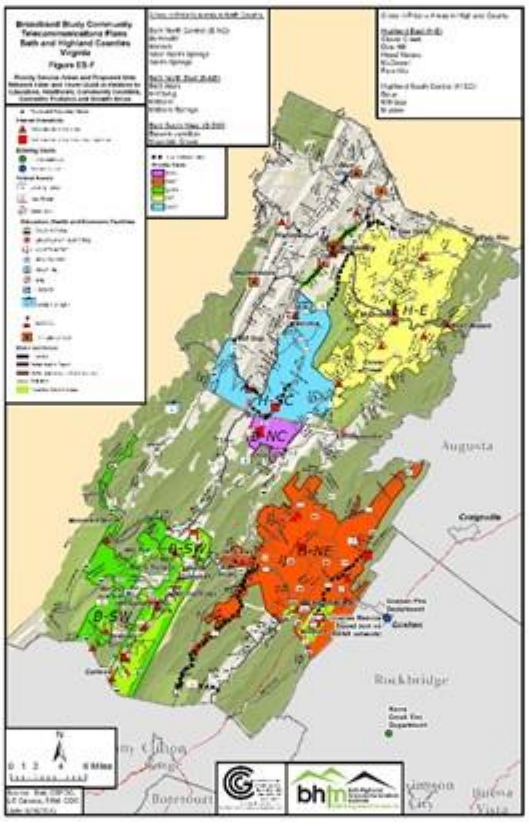
Bath & Highland Counties, VA Community Broadband Telecommunications Strategic Plan
June 30, 2015



Submitted by the bhtn Project Management Team
Assisted by:

COMMUNICATIONS CONSULTING SERVICES INC.

The Telecommunications Division of

Consulting Gateway Corporation

"Your Portal for Engineering, Consulting, IT and Management Services"

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In Association with:

Dewberry

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June 30, 2015

TRANSMITTAL LETTER

Mr. Ashton Harrison
Bath Counties Administrator
Bath County
51 Courthouse Hill Rd
Warm Springs, VA 24482

Roberta Lambert
Highland Counties Administrator
Highland County
140 Fleisher Avenue
Monterey, VA 24465

RE: Bath-Highland Counties' Broadband Telecommunications Planning Project

Dear Counties' Administrators and Elected Officials:

Consulting Gateway Corporation (CGC) and Dewberry are pleased to provide the Community Broadband Telecommunications Planning Project study report for Bath and Highland Counties. This report provides guidance to meet the established project milestones and expectations of the communities while fulfilling the requirements of the Commonwealth of Virginia Rural Broadband Planning Initiative funded through the Department of Housing and Community Development (DHCD). Furthermore, the recommendations and detail provided have been developed to facilitate applications for typical funding assistance for future implementation projects associated with a community broadband network.

After examining the options and roles for the Counties to consider while incorporating typical funding opportunities, it is our recommendation that the Counties can best meet their stated goal of enhancing and encouraging high speed Internet connectivity throughout the counties 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. While five (5) options are presented for consideration, the Project Management Team, along with the consultants, feels only the first three (3) options are cost feasible and doable at this time given the resources available to the counties. The fourth and fifth options are likely to become more feasible if a cost share, cooperative Public-Private-Partnership (PPP) is created. The options are not exclusive of each other and it is believed the most impactful solution may be a combination of some of the above solutions. Details on these options are outlined in the study report.

Last Mile Connectivity Solutions	**Considerations**
Option No. 1 – bht Network Assistance Program	Least Risk, Effort, Expense, Impact & Timeliness
Option No. 2 – Network Extension Funding Public Private Partnership	Provides Incentive for Private Borrowing
Option No. 3 – Customer Premise Equipment Last Mile Cost Subsidy	Aids Low to Moderate Income
Option No. 4 – Wireless Service	Aids Broadband & Emergency Communications
Option No. 5 – Network Build including "Homes with Tails"	Most Risk, Effort, Expense, Impact & Timeliness

A significant catalyst in arriving at these options was direct input from the dominant 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 delivering FTTX is the last mile cost and build.*
- The best way the counties can assist the service providers in enhancing Internet last mile connectivity is to ***assist in structuring low interest financing and assist in cost sharing or structuring last mile connectivity solution options.***

Project Management Team Feedback

- The municipalities would prefer not to own or operate network infrastructure of facilities.
- While the counties are willing to make some manageable investment into enhancing Internet access within the counties, 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 each county can consider their comfort level in moving forward.

By partnering with the private sector the Counties will minimize their investment and risk while meeting the need to address enabling broader service delivery. The State of Virginia encourages rural municipalities to establish partnerships with private providers to enhance broadband service delivery to businesses and citizens. The most successful solutions will likely consist of the counties assuming a liaison role between the service providers and the customers, exchanging commitment for infrastructure investment with commitments for service, assistance with funding applications, potential last mile cost subsidy or sharing, and perhaps access to vertical assets at reduced rates. It is not recommended that the counties proceed with any of the above options without getting cooperation and buy-in from the areas service providers.

The counties could implement the first three (3) 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. Especially since 2 of the 3 existing incumbent Internet Service Providers noted that a Fiber-to-the-Home (FTTH)/Fiber to the Premise (FTTP) is included in their business models over the next few years. Depending on the progress and ability to secure funding for the Emergency response radio communications initiative, a modified solution of the wireless service in Option No. 4 may also have some merit. If Option No. 5 is pursued, further study and discussions with the service providers is warranted to determine the best locations in each county for middle and last mile fiber build.

Regardless of the elected officials' decision on implementation, the Communities' Telecom Planning Study has collected, organized and mapped out significant data on the study area end-user perceptions, as well as service providers' 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 Counties in bringing this vital infrastructure to these Communities.

Sincerely,
Consulting Gateway Corporation

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Enclosure: Bath and Highland Counties, 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), Bath and Highland Counties have 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 Counties broadband Needs Assessment reviews population 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 quality of life criteria such as education, libraries, and unemployment statistics. Surprisingly, Bath and Highland Counties has significant middle mile fiber optics communications infrastructure in-place deployed by the Highland Telephone Cooperative (HTC), MGW, TDS and Lumos Networks. The problem is lack of last mile connectivity infrastructure, as well as pockets of unmet needs and where there is no significant communication infrastructure currently. By reviewing the community profile information as well as the infrastructure map, it is apparent the communications corridors primarily follow Route 220 from the south end of Bath County (Carloover) all the way to the north end of Highland County (beyond Blue Grass); along 42 from the south end of Bath County to Millboro Springs; east to west along Rt. 39 from Millboro Springs to Mountain Grove; and along Route 250 between Headwaters, through McDowell and Monterey near the west boundary line of Highland County.

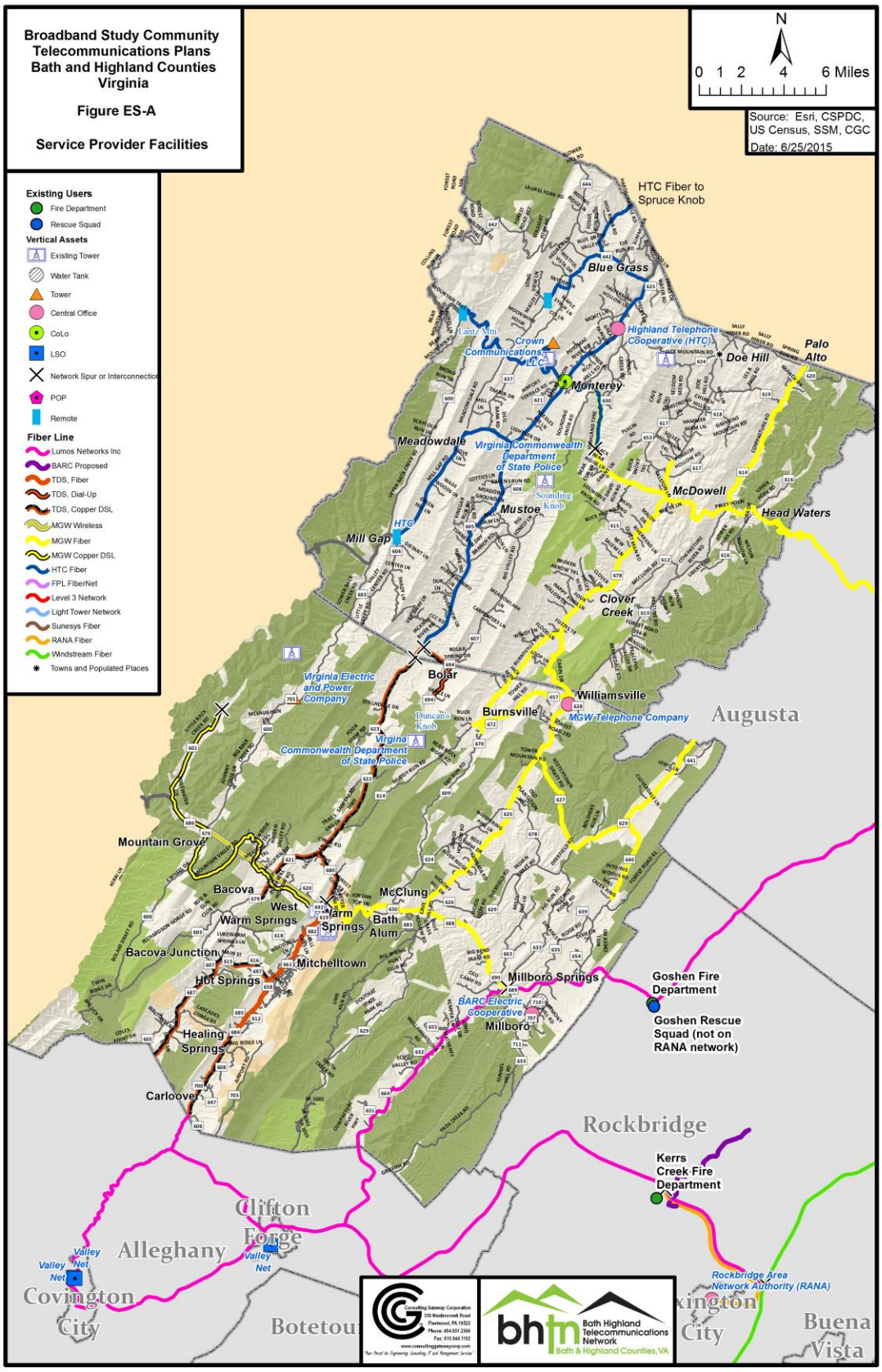
ES1.0 Needs Assessment and Asset Inventory

Region-Wide Data and Maps

The Needs Assessment was completed using existing data such as Comprehensive Plans, Zoning Maps and other studies, as well as new data collected through the 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 such as the Emergency Response Radio Communications study and proposed tower build locations 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: Service Provider Facilities**

Figure ES-A: Service Provider Facilities



ES1.1 Highlights of Survey Response in the Study Area

The following sections provide an abbreviated summary of the survey responses for the study area:

ES1.1a All Surveys

- 233 (48.4%) Surveys were completed by person between the ages of 21-65
- Type of Home Business Type: Agricultural/Forestry/Mining (includes Associated Finance/Insurance/Real Estate, Construction, Services, Other Associated Economic Development Activities) 4.7%; Retail Trade 3.5%; Accounting/Architecture/Engineering/Consulting/Legal 2.0%
- Type of Business from Business Surveys: Other (unspecified) 28.6%; Non-Profit 10.0%; Agricultural/Forestry/Mining (includes Associated Finance/Insurance/Real Estate, Construction, Services, Other Associated Economic Development Activities) 12.9%

ES1.1b Residence and Residence with Home Business Highlights:

- 52.5% of responses had 2 people living in the household
- 82.4% indicated 0 children were under the age of 18 living in the household
- The number of computers, tablets, iPads, wireless phones, and/or other devices utilizing the Internet service at the location was:

  0 Devices 27 (7.9%) 1 Device 55 (16.1%) 2 Devices 47 (13.8%)

  3 Devices 50 (14.7%) 4 Devices 50 (14.7%) 5 Devices 42 (12.3%)
- 26.1% had 1 person and 27.6% had 2 persons 62 years or older living in the household
- While over 90% of households do not have any disabled person(s) residing in the household, over 8% have at least 1 disabled person residing in the household
- When combining Residence and Residence with Home-Based Business, the largest Annual Household Income range is more than approximately $59,000 followed by the second largest percentage being the lowest range of approximately $31,300 or less
- Over 93% of Residences have Internet Access and almost 74% consider Internet Access Very Important or Critical

See Figure ES-B: Internet Connections

- In response to use of the Internet to complete school assignments or job training,

  Yes (K-12) 11.4% Yes (2 or 4 Year College) 9.4% Yes (Trade School) 4.4% No 71.9%
- While E-mail is largest activity (10.6%), Health-Medical related use (9.2%) is essentially tied for 3rd with News Access (9.3%) behind Purchases (10.1%).
- Almost 79% of all Residence/Residence with Home-Based Business Internet needs are supplied by 3 Providers: Highland Telephone Cooperative-HTC (23.5%); MGW Telephone (25.2%); and TDS (29.9%)
- Majority of Residence using DSL (66.3%)
- When Rating Current **Speed of Connection** (Bandwidth), 45.8% Somewhat or Very Dissatisfied

See Figure ES-C: Internet Speed Satisfaction

Figure ES-B: Internet Connections

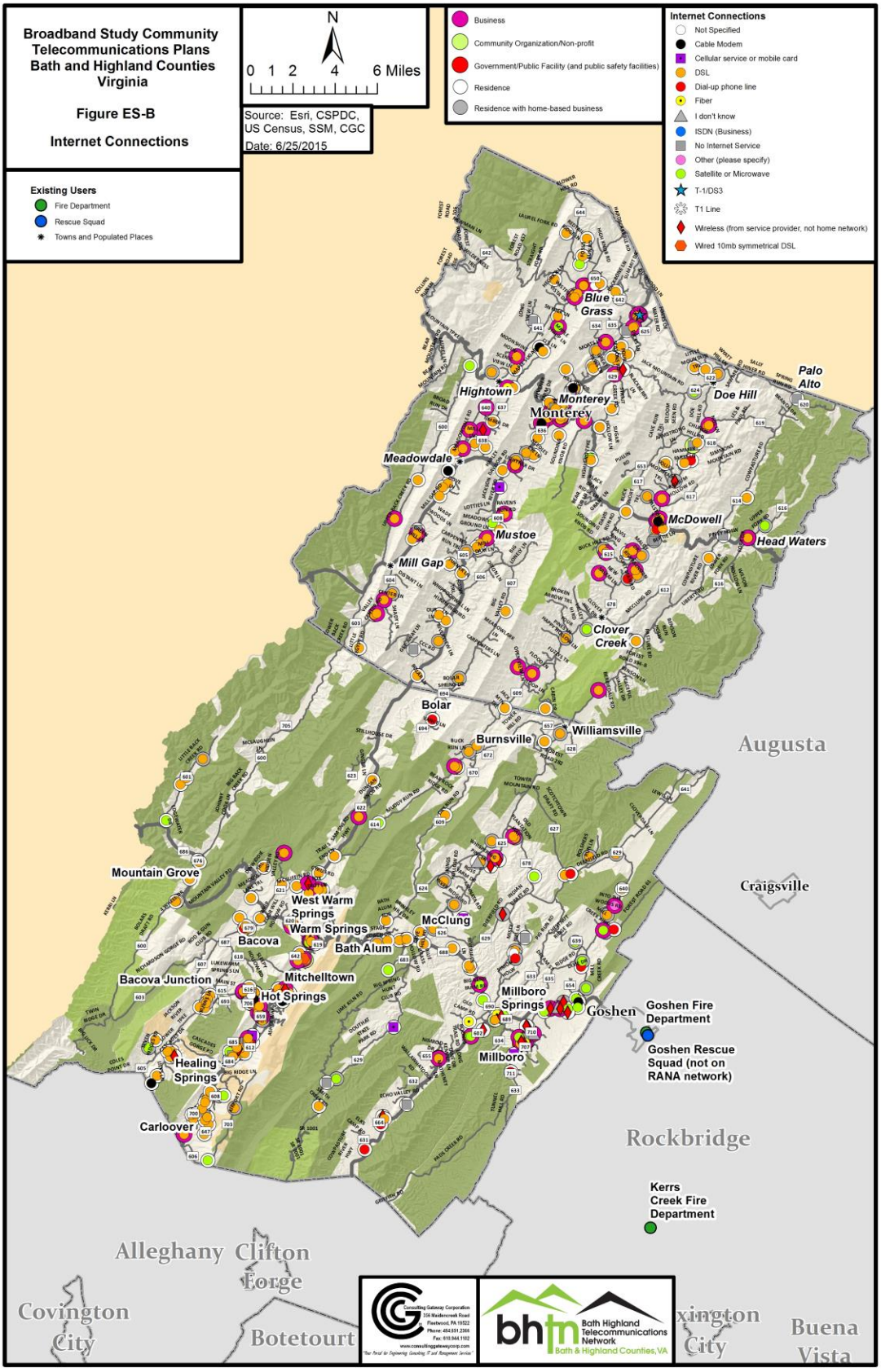
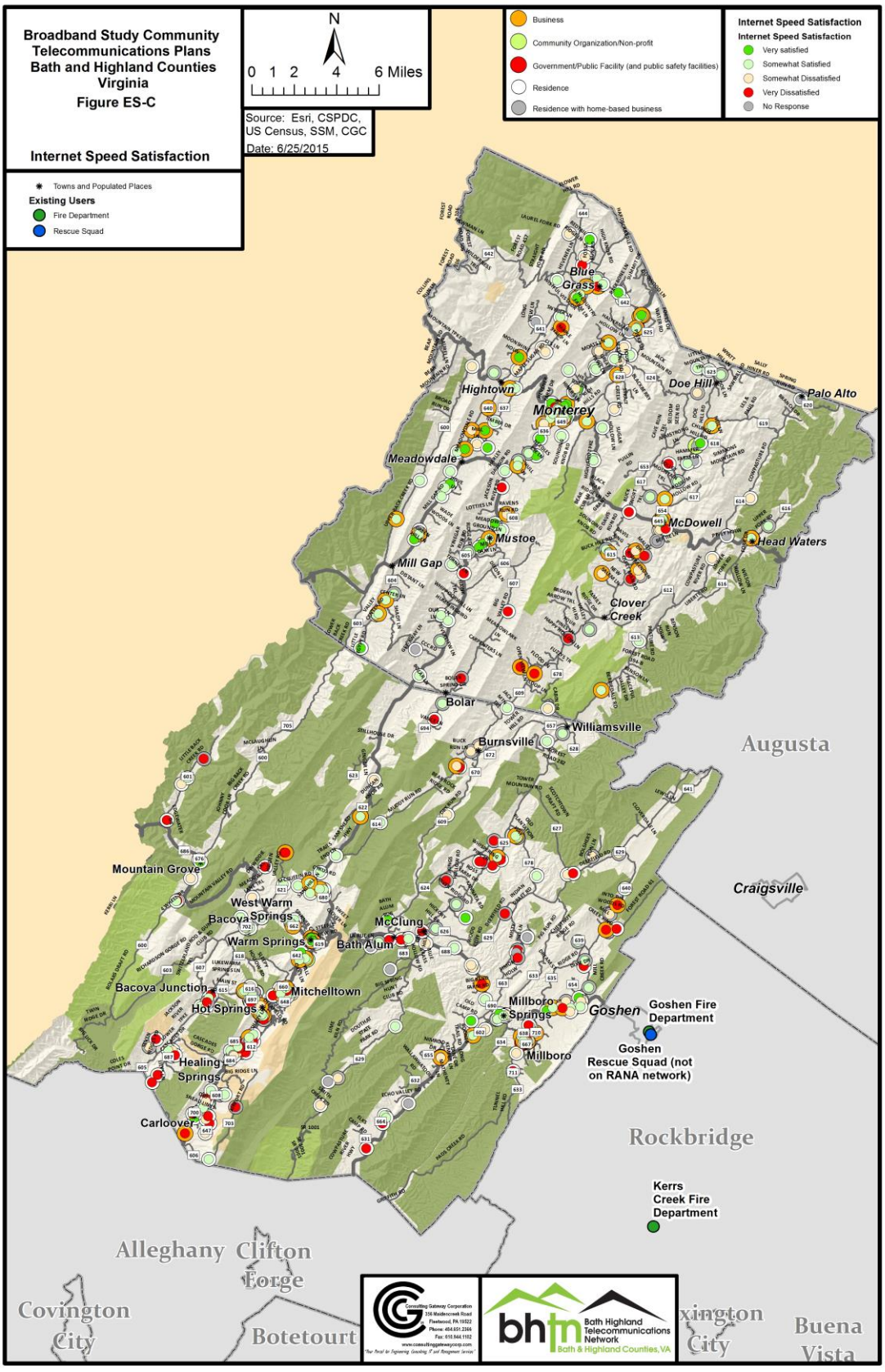


Figure ES-C: Internet Speed Satisfaction



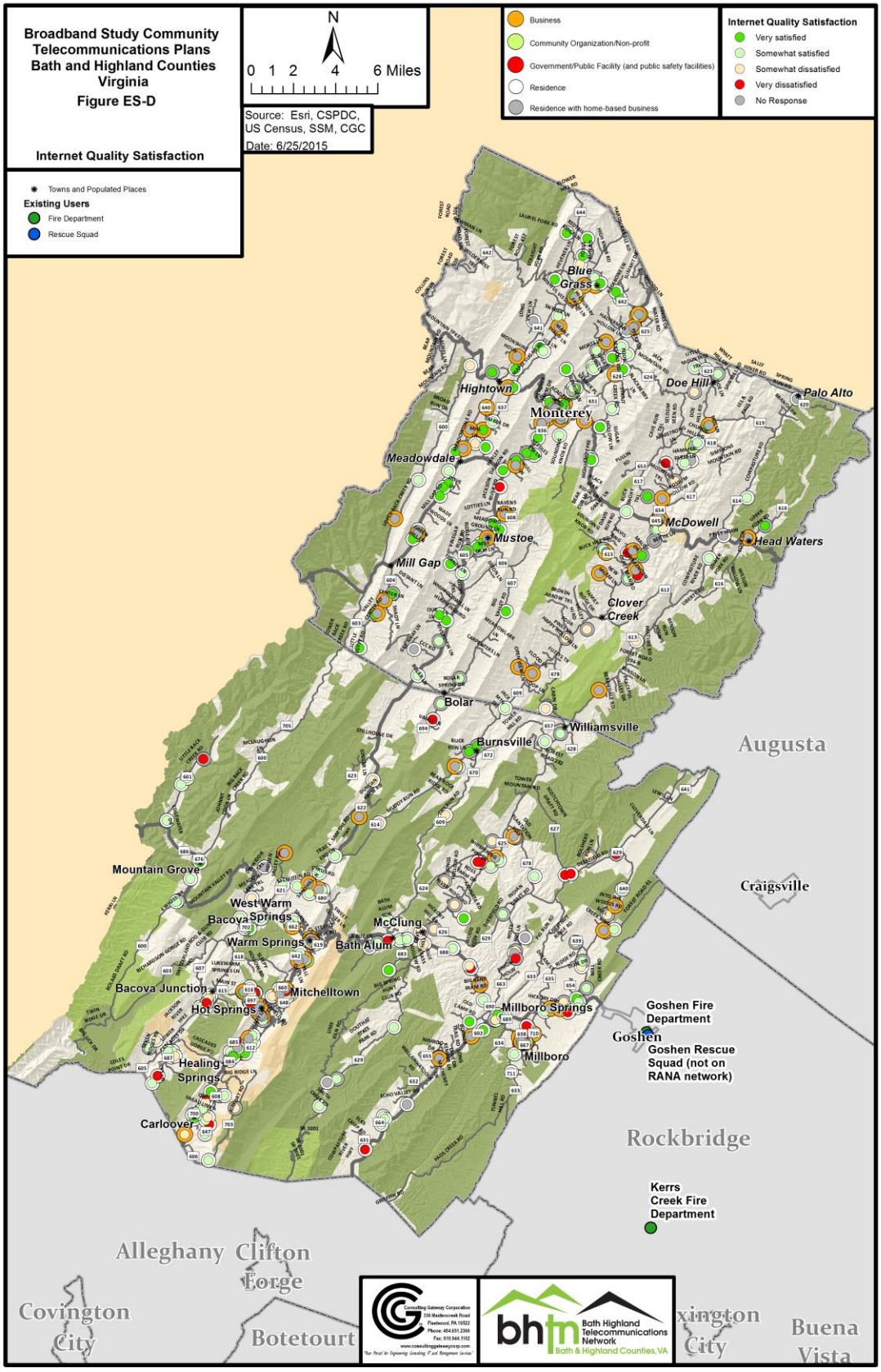
- 66.3% describe provider's **Customer Service and Support** as Very or Somewhat Satisfied
- Majority of Residence are paying between $30-$50 per month for Internet Access
- The 2 major reasons (Over 57%) for residential Internet dissatisfaction is the connection is slow/not enough Bandwidth (28.7%) and Price too high (28.5%). Almost 1/5 of users are also dissatisfied with unreliable service (Over 19%).
- When questioned why not subscribing to High Speed Internet?
  Not available in my area (11.4%) Too Expensive (5.6%)
- Residents are very interested in wireless as an access option
  69% very likely to subscribe, only 5% not likely
- 76.2% indicated they Have Cellular Service
- Verizon dominates cellular service provisioning at 59.8%
- 58.4% of Residence Survey Responses indicated they Do not have Reliable Cellular Coverage at this Location
- With **Overall Satisfaction** with Current Internet Provider almost half Residents stated Very or Somewhat Satisfied

ES1.1c Business Use
Business Highlights:

- Verizon dominates business cellular service provisioning in the region
- 14 of 25 (56%) Business Responses answered No to the question of Do you have Reliable Cellular Coverage at this Location
- Over 96% of Businesses have Internet Access and over 79% consider Internet Access Very Important or Critical
- Business activities performed on-line or conducted at location over the past 6 months
  E-mail 11.8% News 10.5% Gov. Web 10.1% Purchase 9.7% Social Media 8.0%
- Almost 82% of all Businesses/Gov.t/Public Facility/Community Organization/Non-Profit Internet needs are supplied by 3 Providers: Highland Telephone Cooperative-HTC (43.6%); MGW Telephone (17.9%; TDS (20.0%)
- Majority of Business using DSL (68.6%)
- When Rating Current **Speed of Connection** (Bandwidth), 30.7% Somewhat or Very Dissatisfied
- Major reasons for business Internet dissatisfaction is the connection is slow/not enough Bandwidth (35.0%) and Price too high (12.9%); Unreliable service (Over 11.4%).
- 18 of 26 (69%) Responses indicated Very Likely to Subscribe to Wireless High Speed Internet Access if Affordable and Available
- Business No. of Employees at Location:
  1 to 4 50.7% 5 to 9 10.7% None 7.9%

See Figure ES-D: Internet Quality Satisfaction

Figure ES-D: Internet Quality Satisfaction



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: Many students and teachers at home lack necessary high speed Internet connections – 72% of Residence surveys do not use 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. 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.

[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

ES2.1e Growing Business

The State of 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, the Internet access connection is 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, and 3) often slow processing capabilities of aging computers. As new applications, programs, and social media applications continue to grow, bandwidth can become strained and in need of updated faster computers. Examples of demand on library resources include:

- Highland Co. Public Library in Monterey circulates 9,000 volumes per year
- Bath Co. operates a Public Library with a monthly bookmobile service

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 ongoing studies to address Emergency/Public Safety Radio Communications issues in both Counties could provide potential funding or cost sharing opportunities associated with communication towers. The synergies between Broadband and Public Safety needs is addressed in more detail later within the report.

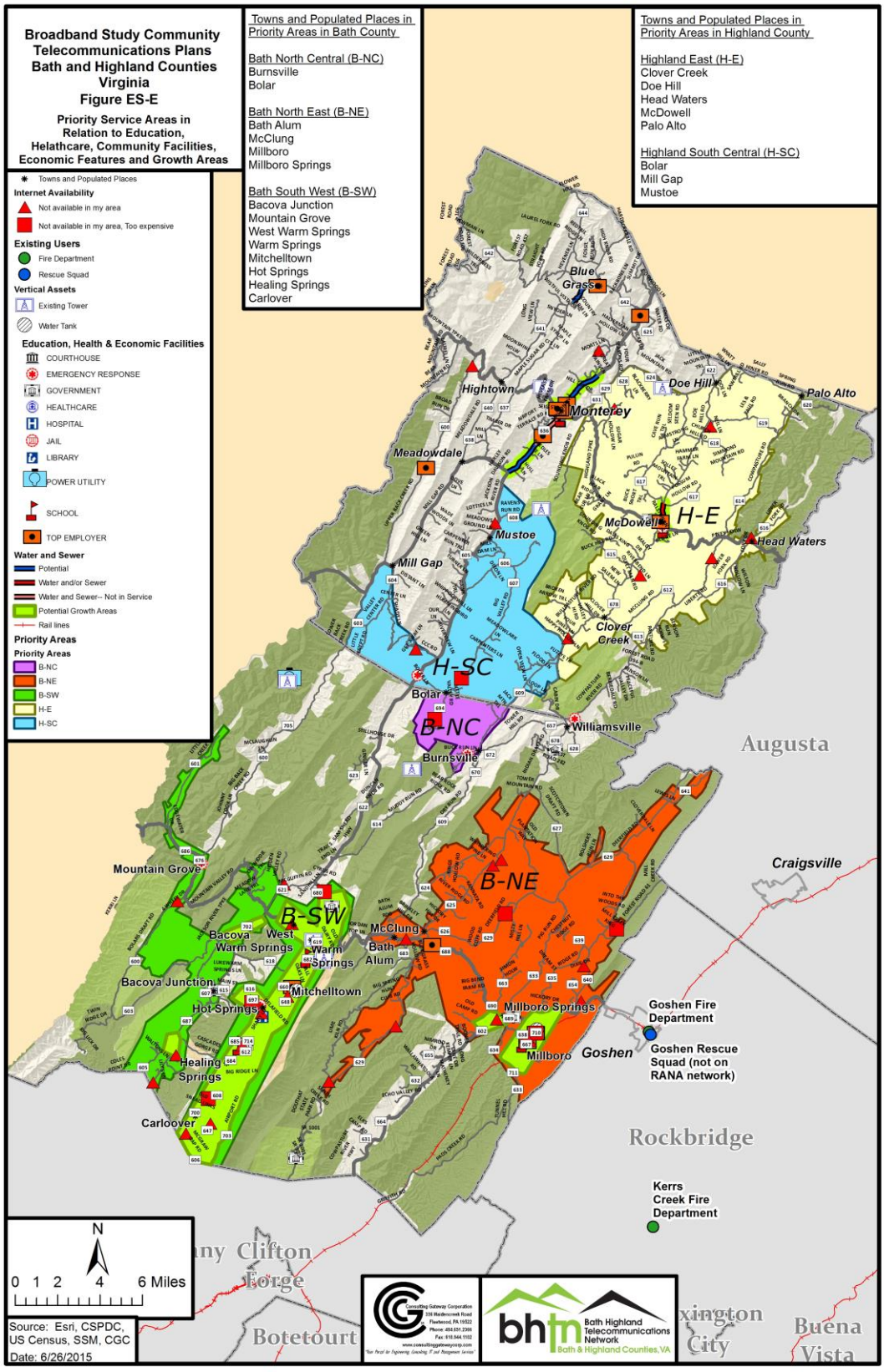
ES2.1h Healthcare

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.

See Figure ES-E: Priority Service Areas in Relation to Education, Healthcare, Community Facilities Economic Features and Growth Areas

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

Figure ES-E: Priority Service Areas in Relation to Education, Healthcare, Community Facilities, Economic Features and Growth 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. Each 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. Each 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 (9.3%), purchases (10.1% and 7.6% Major Purchases), travel (8.4%), and social media (7.9%) in past 6 months, as well as 7.2% 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

Most portions of Bath and Highland Counties 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. 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

The majority of 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 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.

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. 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 five (5) priority areas identified (2 in Highland County and 3 in Bath County) that were reported to have the largest regions of unmet needs and/or lack of adequate communication infrastructure. As a confirmation, while the emergency radio communications studies in the counties were ongoing independently of this Broadband study, these same 5 priority areas surfaced as the locations where wireless communications were struggling.

