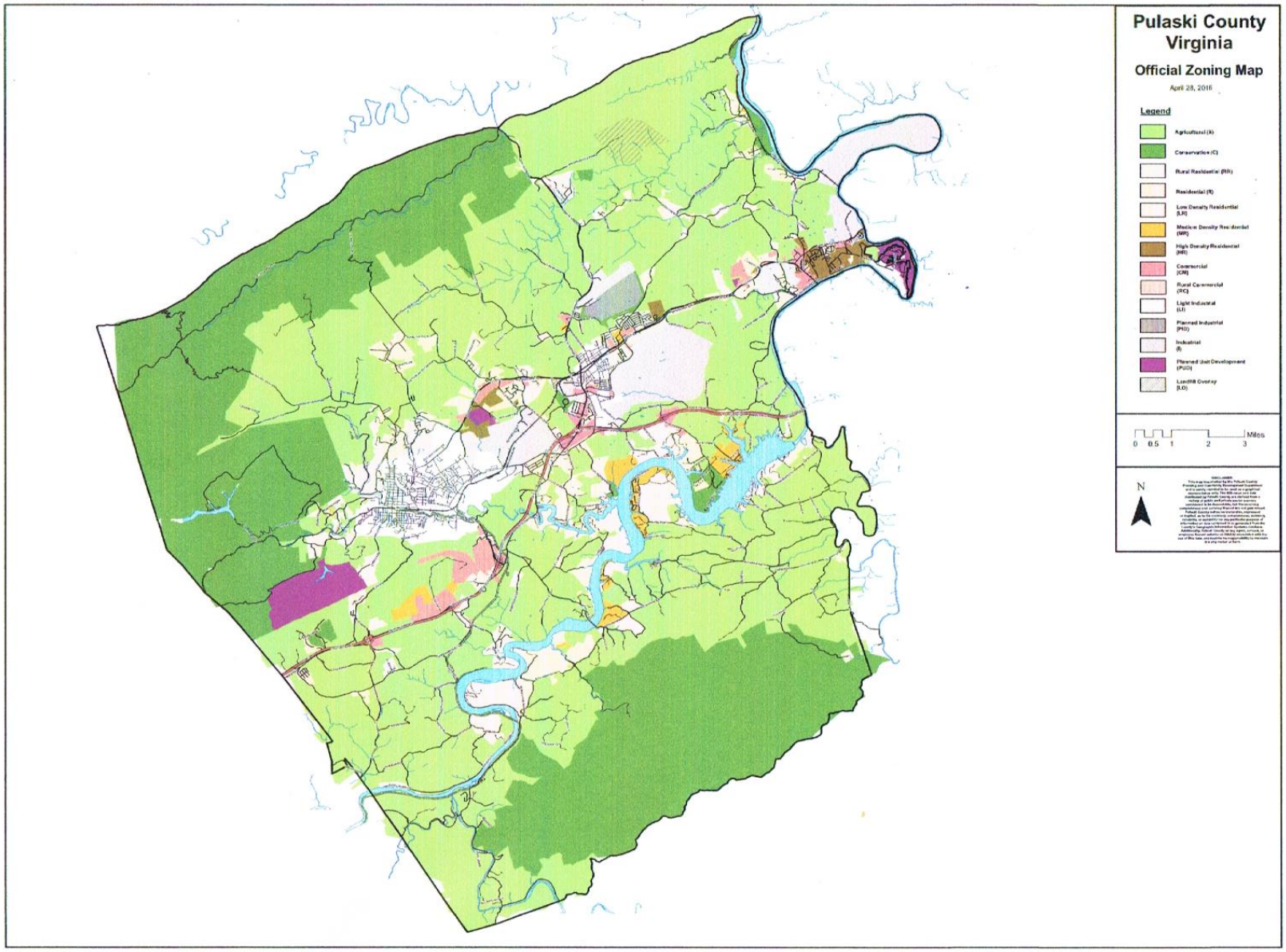
Tc/memo/mgr/alternatives for reestablishing the citizen service office