Generally speaking, the areas in Bath County consisted of the regions:

- From Rt. 220 to Bacova Junction and further west; Healing Springs north to Mountain Grove (B-SW); Rt. 220 growth area along from the south county line near Carloover north to Warm Springs (would require overbuild)
- South of Bolar to Burnsville (B-NC)
- Millboro Springs west to Bath Alum; north towards Williamsville, south along Douthat State Park Road (B-NE)

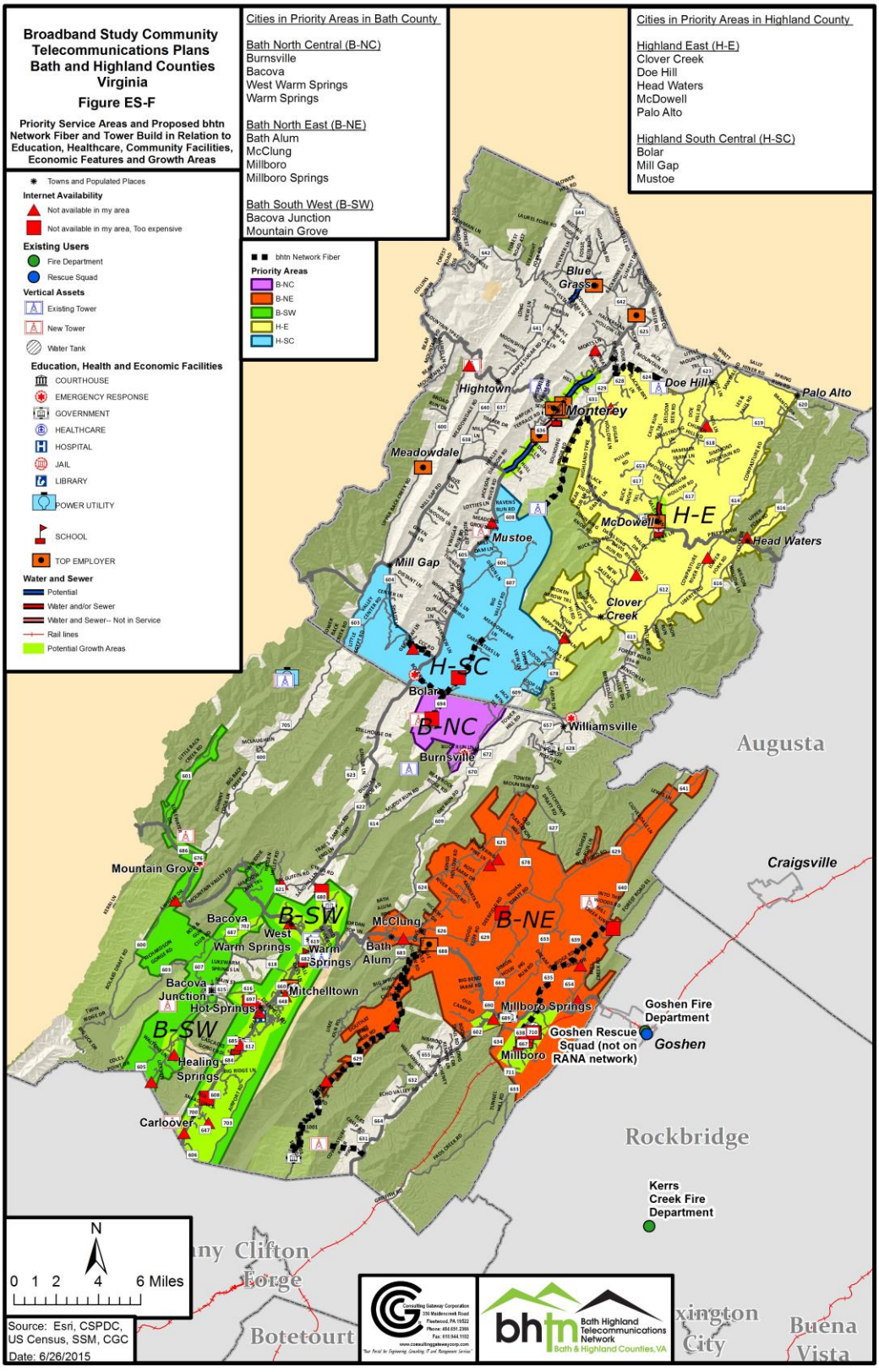
Generally speaking, the areas in Highland County consisted of the regions:

- From Bolar north to Mustoe and from Bolar west to Mill Gap (H-SC)
- From Clover Creek north to Doe Hill and from Head Waters west to Monterey (H-E)

The more populated town centers of Monterey in Highland County and Warm Springs in Bath County is where K-12 schools, libraries, public safety and other community organizations and meeting 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.

See Figure ES-F: Priority Service Areas and Proposed bhtn Network Fiber and Tower Build in Relation to Education, Healthcare, Community Facilities, Economic Features and Growth Areas

Figure ES-F: Priority Service Areas and Proposed bhtn Network Fiber and Tower Build in Relation to Education, Healthcare, Community Facilities, Economic Features and Growth Areas



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;**
- Surprisingly there is quite a significant amount of fiber within the study area.
- Lumos Networks is primarily a carriers'- carrier network with little interest in providing Residential Internet
- Of the three (3) largest Internet retail services providers with the most end-users serving within the study area (HTC, MGW, TDS), none expressed much interest in wireless service offerings due to topology and other interference issues, as well as doubt whether a wireless solution will be able to keep-up with the ever changing broadband speed requirements for broadband of the Federal Communications Commission (FCC). Also there was some expressed concern over reported Radio Quite Zone requirements of the National Radio Astronomy Observatory, Green Bank, WV site located approximately 34 miles from Monterey, VA.
- Of the three (3) largest Internet services providers with the most end-users serving within the study area, 2 (HTC, MGW) of the 3 provider's future business plan is to offer Fiber-to-the-Home (FTTH)/Fiber-to-the-Premise (FTTP) 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.
- BARC, the area's largest electrical cooperative, also expressed its intention to offer FTTH/FTTP in future years.
- The biggest obstacle stated to delivering FTTX is the last mile cost and build.
- The best way the counties can assist the service providers in enhancing Internet last mile connectivity is to ***assist in structuring low interest financing and assist in cost sharing or structuring last mile connectivity solution options.***

Service Provider Response as to Ways the Counties 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.

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

Strategies

a) Establish a limited time CPE (Customer Premise Equipment) and/or Last Mile Connection cost supplementation (subsidy) program in exchange for service contract commitment.
b) Leverage the Emergency Radio Communications Improvements Initiatives such as cost sharing site expense or attaching broadband communications equipment on new towers being utilized and being built.
c) Negotiate 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.
- BARC has poles with drops to the majority of the properties in the study area with another electric cooperative (Shenandoah Valley Electric Cooperative) serving the remaining properties in NW Highland County.

- BARC will start offering FTTX services where there exists greater density, but there is no set time frame to extend services in the less dense service areas of Bath and Highland Counties.
- When questioned if there was concern by BARC of another entity offering FTTX Internet service within their cooperative service area before BARC, BARC responded that would not be a concern or problem.
- Some service providers expressed the $30-$40 per year pole use fee greatly impacted the return on investment.

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

- The municipalities would prefer not to own or operate network infrastructure of facilities.
- While the counties are willing to make some manageable investment into enhancing Internet access within the counties, 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 each 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

There was no request or expressed need for middle mile fiber or other infrastructure to be built from Service Providers. Since the majority of the service providers indicated their long range business plan is a FTTX solution, what specifically 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. 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 is 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 BHTN will 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 the counties may want to seek funding to expedite such build on a case-by-case basis**.

While it is unknown at this time if the counties would undertake the BHTN getting funding to build last mile connectivity access themselves in the event the service provider will not build the access network, the information collected can be used to seek funding to aid the service providers in building the last mile. It appears the counties would prefer the service providers build the access network, but they may be unwilling to wait years with an unknown, uncommitted timeline for such build to occur. **What is being proposed is the counties and service providers cooperate and work together to address the most difficult obstacle identified, enhancing last mile connectivity technology and specifically FTTH/FTTP.** In lieu of, or part of addressing this last mile challenge can be seeking funding for at least subsidizing part of the cost of Customer Premise Equipment (CPE) and/or Last Mile Connection solution.

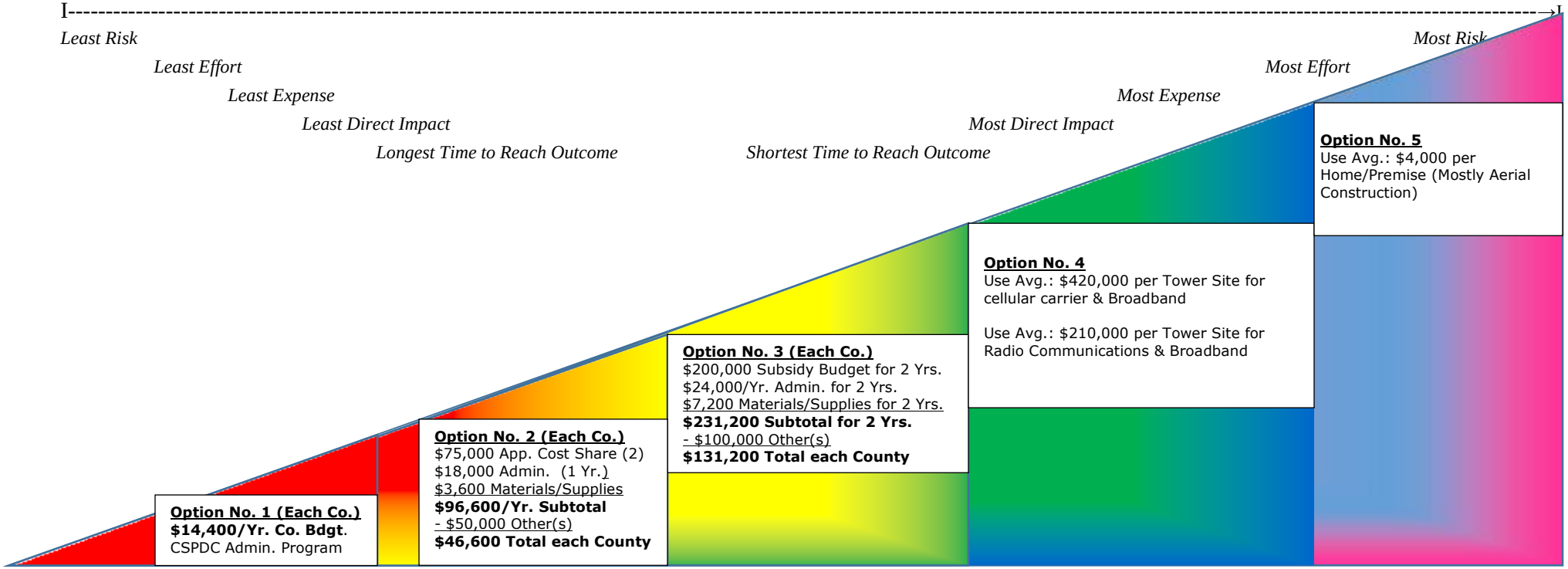
ES3.5 Last Mile Connectivity Solutions

From both service provider input, as well as feedback from the Bath-Highland Project Management Team, the following summarizes the basis for forming the recommendations for last mile connectivity solutions.

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

1) Create the Bath-Highland Telecommunications Network Assistance Program *(BHT-NAP)* to be the liaison between the end-use customer and service provider.
2) Set-up both financing application assistance programs for service providers and cost subsidy programs for customers' equipment and/or last mile connection.
3) Encourage extension of existing infrastructure to capture more customers or improve existing service such as DSL/DSA, wireless or fiber FTTX service.
4) If need be form a Virginia Allowed Wireless Broadband Authority to undertake building/operating municipal telecommunications assets.
5) If a VA Wireless Broadband Authority can't get adequate funding, investigate the formation of a Telecommunications Cooperative to leverage funding opportunities, focus on interested parties willing to make an investment in their telecommunications services, and take a more active role limited or not allowed to municipalities.
6) Continue to pursue the wireless towers needed for Emergency Radio Communications identified in the separate county studies and seek wireless Internet Service Providers (ISPs), perhaps through some form of Public-Private-Partnership (see King and Queen Counties, VA initiative) to attach equipment and/or cost share expense.
7) Continue to discuss with cellular service providers potential use of the wireless towers 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, form a Wireless Broadband Authority to build such solutions on a case-by-case basis to allow interconnection between middle mile and last mile networks.
9) Develop a BHTN 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 counties are comfortable with in order to continue action in the communities for improving Internet, Emergency Response Communications, Cellular Coverage Service and overall telecommunications service applications in the communities.

ES3.5b Bath and Highland Counties, VA Menu of Solution Options



BHT-NAP	Network Extension Funding PPP	CPE/Last Mile Cost Subsidy	Wireless Service	Network Build
Bht- Network Assistance Program	***Get Middle Mile Where Not Existing***	***Assisting Connecting Customers***	***RFP/Cost Share for Wireless Service PPP***	***"Homes with Tails"***
Liaison Between Customer & Provider	***DSL/DSA, Wireless, Fiber Extension***	***Cost Subsidy for Eligible Applicants***	***Multipurpose Objectives-BB, LMR, Cell Service***	***Similar to "Peering Networks"***
1. Take & Investigate Service Claims	1. Aggregate Demand	1. Discuss Funding w/VA, ARC, etc.	1. Seek Finance Options/Develop Funding Plan	1. Confirm Provider Participation
2. Work w/Provider on Solution	2. Encourage to Extend Middle Mile	2. Establish Eligibility Criteria	2. Solicit RFP for Wireless Service PPP	2. Form Authority
3. Work with Customer on Contract	3. Define Scope & Return on Investment	3. Verify Credibility of Cost	3. Negotiate Roles/Terms to Move Forward	3. Determine Aerial/Underground
4. Assess Price Fairness	4. Cost Share Funding Applications	4. Determine Provider Share	4. Support Tower Construction/Backhaul	4. Determine Interconnection Pt.
5. Recommend Eligibility for Other Solutions	5. Plan for Future Technology	5. Determine Customer Share	5. Co-Locate BB Service on Emergency Towers	5. Solicit/Retain Contractor
6. Secure Commitments from all Parties	6. Evaluate Formal vs. Informal PPP	6. Design Refunding Formula	6. Solicit RFP for Cell Service Providers	6. ID 1st & 2nd Middle Mile Needs
7. Provide Assistance with Other Solutions	7. Ensure Commitment for Muni $	7. Administer Program	7. Lease/Maintain Towers	7. Administer Network

Project Management Team w/CSPDC	**Counties/Proj. Mgmt. Team w/CSPDC**	**Co./Proj. Mgmt. Team w/CSPDC**	**← Wireless Broadband Authority →**

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
Some end-users are claiming there is no Internet access to them and/or too expensive while the service providers are stating some type of Internet access is available to all properties in the counties. The BHTN should be to develop a Telecommunications ***Network Assistance Program*** 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.

ES4.1A - OPTION NO. 1: *BHT-NAP*

Premise: Bath-Highland Telecommunications - Network Assistance Program

Description: Liaison between Customer & Service Provider

C3 Approach

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 the BHTN should take control to address the shortcoming.

ES4.1B - OPTION NO. 2: *NETWORK EXTENSION FUNDING PPP*

Premise: Getting middle 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 counties could take to assist in enhancing broadband service in the counties is assist in securing lower interest or better terms financing, and assist in overcoming the last mile connectivity obstacle. Since DSL is providing over 65% of existing high speed Internet access, but FTTX is the planned connectivity in the future, the counties have access to potential financing sources that the service providers may not or the counties could provide resources and/or help cost share a funding application if the return on such an investment is worthwhile. The return on investment would not likely be monetary, but rather increased number of residents and businesses able to get connected.

ES4.1C - OPTION NO. 3: *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.

ES4.1D - OPTION NO. 4: *WIRELESS SERVICE*

Premise: An investment in this option may address to some extent the following multiple objectives: (i) enhancing broadband service and availability; (ii) addressing current problems with emergency response radio communications; (iii) Playing a future role in Public Safety Data Network (PSDN) applications; (iv) Improving cellular service coverage.

Description: Issue a Request for Proposal (RFP) seeking a Wireless Internet Service Provider (WISP) to become a Public-Private-Partner (PPP) with the counties to cost share in the construction, management and operation of vertical tower sites and 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.

Approach

There was little to no interest expressed by the current service providers in pursuing a wireless last mile solution. At the same time, the emergency response agencies of the county are completing a radio study requiring additional vertical assets be built at strategic locations to improve response and interoperability communications. Many of the areas with the radio communication gaps coincided in the general areas identified for gaps in Internet service and cellular service coverage. Therefore this option is intended to leverage each other in an attempt to improve all three objectives. The trend in the cellular service industry seems to favor companies being more willing to submit a proposal to attach to existing towers rather than get involved assisting other parties in locating and cost sharing the build of towers.

ES4.1E - OPTION NO. 5: *NETWORK BUILD*

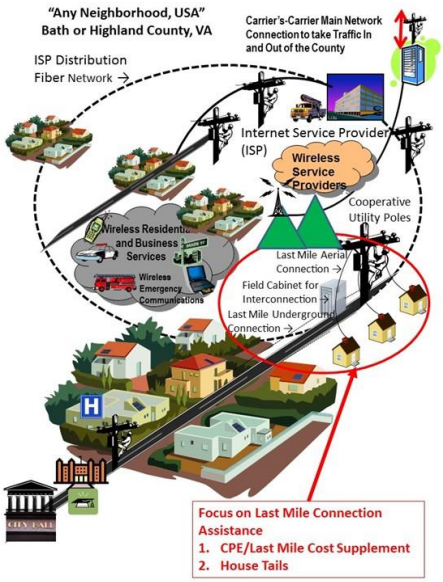
Premise: On a case-by-case basis, be prepared to finance and build the last mile network for middle mile Internet Service Providers (ISP) to connect to and peer through the access network to serve the customer.

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.

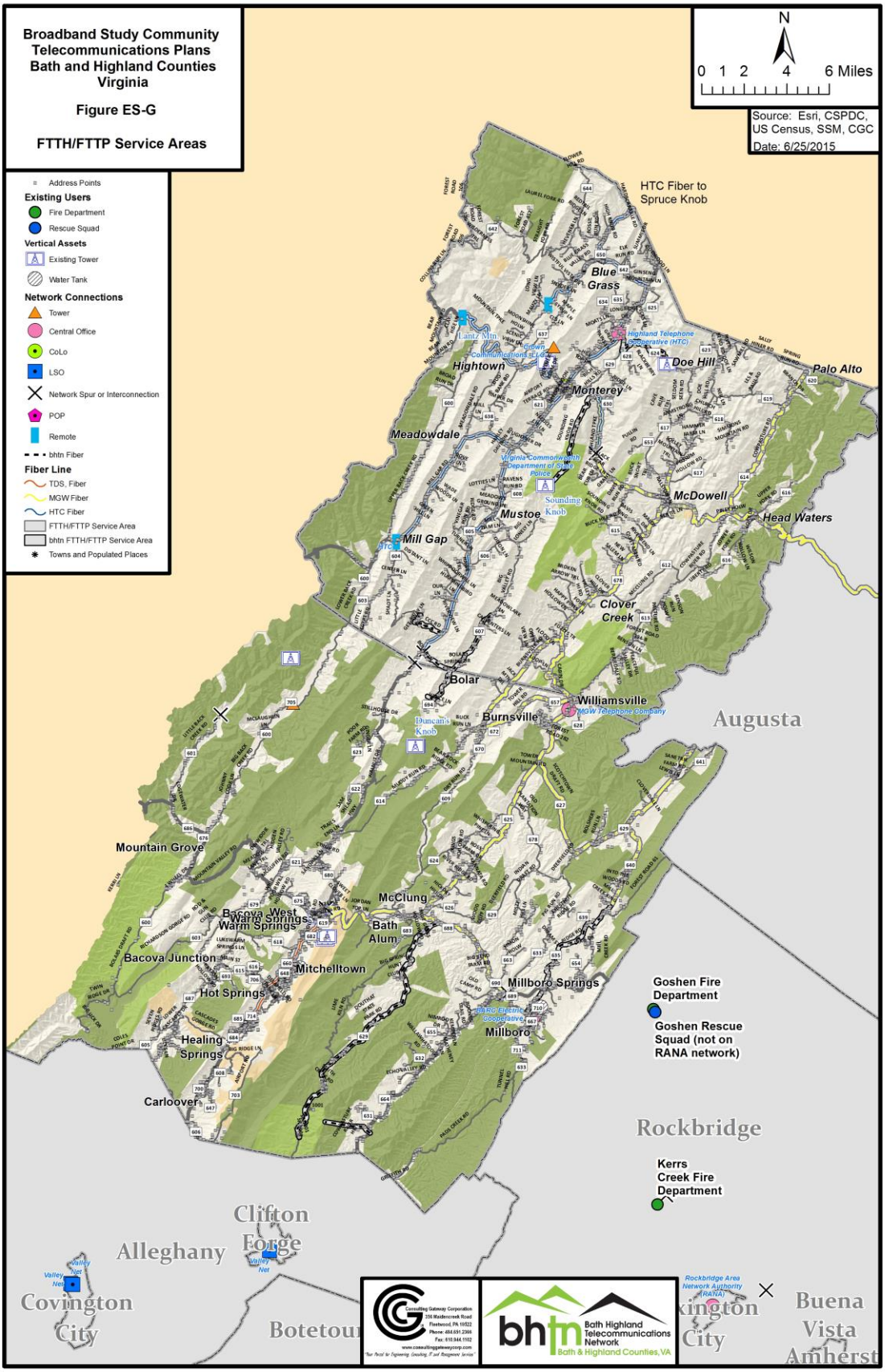
Approach

In addition to being able to access low interest or mc favorable term financing, service providers indicatec the largest obstacle to expediting the timeline for FTTH/FTTP build is last mile build. Therefore if the counties do not want to wait years to have FTTH/FTTP as a last mile connection technology available to businesses and homes, the counties coul form a Wireless Broadband Authority to build and lease the network for access to the customer by the middle mile fiber owner. This type of solution has been referred to as **"Homes with Tails".**

See ES-G FTTH/FTTP Service Areas



ES-G FTTH/FTTP Service Areas



ES4.2 Last Mile Connectivity Solutions Assessment

The consultants are not recommending the counties 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 counties incur significant debt service especially that associated with the two (2) most costly options, wireless service and network build. As can be seen in the tables in Section 1.4, the counties will most likely not recover all the capital and operating expenses associated with these options. Minimal administration and operations and maintenance expense was used because it is anticipated that 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.

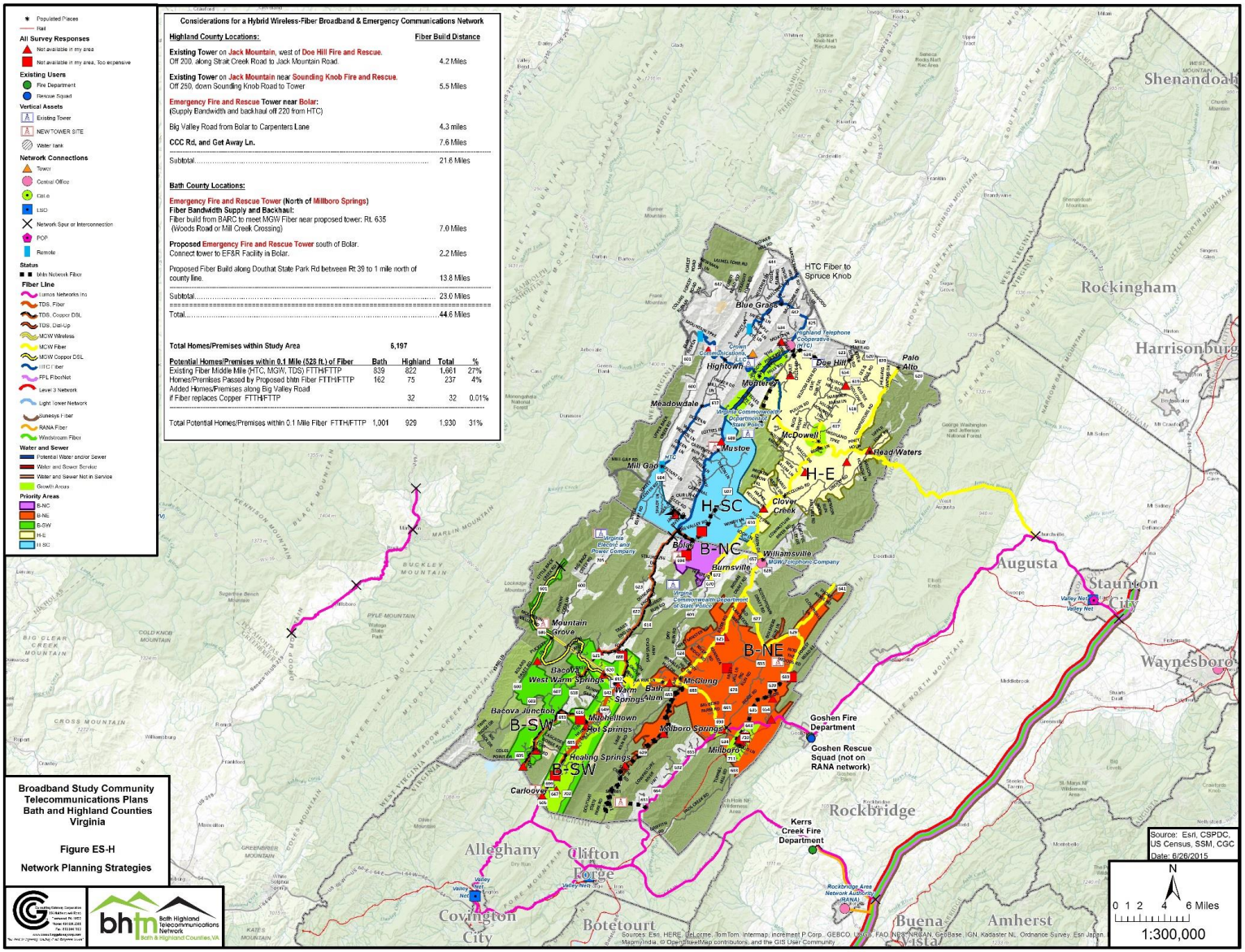
The wireless service option is addressed because the counties will have to eventually take some action to address Emergency Radio Communications and the towers sites and assets could potentially be leveraged for enhancing broadband and cellular service. One caution that warrants further investigation is that besides concern from service providers that a wireless will have interference and topology challenges, and the 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, there was a comment that the National Radio Astronomy Observatory in Green Bank, WV is restrictive in requiring a Radio Quite Zone and control over use of spectrum. In addition, there was no real interest in the project from a wireless service provider. It is also important to understand that wireless signal propagation modeling was not part of the scope of this strategic plan. It is the consultant's understanding that some propagation modeling was completed for the Emergency Response Radio Communications studies. There are a number of wireless technologies that may be considered including use of licensed and unlicensed spectrum.

The last mile "Homes with Tails" network build is addressed to demonstrate the significant expense that the last mile connectivity obstacle costs. When looking at such expense, it is more understandable why the service providers themselves are struggling with a FTTX last mile connectivity solution. This solution 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 presentation of the study findings to the public, it was mentioned that just recently some construction activity was occurring where proposed fiber is shown (Douthat State Park Road). Also the proposed fiber build locations of the bhtn may not necessarily be where fiber would capture the most houses within the 0.1 mile fiber distance, but be the location where addressing both broadband and emergency communications needs, such as to a tower for bandwidth and backhaul applications. If this 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, HTC and MGW have already committed to serving some areas FTTH/FTTP over the next 3 years with additional fiber planned, but not shown. While, the average cost used for building a last mile solution of $4,000/premise may actually be more representative of where middle mile fiber does not currently exist in the solution, the cost also includes funding and debt service expense not usually incorporated into an average unit cost.

The counties could implement the first three (3) solutions, 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 the progress and ability to secure funding for the Emergency Response radio communications initiative, a modified solution of the wireless service may also have some merit. At this time it is doubtful the counties would get all needed parties in agreement in order to continue pursuing the last mile connectivity solution (*Homes with Tails*). 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).

See Figure ES-H Network Planning Strategies

Figure ES-H Network Planning Strategies



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. 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 must be formed under each of the options presented can be found at the bottom of the Menu of Solution Options for Bath and Highland Counties, VA at ES-3.5B. In short, it is felt that formation of a Wireless Broadband Authority may only be warranted under Option No. 4- Wireless Service or Option No. 5 – Network Build including "Homes with Tails". Given the valuable resources the Central Shenandoah Valley Planning District Commissions (CSPDC) offers the counties (such as GIS mapping, preparing funding applications, meeting coordination and moderating, etc.), the consultants recommend the Counties' Project Management Team utilize the CSPDC in furthering Options No. 1, 2 and/or 3.

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
   - ✓ Up to $300,000/Regional Project with 25% Match

3. Community Connect Grant Program
   - ✓ Minimum Award $100,000; Maximum is $3,000,000 for 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. FEMA, Dept. of Homeland Security (such as COPS FAST), U.S. Fire Administration and the VA Dept. of Emergency Management

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

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

8. 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% for increased connectivity?

2. What timeline is reasonable?
3. Will the Counties go it alone, together and/or in some form of Public-Private Partnership?
4. What role will the Counties 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 form a Wireless Broadband Authority?

There are certainly other concerns and issues to investigate, such as 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 are the Counties going to take a wait and see approach?" Within days of completing the study report, the counties were notified by VHCD of being shortlisted for consideration of additional planning study funding and invited to submit a proposal. 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, but for the most part, the service areas of the providers already serving in the Counties is already delineated. True competition in broadband only occurs when there is more than one choice of providers. If towers are constructed, perhaps wireless Internet Service Providers (ISPs) will take interest in providing services but to date, none have expressed interest.

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 Counties 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 bhtn Project Management Team has this valuable data, it is recommended that planning include making this data readily available to parties that can assist the counties 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 Bath and Highland Counties are fortunate to have a significant amount of fiber with some existing wireless communications infrastructure and services to build upon, but 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 1-5 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 discussions and comments are being taken for the definition of Broadband to change to speeds of 25 MB down

and 3 Mb up. It will be up to the Counties 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 Bath-Highland Counties Community Broadband Telecommunications Study is**:** to increase access throughout the **project study area** of Economic Growth Regions, 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 Counties are 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 each county where the elected officials and community stakeholders understand their unique needs and are in the best position to implement a solution.

Specific purposes of pursuing this broadband assessment of the region was to provide information to economic development leaders, the counties, 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 Bath and Highland Counties. Regardless of the outcome of the decision of the elected officials, the Communities' Telecom 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 that 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 communities. 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.

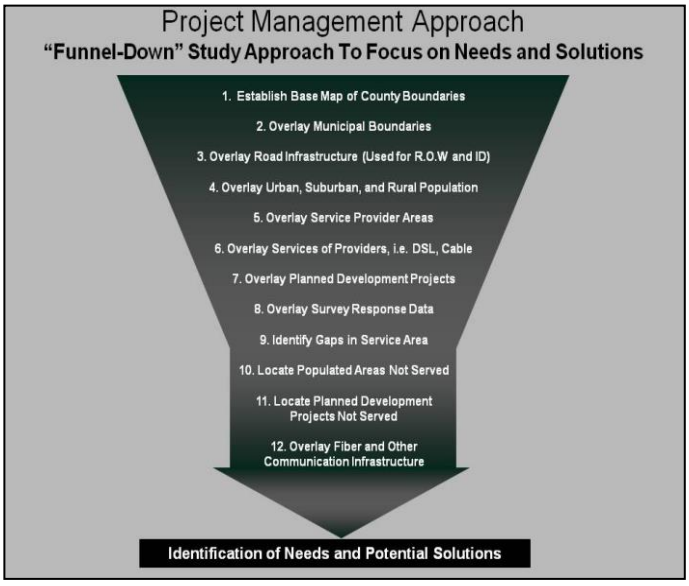
It is expected that over time, technological innovation will help reduce the minimum broadband demand size necessary to make rural deployment more economically feasible. If our rural communities are expected to wait until years after urban America has broadband and are excluded from high-speed connectivity 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 such as locations of Major Employers, Industrial/Commercial Parks, Business districts, Growth Corridors, and Water and Wastewater Infrastructure
   - 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. ***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

1.11 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 a mailed survey, 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 a written survey as the preferred means to obtain community input from the largest number of respondents. Additionally as stated, the survey collection process was augmented by an online version of the survey for the convenience of those using the Internet regularly.

It was also decided by the Project Management Team to use a previously completed Telecommunications business survey with many of the same questions to augment the new surveys. This previous survey was less than one (1) year old and complimented the data collection and feedback resources almost seamlessly

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.

Comments were solicited as to what changes or improvements to the current communication technology in the local communities would best meet citizen's needs, as well as what impact would improve Internet connectivity mean for businesses. Local leaders can use this knowledge to expand the reach of government services and prioritize implementation efforts. Through the survey process, citizens have been recruited as stakeholders in their community's future. See Section 6.0 Appendices for the end-user survey, analysis (tabulation) and comments.

1.12 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, the mailed survey was augmented by an online survey version. The on-line survey was an exact replica of the mailed survey available for easy online entry. The results of the online survey were combined with the mailed survey results. The combination of mailed and online surveying was to ensure that all Counties citizens were afforded the opportunity to provide input for the market assessment. The new survey results were also combined with the previously completed business survey results.

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

1.13 Survey Distribution and Response

Approximately 4,200 surveys were mailed during the 3rd quarter of 2014. During the 4th quarter of 2014, almost 195 hard copies of the survey had been collected from drop-off locations and approximately 170 online surveys had been recorded, totaling around 365 surveys collected. As previously noted, business broadband assessment surveys with many of the same questions distributed and collected about a year before the 2014 surveys was combined during the data analysis because the data was still relevant and fresh resulting in a total of 481 survey responses being analyzed.

❖ Bath County Responses:

✓ Residence: 168 ✓ Business: 48 ✓ Residence With Home Business: 45
✓ Gov. /Public Facility/Public Safety: 2 ✓ Community Organization/Non-Profit: 2

❖ Highland County Responses:

✓ Residence: 101 ✓ Business: 80 ✓ Resid. w/Home Business: 27
✓ Gov. /Public Facility/Public Safety: 3 ✓ Community Organization/Non-Profit: 5

Combined Total: 481 Responses

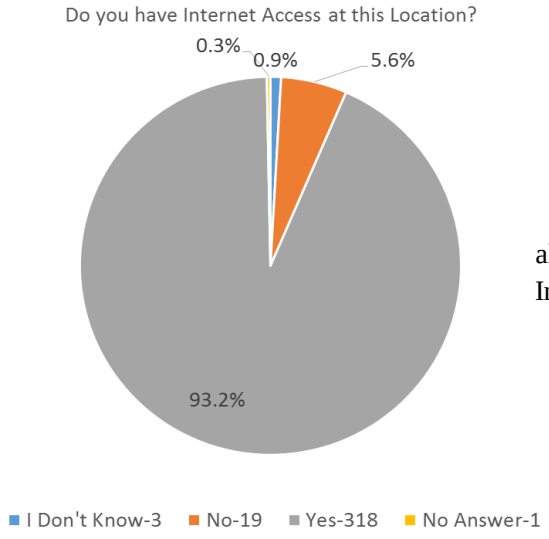
The successful response was attributed to the efforts of the Central Shenandoah Planning District Commission (CSPDC), County staff and Project Mgmt. Team in promoting the online survey and distributing additional copies throughout the Counties

The responses were geocoded and mapped to show areas of demand and technology in use.

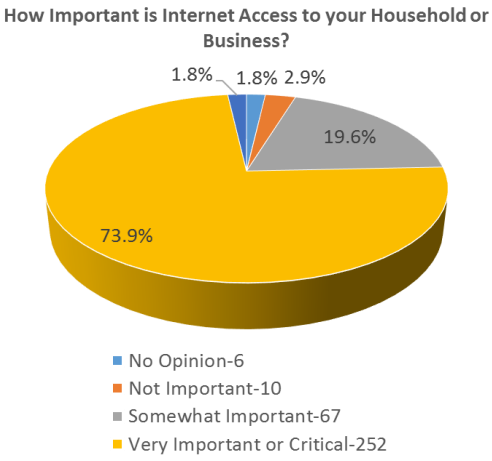
1.14 End-User Input

Residential and business input was provided from both the mailed and on-line surveys. While the responses were tallied and reported under each of the classifications described above, the presentation of findings were split into two (2) groups: (1) Residence and Residence with Home Business, and (2) Business, and Government/Public Facility/Public Safety and Community Organization/Non-Profit.

Residential Internet Access and Importance



Over 93% of Residences have Internet Access & almost 74% consider Internet Access Very



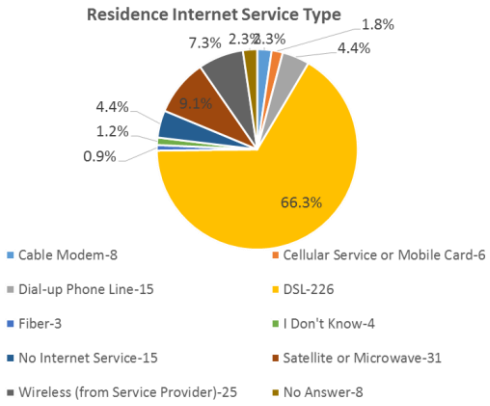
Residential Internet Use

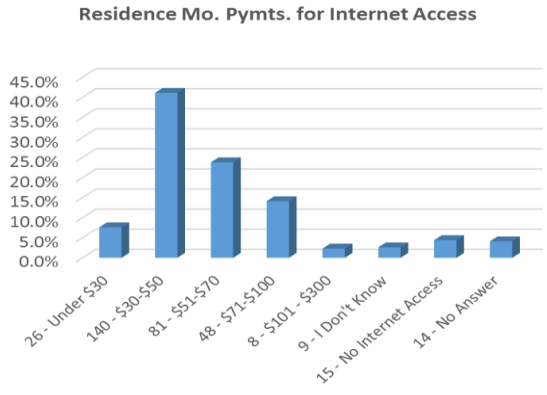
Use of Internet to Complete School Assignments or Job Training	Responses	%
No	245	71.9%
YES (K-12)	39	11.4%
YES (2 or 4 Year College)	32	9.4%
YES (Trade School)	15	4.4%
YES (K-12) YES (2 or 4 year college)	1	0.3%
YES (K-12), YES (Trade School)	1	0.3%
No Answer	8	2.3%
Total	**341**	**100.0%**

Activities Performed On-Line and/or Conducted at Location Over the Past 6 Mo.	Responses	%
Travel	243	8.4%
Health-Medical	**264**	**9.2%**
Purchase	290	10.1%
Sold	70	2.4%
News	269	9.3%
Major Buy	218	7.6%
Teacher	66	2.3%
Job	64	2.2%
On-Line Ed.	78	2.7%
Gov. Web	208	7.2%
School Info	94	3.3%
Banking	226	7.8%
Video	196	6.8%
School Work	64	2.2%
E-mail	**307**	**10.6%**
Social Media	227	7.9%
Total	**2884**	**100.0%**

While E-mail is largest activity, Health-Medical related use is essentially tied for 3rd with News Access behind Purchases.

Residential Connection Type, Speed, Support, Satisfaction and Cost





Majority Paying between $30 - $50 per Month

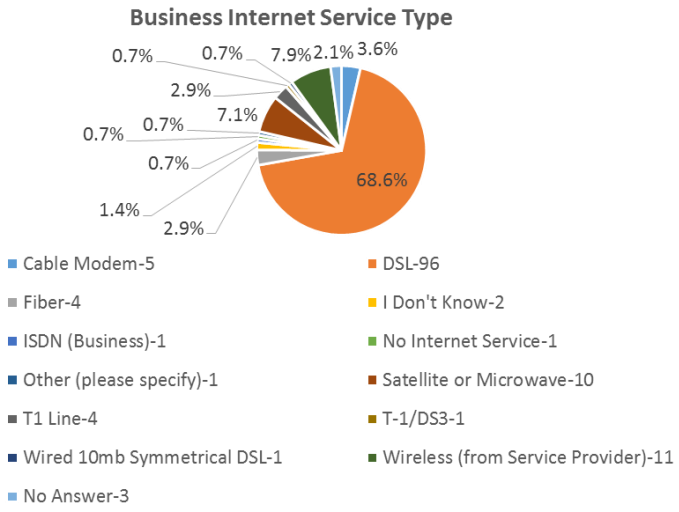
Residential Connection Type, Speed, Support, Satisfaction and Cost

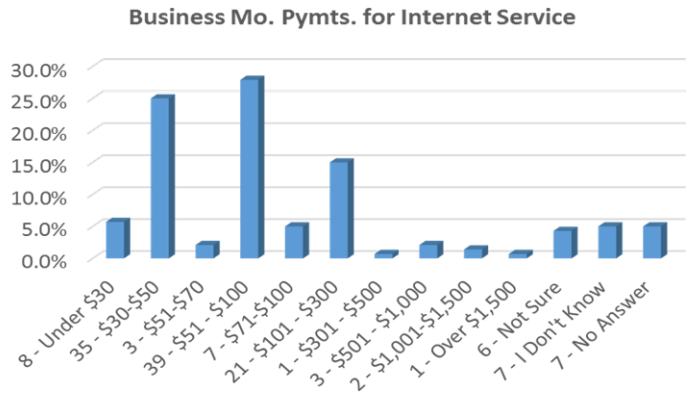
- **Majority using DSL (68.6%)**

- When Rating Current **Speed of Connection** (Bandwidth), **30.7% Somewhat or Very Dissatisfied**
  - ➢ 22 or 15.7% Very Satisfied
  - ➢ 71 or 50.7% Somewhat Satisfied
  - ➢ 30 or 21.4% Somewhat Dissatisfied
  - ➢ 13 or 9.3% Very Dissatisfied
  - ➢ 4 or 2.9% No Answer

- Regarding Customer Service and Support, 80.0% had No Answer because question was not on 2013 survey
  - ➢ 12 or 8.6% Very Satisfied
  - ➢11 or 7.9% Somewhat Satisfied
  - ➢ 4 or 2.8% Somewhat Dissatisfied
  - ➢ 4 or 0.7% Very Dissatisfied
  - ➢ 112 or 80.0% No Answer

Business Connection Type Speed, Support, Satisfaction and Cost





Majority Paying $30 -$100 per Month

- **Majority using DSL (68.6%)**

- When Rating Current **Speed of Connection** (Bandwidth), **30.7% Somewhat or Very Dissatisfied**
  - ➢ 22 or 15.7% Very Satisfied
  - ➢ 71 or 50.7% Somewhat Satisfied
  - ➢ 30 or 21.4% Somewhat Dissatisfied
  - ➢ 13 or 9.3% Very Dissatisfied
  - ➢ 4 or 2.9% No Answer

- Regarding Customer Service and Support, 80.0% had No Answer because question was not on 2013 survey
  - ➢ 12 or 8.6% Very Satisfied
  - ➢11 or 7.9% Somewhat Satisfied
  - ➢ 4 or 2.8% Somewhat Dissatisfied
  - ➢ 4 or 0.7% Very Dissatisfied
  - ➢ 112 or 80.0% No Answer

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.

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.

Bath & Highland Counties' public schools have a Tablet Take Home Program where information is uploaded to the cloud and pushed onto the tablets. Affordability is a large component of enhancing Internet capabilities. The 2 Highland Co. schools (elementary-high school) are connected by HTC-30 Mb up and down. Bath Public Schools are comprised of 2 elementary, 1 high school, and 1 vocational center served by Different Providers:

- MGW serving Millboro Schools-Currently 1 MB up & down (upgrade reported coming)
- Valley Elementary in Hot Springs-10 MB down, 1 MB up
- Bath High School-Synchronous DSL: 2 T-1 lines thru VPN Connection 10 Mb up/down (20 MB up/down near future)

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 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.

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

1.2.1d Higher Education

While there are currently no higher education colleges or universities in the counties, typically the 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 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."[6] 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.

The Highland Center

The Highland Center was established as a non-profit organization in early 1998. It has grown into a multi-purpose community and business incubator that promotes economic, cultural, and community development. The Center facilitates business counseling and free technical assistance services are provided by SCORE (Service Corps of Retired Executives) and SBDC (Small Business Development Center) to start-up and existing businesses.

The Center is embarking on a major renovation of its building and facilities, with the intention of preserving the historical integrity of the building itself for future generations and upgrading the building to improve its mission of

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

promoting economic, cultural, and community development. As part of the renovation, the Center is developing a conference/retreat space that will draw businesspeople and other professionals into the area all year round, adding business for local restaurant and lodging establishments, increasing employment opportunities, and injecting needed income into the local economy. In addition, the conference/retreat component will add income to the Center's operations, increasing its sustainability for the future.

Highland County Chamber of Commerce

The Highland County Chamber of Commerce works to preserve, promote and assist businesses in the community. The Chamber serves as a resource for inquiries related to business opportunities, tourism, and relocation of families and businesses. The following is a list of its primary functions:

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

The Highland County Chamber of Commerce sponsors the Highland Maple Festival, an annual event that attracts upwards of 30,000-50,000 people, as well as the Hands & Harvest Fall Festival and Wintertide Weekend. The Chamber also co-sponsors the Highland County Fair and McDowell Heritage Days.

Throughout much of the 20th century, events and festivals were the driving force behind the tourist industry in Highland County. In 2000, the Chamber re-defined its marketing strategies and began promoting Highland County as a year round tourist destination. The Board of Supervisors matched funds from Virginia Tourism Corporation, the Shenandoah Valley Battlefield Foundation, and the Chamber of Commerce to produce a county brochure designed specifically to attract tourists to the area.

In 2001, the Western Highlands Travel Council (a partnership including Allegheny, Bath, & Highland Counties) initiated an eco-tourism project marketing the region to birders, wildflower enthusiasts, hikers, cyclists, and horseback riders.

The Chamber has also partnered with the Valley Conservation Council to secure funding through the Transportation Enhancement Program to:

- Study the historic significance of the Staunton-to-Parkersburg Turnpike;
- Develop the Staunton-to-Parkersburg Turnpike as a tourist destination by publishing an interpretive driving tour brochure;
- Collaborate with the Highland Historical Society to fund a museum/interpretive center for the Turnpike and the McDowell Battlefield (Highland Museum and Heritage Center);
- And, to develop walking tours of the towns of Monterey and McDowell that both highlight local history and culture and also direct tourist traffic to retailers and restaurants.

An increasing number of visitors are attracted to Highland County each year for its unspoiled beauty, rich Civil War history, outdoor recreational opportunities, festivals and events. Tourism is a steady-growth industry in the region, with the County welcoming an average of two new tourist-related businesses per year for much of the past decade.

1.2.1f Small Business Development Center

The Virginia Small Business Development Center (SBDC) serving the counties is located in Abingdon, Highland County. 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 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".

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

Bath and Highland Counties have a strong business assistance network. Workforce development programs are offered through the following resources:

Area Facility	Type
Career Café' Job Resource Center	Comprehensive Center
Fisherville Workforce Center	VEC Workforce Center
Harrisonburg Workforce Center	VEC Workforce Center
Reemploy Virginia-Fisherville	Reemployment Center
Winchester Workforce Center VEC	Comprehensive Center
Workforce Job Center	Satellite Center

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

Current efforts by public schools and higher education workforce training partners to engage local businesses in offering apprenticeship opportunities should include marketing the economic development benefits of employee training and financial benefits available to employers.

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

Serving Bath County

Covington - Local Office
106 North Maple Avenue
Covington, VA, 24426-1545
PHONE: (540) 962-0983
FAX: (540) 962-8750
Christopher Simmons, Manager

Serving Highland County

Fishersville - Local Office
1076 Jefferson Hwy
Staunton, VA, 24401
PHONE: (540) 332-7750
FAX: (540) 332-7764
Julie Goodlick

Virginia Cooperative Extension of Highland and Bath County

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 (Highland County Office)

PO Box 528

83 Highland Center Drive

Monterey, Virginia 24465

540-468-2225 Fax: 540-468-2789

Shenandoah Valley Workforce Investment Board

The Shenandoah Valley Workforce Investment Board, "SVWIB"), is a non-profit organization established to implement the Workforce Investment Act of 1998 ("WIA") in the counties of Bath and Highland. The SVWIB operates five Valley Workforce Centers that serve individuals and employers located in Harrisonburg, Staunton, Winchester, Page/Luray, and Buena Vista

Valley Workforce Centers have extensive services for anyone seeking employment offering assistance with job searching, resume writing, interviewing skills, networking, filing for unemployment compensation, career exploration, skills assessment, use of computer-phone-fax-printer for job searching, and workshops on many job seeking topics. Employer services include: find and prescreen candidates, help hire Veterans, post and host a job/career fair, labor market information, federal bonding for hiring ex-offenders, and space for hosting job fairs, trainings, or interviews.

Valley OJT is an on-the-job training initiative, funded by a U.S. Department of Labor grant that subsides wages of employees during their on-the-job training. Advanced manufacturing and health care employers are eligible. Some businesses in our region have received over $100,000 in wage subsidies and hundreds of individuals have obtained full-time jobs through the Valley OJT initiative.

1.2.1i Public Library

Bath County Public Library

The Bath County Public Library, which is a branch of the Rockbridge Regional Library (www.rrlib.net), houses 27,500 titles, with access to the resources of the entire regional system via interlibrary loans and from public or college libraries all over the United States. In addition to books, patrons enjoy the availability of 56 magazines and collections of CDs and DVDs, and free high speed Internet access and Office computing such as Microsoft Word and PowerPoint. The Goshen Public Library serves Bath citizens as well; in fact, a Bath resident's free card is good in all 5 of the regional system's libraries.

The Library offers bookmobile service through a deposit station in Williamsville and a stop at Millboro School. A van makes additional Bath County runs, serving seniors, children, and the homebound. Other services include a summer reading club for school-aged children and programs of literary and general interest to the public. The Thomas Craven Meeting Room is a popular meeting place. The Library's catalog is available 24/7 on the Library's Web site: www.rrlib.net/bath/default.htm. The library is located across from the Bath County Courthouse in Warm Springs, and is open six days per week.

Highland County Public Library

The Highland County Public Library, an independent facility located in Monterey, maintains a collection of approximately 16,400 books, 1000 audio books (tape and CD), 600 music albums, 37 periodicals, and 2200 DVDs and videos for children and adults. Services for seniors such as Talking Books, SeniorNavigator.com, and access to the Aladdin Reader are provided. Children's programming includes a monthly Family Movie Night, Afterschool Crafts programs, and a Summer Reading Program. The library offers free high-speed internet access to the public on seven computers. Wi-Fi internet access is also provided. A computer in the children's section provides games and educational programs. The library has a website at *www.highlandlibrary.com* which offers an online card catalog and password access to user accounts. A meeting room, The Mountain View Room, is available for public use. The library maintains 3 book deposit locations; McDowell, Mill Gap, at Highland Senior Center.

Citizens without computers or home Internet access and visitors to the Counties can access the Internet and several applications at no charge. Both Bath and Highland Counties' branches provide access to computers and free Internet access. Patrons with laptop computers can access the Internet wirelessly. Station access is being used for many functions. These include leisure activities such as surfing the Internet and email, to more critical job-search related functions such as working on resumes, researching job opportunities, and applying for jobs advertised by national databases such as Monster.com. It is a common practice for companies to require job applications to be submitted only through an online process. The majority of users are students who either do not have a computer at home or have no Internet access. Other users come to the library to read email, online news and magazines, and perform general Internet searching.

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 Counties. Numerous other training courses are available online through agencies such as FEMA, Department of 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 tied for 3rd highest with News Access over past 6 months.

- Family practice and some critical care is administered by Highland Medical Center, Monterey
- Bath County Community-Hospital is located in Hot Springs; 90 Bed Nursing Home in County
- Telemedicine (such as viewing higher resolution radiology images) requires higher bandwidth access

See Figure ES-E: Priority Service Areas in Relation to Education, Health Care, Community Facilities Economic Features and Growth Areas

1.3 Service Provider Input

A communication for Request of Interest was mailed and e-mailed to over 30 service providers and/or network managers to attend a March 3, 2015 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). Approximately 10 firms responded in some form. Three (3) service providers, HTC, MGW, and TDS provide almost 79% of Residences and almost 82% of businesses that responded to the survey Internet service. While invited, no cellular service providers took interest in the study. Follow-up face-to-face meetings were held with HTC, MGW, BARC and a telephone conference call with TDS.

The three dominate Internet service providers and the electric 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 on a county basis and shown on maps in each county 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 Project Management Team was unreliable cellular service or no cellular phone service in many parts of the counties. In addition, the Emergency Response Radio Communications studies are proposing additional towers be built on which both broadband and improved cellular phone service equipment was being investigated including cost sharing. The survey responses were intended to be used for more than just capturing a snapshot of the state of telecommunications today from a service providers 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 counties 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.

1.31 Service Providers

In most areas of both counties, the businesses and residents do not have choice of Internet Service Providers. The service areas of HTC, MGW and TDS are well defined.

Residential

Name of Company Providing Internet Connection	Responses	%
Direct TV	1	0.3%
Earthlink.net	1	0.3%
Highland Telephone Company (HTC)	80	23.5%
Lumos Networks	6	1.8%
MGW Telephone	86	25.2%
No Internet Service	12	3.5%
PeoplePC.com	1	0.3%
Satellite (Dish, Hughes, Wild Blue, DirecTV)	26	7.6%
TDS	102	29.9%
Verizon	8	2.3%
Verizon Wireless	2	0.6%
I Don't Know	3	0.9%
No Answer	13	3.8%
Total	**341**	**100.0%**

Almost 79% of all Residence/Residence with Home-Based Business Internet needs are supplied by 3 Providers

Businesses

Name of Company Providing Internet Connection	Responses	%
AT&T	1	0.7%
CPSI	1	0.7%
Dish Network	4	2.9%
Exede	1	0.7%
Highland Telephone Company (HTC)	61	43.6%
Hughesnet	3	2.1%
Lumos Networks	5	3.6%
MGW Telephone	25	17.9%
TDS	28	20.0%
WildBlue	1	0.7%
I Don't Know	3	2.1%
No Answer	7	5.0%
Total	**140**	**100.0%**

Almost 82% of all Businesses/Gov.t/Public Facility/Community Organization/Non-Profit Internet needs are supplied by 3 Providers.

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 were established based on the areas of greatest need to allow a phased in approach if warranted. The existing service providers and their facilities 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 had to be interpreted such as where telephone central office switch and remote cabinet locations may be DSL enabled as a result of historical reluctance by Incumbent Local Exchange Carriers (ILECs) to provide DSL remote terminal (RT) information, combined with the current regulatory and legal inability to compel its production. 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). As previously noted, over 30 invitations went out to service providers to attend a meeting and take interest in the study with approximately 10 responding in some form.

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, 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. One area warranting further investigation was the growth area along Rt. 220 between Carloover and Warm Springs where infrastructure was indicated existing, but many surveys indicated service was not available. Option No. 1 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 no interest in the project expressed by Wireless Service Facilities Providers" which may include both towers and anchored antennae facilities (such as roof top) and Interior Wi-Fi hotspots and facilities and therefore only towers were included in the mapping.

The location of "Service Provider Facilities" 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 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: *BHT-NAP*

Premise: Bath-Highland Telecommunications - Network Assistance Program

Description: Liaison between Customer & Service Provider

BHT-NAP Structure

Start by continuing to support and operate the Telecommunications 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 counties negotiate and contract for services with the Central Shenandoah Planning District Commission (CSPDC) to assist the counties in the administration of the service applications, liaison with the service providers, providing maps, etc. Outside the services of the CSPDC, the estimated cost to each 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.

BHT-NAP					
Cost Item	***Amount***	***Subtotal***	***Total Cost***		***Comment***
Administration of Program	$1,000/Mo. x 12 mos.	$12,000 per Year			Recommend discussions with CSPDC to assist and supplement County Staff
Materials/Supplies/Overhead	$200/Mo. x 12 mos.	$2,400 per Year			Map Printing, phone calls, fax, mileage, etc.
BHT-NAP Total			**$14,400/Year**		← Program Cost per County; Does not include cost for CSPDC Support

1.4.b - Option No. 2: *NETWORK EXTENSION FUNDING PPP*

Premise: Getting middle 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 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 the current dominate 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 counties 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 each of the counties towards 1 or 2 funding applications in each county plus $50,000 from service provider(s) for a total of $96,600.

b) Again, in addition to the above suggested county budget, it is recommended the counties negotiate and contract for services with the Central Shenandoah Planning District Commission (CSPDC) to assist the counties and their staff in the administration of the funding applications providing maps, survey results, demographic data, etc. The administrative budget is an estimated cost of $9,000 per county or $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 - Counties' 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.			Recommend discussions with CSPDC to negotiate cost 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 per County; Does not include cost for CSPDC Support

1.4.c - Option No. 3: *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 counties. 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 counties, 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) As with the first two (2) options, it is recommended the counties negotiate and contract for services with the Central Shenandoah Planning District Commission (CSPDC) to assist the counties and their staff in the administration of this option. 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-Counties' 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 Counties cost addressed) Recommend discussions w/CSPDC
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 per County; Does not include cost for CSPDC Support

1.4.d - Option No. 4: *WIRELESS SERVICE*

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: Issue a Request for Proposal (RFP) seeking a Wireless Internet Service Provider (WISP) to become a Public-Private-Partner (PPP) with the counties 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 Counties.
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 counties in the PPP.

Basis of Estimated Cost

a) Since the number of towers sites has yet to be finalized, the cost estimate for this option is intended to represent an average cost per tower site, not a total cost to the counties. The actual costs to the counties would also depend on the RFP to the service providers and the amount the counties 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 counties 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 the Emergency Radio Study has not yet been reviewed, as well as 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 **(see Figure 1.4.d)** for which preliminary data had been collected **(see Table 1.4.d)**, 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. This information is being provided in the event this option with further investigation and engineering is pursued.

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, or bandwidth and minimal operational/maintenance expense because of relying on others to address these expenses, but some party will have to cover such expenses.

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.

Example of Costs Only! Actual Budget and Costs would depend on Radio Study, Tower Locations, Type Tower, etc.

Wireless Service (Bath & Highland Co.s)				Robust Tower Cost $350,000-$450,000
Cost Item	***Amount***	***Subtotal***		***Total Cost***
1. Cell/BB Spec Tower Cost/Site	$400,000 x 2	$800,000		Assume at least 1 new Cell Tower in Highland ($400,000); Start with 1 new Cell Towers in Bath ($400,000) w/possibility to add 1
2. Emergency/BB Radio Tower Cost Per Site	$200,000	$1,100,000		(Assume 2 Existing Towers Cost for Improvements = 1 New Tower Cost); Assume 1 additional new tower ($200,000) + 3 Existing Towers ($300,000) in Highland ($500,000 Total); Assume 2 additional new towers ($400,000) + 2 Existing Towers ($200,000) in Bath ($600,000 Total)
3. Backhaul Arrangements	$75,000x10 Towers	$750,000		At this time, nonspecific if Microwave or Fiber;
4. 10% Soft Costs, Overhead, Overrun, Misc.	Say 10% of Subtotal ($2,650,000)	$265,000		Includes Engineering, Financing Costs, Overrun, Overhead, etc.
5. Interest on $2,915,000 for 15 years @ 5%	$23,051.63/Mo.x12mos.x15 yrs. =$4,149,293 - $2,915,000 = $1,234,293	$1,234,293		County's Interest
6. Administration/O&M	$500/mo.x12 mos.x15 yrs.	$90,000		Minimal O&M expected w/WISP-PPP
		$4,239,293		**Say $4.2 million / 10 Total Towers = $420,000/Cell-BB Tower; Therefore, Use ½ or $210,000/Radio-BB Tower**
Cost Offset	Cell Tower Collocations Fees	($960,000)		An average of $1,750/mo./tower for the first 4 years for one carrier increasing $1,250/mo./tower (lower rate for second positioning) for a second carrier after 4 years to $3,000/mo. total seems reasonable. [$1,750 x 12 mos. x 4 yrs. x 2 towers = $168,000] + [$1,750+ $1,250 x 12 mos. x 11 yrs. x 2 towers = $792,000]; Collocation on Radio Towers also is Probable.
Net Cost		$3,279,293		**Say $3.3 million / 10 Towers = $330,000 Per Tower**

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"

Cellular Mobile Broadband: 3G and 4G Technologies

Figure 1.4.d Potential Tower Sites for Consideration

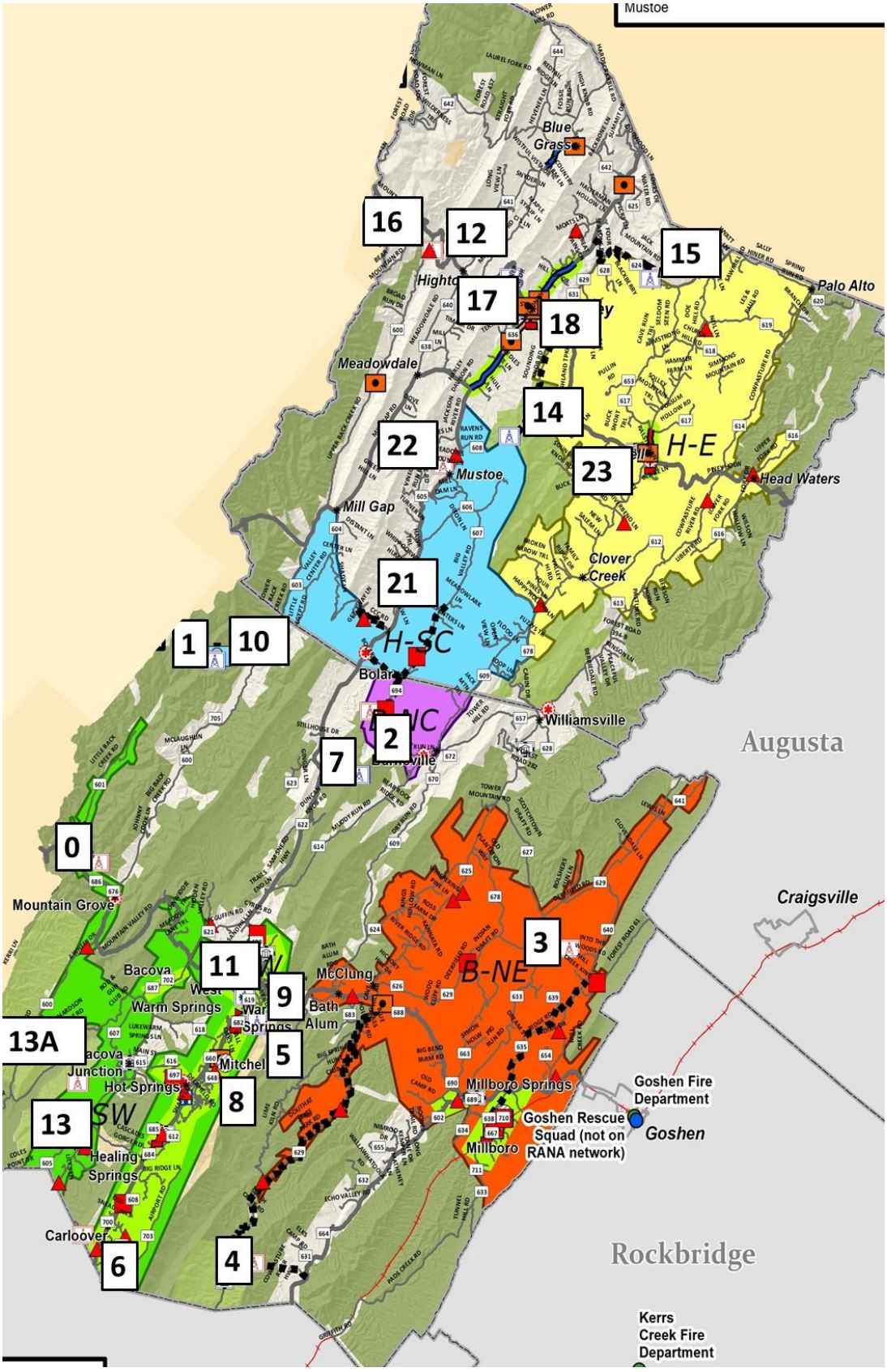


Table 1.4.d Tower Site Information (Conceptual Layout and Planning Preliminary Notes Only – Do Not Rely on Data for Design!; Various Options Reviewed)