Unified Development Ordinance

Pulaski County, Virginia

Adopted October 26, 2015

Attachment "H": Pulaski County, VA Official Zoning Map



Attachment "I": Pulaski County Data Request, Including GIS Data & Maps

April 19, 2016 **Telecommunications Study Information Request**

Telecommunications Planning Services in Conjunction with the Pulaski County, VA Broadband Planning Project

(Please provide electronic copies if available)

1. Any previous telecommunications survey and results solicited by the communities and any other party the communities are aware of and feel relevant.
2. The following documents/information if available:
    - Comprehensive Plans
    - Zoning Maps and Requirements
    - Definitions used for urban, suburban and rural community classifications.
    - Subdivision and Land Development Ordinances
    - Economic Development studies, statistics and/or other information
    - Transportation Studies
    - Current Land Development Applications for institutional, commercial, manufacturing, or other industrial development
    - Any telecommunications proposals, plans, and existing infrastructure and service areas
    - Any Geographic Information System (GIS) data/maps associated with:

      <u>Background data</u>
        - Transportation Routes/Local Roads/Railroads
        - Municipal Boundaries
        - Parcels
        - Streams/ Other Water Bodies

      <u>Economic Data</u>
        - Major Employers
        - Growth Corridors/Areas and What Type of Growth
        - Tax Incentive Development Zones
        - Industrial/Commercial Parks
        - Hospitals and Other Health Care Facilities
        - Schools, Colleges and Vocational Institutions
        - Libraries
        - Police/Fire/Emergency/911 Centers (PSAPS)
        - Airports/Heliports
        - Shipping Ports
        - Municipal Facilities; i.e., Wastewater Treatment Plants, Water Plants, Town Halls/Garages, etc.
        - Business Districts
        - Utility Service Areas/Districts

      <u>Communication's Infrastructure</u>
        - Fiber Optic Lines and Providers
        - Central Office and Remote Cabinet Locations and whether DSL enabled
        - Cable Franchise Areas and where Cable Modem is Offered

- Wireless Towers/Antennae Locations/Service Areas
- Call Centers or Data Storage Facilities

- Telecommunications related studies and surveys
- Telecommunications and other voice, video, data access rates, availability and affordability information
- Names, addresses and phone numbers where available of residents and business properties in the communities (mailing lists/databases if available

3. Area telecommunications service listings and rates (voice, video and data), provider names and contact information, TV channel line-ups
4. Area utility service provider's names and contact information, services and rates
5. County elected and appointed official's names, association/organization position or title, contact information (including e-mail addresses)
6. Community officers and staff associated with project
7. Community stakeholders associated with this telecommunications initiative
8. Existing arrangements for telecommunications services; i.e., provider, connectivity bandwidth, rates, etc. for voice, video and data services
9. Cable TV Franchise Agreements
10. Area demographic information not found in the latest US Census data
11. What GIS coordinate system/projection is the counties using e.g. State Plane NAD 83 South feet.

Typically, GIS data layers that will aid in the analysis, it includes:

- Infrastructure,
- Political Boundaries,
- Land Use/Zoning,
- Any planning layers such as any data from a comprehensive plan,
- Parcels/Buildings/Anything with addresses for geocoding the survey results,
- Government Buildings (schools, hospitals, fire/police, etc.).

- All these data layers help to better understand the county, and once coupled with broad band data, a plan can better be prepared for where new projects should be focused

Attachment "J": Pulaski County, VA 2016 Broadband Assessment Survey

Internet Survey for Pulaski County, VA - 2016

Reliable high-speed internet access is important to keep pace with the world. Connectivity is essential for businesses, education, healthcare, emergency services, and the daily activities of residents. Pulaski County was fortunate to receive a Virginia Telecommunication Planning Initiative (VATPI) Grant to develop a plan that will lay the groundwork to improve and expand internet service in the area. Please help County officials obtain clarity in the need for affordable high-speed internet throughout the County. **Your response to this survey is critical.**

We encourage you to take this survey online at **www.pulaskicounty.org**, OR you may return your completed paper survey by mail or at one of several drop-off locations. Mailing and drop-off information is shown on the back of this form. Any questions about the survey may be directed to the County Administration Office at 540-980-7705. Please submit your survey no later than **July 22, 2016**. All individual responses are confidential. Thank you for your input!