FID	CONNECTION CONSIDERATION	DESC_	OWNER	HEIGHT	ELEV	SOURCE	NAME	DESCRIPTION	LAT	LONG	POWER Consideration	FIBER ROUTE
8		Water Tank		0		Aerial Imagery (2011)	Water Tank					300 ft of Lumos Sam Snead Highway (Rt. 220)
12		Existing Tower Site		0		Aerial Imagery (2011)	Verizon Cell Tower		38°25'41.07"N	79°35'46.62"W		Along Rt. 250 from Monterey to Lantz Mtn. Tower
1	CONNECT w/MICROWAVE	New Tower Site		0		Andy Seabolt (Bath Co)	?Adjacent Tower @ VEPCO	NE Bath EF&R Tower (Near VEPCO)			Power exists to Power Plant	Out of Mtn. Grove, Up Big Black Creek Rd across land to Tower
6		New Tower Site		0		Andy Seabolt (Bath Co)	? Carlover Tower					Carlover Tower 0.76 Miles off Lumos
0		New Tower Site		100		Bath County Radio Study	NW Tower (Radio Study)		38°08'28.46"N	79°53'17.19"W	Power @ intersection of Hwy 39 & Little Back Creek Rd.;	Tower Between Mountain Grove and VEPCO Tower **Connected by Proposed Fiber Build Below**
2	MICROWAVE	Existing Tower Site	USFS	90		Bath County Radio Study	Duncan's Knob USFS Fire Tower	Bath County has one transmitting antenna & base station on platform	38°09'52.06"N	79°42'18.94"W	Power along Rt. 614	Tower West of Burnsville **(Connected by Proposed Fiber Build Below)**
3	CONNECT w/FIBER BUILD from MGW since power pole line must also be built	New Tower Site		100		Bath County Radio Study	NE Tower (Radio Study)		38°04'46.06"N	79°32'32.33"W	Power around Walker Mtn. (Stops @ base - Rt. 633) MOST $ BUILD	Above Millboro Springs (50,000 ft) **(Connected by Proposed Fiber Build Below)**
4		New Tower Site		100		Bath County Radio Study	SE Tower (Radio Study)		37°54'22.04"N	79°46'47.05"W	Power Down Rt. 42 to I-64;	South Central Bath Co. (12,000 ft.) 2.27 Miles off Lumos **Location Replaced Below**
5	CONNECT w/FIBER BUILD from Lumos (0.76 Mile) or TDS	Existing Tower Site	The Nature Conservancy	100		Bath County Radio Study	Warm Springs Tower (BARC Site)	designed as a 120' tower, the top 20' was never purchased	38°01'52.16"N	79°46'53.62"W		0.76 Miles to Lumos
7	MICROWAVE	Existing Tower Site	Va State Police	160		Bath County Radio Study	Duncan's Knob VSP Tower		38°09'51.89"N	79°42'19.73"W		South of Bolar
10	CONNECT w/MICROWAVE	Existing Tower Site	VEPCo	130		Bath County Radio Study	Mountain Grove		38°13'24.56"N	79°48'52.77"W	Power exists to Power Plant	
11	CONNECT w/FIBER BUILD from Lumos or TDS	Existing Tower Site	Bath County	63		Bath County Radio Study	ECC		38°02'46.07"N	79°47'20.07"W		Warm Springs
13		New Tower Site		100		Bath County Radio Study	SW Tower (Radio Study)		37°59'58.96"N	79°54'46.38"W	Underground power along Rd. down to Lake	1000 Ft. to Lumos near Jackson River TPKE; **Location Replaced Below**
9		Existing Tower Site	American Tower	0		CIT-FCC: Cellular	Old AT&T Site					
14	CONNECT w/Existing FIBER from MGW off Rt. 250 down Sounding Knob Rd.	Existing Tower Site		50		Highland LEPC (Nancy W.)	Jack Mountain, near Sounding Knob	2 towers @ location-2011aerial-Wooden Pole	38°20'39.4"N	79°35'46.2"W		Off 250 down Sounding Knob Rd to Tower
15	CONNECT w/Existing FIBER from HTC or MGW	Existing Tower Site		50		Highland LEPC (Nancy W.)	Jack Mountain, west of Doe Hill	could not locate on 2011aerial - Wooden Pole	38°25'40.4"N	79°29'28.2"W		Off 220 along Straight Creek Rd to Jack Mtn. (21,500 Ft.)
16	CONNECT w/Existing FIBER from HTC	New Tower Site		100		Highland LEPC (Nancy W.)	Lantz Mountain	80-100' tower planned to be installed before next winter (2015); Prior Coordinates: 38°28'57.1"N, 79°36'47"W Proposed Lattice Wind Turbine Tower; Connects Monterey Existing Emergency Response Station	38.441183	-79.65546		Out of Monterey on Mountain Rd (250) past Verizon Tower to Upper Black Creek Rd (50,500 ft.)
17	CONNECT w/Existing FIBER from HTC	Existing Tower Site	Roy Gutshall	0		Highland LEPC (Nancy W.)		private owner, may be willing to rent space	38°25'39.52"N	79°35'50.15"W		Near Verizon Tower
18	CONNECT w/Existing FIBER from HTC	Existing Tower Site	Highland County	0		Highland LEPC (Nancy W.)	Emergency Communications Tower	located next to Highland County Sheriff's Office	38°24'45.092"N	79°34'56.115"W	EXISTING Tower next to Highland Co. Sheriff Off	Downtown Monterey

23	ELIMINATE- HTC can serve	New Tower Site/Leased Fiber	Highland Co. EM Lease		2,100'	Highland County-BB Study	McDowell EF&R Tower	Build Tower at Emergency Fire & Rescue; Connects McDowell Existing Emergency Response Station			Power in McDowell	6755 State Hwy 678; Supply Bandwidth & Backhaul out of MGW Telephone Co. in Williamsville via fiber build:North up 678 (Bull Pasture River Road) to McDowell
		Leased Fiber	bhtn Lease			Highland County-BB Study	Redundancy Connecting McDowell and Monterey F&ER	Not Necessary - Optional Redundancy Provision				Add Redundancy by leasing fiber btwn McDowell Fire & Rescue and Monterey Fire & Rescue
21	ELIMINATE- HTC can serve	New Tower Site/New Fiber	bhtn		2,663'	Highland County-BB Study	Bethel Tower	Proposed to Address BB in H-SC Priority Area	38.248N	79.650W	Power along Hwy. 607	Supply Bandwidth & Backhaul out of HTC in Monterey via fiber build off 220: Head East on 607 to Bolar Gap and Little Valley Run & go north on 607 to intersection at Carpenters Lane
22	ELIMINATE- HTC can serve	New Tower Site	bhtn Lease		2,381'	Highland County-BB Study	Mustoe Tower	Proposed to Address BB in H-SC Priority Area	38.324N	79.640W	Power Available	Supply Bandwidth and backhaul off 220 from HTC
		New Tower Site	Highland Co. EM Lease			Highland County-BB Study	Bolar EF&R Tower	Connects Bolar Existing Emergency Response Station				Supply Bandwidth and backhaul off 220 from HTC
2A	Investigate as Alternative to FID#2 Above	New Tower Site	Bath Co. EM			Bath County BB Study	Burnsville EF&R Tower	Same Tower as FID #2 Above				Supply Bandwidth and Backhaul off fiber on 614
3A		New Tower Site	Bath Co. EM			Bath County BB Study	Millboro Springs EF&R Tower	Connects Same Tower as FID #3 Above				Fiber build from BARC to tower: Rt. 635 into Woods Rd or Mill Creek Crossing
0A	ALTERNATIVE SITE to FID#0 Above	New Tower Site	Bath Co. EM			Bath County BB Study	Mountain Grove EF&R Tower	Same Tower as FID #0 Above; Connects Mtn. Grove Existing Emergency Response Station			CONNECT w/MICROWAVE or w/FIBER BUILD off BARC Poles btwn. Warm Springs & Mt. Grove	Build Fiber from off 220 at Warm Springs along 39 (where interconnected w/Lumos): Locate Equip. at MGW Central Off.
13A	ALTERNATIVE SITE: CONNECT w/FIBER BUILD from Lumos (1,000 ft. near Jackson River TPKE)	New Tower Site	Bath Co. EM		2,096'	Bath County BB Study	Bacova Junction EF&R Tower	Proposed to Replace FID #13 Tower Above	38.020 N	79.944 W	Power approx.. 1 mile away	Fiber Bandwidth Supply & Backhaul: Relocate to TM Gathright Wildlife Mgmt. Area (VA Park & Rec.) or McClinton Pt. Primitive Campground; South from Mtn. Grove to Wildlife Mgmt. Area
2A		Network Interconnection between HTC & MGW via thru Burnsville w/Redundancy off Lumos Net-works & Windstream	bhtn			Highland County-BB Study	Fiber Interconnection	Connects Tower FID #2 Above; Connects Burnsville Existing Emerg. Response Station				Burnsville to Bolar: South on Dry Run Rd 609 toward VA 614, Turn Rt. On VA-614, Turn Rt. On Rt., 220,Turn Rt. on 607 (Big Valley Rd.) to Bolar
2A		New Fiber	bhtn			Highland County-BB Study	Fiber Interconnection	Connects Tower FID #2 Above; Connects Williamsville Existing Emerg. Response Station				Burnsville to Williamsville: South on Dry Run Rd 609 towards VA 614, First left onto VA-614,Turn left and stay on VA 614 to Williamsville
2A		New Fiber	bhtn			Highland County-BB Study	Fiber Interconnection	Connects Tower FID #2 Above				Windstream Fiber to Interconnection Loop at intersection 609 & 614:
2A		New Fiber	bhtn			Highland County-BB Study	Fiber Interconnection	Connects Tower FID #2 Above; Connects Hot Springs Existing Emergency Response Station				Lumos Network Fiber to Interconnection Loop from Warm Springs to intersection of 614 and 220:
4A	ALT. SITE CONSIDERATION: CONNECT w/FIBER BUILD from Lumos along 42	New Fiber	bhtn			Bath County BB Study	Bath South-Central EF&S Tower	Proposed to Replace FID #4 Tower Above				(Near Cowpasture River Hwy near Bath South Co. Line):Relocate to Marshall's Automotive Repair or Tender Hearts Quilts off Rt 42 (Cow Pasture Highway)Build off Lumos Network Fiber along 42:

1.4e - Option No. 5: *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 and 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. Publically 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 tentative because it is not being proposed that fiber last mile be built to every home in the counties. In fact, HTC 's and MGW's business plans (as well as eventually BARC) call for continuous rollout of FTTH/FTTP build, but the time line is over several years. Also the type of last mile build, aerial or underground will greatly impact cost. Finally, the amount of fiber to aggregate the interconnection point with middle mile may be extensive.

When looking at homes/premises within 0.1 mile of existing fiber (528 ft.), as well as some additional proposed fiber that would benefit both broadband efforts as well as emergency communications, approximately 1,930 homes/premises are within this distance to the fiber. Some homes/premises are just outside the 0.1 mile distance and at least another 5% could probably be added with little extra expense nearing or exceeding 2,000 sites. A quick assessment during an earlier analysis was made if increasing the distance to 0.15 mile or 792 feet from the fiber, but the added 50% distance did not seem to justify the 21% extra properties.

Therefore for comparative purposes, by using 2,000 as the number of customers for the network build being used for cost determination would be similar to the number of customers used in the CPE/Last Mile Cost Subsidy option (2,000 subsidies) either per county or combined if splitting local match, 2,000 homes/premises in study area = 32.27%. In the past, the typical cost of a FTTH/FTTP was reported to range anywhere between $3,000 to $4,000 at 40% take rate depending on many things such as distance, type construction (aerial vs.

underground), soil type, etc.[7] While this estimate is now almost 7 years old and is probably more applicable for urban settings with much more potential for other utility interference (not to mention the cost range does not state what is included in the cost and probably includes some middle mile, equipment, make ready, permitting, environmental assessments, engineering, etc.), given the extremely mountainous topology of the study area, this cost rule of thumb could be used for preliminary estimating and the total cost used to arrive at an average cost per premise. Therefore an average of $5,000 per home/premise at slightly greater than a 32% take rate would be a start (Would be $5,250 @ 30% take rate).

Some primary middle mile fiber plus some secondary middle mile fiber will probably have to be built to aggregate fibers from multiple premises at strategic locations. Additionally, equipment will probably need to be replaced at least 2x, maybe 3x over the next 15 years and should be considered when estimating. Therefore, at least twice an allowance should be made budgeting for ONT equipment. Another 10% of the subtotal should be used for closing and soft costs of the financing, permitting, environmental studies, cost overrun, and miscellaneous other expense.

As in the wireless service option, while fiber has a service life well in excess of 30-40 years, it is difficult to get lending agencies to amortize funding for more than 15 years for telecommunications assets. Therefore 15 years is recommended for the amortization period at 5% interest, and 15 years used for administration and Operation and Maintenance (O&M) expense. Underground construction is probably not worth considering due to being cost unfeasible for the counties alone. As previously stated, while $4,000 - $5,000 per home/premise is considered unusually high, given the rough, mountainous terrain of the study areas, distance to houses/premises, as well as the estimate including other components not normally in the rules of thumb cost ranges (debt service with interest, make-ready, equipment replacement, soft costs, etc.) **for preliminary estimates it is suggested to continue to use $4,000 per premise is recommended.**

While fiber use lease fees (or access to the customer) will help offset some of the monthly debt service and capital expense, the 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 currently no provider is offering TV/video content. Because of these shortcomings, 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 counties, 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.

As a matter of interest, in general discussion one service provider commented it would take approximately $25 million for last mile to connect the homes/premises in both Bath and Highland Counties. Using the suggested $4,000/home or premise x 6,197 homes/premises = $24,788,000. The difference between the rough service provider quote, and the estimated approach used below is only $212,000 or less than 0.01%.

[7] See Homes with Tails, What if You Could Own Your Internet Connection? By Derek Slater and Tim Wu, found in New America Foundation Wireless Future Program Working Paper #23 November 2008. "Verizon's average cost per customer is around $3,000-$4,000 assuming a 40 percent take-up rate."

Example of Costs Only! Actual Budget & Costs would depend type construction, location of interconnection, extent of make ready, etc.

NETWORK BUILD *(Bath & Highland Co.s)*	**Cost Approach No. 1 –** Per Unit Cost			**Cost Approach No. 2-**Per Mile (2,000 Homes/6,197 Total Homes = 32.2%); $4,000/Prem.@40% Take Rate=$5,000/Prem.@ 32.2%			***Comment (Homes with Tails)***
Cost Item	***Extension*** *(0.1 mile = 528 ft.)*	***Under-ground (UG)***	***Aerial***	***Extension***	***Under-ground***	***Aerial***	Typ. cost = $3,000-$4,000/prem. at 40% Take Rate
Assumptions Boring MM Avg. $8.50/ft Plowing LM Avg. $1.50/ft UG Hardware $2.50/ft. Fiber $1.00/ft.+/- Misc.(HH, Splicing, Con-duit, Cabinet, etc.)$5.00/ft **Use $10/ft LM/$17/ft MM**	Make Ready $0.65/ft. Aerial Instal$1.25/ft. P-Hardw./Strand$$0.35/ft. Fiber $1.00/ft.+/- Misc. (Enclosures, Cabinets, etc.) $0.25/ft. **Say $3.50/ft.**						Aerial Construction, typ. 20 – 50% of cost of underground constr. (Say Avg. 35%)
1. Last Mile fiber drop	2,000x528 ft x $10/ft; 2,000x528 ft x $3.50/ft	$10,560,000	$3,696,000	2,000 prem.x $5,000/prem.	$10,000,000	$3,500,000	
2. Secondary middle mile fiber to aggregate last mile runs to strategic locations	45 Mi.+10 Mi. to aggregate drops = 55 mi. x 5,280= 290,400 ft x $17/ft.; 290,400 ft x $3.50/ft.	$4,936,800	$1,016,400	45 Miles + 10 Miles to aggregate drops = 55 mi. total x $50,000 per mile	$2,750,000	$962,500	Additional 20% added to route mi. in order to aggregate drops at strategic locations (cabinets)
3. ONT Equipment	$350 x 2,000 premises	$700,000	$700,000	$350 x 2,000 premises	$700,000	$700,000	No cost difference w/ONT Equip.
4. 10% Soft costs, Over-head, Overrun & Misc.	10% x $16,196,800 or 10% x $5,412,400	$1,619,680	$541,240	10% x $13,450,000 or 10% x $5,162,500	$1,345,000	$516,250	Includes Engineering, Financing Costs, Overrun, Overhead, etc.
5. Borrowed Money Interest	On $17,816,480 @ 5% $140,891.59/Mo.x12mos.x 15 yrs. =$25,360,486 - $17,816,480 = $7,544,006 On $5,953,640@ 5% $47,081.01/Mo.x12mos.x 15yrs.= $8,474,582 - $5,953,640 = $2,520,942	$7,544,006	$2,520,942	On $14,795,000 @ 5% $116,997.92/Mo.x12mos.x15 yrs. =$21,059,626- $14,795,000 = $6,264,625 On $5,678,750@ 5% $44,907.19/Mo.x12mos.x 15yrs.= $8,083,294 - $5,678,750 = $2,404,544	$6,264,625	$2,404,544	Counties' Interest
6. Administration/O&M	$1,000/Mox12 Mosx15 Yrs.	$180,000	$180,000	$1,000/Mo.x12 Mos.x15 Yrs.	$180,000	$180,000	Min. O&M expected w/WISP PPP-
7. Future ONT Replacement	$250 x 2,000 premises	$500,000	$500,000	$250 x 2,000 premises	$500,000	$500,000	Elec. equip. will be replaced at least 1x in 15 yrs. (possibly 2x)
LAST MILE NETWORK BUILD Total	$9,154,582-$180,000-$500,000 = $8,474,582/2,000 Prem=$4,237/Prem	$26,040,486	**$9,154,582**		$21,739,625	**$8,763,294**	$8,763,294-$180,000-$500,000 = $8,083,294/2,000 Prem=$4,042/Prem
							Use $4,000 per Premise
Cost Offset		($5,400,000)	($5,400,000)	Last Mile Access Lease Fees $15/mo./premise x 2,000 premises x 12 months x 15 years	($5,400,000)	($5,400,000)	Because No Provider is currently providing TV, last mile lease fee will be less than if triple play was offered; Probably increase over 15 yrs.
Net Cost		$20,640,486	**$3,754,582/2,000 = $1,877/Prem.**		$16,339,625	**$3,363,294/2,000 = $1,682/Prem.**	

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 counties are fortunate to have service providers with some existing telecommunications fiber optics infrastructure to build upon although currently mostly being middle mile infrastructure. 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-ways, 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 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 the Emergency Radio Communications Study.
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 counties
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 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 is the telecommunications services. The Commonwealth of 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. Applicable sections of the Virginia Code stating allowances, as well as prohibitions can be found in Section 2.1.

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 Counties' 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 counties are willing to make some manageable investment into enhancing Internet access within the counties, 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. 4-Wireless Service or Option No. 5-Network Build including "Homes with Tails".

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 is 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. 2 – Network Extension Funding through a Public-Private Partnership (PPP) probably lends itself to the private sector service provider being the applicant while Option No. 3 – 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

2.1 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.

2.2 Bath and Highland Counties Community Telecommunications Broadband Planning Initiative

As previously discussed, the approach consisted of collecting existing data as well as new data. Representatives of Bath and Highland Counties 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 providers names and contact information, services and rates
5. County elected and appointed officials 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 counties were fortunate in that much of the requested data was being maintained by the Central Shenandoah Planning District Commission 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.

2.3 Study Area History

Bath County

Historical Features (From http://www.bathcountyva.org/about-bath-county.html)

By 1740 he had purchased land on the Cowpasture River which he gave by deed to his only American born child, Charles. Charles settled at Fort Lewis in 1761. Charles later died at the Battle of Point Pleasant in 1774. Another son of John Lewis, Andrew, along with Thomas Bullitt, obtained a patent for the Hot Springs tract of 300 acres. Together they built the first hotel on the site of the present Homestead Resort in 1766. Visitors began coming to the springs of Bath County by 1750 and by the early 1800's records indicate 6,000 visitors annually.

An act of the Virginia assembly passed December 14, 1790, created Bath County from the counties of Augusta, Botetourt and Greenbrier. The first court in Bath County convened on May 10, 1791, at the home of Margaret Lewis, in Warm Springs. Warm Springs later became the county seat. Named for the English resort city of Bath, the county quickly became a national resort attraction. The soothing mineral waters have been attracting visitors for well over 200 years.

Today Bath County is recognized as a major recreational and resort destination in the scenic Allegheny Mountains of Virginia. Rich with lush forests, rushing crystal rivers and streams, hot and warm springs, and beautiful mountain scenery, the county is home to fabulous hotels, rustic lodges, and quaint bed and breakfasts.

Nearly 90% of Bath County's 345,600 acres is forest, 176,809 of which comprise the George Washington National Forest.

Cultural Features (From http://www.bathcountyva.org/about-bath-county.html)

The County of Bath is named for the English resort city of Bath, an ancient city visited for its healing spring waters since Roman times. For over 200 years the County of Bath has been defined but its natural beauty, the minerals springs that define some of its landscape, and southern hospitality. Located along the western, central border with West Virginia, Bath County encompasses 540 square miles. 89% of Bath County is comprised of forest, with 51% in national forest and 6% under state park. The Nature Conservancy also owns more than 9,000 acres of critical forest habitat.

From the earliest days when weary travelers stopped to rejuvenate in the healing springs now known as the Jefferson Pools tourism has played a major role in the development of Bath County. Since the first Homestead Resort was built in 1766, the community of Hot Springs has been a nationally recognized four season resort attraction. The popularity of "taking the waters" in the mid-18th century secured Bath County's place as a tourism attraction. The tourism sector employs almost 65% of Bath County's workforce and generates upwards of $225.7 million in revenues.

The County seat is located in Warm Springs. The County is governed by an elected Board of Supervisors, one from each of the 5 magisterial districts: Cedar Creek, Millboro District, Valley Springs District, Warm Springs District, and Williamsville. Warm Springs is home to the County Court House, the County administrative offices, Sheriff's Department, Public Library, along with a budding arts district and an historical museum and genealogical library.

What makes Bath County most unique is its people. It is a community where farmers have worked the same land their families have owned for hundreds of years. It is a community where visitor meet people born and raised in Europe who have chosen to live in Bath County. It is a community where the person you bump into at the farmers market may have studied piano at Juilliard School of Music.

Highland County

History Features (From http://www.highlandcova.org/aboutus.html)

Highland County was formed in 1847 from Bath and Pendleton counties. The county encompasses 416 square miles of spectacular mountain terrain and received its name from its prevailing high altitude. Highland County is rich in historic tradition. The Battle of McDowell was waged in Highland County during the Civil War. This was a significant battle in Stonewall Jackson's 1862 Valley Campaign. Monterey, the county seat, was established in 1848. Highland County is also rich in its natural resources. Agriculture plays a major role in Highland's economy.

2.4 Study Area Key Demographics

State & County QuickFacts - Bath County, Virginia

People QuickFacts	Bath County	Virginia
Population, 2013 estimate	4,616	8,260,405
Population, 2010 (April 1) estimates base	4,731	8,001,031
Population, percent change, April 1, 2010 to July 1, 2013	-2.4%	3.2%
Population, 2010	4,731	8,001,024
Persons under 5 years, percent, 2013	3.6%	6.2%
Persons under 18 years, percent, 2013	16.4%	22.6%
Persons 65 years and over, percent, 2013	24.5%	13.4%
Female persons, percent, 2013	50.0%	50.8%
White alone, percent, 2013 (a)	93.5%	70.8%
Black or African American alone, percent, 2013 (a)	4.9%	19.7%
American Indian and Alaska Native alone, percent, 2013 (a)	0.2%	0.5%
Asian alone, percent, 2013 (a)	0.3%	6.1%
Native Hawaiian and Other Pacific Islander alone, percent, 2013 (a)	0.0%	0.1%
Two or More Races, percent, 2013	1.1%	2.7%
Hispanic or Latino, percent, 2013 (b)	1.6%	8.6%
White alone, not Hispanic or Latino, percent, 2013	92.3%	63.6%
Living in same house 1 year & over, percent, 2008-2012	87.3%	84.7%
Foreign born persons, percent, 2008-2012	3.2%	11.1%
Language other than English spoken at home, pct age 5+, 2008-2012	1.1%	14.7%
High school graduate or higher, percent of persons age 25+, 2008-2012	83.8%	86.9%
Bachelor's degree or higher, percent of persons age 25+, 2008-2012	16.1%	34.7%
Veterans, 2008-2012	322	734,151
Mean travel time to work (minutes), workers age 16+, 2008-2012	30.2	27.5
Housing units, 2013	3,281	3,412,460
Homeownership rate, 2008-2012	80.0%	67.8%
Housing units in multi-unit structures, percent, 2008-2012	5.3%	21.5%
Median value of owner-occupied housing units, 2008-2012	$147,900	$249,700
Households, 2008-2012	2,008	3,006,219
Persons per household, 2008-2012	2.27	2.59
Per capita money income in past 12 months (2012 dollars), 2008-2012	$27,471	$33,326

Median household income, 2008-2012	$51,528	$63,636
Persons below poverty level, percent, 2008-2012	13.9%	11.1%

Business QuickFacts	Bath County	Virginia
Private nonfarm establishments, 2012	125	192,730[2]
Private nonfarm employment, 2012	1,791	3,089,241[2]
Private nonfarm employment, percent change, 2011-2012	-2.0%	2.0%[2]
Nonemployer establishments, 2012	322	529,636
Total number of firms, 2007	399	638,643
Black-owned firms, percent, 2007	F	9.9%
American Indian- and Alaska Native-owned firms, percent, 2007	S	0.5%
Asian-owned firms, percent, 2007	F	7.0%
Native Hawaiian and Other Pacific Islander-owned firms, percent, 2007	F	0.1%
Hispanic-owned firms, percent, 2007	F	4.5%
Women-owned firms, percent, 2007	S	30.1%
Manufacturers shipments, 2007 ($1000)	0[1]	92,417,797
Merchant wholesaler sales, 2007 ($1000)	1,524	60,513,396
Retail sales, 2007 ($1000)	20,958	105,663,299
Retail sales per capita, 2007	$4,498	$13,687
Accommodation and food services sales, 2007 ($1000)	D	15,340,483
Building permits, 2012	10	27,278

Geography QuickFacts	Bath County	Virginia
Land area in square miles, 2010	529.16	39,490.09
Persons per square mile, 2010	8.9	202.6
FIPS Code	017	51
Metropolitan or Micropolitan Statistical Area	None	

1: Counties with 500 employees or less are excluded.
2: Includes data not distributed by county.

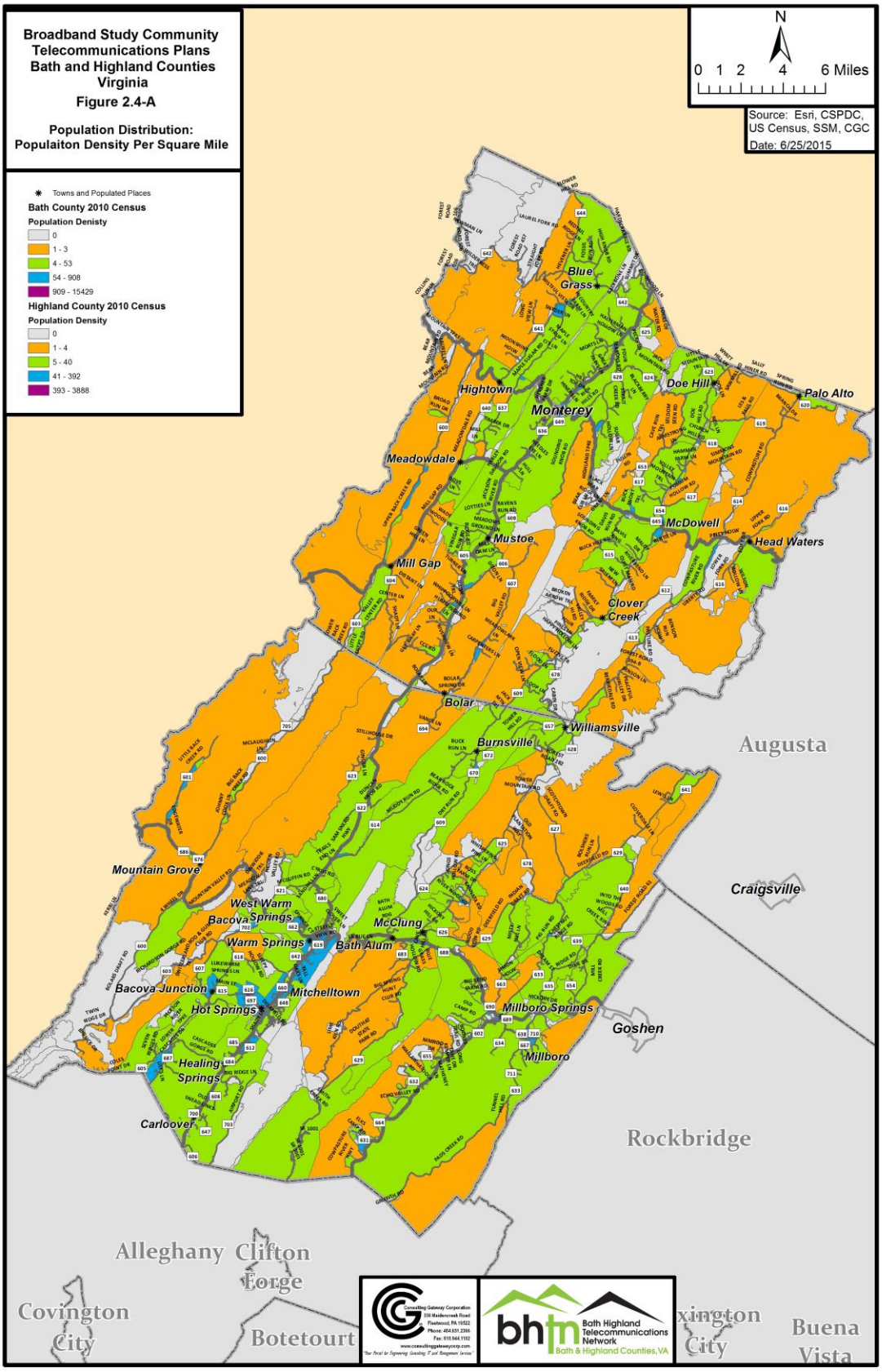
(a) Includes persons reporting only one race.
(b) Hispanics may be of any race, so also are included in applicable race categories.

D: Suppressed to avoid disclosure of confidential info.

F: Fewer than 25 firms
FN: Footnote on this item for this area in place of data
NA: Not available
S: Suppressed; does not meet publication standards
X: Not applicable
Z: Value > than zero but less than half unit of measure shown

Source U.S. Census Bureau: State and County QuickFacts. Data derived from Population Estimates, American Community Survey, Census of Population and Housing, State and County Housing Unit Estimates, County Business Patterns, Nonemployer Statistics, Economic Census, Survey of Business Owners, Building Permits
Last Revised: Tuesday, 08-Jul-2014 06:46:28 EDT

Figure 2.4-A: Population Distribution - Population Density per Square Mile



State & County QuickFacts - Highland County, Virginia

People QuickFacts	Highland County	Virginia
Population, 2013 estimate	2,215	8,260,405
Population, 2010 (April 1) estimates base	2,319	8,001,031
Population, percent change, April 1, 2010 to July 1, 2013	-4.5%	3.2%
Population, 2010	2,321	8,001,024
Persons under 5 years, percent, 2013	3.0%	6.2%
Persons under 18 years, percent, 2013	12.7%	22.6%
Persons 65 years and over, percent, 2013	29.3%	13.4%
Female persons, percent, 2013	50.7%	50.8%
White alone, percent, 2013 (a)	98.6%	70.8%
Black or African American alone, percent, 2013 (a)	0.6%	19.7%
American Indian and Alaska Native alone, percent, 2013 (a)	0.3%	0.5%
Asian alone, percent, 2013 (a)	0.3%	6.1%
Native Hawaiian and Other Pacific Islander alone, percent, 2013 (a)	0.0%	0.1%
Two or More Races, percent, 2013	0.2%	2.7%
Hispanic or Latino, percent, 2013 (b)	1.2%	8.6%
White alone, not Hispanic or Latino, percent, 2013	97.5%	63.6%
Living in same house 1 year & over, percent, 2008-2012	90.0%	84.7%
Foreign born persons, percent, 2008-2012	0.4%	11.1%
Language other than English spoken at home, pct age 5+, 2008-2012	0.5%	14.7%
High school graduate or higher, percent of persons age 25+, 2008-2012	80.0%	86.9%
Bachelor's degree or higher, percent of persons age 25+, 2008-2012	23.7%	34.7%
Veterans, 2008-2012	309	734,151
Mean travel time to work (minutes), workers age 16+, 2008-2012	23.1	27.5
Housing units, 2013	1,846	3,412,460
Homeownership rate, 2008-2012	83.7%	67.8%
Housing units in multi-unit structures, percent, 2008-2012	0.7%	21.5%
Median value of owner-occupied housing units, 2008-2012	$184,700	$249,700
Households, 2008-2012	1,052	3,006,219
Persons per household, 2008-2012	2.20	2.59
Per capita money income in past 12 months (2012 dollars), 2008-2012	$26,798	$33,326
Median household income, 2008-2012	$50,136	$63,636

Persons below poverty level, percent, 2008-2012	10.8%	11.1%

Business QuickFacts	Highland County	Virginia
Private nonfarm establishments, 2012	89	192,730[2]
Private nonfarm employment, 2012	375	3,089,241[2]
Private nonfarm employment, percent change, 2011-2012	2.7%	2.0%[2]
Nonemployer establishments, 2012	247	529,636
Total number of firms, 2007	307	638,643
Black-owned firms, percent, 2007	F	9.9%
American Indian- and Alaska Native-owned firms, percent, 2007	F	0.5%
Asian-owned firms, percent, 2007	F	7.0%
Native Hawaiian and Other Pacific Islander-owned firms, percent, 2007	F	0.1%
Hispanic-owned firms, percent, 2007	F	4.5%
Women-owned firms, percent, 2007	F	30.1%
Manufacturers shipments, 2007 ($1000)	0[1]	92,417,797
Merchant wholesaler sales, 2007 ($1000)	D	60,513,396
Retail sales, 2007 ($1000)	8,851	105,663,299
Retail sales per capita, 2007	$3,700	$13,687
Accommodation and food services sales, 2007 ($1000)	D	15,340,483
Building permits, 2012	12	27,278

Geography QuickFacts	Highland County	Virginia
Land area in square miles, 2010	415.16	39,490.09
Persons per square mile, 2010	5.6	202.6
FIPS Code	091	51
Metropolitan or Micropolitan Statistical Area	None	

1: Counties with 500 employees or less are excluded.
2: Includes data not distributed by county.
(a) Includes persons reporting only one race.
(b) Hispanics may be of any race, so also are included in applicable race categories.
D: Suppressed to avoid disclosure of confidential information
F: Fewer than 25 firms
FN: Footnote on this item for this area in place of data
NA: Not available
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Source U.S. Census Bureau: State and County QuickFacts. Data derived from Population Estimates, American Community Survey, Census of Population and Housing, State and County Housing Unit Estimates, County Business Patterns, Nonemployer Statistics, Economic Census, Survey of Business Owners, Building Permits
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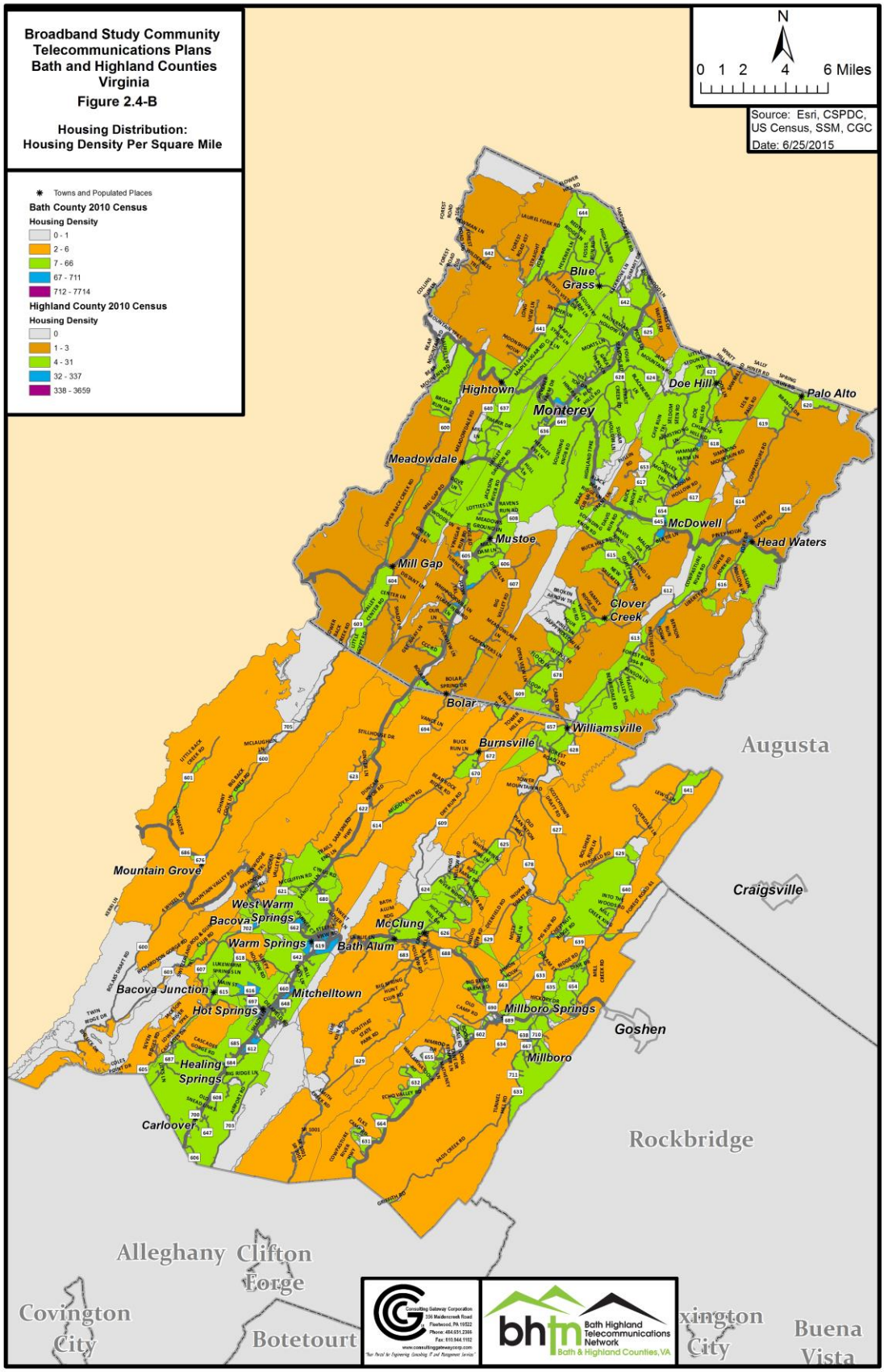
Figure 2.4-B: Housing Distribution - Housing Density per Square Mile



Central Shenandoah Valley Region

Facts and Figures 2010

BATH COUNTY
HIGHLAND COUNTY

BATH COUNTY and **HIGHLAND COUNTY** are nestled in the Allegheny Mountains of west-central Virginia. The Bath-Highland Area cover 956 square miles of land and is home to 7,000 people. Bath, formed in 1790 and known for its soothing mineral waters, long has been recognized as a major resort center. Highland, formed in 1847, is known as "Little Switzerland" because of its pristine mountain beauty. Warm Springs is the county seat of Bath. Monterey, an incorporated town, is the county seat of Highland.

Rich in historic tradition and natural resources, the Bath-Highland Area is characterized by high, narrow mountain ridges and narrow river valleys. A large percentage of land in the Bath-Highland Area is publicly held and protected, providing raw material for industry and an abundance of opportunities for outdoor recreation. The Bath-Highland Area is approximately 100 miles north of Roanoke, 155 miles west of Richmond, 195 miles southwest of Washington D.C., and 250 miles west of the Port of Hampton Roads.

REGION AT A GLANCE

Population
Bath-Highland Area
1990 Census: 7,434
2000 Census: 7,584
2009 Provisional Estimate: 7,018

Population by Locality
2009 Provisional Estimates
Bath: 4,745
Highland: 2,273

Income
2008 Per Capita
Bath: $38,231
Highland: $31,497

2007 Median Adjusted Gross Income
for Married Couples
Bath: $46,463
Highland: $42,538

Sources: Weldon Cooper Center for Public Service and the U.S. Census Bureau

Government
Bath: 5 member Board of Supervisors
Highland: 3 member Board of Supervisors

Real Estate Tax
(per $100 assessed value)
Bath: $0.55
Highland: $0.40
Town of Monterey: $0.10

Bank Deposits
2009 Total: $171 million

Communications
Five telephone companies service the area.
Internet service is available to some areas.

Transportation
Road – U.S Routes 250 and 220
State Routes 42 and 39
Rail – CSX Transportation and Amtrak
Air – Ingalls Field and Shenandoah Valley Regional Airport
Port – Hampton Roads (250 miles east)

Sources: Weldon Cooper Center for Public Service and the U.S. Census Bureau

Compiled and published by the Central Shenandoah Planning District Commission, 112 MacTanly Place, Staunton, VA 24401 (540) 885-5174. FAX (540) 885-2687. Website: www.cspdc.org. e-mail: cspdc@cspdc.org. The publication of this report was financed in part, through a planning assistance grant from the Economic Development Administration, United States Department of Commerce, EDA Project Number 01-83-08435.

The following table information are related excerpts from the Counties' Comprehensive plans found at http://www.bathcountyva.org/assets/Comprehensive_Plan_whole_document_-_7-23-07_edits.pdf) and http://www.highlandcova.org/Compplan/Overview.htm)

Demographics Goals, Objectives and Strategies

Demographic Goals 1. Encourage young adults to stay in Bath County and seek to attract young families with children. 2. Support services for low-to-moderate income residents so that they may lead fulfilling lives and be effective participants in the community. 4. Plan for the future diversity of the population including suitable services, education, employment, and housing opportunities. **Demographic Objectives** a. Encourage and expand vocational and work-study programs in the public school system to strengthen the skills of young people and make them more marketable as local employees. b. Support age-appropriate activities and programs to meet the social and recreational needs of local children and adults. d. Support opportunities for the elderly to participate in recreation programs through private and County funded organizations.	**Demographic Goals** DG-1 Encourage young adults to stay in Highland and seek to attract young families with children. DG-3 Determine ways to increase access to services by local residents living at or below the poverty level. **Demographic Objectives** DO-1 Encourage business opportunities for entrepreneurs who want to stay in or move to Highland. DO-2 Encourage young families to stay in/return to Highland. **Demographic Strategies** DS-3 Market the quality of public school system as an asset DS-4 Market the availability of current and planned technology infrastructure. DS-5 Conduct a study of job needs in the county/market openings to young adults. Support job/trade training, through targeted school and community college programs. DS-6 Conduct a study to id future services as residents in the county age. Report business opportunities to provide services.

Broadband Strategic Planning Implications:

- Keeping young adults and families in the community, certain recreation activities, planning for the future diversity of the population including suitable services, education, employment, and housing opportunities, and being attractive to business opportunities for entrepreneurs **will require high-speed access and bandwidth to world-wide information**
- Supporting services for the elderly (smart home applications and telemedicine) and low to moderate income **will require affordable service**
- Encouraging and expanding vocational and work-study programs in the public school system to strengthen the skills of young people and make them more marketable as local employees, as well as support of age-appropriate activities and programs to meet the social and recreational needs of local children and adults **will require effective broadband education development strategies.**
- Identifying anticipated future service needs of residents and businesses **will require good response and understanding from the needs assessment** milestone of the study

2.5 Community Vision and Values

Bath County: Where We Are Today

Bath County citizens today appreciate that they reside in a beautiful, peaceful County that is well known for its popular tourist attractions and natural environment. In addition to tourism opportunities, Bath County is recognized as a focal point for many diverse cultural and recreational activities, as well. Bath citizens are pleased with the overall quality of their local government and the services it provides at relatively low costs.

The residents also see that the County is in need of improvements. A priority is to ensure the continuation and source of paying for quality education for the county's children. Maintaining a healthy supply of local jobs is important to the citizens so that their young people can remain in Bath County if they desire. The need to diversify the employment base, while maintaining tourism as an important economic sector has been identified. Bath residents see that unmanaged growth can degrade the natural environment and rural character of the County, but a lack of growth can mean a loss of economic opportunity and stagnation.

Where Tomorrow Will Lead

According to community discussion, four interrelated themes make up the "key success factors" for Bath's future. The identified challenge is to integrate and balance these themes so as to maintain a cohesive whole in the County. Citizens acknowledge the importance of "thinking regionally" when planning for the following. Four visioning themes evolved from public discussions:

❖ Land use/environmental balance ❖Econ. opportunity

❖ Social wellbeing ❖Educ. quality

TODAY'S VIEW & A VISION FOR THE FUTURE

Highland County is known for its tree-covered mountains and open valleys, and its numerous streams which are the headwaters of major river systems that flow to the Chesapeake Bay. The mountainous terrain and wind resources have been significant factors in the proposed development of the first commercial wind farm in VA.

Highland County is known for its strong community spirit, manifested in the exceptionally high rate of volunteerism and many institutions supported through voluntary contributions, above-average participation in public affairs, friendliness, and people who are hard-working and honest. Scenic beauty is an outstanding feature, but the mountains also impact the roads, and job opportunities. These factors have had a negative impact on retaining young people after graduation.

A Vision for the Future

Our economy must expand beyond agriculture to include tourism, retail, commercial, and service-oriented businesses. We must seek innovative ways to diversify our economy and provide job opportunities. Relevant planning principles:

• Create a diverse, stable economy that provides a range of economic opportunities for all citizens.

• Maintain, enhance/expand the services necessary to enrich the lives of our citizens and to sustain a healthy community (high-quality education and opportunities for recreation and cultural activities.

Broadband Strategic Planning Implications:

- Maintaining a healthy supply of local jobs (economic opportunity) **will require ensuring businesses have the technical resources to compete in a global economy**
- Diversify the employment base, **will require providing opportunities for on-line training/job preparation and telecommuting**
- Continued participation in public affairs and establishing hard-to-reach service oriented business **will require strong e-government and e-commerce capabilities**
- Maintaining tourism as an important economic sector **will require being able to promote on-line the historic and recreational assets of the community**
- Maintaining and sustaining high-quality education and learning opportunities **will require attracting/keeping teachers by providing needed technical resources and programs such as laptop computers and distance learning**

2.6 Economic Opportunities

BATH COUNTY ECONOMIC OPPORTUNITY

The condition of the overall economy determines the availability of jobs, the size of the tax base, and the means by which individuals, families, businesses, and public institutions are able to afford the type of community envisioned. Diversified economic growth will provide the County with more stable jobs, better salaries, and more opportunity for the county's children to stay in the area to work. A diversified economy will contain a significant portion of community based and locally owned businesses, including technology, agriculture, and arts and crafts. It will also keep the County well positioned for advances in technology.

Bath County Economy

The ability of any community to sustain itself is largely dependent upon its economic assets. Such assets must be understood and cultivated for any community to flourish economically. Bath County therefore faces the challenge of capitalizing on economic opportunities without sacrificing the unique character and beauty for which the County has become so well-known.

Bath County Economy Goals

1. Strive to retain existing businesses and industry and help them to succeed.
2. Attract new businesses, while ensuring that growth and industrial development occur in suitable locations and are compatible with Bath's environmental, scenic, and rural character.
3. Build relationships that will create an enabling environment to provide opportunities for the County's labor force, as well as build local revenue.
4. Strengthen the promotion of tourism in Bath County.
5. Encourage the growth of small locally-owned private businesses as opposed to a large-scale "one-size fits all" approach to new business services.

Bath County Economy Objectives

a. Diversify the economy by working with appropriate parties that have expressed an interest in locating here, and pursue new businesses that would fit in with the existing environment.

b. Pursue a partnership program to enhance potential relationships between the schools and local businesses.

c. Attract environmentally low-impact, high wage industries, such as those in the areas of technology,

Economic Development Authority

The county has recently revitalized its Economic Development Authority. The group hopes to foster a proactive approach to economic development. It works closely with existing businesses while also identifying and attracting new businesses that are a good fit for Highland's unique characteristics.

Tourism

Highland has acknowledged local and regional tourism as an important economic opportunity. The Chamber of Commerce and The Highland Center work hard to expand and promote tourism as well as other areas of economic development.

Technology

As more jobs become dependent on technology, opportunities are created for workers that live outside of large metropolitan areas. Highland has a high quality of life that could attract such workers if the infrastructure, particularly broadband, becomes available. The county should explore ways to take advantage of this trend.

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Economy Goal

EG-1 Maintain a viable, diverse economy

Economy Objectives

EO-1 Diversify the employment base

EO-2 Support/expand the existing businesses-industries

EO-5 Assist local businesses in promoting their products at the local, state and national level.

EO-6 Identify/attract businesses offering wages/benefits adequate to support working families with children.

EO-7 Maintain the County's high quality of life, which serves to attract new employers and employees.

EO-8 Develop strong telecommunications infrastructure.

EO-9 Encourage value added enterprises.

EO-11 Recognize tourism as a diverse and viable economic development opportunity

home-based or telecommuting businesses, and business incubators. d. Create an inventory of existing buildings and encourage new development to take place in existing vacant buildings, rather than constructing new ones. e. Provide skilled and vocational training in the High School and encourage our local businesses to employ these skilled laborers. f. Work with local/regional partnerships for developing a strong Business Retention and Expansion Program. g. Continue to strengthen Bath County's working relationship with agencies such as the Virginia Economic Development Partnership and the Economic Development Association. h. Support an overall campaign for the community to attract tourism dollars to the County. i. Increase the number of telecommuters as a livelihood.	EO-12 Develop an Economic Development Strategic Plan that encourages job opportunities. **Economy Strategies** ES-1 Encourage/strengthen partnerships between businesses and schools to prepare graduates for workforce. ES-2 Request the Economic Development Authority to attract businesses that provide high-skilled jobs. ES-9 Request the Economic Dev. Authority, The Highland Center and the Chamber to encourage businesses to occupy existing vacant buildings ES-15 Continue training opportunities for businesses. ES-16 Explore creation of Highland website-local businesses and craftsman can market their products globally. ES-17 Identify and support the providing of the latest technology to local businesses at all levels. ES-21 Develop a tourism-marketing plan that will support local tourist-related services and businesses

Broadband Strategic Planning Implications:

- Retaining existing businesses and industry and helping them to succeed **will require adequate Telecommunications infrastructure and bandwidth**
- Strengthening tourism as an important economic sector **will require being able to promote on-line the historic and recreational assets of the community**
- Creating opportunities for workers that live outside of large metropolitan areas in rural areas such as the study area **will require providing the infrastructure and reasonably priced bandwidth for on-line service oriented businesses and promotion/marketing of wholesale and retail products**
- Encourage businesses to occupy existing vacant buildings **will require retrofitting such buildings with modern amenities such as a robust telecommunications infrastructure**
- Attract businesses offering wages/benefits adequate to support working families with children **will require site-ready amenities such as water, sewer power and telecommunications infrastructure, as well as overall quality of family life expectations; i.e., quality education, recreation, community safety, etc.**

2.7 Utility Infrastructure

Bath County Utilities **Utilities Objectives** Encourage partnerships	**Highland County Utilities** Development and the availability, quality and cost of utility services can be guided by local government. Development should occur where these services can be provided at least cost or where they can be installed and function without additional costs or failure in the future.

among existing utility providers that will support appropriate economic development endeavors.	**Utilities Goal** UG-1 Ensure utilities' capacity will provide adequately for the current population and allow for growth. **Utilities Objectives** UO-6 Maintain awareness of level of telecommunications available, with emphasis on the expansion of broadband capabilities and cell phone coverage. **Utilities Strategies** US-6 Facilitate dialogue between people who have needs and electricity, water, sewer, and telecommunications suppliers.

Broadband Strategic Planning Implications:

- Partnerships with utilities is essential for most community broadband planning initiatives and **will require proposing a win-win business modeling scenario that fits in well with the utility's business plan and revenue model**
- Mobile broadband through cell phones has grown as a main stream technology for providing wireless Internet access but **will require taking steps to enhance wireless signal propagation, likely through more vertical assets, as well as transmitting/backhauling data and communications from the towers**
- Facilitate dialogue with utilities **will require recognizing and respecting proprietary and confidential communications and information**

2.8 Social Well Being

Bath County Social Well Being

Since the residents of Bath County form the foundation of its society, providing them with the best possible quality of life is important. The Comprehensive Plan identifies the desire to maintain the high quality of social services currently available in Bath, and assist needy individuals in obtaining relief against poverty. The County intends to continue to participate in funding assistance programs that allow residents access to available, affordable housing.

Animal Shelter

The Bath County Animal Shelter is located at the County's waste handling site. The building contains 5 runs for dogs, including one that may serve as an isolation run.

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Mountain Crest Retirement Home

Mountain Crest will consist of 28 apartments in 7 buildings, with each building having 3 one-bedroom apartments for a total of 21 one-bedroom units. All of the units are low to moderate income, with rents affordable to those with incomes between 40 and 60 percent of the area median.

Rockbridge Area Community

Services Board provides a wide range of mental health and mental retardation services with clinic hours three days a week at their

Highland County Department of Social Services

Located in Monterey, the department of social services offer benefit programs that include Food Stamps, Medicaid and fuel/cooling assistance. These benefits are based on income and resource eligibility. Service programs include adult services, adult protective services, child protective services, day care services, foster care and adoption. Pursuant to the Comprehensive Services Act, an inter-disciplinary team that accepts referrals for Highland at-risk youth and their families, including but not limited to counseling, treatment and mentoring. The department also makes referrals to other area/regional agencies as needed.

Childcare

Highland is currently without a public childcare facility

Valley Program for Aging Services

This area agency on aging for Planning District 6 targets those 60 years old and older

office in Bacova. A group home, **The Wellman House** and day support program, is located in Millboro. **The Springs Nursing Center** provides skilled and long-term care in the 60 bed facility. The recent addition of an Alzheimer's unit expands services to this population. **The Bath County Health Department** strives to meet the medical health issues and the environmental health issues of the community. The mission of the Bath County Social Services Department is to promote self-reliance and protection for residents through community-based services. **Valley Program for Aging Services** provides 5 meals a week through Bath Community Hospital and assistance from Meals-on-Wheels volunteer organization as well as homemaker/aide services. **The Senior Center**, located in Warm Springs, Va. is the meeting place of Bath County senior citizens. **The Allegheny Free Clinic** uses Bath Community Hospital as a location to screen new enrollees and to update information on current patients. **Safe Homes of Allegheny** provides emergency services and a wide range of educational services to Bath County.	in the greatest economic or social need. The agency currently serves 17.8% of Highland's senior population as compared to less than 4% in most other jurisdictions. Services include information, assistance and case management and the operation of the Highland County Senior Center. The senior center includes congregate meals, disease prevention, health promotion, socialization, recreation and transportation. In home services include personal care, Meals on Wheels, disease prevention and health promotion. Other services include long term care ombudsman and legal assistance. ***Blue Ridge Area Food Bank Highland County Chapter*** Located at the Word of Faith Church in Monterey, this local chapter distributes food boxes to Highland families and individuals who are in need or in crisis. In 2004, food was distributed to 29 households each month. These households represent 85 individuals, 42 of whom were children under age 18. ***Highland Evangelistic Association*** A collection of local church representatives-provides assistance to individuals and families based on need.

Broadband Strategic Planning Implications:

- Maintaining high quality of social services and assisting needy individuals in obtaining relief against poverty **will require not only maintaining a robust communications and information dissemination resources, but some financial provisions (discount Internet service, cost sharing programs for equipment, etc.,) and/or alternative access (such as library Internet access) in some cases to ensure income is not a barrier to access and utilize available services**

2.9 Educational Quality

BATH COUNTY EDUCATIONAL QUALITY	EDUCATION
Quality education has been a strength in the County and the residents seek to continue that. The citizens want to maintain overall quality while addressing the needs of different types of students – those going on to college and those going directly to jobs; the preschooler, the adult learner and the career changer; those who find learning to be difficult and those who need to be challenged. Keeping the public schools matched with our community's needs, and providing adequate funding for education are challenges now and will be in the	Highland County Public Schools is the smallest school division in the Commonwealth with fewer than 300 students in a one-campus K-12 school. The system has a part-time superintendent, two principals (elementary and middle/high school,) and a professional staff ranging between 30 – 40 individuals resulting in an extremely low teacher / pupil ratio. Highland High School grades 6 through 12 were awarded the Blue Ribbon Schools Award, the highest recognition for academic excellence, by the federal government in 2010.

future. The majority of the local government budget will continue to go into education. The citizens must be certain that local educational programs continue to provide significant returns, and are supportive of the economic and social elements of the County.

EDUCATION GOALS

Continue to nurture and prepare students for post-graduation endeavors and success. Build partnerships between the school system and local businesses, organizations, and agencies to expand regional career-tech programs thereby maximizing opportunities for learning and collaborative experiences.

OBJECTIVES

Promote technology to enhance and sustain the teaching process and school administration.

Foster an apprenticeship program between the school system and local businesses and agencies in order to prepare high school students for trade certifications and job placement.

Facilitate mentoring and educational opportunities for students through local resources in and outside the County.

In conjunction with several surrounding counties, support distance learning for students and adults via satellites courses linked with community colleges and universities in the region.

Enhance communication between and among students, parents, personnel (school level to superintendent), School Board, Board of Supervisors, and community and support volunteer programs in our schools.

Utilize computer labs at the public schools to offer classes in computer technology to aid adult education in the community.

Institute a policy to ensure that developers, and not taxpayers, pay for the costs and impacts of development within the County.

Education Goals

EDG-1 Provide Highland County students with the best education possible.

Education Objectives

EDO-1 Promote the vocational, work-release and work-study programs in the public school system to strengthen the skills of young people so more marketable as local employees. Seek apprenticeship programs.

EDO-2 Promote preparation of students in the school system for 4-year college programs/vocational career.

EDO-4 Promote Community Mentors/Advisors Guild program to include a broader population of students. Find residents to share skills, expertise and experiences.

EDO-5 Promote improvement of communication between employers, school and parents to help develop ed. /training programs balancing needs & resources.

EDO-6 Promote more opportunities for adult technical education through expanded offerings of distance learning courses or apprenticeship programs.

EDO-7 Encourage cooperation and communication with the home school community.

Education Strategies

EDS-1 Encourage local contractors and businesses to establish apprenticeship programs in conjunction with work-release program in place in school system.

EDS-3 Promote a structured mentor program and Advisors Guild program and promote existing program to both students and adult County residents.

EDS-4 Solicit and id adult citizens who would volunteer their time to participate in a mentor's program and Advisors Guild for Highland County students.

EDS-6 Continue cooperation and communication with home school community.

Broadband Strategic Planning Implications:

- To build partnerships between the school system and local businesses, organizations, and agencies to expand regional career-tech programs **will require volunteer and mentoring programs. technical education courses,**

effective broadband development strategies and the infrastructure to support such partnerships

- To accommodate and promote more opportunities for adult technical education through expanded offerings of distance learning courses or apprenticeship programs **will require having technical infrastructure and capabilities to access/accommodate video streaming, downloading data, VoIP & IPTV programs, etc.**

2.10 Government Services

Bath County Government

The role of government is continually changing and should be responsive to the needs of all its citizens. In order for Bath County to best meet the needs of its residents, local obligations must be prioritized and reflected in a strategic plan of governance and funding.

The citizens of Bath County elect a 5-member Board of Supervisors to four-year terms who adopt the annual budget, set policy and direction for the County, and appoint a County Administrator.

GOVERNMENT AND FINANCE GOALS

1. Provide the best possible government service to all residents of Bath County.
2. Strive to Increase the County's financial resources.

OBJECTIVES

a. Continue to use the Capital Improvements Plan and the recommendations of the Planning Commission as a basis for allocating funding for capital projects.

b. Pursue the benefits of consolidating similar local services, such as those existing in both the school system and the local government.

c. Aggressively pursue alternative funding sources (i.e. – grants) to provide new revenue streams for capital improvements.

d. Continue to maintain an adequate fund balance.

e. Develop a long-term plan that promotes the common interests between businesses and the County.

Highland County Government

Local Government Structure

Highland County is divided into 3 magisterial districts: Stonewall, Monterey (including the Town of Monterey), and Blue Grass. Three representatives are elected at large to serve on the Board of Supervisors for a term of four years. The Board is responsible for handling the legislative and administrative affairs of the County. The County provides building inspection, health department services, social services, solid waste removal and recycling. The County has a full-time County Administrator who serves at the pleasure of the Board of Supervisors. Elected constitutional officers in the county are the County Treasurer, the Commissioner of Revenue, and the Clerk of the Circuit Court, the Commonwealth Attorney, and County Sheriff. Highland has a number of boards and authorities. These include the Planning Commission, the Board of Zoning Appeals, the Recreation Commission, and the Economic Development Authority.

The Town of Monterey, Highland's only town, is governed by six council members and a mayor. The mayor is considered the chief administrative officer of the Town. All council members are elected for two-year terms. The council is responsible for all legislation directly applicable to the Town and oversees service provision of water, wastewater, solid waste collection/ disposal, streetlights, sidewalks, & fire hydrants.

Both the Town of Monterey and Highland County are part of the 25th Judicial Circuit, which is served by four full-time judges elected by the General Assembly of Virginia for eight-year terms.

Government and Finance Goals

GFG-1 Continue to provide open, effective, responsive government service and financial management on behalf of all county citizens.

Government Objectives

GFO-1 Use of the Comprehensive Plan as a guide in decision making/operations at all levels of county gov.

GFO-3 Encourage the expansion of public information on the county website.

f. Fund, provide, and strive to retain adequate staffing levels to meet the growing needs of the County.	**Government Strategies** GFS-4 Consider Feasibility of expanding county website

Broadband Strategic Planning Implications:

- To provide the best possible government service to all residents and strive to increase the financial resources **will require a broadband infrastructure usable by government and a business model that does not place a burden on the counties, but rather a revenue source**
- To use of the Comprehensive Plan as a guide in decision making/operations **will require actually utilizing through implementation the strategies recommended to meet the objectives and goals identified and not just putting them in writing**
- For better expansion and dissemination of public information on the county website **will require maximizing e-government service capabilities and having the infrastructure in-place for access by the constituents**

2.11 Public Safety

Bath County Public Safety

The Bath County Local Emergency Planning task force is made up of citizens from within the community that assist the Bath County Local Emergency Planning Committee (LEPC). LEPC is appointed by the County Board of Supervisors and serves the citizens of Bath County with an all-hazards approach to Disaster Planning.

The Sheriff's Office provides law enforcement protection for Bath County 24 hours per day, 365 days per year. Nineteen full-time officers provide services ranging from dispatching of 911 calls, patrolling county highways, investigations, transporting of prisoners, community education, traffic control and funeral escorts. In conjunction with these efforts, Virginia State Police provide vehicle accident investigations, etc.

There are five (5) **Volunteer Fire Departments** in the County- Burnsville, Bath- Highland, Hot Springs, Mountain Grove, and Millboro. Additionally, there are three (3) volunteer rescue squads- Hot Springs, Burnsville, and Millboro. These essential services rely on the good will and time of volunteers from the community.

Bath Community Ambulance Services, operated by Bath Community Hospital, provides mutual aid services to these volunteer squads. The VEPCO ambulance service assists with calls in the Mountain Grove area when available.

Highland County Public Safety

Highland County is protected by three volunteer fire departments located in Monterey, McDowell and Bolar. In an effort to provide overlapping coverage and quick response times, these departments also work with adjoining fire and rescue departments in West Virginia, Bath County, U. S. Forest Service and Dominion Virginia Power. The Rescue Squad has a station in Monterey and a sub-station in McDowell.

Highland County Volunteer Fire Department

Responsible for the areas of Monterey and Blue Grass, this fire department maintains stations in both localities. The Monterey station houses five units and the Blue Grass substation houses two units. Maintaining the stations and equipment and replacing older equipment continues to be its main challenge.

McDowell Volunteer Fire Department

Responsible for areas of McDowell, Doe Hill and Head Waters, this fire department maintains a station in McDowell and a sub-station in Headwaters. It seeks to acquire a new building to house their equipment and double as an emergency disaster shelter.

Bolar Volunteer Fire Department

Responsible from Mustoe to Rocky Ridge, Big Valley and Little Valley, this fire department has four pieces of equipment.

Highland County Volunteer Rescue Squad

This rescue squad covers the entire county with a station in

Bath County, a designated Medically Under-served Area (MUA), has as its asset a small rural hospital, Bath Community Hospital (BCH), which is a not for profit, Critical Access Hospital (CAH). Services include twenty-four (24) hour emergency services, home health and hospice care, community outreach programs, such as Health Connection, rehabilitation services, and a select group of diagnostic services and specialty clinics. There are four family practice physician offices located in the Ingalls building adjacent to BCH. Two Family Nurse Practitioners enhance these offices. A clinic in Millboro is available one evening a week, with services provided by a family nurse practitioner. Bacova Rehab and Wellness, a medical wellness facility is located in Bacova, operated by BCH, and staffed by exercise technicians and physical therapists.

OBJECTIVES

Seek to provide Volunteer Fire and Rescue Services to cover the entire County and strive to reduce the emergency response times. Continue to upgrade our current emergency communications system (an enhanced E911 system) to include reverse E911 system (as a "Phase II" implementation) through construction of Bath County Emergency Services complex. Actively provide direction and incentives for the provision of information services for wireless communications, broadband services and other new technologies by adopting a comprehensive telecommunications ordinance. Support and enhance the Bath County Local Emergency Planning Committee, and continue to work with the Central Shenandoah Planning District Commission to establish an inter-jurisdictional task force. Support forming Memorandums of Understanding between local, regional, and state jurisdictions, and establish a clear management structure for forming plans, policy, procedure, and protocols that strive to achieve consensus among fire, EMS, law enforcement, and other health and safety related groups, and grant the ability to cross jurisdictional boundaries.