LOCATION & INTERNET SERVICE:

1. What is the street address for this location? (Use physical address-no PO Boxes)
   A. Street address_____
   B. City_____, VA C. Zip code_____

2. Please check the most appropriate category for this location:
   ☐ Residence (Year Round) ☐ Residence with home-based business
   ☐ Seasonal Residence Only ☐ Business
   ☐ Government/Public Facility (including public safety facilities)
   ☐ Community Organization/Non-profit

3. Do you have Internet access at this location?
   ☐ YES ☐ NO ☐ I don't know

4. Name of company providing your Internet connection at this location?
   ☐ AT&T ☐ HughesNet ☐ TDS
   ☐ Citizens ☐ Lingo (MGW) ☐ T-Mobile
   ☐ Comcast ☐ Lumos Networks ☐ US Cellular
   ☐ Dish Network ☐ NRVUnwire (New River Valley) ☐ Verizon
   ☐ CenturyLink ☐ nTelos ☐ WildBlue
   ☐ DirectTV ☐ Shentel ☐ I don't know
   ☐ exede ☐ Sprint ☐ No Internet
   Other:_____

5. Which of the following best describes the type of Internet service you subscribe to at this location? (*See reverse side for definitions)
   ☐ No Internet service
   ☐ I don't know
   ☐ Dial-up phone line
   ☐ Cellular service or mobile card (LTE/4G or 3G)
   ☐ Satellite or Microwave (dish)
   ☐ Wireless (from service provider, not home network)
   ☐ DSL (higher speed across telephone line)
   ☐ Cable Modem (co-axial or fiber)
   ☐ ISDN (Business)
   ☐ T-1/DS3 Line (Business)
   ☐ Fiber Optics

6. To the best of your knowledge, how much are you currently paying per month just for Internet access (unbundled)?
   ☐ No Internet access ☐ Under $30 ☐ $30-$50 ☐ $51-$70
   ☐ $71-$100 ☐ $101-$300 ☐ $301-$500 ☐$501-$1,000
   ☐ $1,001-$1,500 ☐ Over $1,500 ☐ I don't know

7. Thinking about your current communication expenses, how much would you be willing to pay per month for a combination package of high speed Internet, telephone and pay TV services?
   ☐ $100 or less ☐ $101-$125 ☐ $126-$150 ☐ $151-$175
   ☐ $176-$200 ☐ $201-$299 ☐ $300 or more ☐ Not Interested

8. If affordable wireless high-speed Internet access was available in your community, how likely would you be to subscribe to this service?
   ☐ Very likely ☐ Somewhat likely ☐ Not likely

9. How important is Internet access to you/your household or business?
   ☐ No opinion ☐ Not important ☐ Somewhat important
   ☐ Very important or critical

10. How many computers, tablets, iPads, wireless phones, and/or other devices utilize an Internet service at this location? _____

11. In the past 6 months, which of the following activities have you performed online and/or conducted at this location? (*Check all that apply*)
   ☐ Searched for travel related info ☐ Completed school assignments
   ☐ Searched health or medical info/Telemedicine ☐ Used E-mail
   ☐ Purchased products or services ☐ Followed social media
   ☐ Sold products or services (Facebook, Twitter, etc.)
   ☐ Visited a News website ☐ Employment Functions
   ☐ Researched a major purchase (Teaching, Buying/Selling Stocks, etc.)
   ☐ Communicated with a teacher
   ☐ Searched for a job
   ☐ Took an online course/Distant Learning/Telestudent
   ☐ Visited government website
   ☐ Searched info related to school
   ☐ Performed bank transaction
   ☐ Download/watched video online

12. Please rate your current speed of connection (bandwidth):
   ☐ Very satisfied ☐ Somewhat satisfied
   ☐ Somewhat dissatisfied ☐ Very dissatisfied

13. Please rate the customer service and support from your provider:
   ☐ Very satisfied ☐ Somewhat satisfied
   ☐ Somewhat dissatisfied ☐ Very dissatisfied

14. How would you describe your overall satisfaction with your current Internet service?
   ☐ Very satisfied ☐ Somewhat satisfied
   ☐ Somewhat dissatisfied ☐ Very dissatisfied

15. Reason for dissatisfaction?
   ☐ Price too high ☐ Unreliable ☐ Lack of technical support ☐ Problem w/E-mail
   ☐ Poor customer support ☐ Slow connection/Not enough bandwidth (speed)

16. If you do not subscribe to a high-speed Internet service (faster than dial-up over the telephone line), why not?
   ☐ Not available in my area ☐ Too expensive ☐ Not reliable/secure
   ☐ Using Internet elsewhere ☐ Lack of Internet service set-up support
   ☐ Lack of computer set-up and use support ☐ Not interested in this service

CELLULAR PHONE SERVICE:

17. Do you have cellular phone service? ☐YES ☐NO ☐I don't know

18. Name of the company providing your cellular service?
   ☐ AT&T ☐ Sprint ☐ Tracfone
   ☐ Net 10 ☐ Straight Talk ☐ Verizon
   ☐ nTelos ☐ T-Mobile ☐ US Cellular
   ☐ I don't know ☐ No cellular service Other: _____

19. Do you have reliable cellular coverage when using it at this location?
   ☐YES ☐NO ☐I don't know

DEMOGRAPHIC INFORMATION: If you checked "Residence (Year Round)" or "Residence with home-based business" or "Seasonal Residence Only" for #2, please complete the following questions of the survey. *Please note that demographic information is confidential and will only be used to assist in qualifying the County for future grants related to broadband implementation.*

20. What is your age? (the person actually filling out the survey) _____

21. What is the number of people living in this household? _____

22. How many children (under 18) live in this household? _____

23. How many persons 62 years or older live in this household? _____

24. Are there any disabled persons residing at this household?
   ☐ YES ☐ NO If YES, how many? _____

25. Does anyone in your household use the Internet to complete school assignments or job training course work?
   ☐ YES (K-12) ☐ YES (2 or 4 year college) ☐ YES (Graduate School)
   ☐ YES (trade school) ☐ NO

26. ANNUAL HOUSEHOLD INCOME: Household income is defined as income of all adult (18 and older) household members received from all sources such as wages, salaries, interest income, investment income, social security, public assistance, or other sources. (*Check only one*)
   ☐ $32,150 or less ☐ $32,151 - $36,750 ☐ $36,751- $41,350
   ☐ $41,351 - $45,900 ☐ $45,901 - $49,600 ☐ $49,601 - $53,250
   ☐ $53,251 - $56,950 ☐ $56,951 - $60,600 ☐ More than $60,600

Continue if you selected Residence with a home-based business in Question #2.

ADDITIONAL BUSINESS QUESTIONS: If you checked any category other than "Residence (Year Round)" or "Seasonal Residence Only" for #2, please complete the following questions and YOU'RE DONE!

27. Please check the type of business conducted at this location *(Check one)*:
   ☐ Accounting ☐ Architecture/Engineering
   ☐ Agriculture/Forestry/Mining ☐ Business and Personal Finance
   ☐ Communication/Technology ☐ Contractor/Construction
   ☐ Finance/Insurance/Real Estate ☐ Education
   ☐ Healthcare ☐ Government
   ☐ Retail Trade ☐ Wholesale Trade
   ☐ Non-classified ☐ Other _____

28. How many employees work at this location? _____

29. Do you utilize a VPN (Virtual Private Network) for employees to work from home? ☐ YES ☐ NO ☐ I don't know

30. How difficult is it to find employees with computer, software, and Internet skills from the local area?
   ☐ Very difficult ☐ Somewhat difficult ☐ Not difficult

31. How difficult is it to find and provide the appropriate training for employees in computer, software, and Internet applications?
   ☐ Very difficult ☐ Somewhat difficult ☐ Not difficult

DO YOU HAVE ADEQUATE, AFFORDABLE INTERNET SERVICE? TELL US ABOUT IT!!!