Monterey and a sub-station in McDowell. Its members cite as their goals to attract additional volunteers and to acquire a building to house their units and a training facility

Highland County Sheriff's Department

Highland County Sheriff's Department is located in Monterey, Virginia at 145 W. Main Street, and is responsible for maintaining a Public Safety Answering Point (PSAP) at this location. The Highland County Sheriff's Department offers round-the-clock service, providing law enforcement, court duty, community service, civil process, corrections and detainee transportation. In addition to the sheriff, staff includes six deputies, eight civilians and three reserve officers. Law enforcement services include police patrol, investigations, and cooperation with the regional drug task force. Reserve officer activities include crowd control, traffic control and assisting regular officers. The department does not operate its own jail but partners with Augusta County in using the Middle River Regional Jail located in Verona, Virginia.

Highland County Office of Emergency Management

Highland County has an appointed volunteer Emergency Manager. Duties include the organized analysis, planning, decision making and assignment of available resources to prepare for, respond to and recover from a disaster. The goal of emergency management is to save lives, prevent injuries, and to protect property and the environment when emergencies occur.

Red Cross

The Jackson River Chapter of the American Red Cross responds to all types of disasters in Alleghany, Bath and Highland Counties. An integral part of the Red Cross's disaster mission is to be prepared for disasters before they occur.

The Chapter provides information about upcoming blood drives, CPR/first aid, life-guarding, water safety, HIV/AIDS education classes and procedures for sending emergency military messages.

Broadband Strategic Planning Implications:

- To increase the potential of savings lives, personal property and overall have effective Public Safety and Emergency Response services **will require the ability of Interoperable Communications between agencies, devises and regions including the ability for cell phone, text messaging, automated dialing warning alerts, digital bulletin boards, and other IP delivered applications**

2.12 Community Facilities

Bath County Library Facilities

The Bath County Public Library, which is a branch of the Rockbridge Regional Library (www.rrlib.net), houses 27,500 titles, with access to the resources of the entire regional system via interlibrary loans and from public or college libraries all over the United States. In addition to books, patrons enjoy the availability of 56 magazines and collections of CDs and DVDs, and free high speed Internet access and Office computing such as Microsoft Word and PowerPoint. The Goshen Public Library serves Bath citizens as well; in fact, a Bath resident's free card is good in all 5 of the regional system's libraries.

The Library offers bookmobile service through a deposit station in Williamsville and a stop at Millboro School. A van makes additional Bath County runs, serving seniors, children, and the homebound. Other services include a summer reading club for school-aged children and programs of literary and general interest to the public. The Thomas Craven Meeting Room is a popular meeting place. The Library's catalog is available 24/7 on the Library's Web site: www.rrlib.net/bath/default.htm. The library is located

The Highland County Public Library

The Highland County Public Library, an independent facility located in Monterey, maintains a collection of approximately 16,400 books, 1000 audio books (tape and CD), 600 music albums, 37 periodicals, and 2200 DVDs and videos for children and adults. Services for seniors such as Talking Books, SeniorNavigator.com, and access to the Aladdin Reader are provided. Children's programming includes a monthly Family Movie Night, Afterschool Crafts programs, and a Summer Reading Program. The library offers free high-speed internet access to the public on seven computers. Wi-Fi internet access is also provided. A computer in the children's section provides games and educational programs. The library has a website at *www.highlandlibrary.com* which offers an online card catalog and password access to user accounts. A meeting room, The Mountain View Room, is available for public use. The library maintains 3 book deposit locations; McDowell, Mill Gap, at Highland Senior Center.

Recreation

Highland County Recreation Commission

The recreation commission is comprised of volunteers who have been appointed by the board of supervisors. They offer organized youth and adult athletic programs, organized group trips, a fitness center and sponsor an annual road bike challenge.

Highland Park

Located adjacent to the school, this proposed multi-use facility includes a pool, athletic fields, cycling and pedestrian facilities.

COMMUNITY SERVICES

In Highland, many services are provided or supplemented by an active network of volunteer organizations. These groups contribute greatly to the quality of life here.

Medical Care

The Highland Medical Center, Inc.

The Highland Medical Center is a non-profit, 501(c)3 corporation that, after incorporation in 1992, opened the doors of a 10,000 square foot building in September 1996. The mission of the center has been to provide high quality, primary and preventative medical services to the community regardless of the ability to pay. The center offers a variety of primary care services (treatment of acute and chronic illness, cancer screenings, electrocardiograms, echocardiograms, ultrasounds, minor surgical procedures, x-ray, and laboratory services) and some pharmacy services. There is also a wellness center. In 2003, the center attained status as a Federally Qualified Health Center, making the center eligible for federal grants geared toward removing barriers for the underserved. The center has been equipped with a high speed communications line (T1) that allows for telemedicine consultation with specialists and attaining professional services such as interpretation of x-rays.

across from the Bath County Courthouse in Warm Springs, and is open six days per week.

Mountain Crest Retirement Home

Mountain Crest will consist of 28 apartments in 7 buildings, with each building having 3 one-bedroom apartments for a total of 21 one-bedroom units. All of the units are low to moderate income, with rents affordable to those with incomes between 40 and 60 percent of the area median.

Parks & Recreation

The Bath County Department of Parks and Recreation is committed to making the County a better place to live, work, and play. Such commitment is evident in the wide variety of recreational activities, classes, and sports available to residents that are based on the needs of the community.

The Department offers a wide range of programs for adults and children, which range from organized sports to pool facilities in Ashwood at Valley Elementary School, and at the Old Millboro School. A skateboard park has also been added to the Valley Elementary grounds. The Parks and Recreation Department focuses on education, safety, physical activity, and community

Highland Health Department

Located in Monterey, the Highland County Health Dept., a VA state agency, offers children's specialty services, communicable disease control, environmental health services, health education, medical/nursing services, nutritional services and vital records.

Bath Community Hospital

Located approximately 35 miles south of Monterey in Hot Springs, VA, Bath Community Hospital is a critical access hospital with licensed capacity of 25 beds. Remaining beds are skilled nursing care beds. Emergency services provided 24 hrs. /day. Arrangements have been made with Alleghany Regional Hospital, Augusta Medical Center, Carillion Roanoke Memorial, Medical College of Virginia and the University of Virginia for the transfer of critical access inpatients who require extended stays greater than 96 hrs. and who require services such as cardiac, neurology, trauma, oncology, obstetrics, orthopedics, urology and pediatric intensive care.

Other departments are **Community House Home, Hospice of the Highlands and Bath-Highland Rehab.** The active medical staff of BCCH consists of 3 family practitioners who see inpatients, patients in the emergency department and maintain private office practices. Two family nurse practitioners provide patient care for inpatients under supervision of a physician. Several specialty practitioners see patients in outpatient clinics and consults with the active medical staff as needed. Bath County Community Hospital is accredited by the Joint Commission on Accreditation of Healthcare Organizations and licensed by the Commonwealth of Virginia.

Augusta Medical Center

Located in Fishersville, VA, the Augusta Medical Center is a full service hospital that offers behavioral health services, birthing center, community services, diagnostics, emergency dept., pain management clinic, radiology, rehabilitation & surgical services.

Augusta Regional Free Clinic

Located in Fishersville, Virginia, the Augusta Regional Free Clinic offers medical care, pharmacy services, laboratory, radiology, referrals and patient education.

Woodrow Wilson Rehabilitation Center

Located in Fishersville, Virginia, the Woodrow Wilson Rehabilitation Center offers medical rehabilitation services that include occupational therapy, assistive technology, neuro-physiology, spinal cord injury and audiology/speech-language. Vocational rehabilitation services include peer mediation, independent living skills, vocational evaluation & ed. support.

Commonwealth Center for Children and Adolescents

Located in Staunton, Virginia, the facility serves children/adolescents who have threatened or attempted suicide, have aggressive or assaultive behavior or need evaluation or medication management.

involvement. The County has two primary park facilities: Ashwood Park and Old Millboro School offering County residents various forms of active recreation including swimming, softball, soccer, and playgrounds among others. These facilities are in addition to the vast federally-protected and state-protected parklands within the County used for outdoor recreation. The County is currently working with the Central Shenandoah Planning District Commission to create and implement a Bicycle and Pedestrian Plan that could provide locals with safer access to these amenities, as well as draw tourists to enjoy scenic views and enviable outdoor activity. The County will also continue to pursue a myriad of programs for residents and visitors as needs evolve and opportunities present themselves. **Objectives** Strengthen the funding and maintenance of the library services and facilities to meet the needs of the growing and diverse population.	***Western State Hospital*** Located in Staunton, Virginia, this facility serves citizens of the Commonwealth with serious mental or substance abuse disorders. ***Virginia School for the Deaf and Blind*** Located in Staunton, Virginia, this facility provides comprehensive educational services to deaf, hard of hearing, blind or visually impaired children who require specialized instruction. **Community Service Goals** CSG-1 Enhance quality of life thru organizations, clubs, agencies that plan/execute a wide range of services to the community. **Community Service Objectives** CSO-2 Encourage partnerships and conversation between clubs, organizations, and agencies, in order to leverage resources. **Community Service Strategies** CSS-1 Invite all community organizations to share their long range plans and identify areas of technical assistance they need. CSS-3 Reinstate Highland Executive Committee to facilitate partnership opportunities and shared/leveraged resources. CSS-4 Offer regulatory and resource development workshops for community organizations. CSS-5 Execute strategic plan of the Highland Medical Center board to offer fullest medical care possible to the community. CSS-7 Execute long range plans to increase services and public use of Highland County Public Library. CSS-8 Execute long range plans to assess and replace equipment; recruit and train volunteers to provide fire protection. CSS-14 Continue businesses & non-profit organizations counseling. CSS-15 Continue efforts to increase tourism in the community CSS-20 Continue to explore ways to assure funding to provide full services to Highland County's citizens who are 60 years and older. CSS-21 Continue radio coverage to Highland County through regular and special emergency programming.
Broadband Strategic Planning Implications: • To facilitate partnership opportunities and shared/leveraged resources **will require a number of community**	

outreach programs including educational, planning, training and ongoing support.

- To accomplish continuing to provide counseling services to businesses and non-profit organizations **will require .promoting community involvement and volunteering to share specialty skills**

2.13 Land Use

Bath County Land Use Goals

2. Encourage the location of any new development to correspond with existing or planned public utilities, and create standards for more localized systems when expansion to a designated, appropriate area would be cost prohibitive.

.4. Encourage "Village Type" growth models for business and residential areas.

OBJECTIVES

Locate potential industrial development sites on relatively small pads in the vicinity of one another, so as to centralize development in "industrial parks." Discourage strip development along Routes 220, 39, and 42, as well as other highways. Encourage commercial development in existing business districts and gradual growth at the peripheries of such areas. Consider revising the current Zoning Ordinance to include the following:

Adopt a set of comprehensive telecommunications, wind, and solar facilities siting guidelines.

e. Planned community growth areas in Bath County include the following:

(1) Route 220 Corridor (north of Warm Springs south to Carloover)

(2) Route 39 West (including Warm Springs)

(3) Bacova

(4) Cedar Creek (north of trailer park, south of Cascades)

Highland County Land Uses

Existing land uses are primarily forestry and agriculture. Nearly 22% is national forest and about 5% is state natural area and forest. Such federal and state lands are reserved primarily for conservation and recreational purposes. Approximately 36% of land in the county is used for agricultural purposes. Much of the County's remaining land is undeveloped, privately-owned forest. About 1% of the land is developed. All parcels of land in Highland County are classified into one of the following general categories:

• Single-Family Residential – Urban

• Single-Family Residential – Suburban up to 20 acres

• Multi-Family Residential

• Commercial/Industrial

• Agricultural / Undeveloped 20-100 acres

• Agricultural / Undeveloped over 100 acres

• Tax Exempt (Gov., Religious, Charitable, Educational or Others)

According to local revenue records (2010), there are 4,077 parcels of land in Highland County. Of these, 203 are tax-exempt. The largest land-use category is single family residential, and the smallest is educational. In 2010, the total appraised value of Highland County real estate was over $693 million.

Land Use Plan

Land use suitability is usually determined by the characteristics of the land and of the environment, available infrastructure, and existing adjacent uses. Highland County's Future Land Use Plan should be based on community principles.

Development of Business and Industry

It is recommended that potential business or industrial development sites, whenever possible, be encouraged to locate in "park-like" settings and encourages the centralized location of new industry. In addition, proper buffers between new industries, utilities, and existing residential and agricultural uses are recommended to minimize impact on agricultural landowners.

Commercial Development

While some of our citizens' retail needs can be met by patronizing Highland's current commercial sector, many agree that an expanded retail base is desirable. Guidelines for future commercial growth will encourage development in existing business districts and gradual growth at the edges of such areas.

Residential Development

Ensure that future residential development is sensitive not only to the quality

(5) Millboro Springs and Millboro f. In the remainder of the County, consider allowing low-density occupancy uses upon review. g. Discourage "Big Box Type" commercial buildings and place limit the total square footage allowed in any one building in certain zones.	of life for our current residents, but for future residents. Additional development should be planned carefully to correspond with the current and future placement of utilities and infrastructure. **Land Use Objectives** LO-6 Balance growth by encouraging a mix of compatible uses in areas with appropriate utility and infrastructure support. **Land Use Strategies** LS-5 Review and revise as appropriate current zoning ordinances to address specific goals of the Comprehensive Plan.
Broadband Strategic Planning Implications: • To achieve land use buy-in and acceptance from residents **will require ensuring commercial and business development locates where encouraged using availability of utility service as a driver of site selection**	

2.14 SWOT

Bath County Strengths & Weaknesses Some of the County's **greatest *strengths*** were typified by: recreation**,** environmental conservation **,** relatively untouched landscape**,** the rural setting Participants identified some of the **Bath County's *weaknesses*** as follows: not enough residential planning, lack of strong employment, no long-range land use plan passive citizen involvement, lack of available healthcare lack of public utilities, loss of tax revenue due to extensive publicly owned land, having five phone systems in the County. **Bath County Opportunities & Threats** Some of the key ***future opportunities*** cited by participants were: special events, cottage industries, building trades and trade schools, targeted tourism use of technology, entrepreneurs/small business promoting recreation However, the **Bath County *greatest threats*** were perceived as: unrestricted growth and development, lack of planning and failure to follow Comprehensive Plan, franchise businesses,	**Highland County Strengths & Weaknesses** **Strengths** • The County's significant natural and historic resources • The county's traditional rural lifestyle, including productive farming and forestry. ***Weakness*** Highland's small population and unique characteristics pose their own set of challenges to increased economic activity. The economies of scale frequently do not allow for traditional solutions so private citizens and county leaders will continue to look for innovative ways to ensure a viable economy for all Highlanders while preserving the scenic and rural character of Highland. Steep terrain and the high proportion of public ownership leave relatively little of the land area in Highland County feasible to develop. Thus it is in the county's interest to ensure that suitable sites are developed as efficiently and carefully as possible, in ways that serve the long-term needs of county citizens **Opportunities** The County is genuinely concerned about stabilizing and expanding its employment base, and acknowledges that locating certain businesses and industries in Highland may indeed be beneficial to the people of Highland County. An expanding retail base should be encouraged in Highland County. It is important to encourage development that protects the environmental integrity and economic prosperity of the county. Immediate land use challenges facing Highland County include balancing varied needs of citizens, especially as more part-time residents are added to the community

impact upon our quality of life, inability to retain our young people	**Threat** We are challenged, as we look to the future, to protect the quality of our environment and its inherent quality of life while meeting the economic and social needs of our citizens.
Broadband Strategic Planning Implications: • To promote connectivity among the places where people live, work, and play **will require more than roads, but rather information and awareness disseminated through voice, video and data platforms.**	

2.15 Community Values

Bath County Community Values	**Highland County Community Values**
When asked what people ***valued most today*** about Bath County, several the top responses included (in descending order): • rural quality of life • school system • community support **Bath County** was seen as *a* ***special place*** because of the following factors: quality of life • no huge "superstores" • very few housing developments • beautiful Homestead resort • privately owned businesses	Highland County is widely known for the scenic beauty of its physical environment. Both the natural land and agricultural landscapes contribute to this scenic beauty. Highland County is defined by its natural resources. Although there is evidence of human activity throughout the county, the natural landscape dominates. Our low population density and lack of industry have maintained Highland County as a place where nature still has the upper hand; from the unbroken, tree-lined ridges to the free-flowing streams and rivers. A long-term goal of Highland County citizens is the preservation and protection of Highland County's unique natural resources. While the county is obliged by a variety of State and Federal regulations to protect attributes such as air and water quality and unique habitats, the ultimate responsibility of achieving a healthy economic/environmental balance lies with the citizens of Highland County and its elected officials.
Broadband Strategic Planning Implications: • To balance the community value of living and custodian of pristine environmental and natural resources, but take action to increase broadband availability **will require using techniques to hide or blend in through use natural looking materials towers, antennae arrays, underground cabling, earth tone color looking pedestals, etc.**	

2.16 Visioning the Future– Accomplishments & Character of Villages

Visioning the future of Bath County	**Highland County Strategies for the Future**
Participants were asked to ***envision what Bath County would look like in 20 years***. Responses included: • small population increase • model vocational school, and *Development* would occur in thriving small villages. • Safety, health and welfare of citizens are a top priority. • The County has a model historical preservation district. • Craftsmen/tradesmen are in demand outside of the County. • Mom & Pop businesses still thrive. • Strip malls do not overrun the County. • There is improved health care and effective social services. • Clustered development is encouraged and green space is preserved.	The County shall consider all statutory tools available to promote coordinated and harmonious development and the health, safety, prosperity, and general welfare of county residents and landowners, including but not limited to: • land use taxation flexible zoning agricultural and forestall districts conservation easements • scenic road and river designations.

- The future *economy* of Bath County respects beauty, outdoor recreation (hunting and fishing), and consists of a non-invasive tourism (day/cottage renters and Homestead visitors etc., not large bus groups).
- Bath County economy helps to recruit teachers, expands local farming jobs, creates high-tech manufacturing jobs for the next generation, and sees an overall increase in income through a strong and more diversified job base.
- Family farms remain protected and alternative energy sources are explored.

Well-known ***accomplishments*** **in Bath County 20 years from now** would include:

- better infrastructure and utilities
- increased job opportunities
- next generation retention
- diversified employment
- good hospital/healthcare, and
- small private businesses that are not overrun by franchises.

The Character of Bath County Villages

Twenty years from now, our villages will be typified by the following individual **characteristics and differences** noted between these unique communities:

Hot Springs

- Retail
- Residential

Bacova

- Remain Residential
- Selective growth around existing area
- Expand small manufacturing & light industrial

Mitchelltown

- Commercial
- High density residential

Millboro -

- Industrial park
- Railroad access
- Small, clean industry tied to area
- Tourism
- Biotechnology

Blue Grass District

Highland's Blue Grass District runs vertically along the western-most portion of the county. It is comprised of 60,299 acres. Within the district is the village of Blue Grass, a small community characterized by a tight linear pattern of development. The village is located along Routes 640 and 642, which intersect the village center. The community of New Hampden, located to the southwest of Blue Grass, is somewhat smaller and more dispersed.

Monterey District

The Monterey District, comprised of 61,518 acres, extends along Route 220 on both sides through the middle of the county. It does not include the Town of Monterey. A potential growth corridor exists along the north / south and east / west primary highways passing through the Town of Monterey.

Stonewall District

The Stonewall District is the largest in area among the County's magisterial districts, consisting of 67,238 acres. Its eastern-most portion is comprised of the George Washington National Forest and the Highland Wildlife Management Area constitutes its southwest corner. The community of McDowell is the oldest permanent community in the county, but lacks the size and diversity of development found in Monterey. It is primarily a collection of residences and a few service-related businesses located along Route 250. There is growth area potential adjacent to McDowell pending the outcome of the Battlefield Preservation Plan now in development.

Town of Monterey

As the County seat and only

Burnsville/Williamsville - Rural, residential farms - Forests - Additional recreational facilities **Warm Springs** - No major changes cited - Remains seat of government At the conclusion of these visioning sessions, participants were asked to place colored stickers by the short and long-term issues that were of primary concern to them. From the tallies, it becomes clear that the major concerns for the future vitality of the County center around constraining and controlling development through thorough Land Use Regulations and careful planning.	incorporated Town in Highland, Monterey has grown to be the largest community in the county. Major facilities in the town include the County Courthouse, the post office, The Highland Center, plus numerous shops, restaurants, and services. Adjacent to the town are the county elementary-high school complex and the Highland Telephone Cooperative. The Town serves as a distribution center for government services and agricultural goods, and is the center of the County's tourist industry. Both the Highland County Fair and the Highland Maple Festival are centered in Monterey each year. There is a proportionally balanced mix of land uses in the Town which provides it with healthy economic and social unity.

Broadband Strategic Planning Implications:

- To be attractive and keep costs of broadband improvement projects **will require utilizing existing and future planned business entities/development, health care, education institutions and government facilities as anchor tenants which can help support further expansion into the residential neighborhoods**

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 that provides 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)
Satellite
3G Wireless/4G Wireless
Optical Wireless
Consumer (MPEG) Broadband
Wi-Fi
WiMax
WLAN (Wireless Local Area Networks)
Ultra Wideband
BPL (Broadband over Power Lines)

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 and digital transmission paths are used to establish connections for sending voice (telephone), video and data (including electronic mail and facsimile) over digital telephone lines and POTS lines. ISDN is an international communications standard with typical speeds from 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 a 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.[8]

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.[9]

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

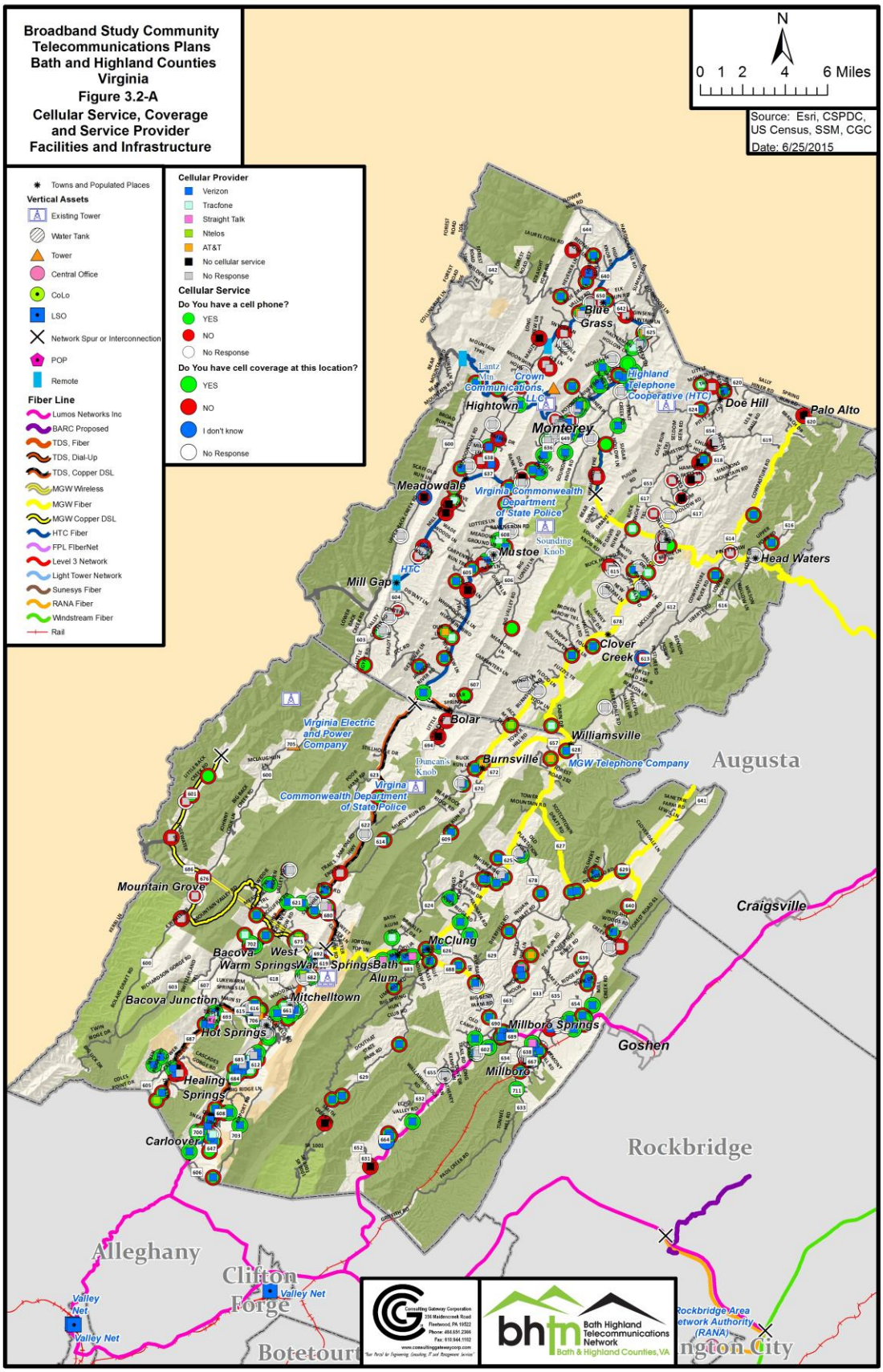
Unlike DSL, Cable and fixed wireless, which are still relatively computing-centric, 3G wireless combines high-speed data access with the mobility of handsets. 3G provides over 384 Kbps of bandwidth when a device is stationary or moving at pedestrian speed, 128 Kbps in a car, and 2 Mbps in fixed applications. 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.[10]

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.

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

Figure 3.2-A: Cellular Service Coverage and Service Provider Facilities and Infrastructure



Wi-Fi

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[11].

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[12].

[11] Source of information: Moving Towards Broadband Ubiquity in U.S. Business Markets, April 2001, Cahners In-Stat Group 2001.
[12] 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[13].

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[14].

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.[15]

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[16], 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." [17]

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.

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

[16] 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.
[17] March 22, 2006 e-article by eMarketer Inc. (www.emarketer.com)

4.0 Bath County

4.1 Bath County Community Needs Assessment

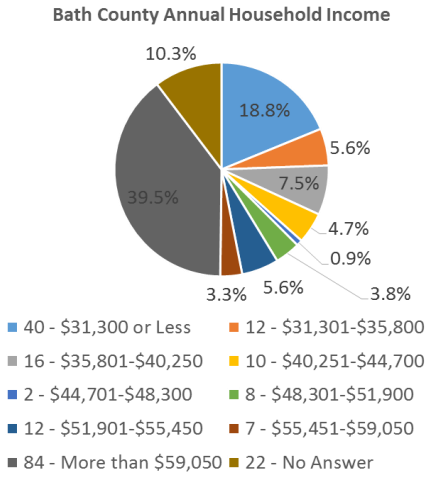
4.1a Background

One objective of the Community Broadband Planning Study was to document the availability of communication technologies throughout the study area and to assess the amount of demand by residential and business end-users. Communication technologies include any form of Internet access, pay TV, and telephone delivered by any medium.

The use of a mailed survey 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 a written survey as the preferred means to obtain community input from the largest number of respondents.

In addition to validating service availability by geographic area, end users provided valuable input to calculate demand for advanced technologies such as higher speed and wireless Internet access and phone service that uses the Internet as a transmission medium. 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.

Comments were solicited as to what changes or improvements to the current communication technology in the Counties would best meet citizens' needs (See comments in Appendix C). Local leaders can use this knowledge to expand the reach of government services and prioritize implementation efforts. Through the survey process, citizens have been recruited as stakeholders in their community's future.



When combining Residence and Residence with Home-Based Business, the largest Annual Household Income range is More than approximately $59,000 followed by the second largest percentage being the lowest range of approximately $31,300 or less

4.1b Area Assets

In preparation for a market survey to assess needs, base maps were developed for use throughout the study. Economic development personnel provided input on future growth areas. Local provider input and independent research was used to develop a telecommunication infrastructure map, and census data was applied to display population and housing density throughout the Counties. Maps are displayed on the following pages.

See Figure 4.1-A Education, Public Safety and Service Provider Facilities and Infrastructure

Figure 4.1-A: Education, Public Safety & Service Provider Facilities and Infrastructure – Bath County, VA

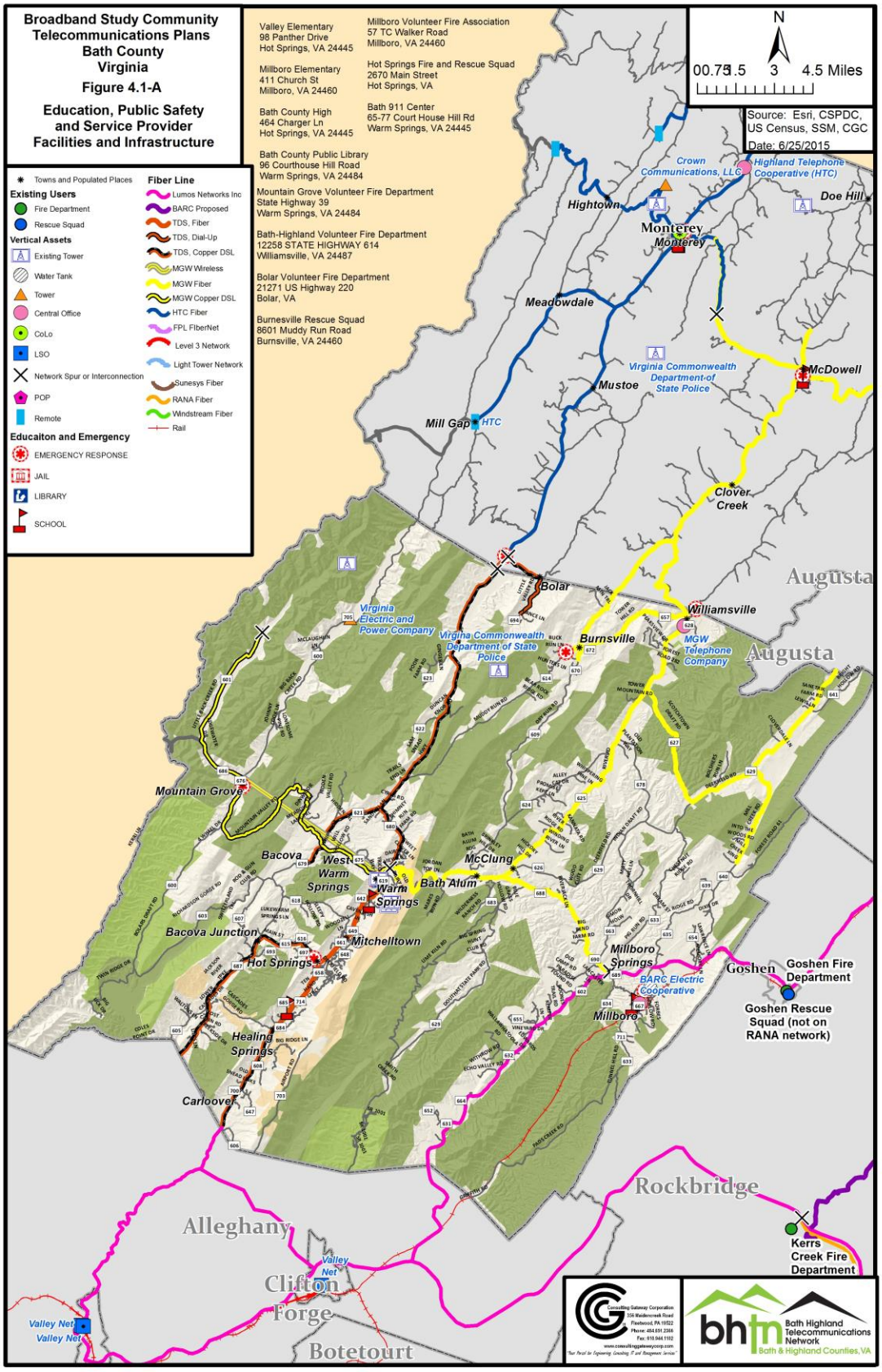
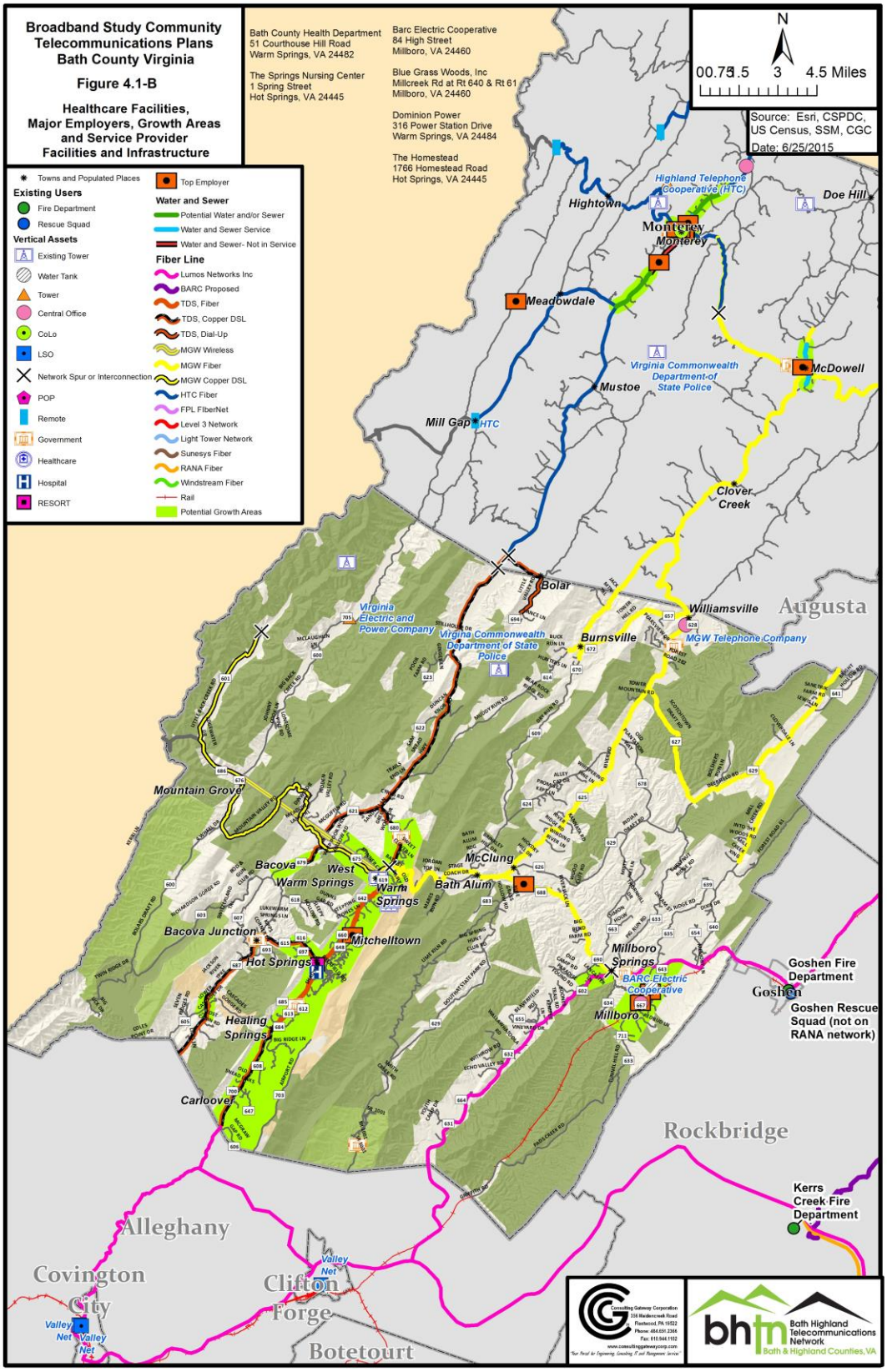


Figure 4.1-B: Healthcare Facilities, Major Employers, Growth Areas, and Service Provider Facilities & Infrastructure – Bath County, VA



4.1c Local Internet Services

Bath County Utilities

BARC:

Incorporated in 1938, BARC Electric Cooperative has grown from 1,008 meters served to over 12,000 today. Its service area originally provided power for Bath, Alleghany and Rockbridge Counties, but has since grown to include Augusta and Highland Counties as well. It is a non-profit, tax-paying organization vitally interested in the residential, industrial and commercial development of its service area. Power for BARC members is generated at the Clover Power Station in Halifax County, VA. BARC employs over 45 full-time people, and is governed by a 7 member Board of Directors with daily operations being overseen by the managerial staff, headed by General Manager/CEO.