TYPES OF INTERNET SERVICE: For Question #5 of the survey

* Dial-up phone line - A slower 'landline' connection often provided by a telephone company. This type of connection produces a 'dial-tone' and 'connect-tone' when connecting the modem.
* DSL phone line - Digital Subscriber Line, a higher speed landline connection often provided by a telephone company. This type of modem connection is 'always on.'
* Cellular service or mobile card - A higher speed connection provided by your cell phone service, may be provided as a data package added to your existing cell phone service. LTE/4G means Long Term Evolution (high-speed data for phones & other mobile devices)/Fourth Generation data technology for cellular networks –following 3G (Third Generation) technology.
* Fixed wireless - Higher speed through an external receiver on your premises or an antenna connected to your computer.
* Satellite - Higher speed connection from a satellite dish.
* Cable Modem - Higher speed connection often provided by a cable TV company, may be bundled with television and phone services.
* Fiber - High speed fiber-optic connection. This is a dedicated circuit, typically used in businesses.
* Other *(please specify)*: Example – WiFi from an external source.

ONLINE SURVEY OPTION: We encourage you to take this survey online. To do so, you may find it at the following web address.

www.pulaskicounty.org

DROP-OFF LOCATIONS/RETURN BY MAIL: For your convenience, the following locations have volunteered to be pick-up and drop-off locations for surveys. Please be sure to seal your survey prior to drop-off or mailing. To return your survey by mail, please fold it in thirds (1/3) with return address and stamp location to the outside, seal it with tape (no staples), attach a stamp, and drop it in any mailbox.

Return by Mail	Drop-off Locations
Pulaski County County Administration Office 143 Third Street, NW Pulaski, VA 24301-4900	County Administrator's Office Pulaski County Library Free Memorial Library Pulaski County Chamber of Commerce

PLACE STAMP HERE

Please mail your completed survey to:

PULASKI COUNTY
COUNTY ADMINISTRATION OFFICE
143 THIRD STREET, NW
PULASKI, VA 24301-4900

Attachment "K": Pulaski County, VA Potential Wireless Solutions Supporting Information

Potential Solution Region/Site	Coordinates	#	Housing Units	Poor Cell Service?	Access Rd - Existing or Proposed	Access Rd Length	Grade Change	Connecting Road	Proximity to Fiber	Mapped Potential Tower Site?	Mapped Existing Tower/Tank?	Public or Private?	Notes
Along Little Creek Rd.- Western half along north-west boundary of County	37.095632, -80.876967	1	19	Partially					3 mi to potential	YES	NO		
	37.170373, -80.784987	2	47	Partially	Existing dirt/grass farm road would need to be enhanced	3300	7%	Little Creek Rd - dirt/grass	1 mi to potential	YES	NO		
Along Little Creek Rd.- eastern half along north-west boundary of County	37.184005, -80.751847	3	47	NO					2 mi to potential	NO	NO		
Cox Hollow Rd and Mines Rd	37.083527, -80.81506	4	93	MOSTLY	proposed	155	23%	good condition - Winding Way Drive	1 mi to potential	NO	NO	private - Robinson Tract	
	37.095632, -80.876967	5	19						3 mi to potential	YES	NO		
West of the Town of Pulaski	37.065633, -80.783322	6	93	NO					1.5 mi	NO	TOWER		

	37.079009, -80.799910	7	93	MOSTLY	Existing 11' wide paved access road would need to be enhanced	650	13%		3 mi	NO	TANK		
Alum Spring Rd. and Black Hollow Rd. north of the Town of Pulaski and northwest of Dublin	37.143190, -80.7970	8	169	partially	on route 643		>25%	643 Alum Spring Rd - heavily wooded; in foothills	at potential fiber	YES	NO	public - park	top of mountain - better range
	37.184005, -80.784987	9							3 mi to potential	NO	NO		
(ADDED LATER) Alum Spring Rd. and Black Hollow Rd. north of the Town of Pulaski and northwest of Dublin													
Forrest Circle and Highland Rd. near Regional Airport Above Dublin	37.196081, -80.668876	10	169	NO	depends on location of tower on property (>100')		depends	good condition - Cloyds Mtn Rd	2.5 mi	YES	NO		landfill
Hiawassee Area	36.969161, -80.713530	11	184	HALF					NO	NO	NO	FIRE STATION	medium-high density within a mile, but this area does not have poor cell service
	36.948406, -80.713530	12	134	HALF					NO	NO	NO		1/2 in unreliable cell service

	37.018985, -80.623147	13	166	NO					NO	YES	NO		
	36.994472, -80.770985	14	245	PARTIALLY	proposed	2000	3%	grass/weeds/brush; through farm	.5 mi	NO	TANK	private - farm	high-density area not in poor cell service area
	37.004871, -80.746549	15	332	half				good condition - Academy St	YES	NO	NO	FIRE STATION	
Boy Scout Camp East of Hiwassee to County boundary	36.951631, -80.662567	16	79	yes					NO	NO	TOWER		
Green House Rd., Gum Log Rd., and Simpkinstown Rd. along south-eastern boundary line of County	37.023720, -80.593500	17	384	mostly					NO	NO	NO	FIRE/RESCUE	
Shelburn Rd. and Burma Rd. along central eastern boundary line of the County	37.068450, -80.579660	18	375	mostly	existing gravel parking lot			good condition - Shelburne Rd	3 mi	NO	NO	public - fire station	
	37.113821, -80.561850	19											IN RADFORD NOT IN PULASKI
Beamer Hollow Rd., Jennings Rd., and Miller Line in center of County just south of 81	37.020405, -80.720228	20	251	partially			5%	10' wide with sharp turn (almost 180) paved private driveway	close	NO	TANK		

	37.004779, -80.683695	21	248	half					.5 mi	NO	TOWER		
Pea Creek Area	37.070139, -80.699930	22	460	partially	Existing 11' gravel access road would need to be enhanced	500	6%		YES	NO	TOWER		
Parrott River Rd in northeast corner of county	37.205640, -80.615850	23	242	partially					NO	NO	NO	FIRE STATION	only half of range is in Pulaski
	37.217050, -80.626219	24	242	partially					NO	NO	TANK		less than half of range is in pulaski, minimally in poor cell service
Area near state park road, south of 81	37.074824, -80.663557	25	617	partially	proposed	275	15%		.5 mi	NO	TANK		
Cloyds Mountain, Dublin, VA	37.1804098, -80.7231911	26		NO						NO	YES	Ron Hines	almost half of range outside pulaski
Lyons Rd / Redwood Lane, Dublin, VA	37.071095, -80.6494748	27	617	partially	proposed	205	11%	to be enhanced 650 ft.	1.5 mi	NO	NO	private - Ron Hines	captures medium-high density area with poor cell service and portion of other areas with low cell service

Acknowledgements

While every effort has been made to accurately document the origin and sources of information received and used within this report, multiple parties provided a vast array of resources and it is possible footnotes, end-notes, other references or acknowledgement were missed and/or an interested party may need to go to the original document to see the complete list of participants and resources in the preparation of the information. If an omission or error is noted, Consulting Gateway Corporation (CGC) sincerely apologizes and the party discovering such unintended omission or error should contact CGC and corrections will be made and the report resubmitted to the county for distribution. Every reasonable effort has been made to assure the accuracy of information contained within this report through the use of standardized, reliable data sources, including the communities and service providers. However, CGC provides this information 'as is' and therefore assumes no liability arising from the use of this report or data.

Contributing Participants and/or Information Resources

- Members of the Pulaski County, VA Broadband Study Project Management Team
- Staff, elected officials and citizens of Pulaski, VA
- Emergency Response Center and Personnel for Pulaski, VA
- Pulaski County Comprehensive Plan
- Commonwealth of Virginia Housing and Community Development
- Consulting Gateway Corporation, Fleetwood, PA
- Dewberry Engineers, Inc. Glen Allen, VA
- MLMapping Wyomissing, PA
- Citizens Telephone Cooperative, New Hope, VA
- Lumos Networks Waynesboro, VA
- MGW Telephone Williamsville, VA
- Lingo Networks, Staunton, VA
- ValleyNet (Partnership of Century Link, Lumos Network and Shentel) Waynesboro, VA
- Verizon, New York, NY
- Service Corps of Retired Executives, Virginia www.score.org
- Virginia Employment Commission www.vec.virginia.gov
- Virginia Small Business Development Center (VASBDC) www.virginiasbdc.org
- http://www.cspdc.org
- http://quickfacts.census.gov