TDS Telecom:

TDS Telecom brings locally-based telecommunications services to 900 rural and suburban communities across the U.S. Founded in 1969, TDS is a growing part of the Telephone and Data System, Inc. providing the following services:

- Local/Long Distance Telephone Service
- Voice Mail
- Centrix
- ISDN-PRI
- Digital Transport Services
- Maintenance Plans
- Business Data Solutions
- Web Hosting
- Services/Managed Network Services/Virtual
- Managed Data Services/Co-Location
- Private Networks
- Managed Application Services
- Direct Inward Dial/Direct Outward Dial Services
- Business Telephone Systems/Key & PBX, VoIP Systems
- Internet Access/Dial-Up/DSL Services/Symmetrical Internet up to 45 Meg Up & Down Speeds
- High Speed Data Transport/DS1/DS3 1//100 Mbps-1 Gig Ethernet

MGW:

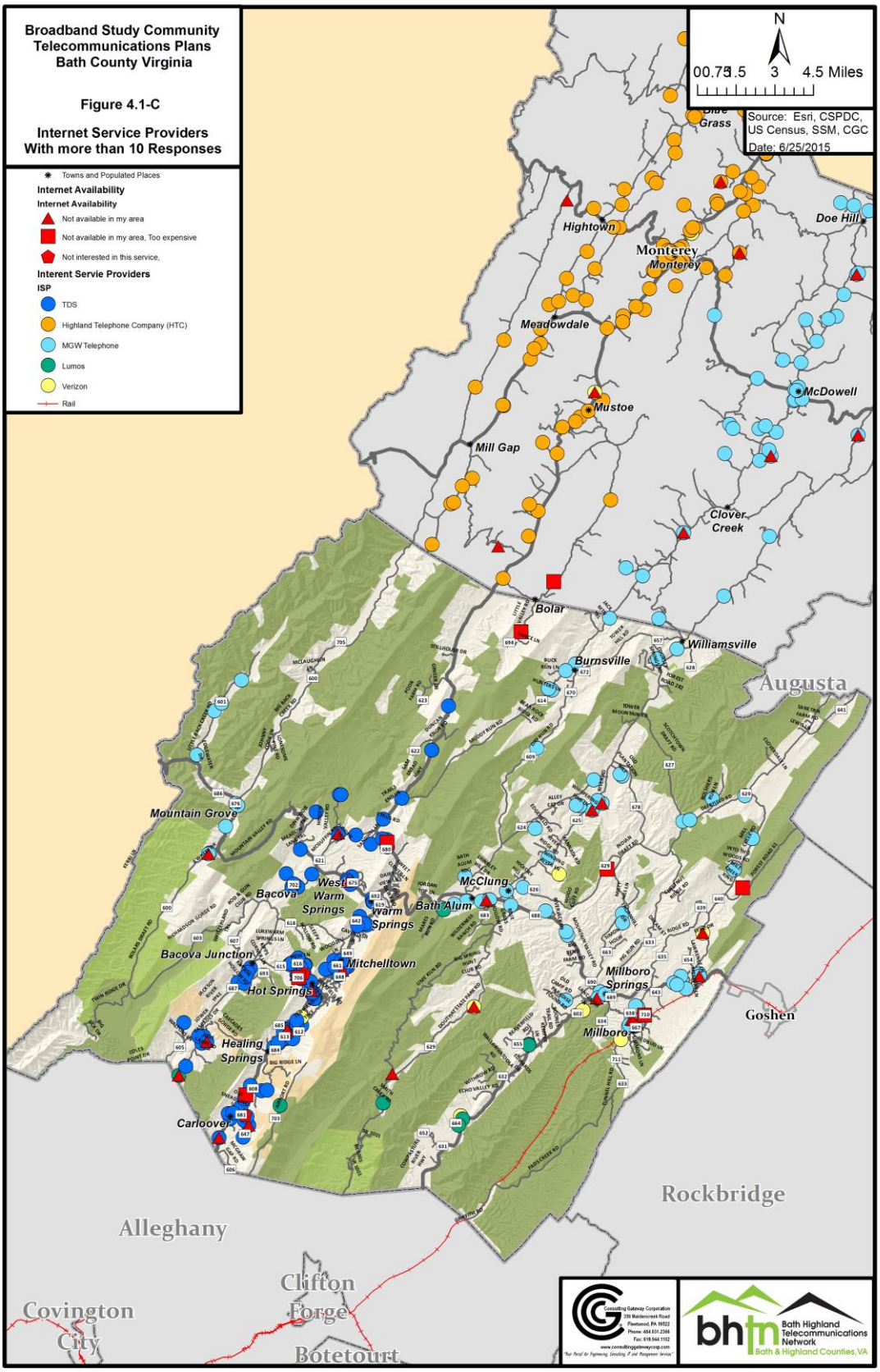
MGW Communications, through its subsidiaries, Telephone and Networks are providing high speed internet to all of their wire line exchanges. MGW Networks is also providing high speed in other areas like the Millboro community, and are bringing two more wireless sights up for more coverage. MGW is constantly upgrading equipment to provide the best service to its customers. They have just installed in the McClung exchange gigE bandwidth equipment. In the Mt. Grove exchange, they are exploring the possibility of adding additional equipment to enhance broadband capabilities.

Bath County Wireless Telecommunications

Bath and Highland Counties are served by a few major wireless telecommunications providers with Verizon currently having the most coverage. Even though there is not anticipated large quantities of people moving into the Counties or increased road traffic, as technologies evolve and more applications are developed, there will be an increased demand for more reliable and continuous wireless communications services. In order to accommodate such an increasing appetite for these amenities, the Counties will need to institute incentives and regulations to strike a balance between modernization and preservation. The County should adopt a comprehensive Telecommunications Ordinance that regulates placement, height, screening and other aspects of proposed structures. It should work with various providers to ensure that high standards are developed and met.

Efforts should also be supported to encourage telecommuting through the use of computer technology in the Counties which is becoming more popular nationwide. Telecommuting jobs can help to reduce the amount of travel time on County roads, decreasing both air pollution and fuel consumption.

Figure 4.1-C: Internet Service Providers With more than 10 Respondents – Bath County, VA



4.2 Bath County Broadband Education Development Strategies

See Section 1.2 for discussion of Gap Analysis and Broadband Education Development Strategies and Appendix 7.0 for additional project input...

4.3 Bath County Last Mile Connectivity Solutions

As previously stated, the most effective approach towards a last Mile Connectivity Solution may be a combination of the options presented for consideration. While it is believed Options No. 1 and 2 would equally be Highland County and Bath County, Option No. 3 – CPE/Last Mile Cost Subsidy program may actually benefit Bath County more than Highland because both HTC and MGW in Highland have expressed providing a FTTH/FTTP solution in the business plan, but TDS and MGW serve in Bath County and TDS has made no such commitment. There is a significant amount of fiber middle-mile in Bath but the last mile cost is a barrier. In addition, it seems Bath County may need more towers to provide adequate coverage for Emergency Radio Communications and therefore Option 4 – Wireless Solution in Bath County could benefit from a cost subsidy program for wireless service Customer Premise Equipment.

Regarding Option No. 5 – Network Build, as previously stated it is believed this solution is not currently cost feasible for the county to undertake on its own. This solution would best be evaluated on a cost share model, where the expense and load (and cost reductions and savings) is distributed among multiple parties. Because BARC owns the majority of utility poles in Bath County, having BARC engaged in the solution would be crucial.

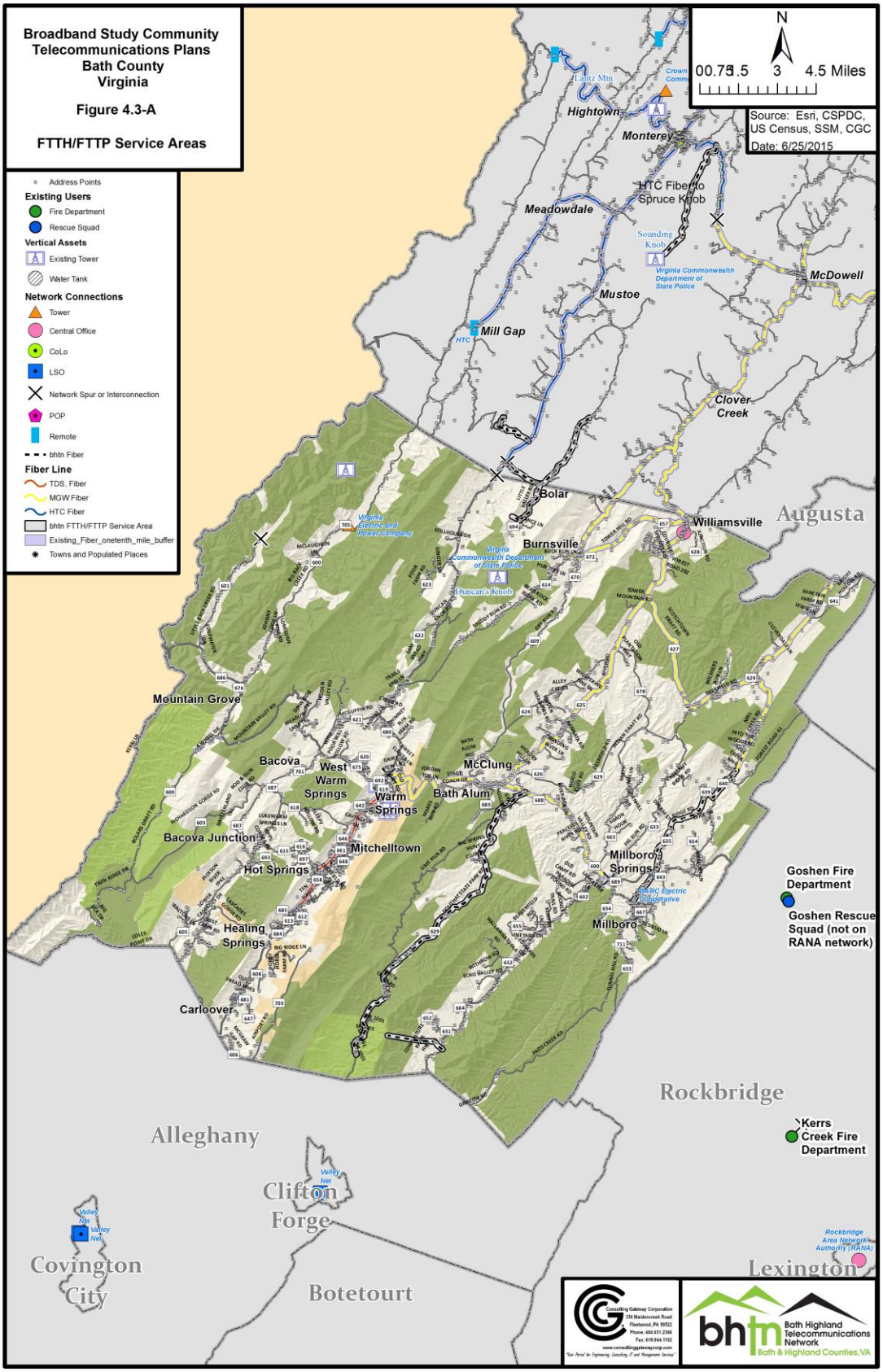
Bhtn proposed fiber in Bath is shown only for the purposes of demonstrating and calculating the number of homes within the 0.1 mile buffer that could be fiber connected if such middle mile existed or was built. If Option No. 5 – Network Build was pursued with the cooperation of the service providers, further strategic planning would need to occur with the service providers to identify the locations of fiber routes that they did not intend to build, but if built by the counties would maximize the number of connections possible while at the same leveraging the service provider fiber where the interconnection would occur.

The proposed fiber coming out of Bolar heading south not only would capture homes in need of improved service, but can be used for providing an essential tower bandwidth and backhaul, not to mention position the same tower for potential wireless Internet service.

The proposed fiber coming out of BARC heading north, perhaps could be interconnected with existing MGW fiber which could be used to connect a new tower being proposed through the Emergency Radio Communications study.

Field assessment would be warranted to determine the most cost effective build for the proposed fiber along Douthat State Park Road between Rt. 39 to 1 mile north of the county line because of its rough rural setting, but over 100 homes could be reached, some of which responded to the survey indicating service not available in the area. During the presentation of the report to the public, there was a comment that fiber build construction activity was believed to be going on along Douthat State Park Road. Further investigation would be warranted if Option No. 5 was pursued.

Figure 4.3-A: FTTH/FTTP Service Areas – Bath County, VA



4.4 Bath County Preliminary Engineering, Design & Cost Estimates

Option No. 1: *BHT-NAP* *(See Section 1.4a for Structuring Details & Costs)*
Premise: Bath-Highland Telecommunications - Network Assistance Program

Description: Liaison between Customer & Service Provider

Option No. 2: *NETWORK EXTENSION FUNDING PPP* *(See Section 1.4b for Structuring Details & Costs)*
Premise: Getting middle mile where not existing or improving where exists

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

Option No. 3: *CPE/LAST MILE COST SUBSIDY* *(See Section 1.4c for Structuring Details & Costs)*
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.

Option No. 4: *WIRELESS SERVICE* *(See Section 1.4d for Structuring Details & Costs)*
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: Issue a Request for Proposal (RFP) seeking a Wireless Internet Service Provider (WISP) to become a Public-Private-Partner (PPP) with the counties 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. Proposed fiber build costs vary considerably depending on type construction (aerial or underground), topology, soil or tree interference conditions, environmental issues and more. The following table is provided only as an example of potential costs associated with a wireless service option involving the construction and/or rehabilitation of towers.

Example of Costs Only! Actual Budget and Costs would depend on Radio Study, Tower Locations, Type Tower, etc.

Wireless Service (Bath County)				Robust Tower Cost $350,000-$450,000
Cost Item	***Amount***	***Subtotal***		***Total Cost***
1. Cell/BB Spec Tower Cost	$400,000 x 1	$400,000		Start with 1 new Cell Towers in Bath ($400,000) w/possibility to add 1
2. Emergency/BB Radio Tower Cost Per Site	$200,000	$600,000		(Assume 2 Existing Towers Cost for Improvements = 1 New Tower Cost); Assume 2 additional new towers ($400,000) + 2 Existing Towers ($200,000) in Bath ($600,000 Total)
3. Backhaul Arrangements	$75,000x5 Towers	$375,000		At this time, nonspecific if Microwave or Fiber;
4. 10% Soft Costs, Overhead, Overrun,Misc.	Say 10% of Subtotal ($1,375,000)	$137,500		Includes Engineering, Financing Costs, Overrun, Overhead, etc.
5. Interest on $1,512,500 for 15 years @ 5%	$11,960.75/Mo.x12mos.x15 yrs. =$2,152,935 - $1,512,500 = $640,435	$640,435		County's Interest
6. Administration/O&M	$250/mo.x12 mos.x15 yrs.	$45,000		Minimal O&M expected w/WISP-PPP
		$2,197,935		Say $2.2 million / 5 Total Towers = $440,000/Tower **($440,000 Bath + $400,000 Highland)/2 = $420,000/Tower Avg.**
Cost Offset	Cell Tower Collocations Fees	($480,000)		An average of $1,750/mo./tower for the first 4 years for one carrier increasing $1,250/mo./tower (lower rate for second positioning) for a second carrier after 4 years to $3,000/mo. total seems reasonable. [$1,750 x 12 mos. x 4 yrs. x 1 towers = $84,000] + [$1,750+ $1,250 x 12 mos. x 11 yrs. x 1 towers = $396,000]; Collocation on Radio Towers also is Probable.
Net Cost		$1,717,935		**Say $1.7 million / 5 Towers = $340,000 Per Tower**

Option No. 5: *NETWORK BUILD* *(See Section 1.e for Structuring Details & Costs)*

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.

The breakdown of FTTH/FTTP within 0.1 mile (528 ft.) of Fiber is as follows:

	Bath	Highland	Total		Percentage
Existing Fiber Middle Mile (HTC, MGW, TDS) FTTH/FTTP	839	822	1661		27%
Homes/Premises Passed by Proposed bhtn Fiber FTTH/FTTP	162	75	237		4%
Added Homes/Premises along Big Valley Road if Fiber replaces Copper FTTH/FTTP		32	32		0.01%
Total	1001 (52%)	929 (48%)	1930 (100%)		31% of a Total 6,197 Homes/Premises within Study Area

Since the total number of homes/premises within 0.1 mile (528 ft.) of fiber is almost exactly half between Bath and Highland Counties, Bath County can use for estimating 52% of the cost shown in the table of 1.4e-Option No. 5: Network Build or 52% x ($8,763,294 - $180,000 Admin./O&M - $500,000 Future ONT Replacement) or $8,083,294 = $4,203,313. Since these are preliminary cost estimates it is still recommended Bath County use $4,000 per Home/Premise.

4.5 Bath County Organization and Network Options

As previously addressed, if Bath County were to pursue Options No. 1, 2 or 3, it is not believed a Broadband Authority would be needed. If Options no. 4 or 5 were pursued, it is likely an authority would be needed and could play a large role incurring debt service for these more expensive builds.

4.6 Bath County Funding Strategies

Last Mile Solution Options No. 1 and 2 would probably be best funded from County funds unless there was a much expedited funding application where the cost of completing the application did not outweigh the benefit of the monies received.

It is hoped the Virginia, or Appalachia Region Commission (ARC) may be a funding source for Option No. 3 since it directly benefits low to moderate income families within the Commonwealth and mountain range.

The USDA-RUS Telecommunications funding programs may be the best resource for either Options No. 4 or 5. The current USDA Rural Development Programs are:

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

To learn more about each of these programs, please visit http://www.rd.usda.gov/programs-services/all-programs

4.7 Closing Comments for Bath County

Bath County is unique in having existing infrastructure at both ends of the quality spectrum ranging from old legacy copper networks providing relatively inexpensive and slow speed services (dial-up and somewhat unreliable CDSL service) that has received a fairly large number of dissatisfaction responses through the survey solicitation to more expensive high speed carrier grade fiber optics for businesses willing to pay and carrier transport services. Not only is the last mile connection a significant problem, but the carrier grade fiber optic owners have not expressed much interest in providing residential retail services.

In addition, while BARC has expressed interest to someday provide FTTH/FTTP services, it is believed it will be years before the rural areas of Bath County are addressed, if at all. BARC has indicated that if another provider began serving the properties in Bath County before they would provide service, which should not be a problem. Therefore, since there is quality infrastructure to perhaps lease or build off of, significant strides in accomplishing a FTTH/FTTP delivery system could be accomplished if successful negotiations would result in the existing fiber optics cabling to be used. If the existing infrastructure can't be used, then not only would last mile fiber need to be built, but a significant amount of fiber optic middle mile would be needed. In summary, much more discussions and perhaps negotiations is recommended with the service providers that own existing infrastructure in Bath County, as well as seeking a service provider that would consider using the infrastructure of others to expand and improve service.

5.0 Highland County

5.1 Highland County Community Needs Assessment

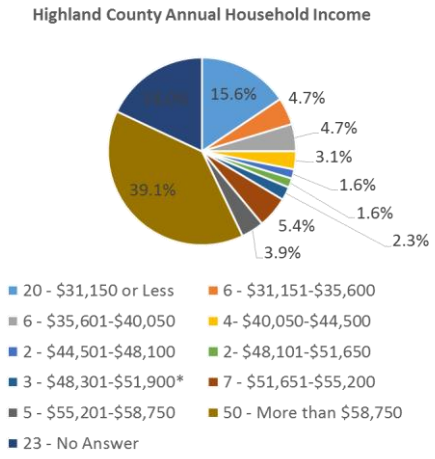
5.1a Background

One objective of the Community Broadband Planning Study 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. Communication technologies include any form of Internet access, pay TV, and telephone delivered by any medium.

The use of a mailed survey 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 a written survey as the preferred means to obtain community input from the largest number of respondents.

In addition to validating service availability by geographic area, end users provided valuable input to calculate demand for advanced technologies such as higher speed and wireless Internet access and phone service that uses the Internet as a transmission medium. 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.

Comments were solicited as to what changes or improvements to the current communication technology in the Counties would best meet citizens' needs. Local leaders can use this knowledge to expand the reach of government services and prioritize implementation efforts. Through the survey process, citizens have been recruited as stakeholders in their community's future.



When combining Residence and Residence with Home-Based Business, the largest Annual Household Income range is More than approximately $59,000 followed by the second largest percentage being the lowest range of approximately $31,300 or less

*Three (3) Highland County Residences used income range of Bath County

5.1b Area Assets

In preparation for a market survey to assess needs, base maps were developed for use throughout the study. Economic development personnel provided input on future growth areas. Local provider input and independent research was used to develop a telecommunication infrastructure map, and census data was applied to display population and housing density throughout the Counties. Maps are displayed on the following pages**.**

See Figure 5.1-A Education, Public Safety and Service Provider Facilities and Infrastructure

Figure 5.1-A Education, Public Safety & Service Provider Facilities & Infrastructure – Highland County, VA

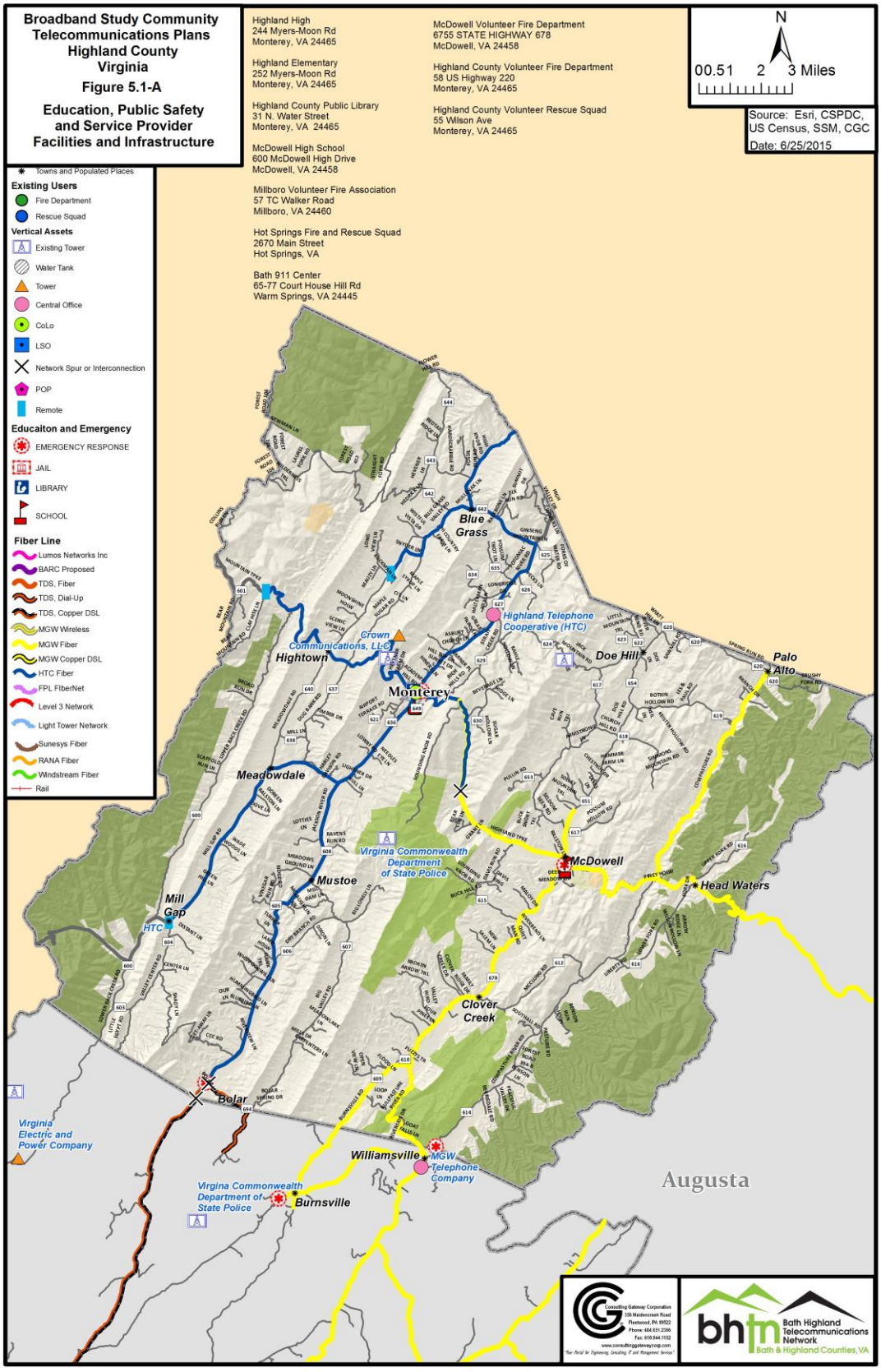
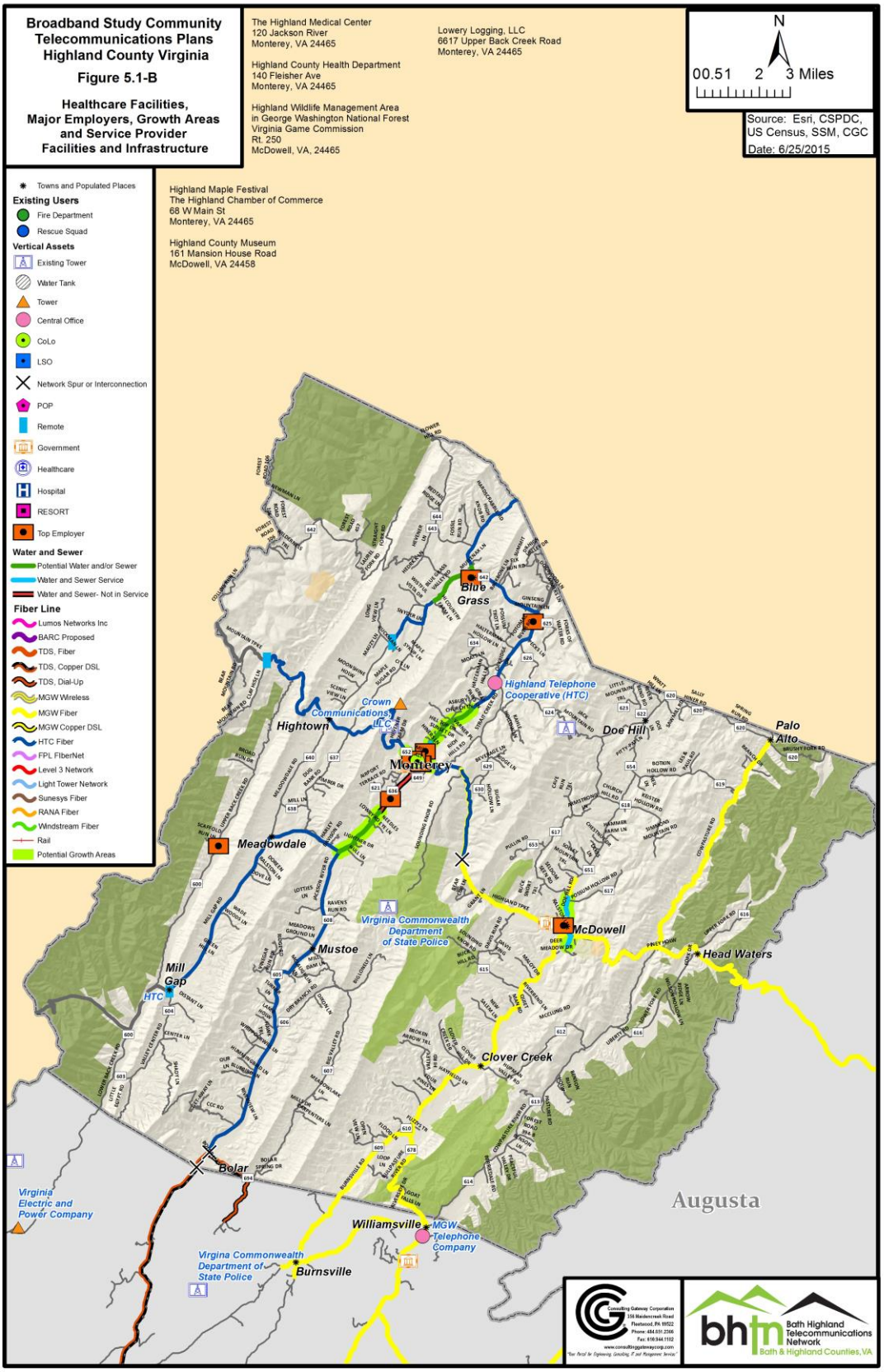
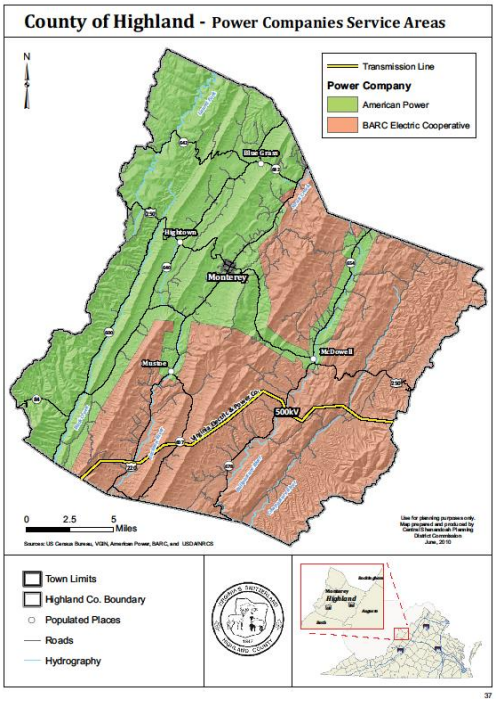


Figure 5.1-B Healthcare Facilities, Major Employers, Growth Areas, and Service Provider Facilities & Infrastructure – Highland County, VA



5.1c Local Internet Services



Highland County Utilities

BARC: (See description above) & Shenandoah Valley Electric Cooperative

Highland County receives its electrical power from both Shenandoah Valley Electric Cooperative and BARC Electric Cooperative. Currently, there is one 69 kV transmission line in the county, as well as one 69-12.5 kV substation. The line owned by Shenandoah Valley Electric Cooperative enters Highland at the West Virginia border, paralleling Route 250. The substation is located just north of Monterey (refer toMap 37). In general, the western half of the County is served by Shenandoah Valley Electric Cooperative and the eastern half by BARC Electric Cooperative. Generally, 7.2/12.5 kV lines are sufficient to handle light industry or large commercial or recreational facilities. For this reason, areas delineated by power providers in Map 9 offer little limitation to light industry or commercial/recreational development, in terms of available electric power.

Currently, three-phase electrical service can be provided in the area surrounding Monterey, along the corridor of U.S. Route 220 south to Route 84, and along Route 84 to the community of Mill Gap. It can also be provided along the corridor of U.S. Route 250 east of Monterey to the community of McDowell.

[Wind Turbines - A commercial wind turbine farm, the first in Virginia, has been approved for construction on Alleghany Mountain on the western border of the county. The project will feed to the existing 69 kV transmission line operated by Allegheny Power.]

Highland Telephone Cooperative

Highland Telephone Cooperative provides land-based telephone service to the west side of the County, including Monterey and Blue Grass Magisterial Districts. Highland Telephone Cooperative provides Digital Subscriber Line broadband service. Internet access is also available throughout the county via dial-up services.

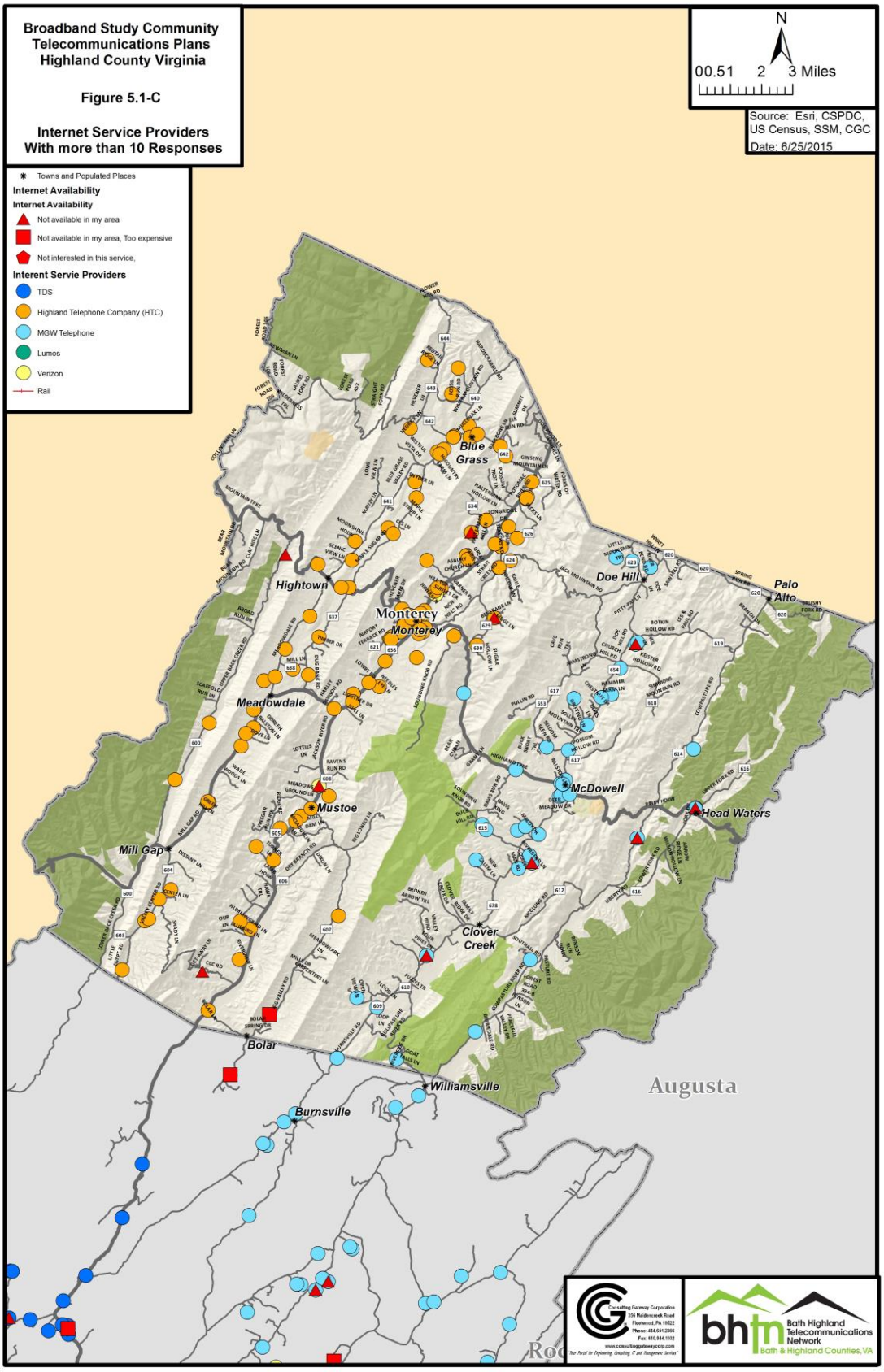
MGW (See description above)

MGW Telephone provides service to McDowell and the Stonewall Magisterial District. Cell phone service is available in parts of the county. MGW Telephone provides Digital Subscriber Line broadband service. Internet access is also available throughout the county via dial-up services.

Service Provider Request for Interest

Over 30 invitations went out to service providers and/or potential collaboration partners (such as a Public-Private-Partnership) to attend a meeting and take interest in the study with approximately 10 responding in some form. Follow-up face-to-face meetings were held with the service providers currently serving in the counties.

Figure 5.1-C: Internet Service Providers With more than 10 Responses – Highland County, VA



5.2 Highland County Broadband Education Development Strategies

See Section 1.2 for discussion of Gap Analysis and Broadband Education Development Strategies and Appendix 8.0 for additional project input.

5.3 Highland County Last Mile Connectivity Solutions

It is believed Options No. 1, 2 would equally be Highland and Bath County. While Option No. 3 – CPE/Last Mile Cost Subsidy program would undoubtedly benefit Highland County, both HTC and MGW have expressed providing a FTTH/FTTP solution in the business plan with a specific timeline for implementation.

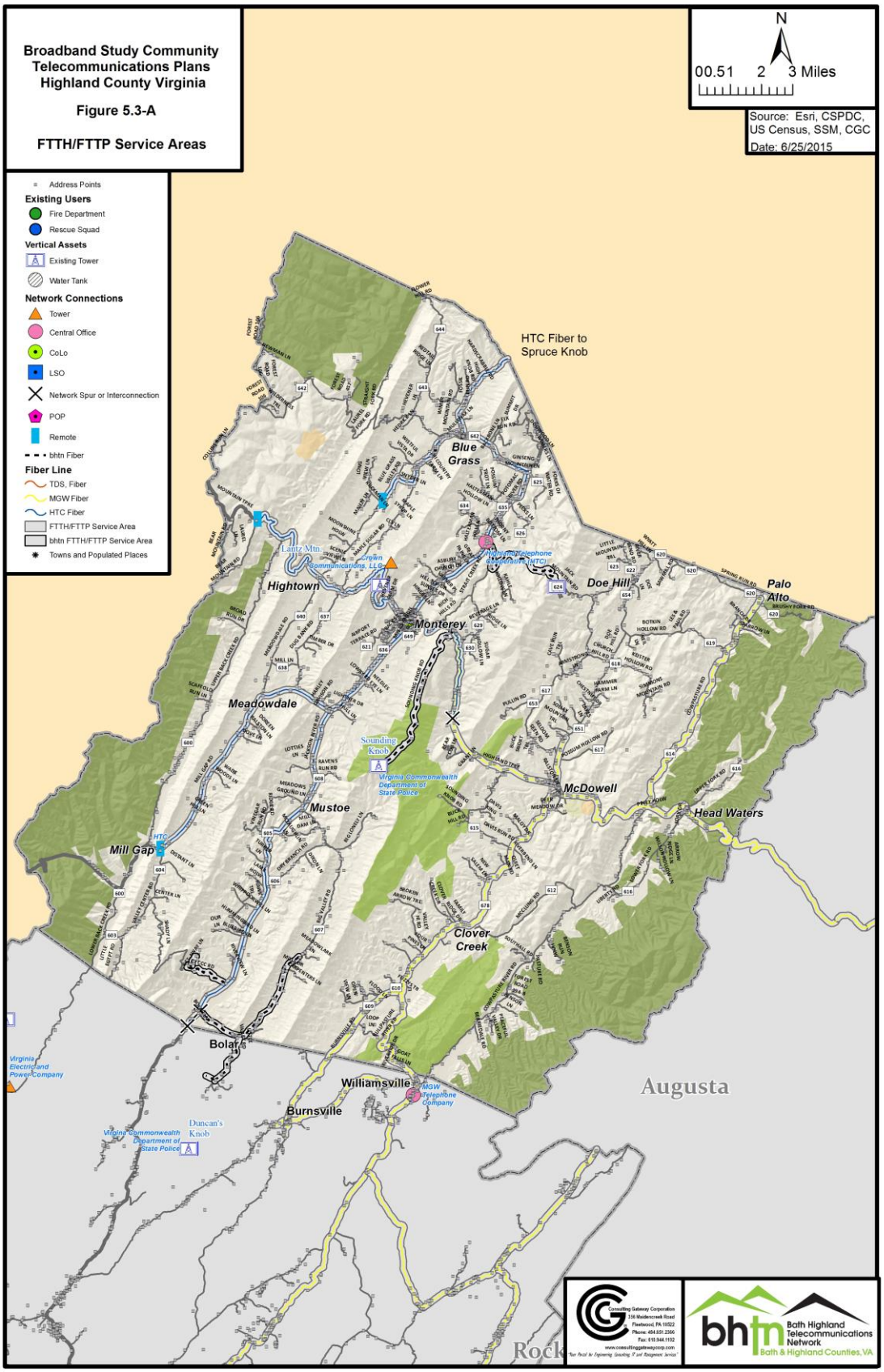
Regarding Option No. 4 – Wireless Solution, Highland Emergency Response personnel have indicated a number of existing towers are planned to be used, some with wooden poles of only 50' height and there is doubt if such infrastructure would be attractive to a WISP or even high enough to be effective.

Regarding Option No. 5 – Network Build, as previously stated it is believed this solution is not currently cost feasible for the county to undertake on its own. This solution would best be evaluated on a cost share model, where the expense and load (and cost reductions and savings) is distributed among multiple parties. Because both BARC and the Shenandoah Valley Electric Cooperative owns the majority of utility poles in Highland County, having both cooperatives engaged in the solution would be crucial. The Shenandoah Valley Electric Cooperative has not expressed any interest in the Broadband Project.

Bhtn proposed fiber in Highland is shown only for the purposes of demonstrating and calculating the number of homes within the 0.1 mile buffer that could be fiber connected if such middle mile existed or was built. If Option No. 5 – Network Build was pursued with the cooperation of the service providers, further strategic planning would need to occur with the service providers to identify the locations of fiber routes that they did not intend to build, but if built by the counties would maximize the number of connections possible while at the same leveraging the service provider fiber where the interconnection would occur. The proposed fiber coming out of Bolar heading north would eventually complete a loop of fiber with HTC building in redundancy and reliability.

The proposed fiber shown is intended to serve a dual purpose of not only capturing homes within the o.1 mile buffer, but to connect towers for proposed bandwidth and backhaul use. This not only would benefit the Emergency Radio Communications needs, but also play a significant role in Option No. 4 – Wireless Service of broadband.

Figure 5.3-A: FTTH/FTTP Service Areas – Highland County



5.4 Highland County Preliminary Engineering, Design & Cost Estimates

Option No. 1: *BHT-NAP* *(See Section 1.4a for Structuring Details & Costs)*
Premise: Bath-Highland Telecommunications - Network Assistance Program

Description: Liaison between Customer & Service Provider

Option No. 2: *NETWORK EXTENSION FUNDING PPP* *(See Section 1.4b for Structuring Details & Costs)*
Premise: Getting middle mile where not existing or improving where exists

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

Option No. 3: *CPE/LAST MILE COST SUBSIDY* *(See Section 1.4c for Structuring Details & Costs)*
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.

Option No. 4: *WIRELESS SERVICE* *(See Section 1.4d for Structuring Details & Costs)*
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: Issue a Request for Proposal (RFP) seeking a Wireless Internet Service Provider (WISP) to become a Public-Private-Partner (PPP) with the counties 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. Proposed fiber build costs vary considerably depending on type construction (aerial or underground), topology, soil or tree interference conditions, environmental issues and more.

Example of Costs Only! Actual Budget and Costs would depend on Radio Study, Tower Locations, Type Tower, etc.

Wireless Service (Highland County)				Robust Tower Cost $350,000-$450,000
Cost Item	***Amount***	***Subtotal***		***Total Cost***
1. Cell/BB Spec Tower Cost/Site	$400,000 x 1	$400,000		Assume at least 1 new Cell Tower in Highland ($400,000)
2. Emergency/BB Radio Tower Cost Per Site	$200,000	$500,000		(Assume 2 Existing Towers Cost for Improvements = 1 New Tower Cost); Assume 1 additional new tower ($200,000) + 3 Existing Towers ($300,000) in Highland ($500,000 Total)
3. Backhaul Arrangements	$75,000x5 Towers	$375,000		At this time, nonspecific if Microwave or Fiber;
4. 10% Soft Costs, Overhead, Overrun,Misc.	Say 10% of Subtotal ($1,275,000)	$127,500		Includes Engineering, Financing Costs, Overrun, Overhead, etc.
5. Interest on $1,402,500 for 15 years @ 5%	$11,090.88/Mo.x12mos.x15 yrs. =$1,996,358 - $1,402,500 = $593,858	$593,858		County's Interest
6. Administration/O&M	$250/mo.x12 mos.x15 yrs.	$45,000		Minimal O&M expected w/WISP-PPP
		$2,041,358		Say $2.0 million / 5 Total Towers = $400,000/Tower **($400,000 Highland + $440,000 Bath)/2 = $420,000/Tower Avg.**
Cost Offset	Cell Tower Collocations Fees	($480,000)		An average of $1,750/mo./tower for the first 4 years for one carrier increasing $1,250/mo./tower (lower rate for second positioning) for a second carrier after 4 years to $3,000/mo. total seems reasonable. [$1,750 x 12 mos. x 4 yrs. x 1 towers = $84,000] + [$1,750+ $1,250 x 12 mos. x 11 yrs. x 1 towers = $396,000]; Collocation on Radio Towers also is Probable.
Net Cost		$1,561,358		**Say $1.6 million / 5 Towers = $320,000 Per Tower**

Option No. 5: *NETWORK BUILD* *(See Section 1.e for Structuring Details & Costs)*

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.

The breakdown of FTTH/FTTP within 0.1 mile (528 ft.) of Fiber is as follows:

	Bath	Highland	Total		Percentage
Existing Fiber Middle Mile (HTC, MGW, TDS) FTTH/FTTP	839	822	1661		27%
Homes/Premises Passed by Proposed bhtn Fiber FTTH/FTTP	162	75	237		4%
Added Homes/Premises along Big Valley Road if Fiber replaces Copper FTTH/FTTP		32	32		0.01%
Total	1001 (52%)	929 (48%)	1930 (100%)		31% of a Total 6,197 Homes/Premises within Study Area

Since the total number of homes/premises within 0.1 mile (528 ft.) of fiber is almost exactly half between Bath and Highland Counties, Highland County can take approximately 48% of the cost shown in the table of 1.4e-Option No. 5: Network Build or 48% x ($8,763,294 - $180,000 Admin./O&M - $500,000 Future ONT Replacement) or $8,083,294 = $3,879,981. For these preliminary cost estimates it is still recommended Bath County use $4,000 per Home/Premise

5.5 Organization and Network Options

As previously addressed, if Bath County were to pursue Options No. 1, 2 or 3, it is not believed a Broadband Authority would be needed. If Options no. 4 or 5 were pursued, it is likely an authority would be needed and could play a large role incurring debt service for these more expensive builds.

5.6 Highland County Funding Strategies

Last Mile Solution Options No. 1 and 2 would probably be best funded from County funds unless there was a much expedited funding application where the cost of completing the application did not outweigh the benefit of the monies received.

It is hoped the Virginia, or Appalachia Region Commission (ARC) may be a funding source for Option No. 3 since it directly benefits low to moderate income families within the Commonwealth and mountain range.

The USDA-RUS Telecommunications funding programs may be the best resource for either Options No. 4 or 5. The current USDA Rural Development Programs are:

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

To learn more about each of these programs, please visit http://www.rd.usda.gov/programs-services/all-programs

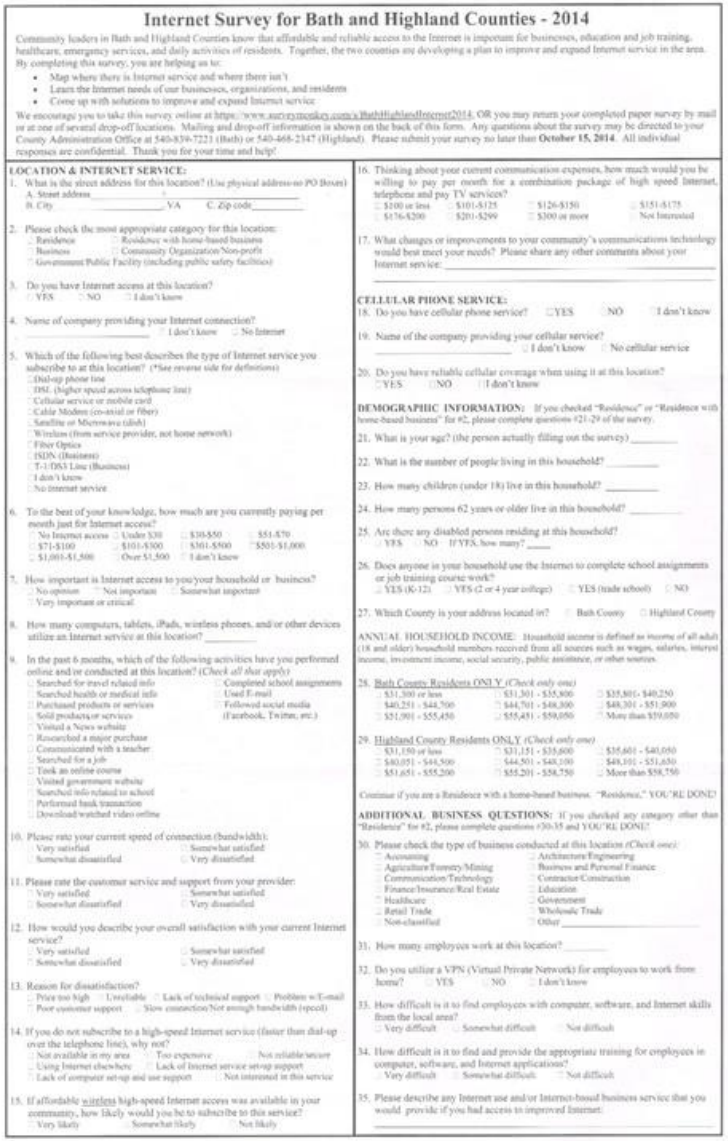
5.7 Closing Comments for Highland County

Highland County is fortunate to have the existing dominate service providers planning FTTH/FTTP in their business plans with near-term timelines of infrastructure build projects to make significant progress towards this goal over the next 3-5 years. What will also play a role in the ability of these service providers to provide competitively priced service will the ability for them to purchase reasonably priced large bandwidth to distribute across their networks from carriers that sell bandwidth to local service providers. Just like a retail customer, if there are limited companies or interconnections resulting in limited competition to provide such wholesale bandwidth there is little incentive to lower prices to beat a competitor. Such limited availability of significant bandwidth and competitive pricing has been a comment expressed by at least one of the service providers during the study.

Just as in Bath County, it appears many of the existing and planned towers for the Highland emergency radio communications initiative could be served by fiber from the existing service providers. At some locations, some limited fiber construction build may be warranted to make this preferred bandwidth delivery and backhaul method available. While there was little to no interest expressed in providing wireless broadband service, cost sharing at the planned tower sites and/or towers themselves could fill some localized areas of unmet need outside of those that would be served by a FTTH/FTTP solution if a Wireless Internet Service Provider (WISP) could be found that would be interested in taking on such a role. This would be a difficult given the limited number of remaining customers that may not be served by fiber.

6.0 Study Area Appendices

Appendix A: Residential and Business End-User Survey



Internet Survey for Bath and Highland Counties - 2014

Community leaders in Bath and Highland Counties know that affordable and reliable access to the Internet is important for businesses, education and job training, healthcare, emergency services, and daily activities of residents. Together, the two counties are developing a plan to improve and expand Internet service in the area. By completing this survey, you are helping us to:

- Map where there is Internet service and where there isn't
- Learn the Internet needs of our businesses, organizations, and residents
- Come up with solutions to improve and expand Internet service

We encourage you to take this survey online at https://www.surveymonkey.com/s/BathHighlandInternet2014, 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 your County Administration Office at 540-839-7221 (Bath) or 540-468-2347 (Highland). Please submit your survey no later than **October 15, 2014**. All individual responses are confidential. Thank you for your time and help!

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 ☐ Residence with home-based business
   ☐ Business ☐ Community Organization/Non-profit
   ☐ Government/Public Facility (including public safety facilities)
3. Do you have Internet access at this location?
   ☐ YES ☐ NO ☐ I don't know
4. Name of company providing your Internet connection?
   _____ ☐ I don't know ☐ No Internet
5. Which of the following best describes the type of Internet service you subscribe to at this location? (*See reverse side for definitions*)
   ☐ Dial-up phone line
   ☐ DSL (higher speed across telephone line)
   ☐ Cellular service or mobile card
   ☐ Cable Modem (co-axial or fiber)
   ☐ Satellite or Microwave (dish)
   ☐ Wireless (From service provider, not home network)
   ☐ Fiber Optics
   ☐ ISDN (Business)
   ☐ T-1/DS3 Line (Business)
   ☐ I don't know
   ☐ No Internet service
6. To the best of your knowledge, how much are you currently paying per month just for Internet access?
   ☐ 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. How important is Internet access to you/your household or business?
   ☐ No opinion ☐ Not important ☐ Somewhat important
   ☐ Very important or critical
8. How many computers, tablets, iPads, wireless phones, and/or other devices utilize an Internet service at this location? _____
9. 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 ☐ Used E-mail
   ☐ Purchased products or services ☐ Followed social media (Facebook, Twitter, etc.)
   ☐ Sold products or services
   ☐ Visited a News website
   ☐ Researched a major purchase
   ☐ Communicated with a teacher
   ☐ Searched for a job
   ☐ Took an online course
   ☐ Visited government website
   ☐ Searched info related to school
   ☐ Performed bank transaction
   ☐ Download/watched video online
10. Please rate your current speed of connection (bandwidth):
    ☐ Very satisfied ☐ Somewhat satisfied
    ☐ Somewhat dissatisfied ☐ Very dissatisfied
11. Please rate the customer service and support from your provider:
    ☐ Very satisfied ☐ Somewhat satisfied
    ☐ Somewhat dissatisfied ☐ Very dissatisfied
12. How would you describe your overall satisfaction with your current Internet service?
    ☐ Very satisfied ☐ Somewhat satisfied
    ☐ Somewhat dissatisfied ☐ Very dissatisfied
13. Reason for dissatisfaction?
    ☐ Price too high ☐ Unreliable ☐ Lack of technical support ☐ Problem w/E-mail
    ☐ Poor customer support ☐ Slow connection/Not enough bandwidth (speed)
14. 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
15. 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
16. 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
17. What changes or improvements to your community's communications technology would best meet your needs? Please share any other comments about your Internet service: _____

CELLULAR PHONE SERVICE:

18. Do you have cellular phone service? ☐ YES ☐ NO ☐ I don't know
19. Name of the company providing your cellular service?
    _____ ☐ I don't know ☐ No cellular service
20. Do you have reliable cellular coverage when using it at this location?
    ☐ YES ☐ NO ☐ I don't know

DEMOGRAPHIC INFORMATION: If you checked "Residence" or "Residence with home-based business" for #2, please complete questions #21-29 of the survey.

21. What is your age? (the person actually filling out the survey) _____
22. What is the number of people living in this household? _____
23. How many children (under 18) live in this household? _____
24. How many persons 62 years or older live in this household? _____
25. Are there any disabled persons residing at this household?
    ☐ YES ☐ NO If YES, how many? _____
26. 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 (trade school) ☐ NO
27. Which County is your address located in? ☐ Bath County ☐ Highland County

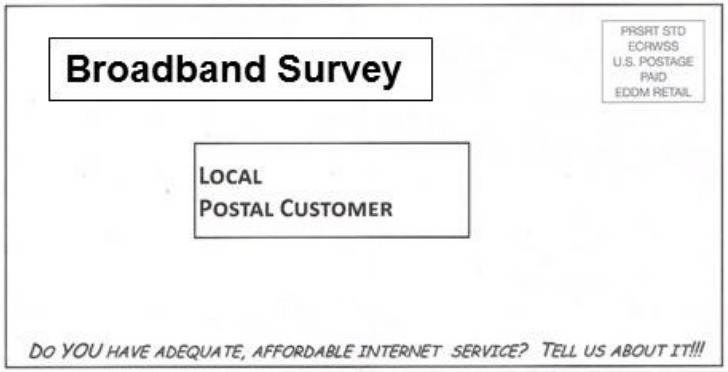
ANNUAL HOUSEHOLD INCOME: Household income is defined as income of all adult (18 and older) household members received from all sources such as wages, salaries, interest income, investment income, social security, public assistance, or other sources.

28. Bath County Residents ONLY (*Check only one*)
    ☐ $31,300 or less ☐ $31,301 - $35,800 ☐ $35,801- $40,250
    ☐ $40,251 - $44,700 ☐ $44,701 - $48,300 ☐ $48,301 - $51,900
    ☐ $51,901 - $55,450 ☐ $55,451 - $59,050 ☐ More than $59,050
29. Highland County Residents ONLY (*Check only one*)
    ☐ $31,150 or less ☐ $31,151 - $35,800 ☐ $35,601 - $40,050
    ☐ $40,051 - $44,500 ☐ $44,501 - $48,100 ☐ $48,101 - $51,650
    ☐ $51,651 - $55,200 ☐ $55,201 - $58,750 ☐ More than $58,750

Continue if you are a Residence with a home-based business. "Residence," YOU'RE DONE!

ADDITIONAL BUSINESS QUESTIONS: If you checked any category other than "Residence" for #2, please complete questions #30-35 and YOU'RE DONE!

30. 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 _____
31. How many employees work at this location? _____
32. Do you utilize a VPN (Virtual Private Network) for employees to work from home? ☐ YES ☐ NO ☐ I don't know
33. How difficult is it to find employees with computer, software, and Internet skills from the local area?
    ☐ Very difficult ☐ Somewhat difficult ☐ Not difficult
34. 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
35. Please describe any Internet use and/or Internet-based business service that you would provide if you had access to improved Internet: _____



Broadband Survey

PRSRT STD
ECRWSS
U.S. POSTAGE
PAID
EDDM RETAIL

LOCAL
POSTAL CUSTOMER

DO YOU HAVE ADEQUATE, AFFORDABLE INTERNET SERVICE? TELL US ABOUT IT!!!

ONLINE SURVEY OPTION: We encourage you to take this survey online. To do so, you may find it at the following web address:

https://www.surveymonkey.com/s/BathHighlandInternet2014

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.
- 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

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 seal it with tape (no staples), write in the appropriate address listed below, attach a stamp, and drop it in any mailbox.

BATH COUNTY

Drop-off Locations

Warm Springs Area: County Administrator's Office (*Mr. Ashton Harrison*)
Hot Springs Area: BR&T Bank (*Mr. Bobby Spurgeon*)
Millboro Area: BARC Office in Millboro (*Mr. Dave Clinton*)

Return by Mail

Bath County Administration Office
PO Box 309
Warm Springs, VA 24484

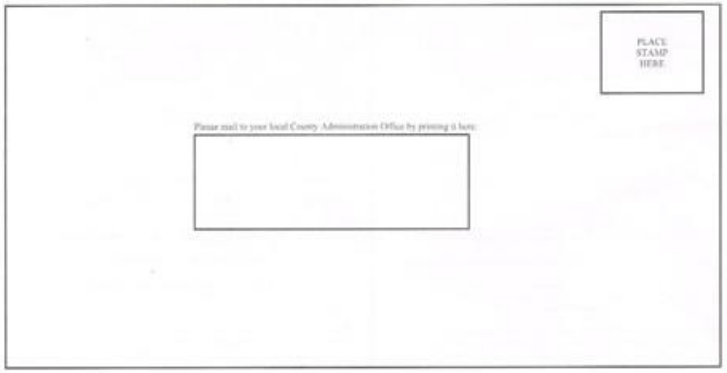
HIGHLAND COUNTY

Drop-off Locations

Monterey Area: Treasurer's Office at the Courthouse
Monterey Area: Highland County Library (*Ms. Tomi Herald*)
Blue Grass Area: Country Convenience (*Mr. & Mrs. Kimble*)
McDowell Area: Mountain Oasis (*Mr. David Heatwole*)
Headwaters Area: Miller's Store (*Mr. Ronnie Miller*)

Return by Mail

Highland County Administration Office
PO Box 130
Monterey, VA 24465



PLACE STAMP HERE

Please mail to your local County Administration Office by printing it here:

Appendix B: Residential End-User Survey Tabulation

	SUMMARY	Bath Residence	Bath Business	Bath Gov/Pub Facility/ Safety	Bath Resid. w/Home Bus.	Bath Comm Org/Non-profit	BATH TOTAL	Highland Residence	Highland Business	Highland Gov/Pub Facility/ Safety	Highland Resid. w/Home Bus.	Highland Comm Org/Non-profit	HIGH-LAND TOTAL	COMBINED	COMMENTS
#3	**Do you have Internet Access at this Location?**														
	I don't know	1					1	2					2	3	
	No	10			1		11	7	3		1	1	12	23	
	Yes	156	47	2	44	2	251	92	77	3	26	4	202	453	
	No Answer	1	1				2						0	2	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#4	**Name of company providing your Internet connection?**														
	AT&T						0		1				1	1	
	Comcast (Xfinity)						0						0	0	
	CPSI		1				1						0	1	
	Direct TV	1					1						0	1	
	Dish Network		3				3		1				1	4	
	Dish Net						0						0	0	
	Earthlink.net	1					1						0	1	
	Exede		1				1						0	1	
	Highland Telephone Company (HTC)						0	66	55	3	14	3	141	141	
	Hughesnet		3				3						0	3	
	ISP						0						0	0	
	Lumos Networks	5	4		1		10		1				1	11	
	MGW Telephone	40	9	1	20		70	18	14		8	1	41	111	
	No Internet Service	6			1		7	5					5	12	
	PeoplePC.com	1					1						0	1	
	Satellite (Dish, Hughes, Wild Blue, DirecTV)	12			8		20	3			3		6	26	
	Shentel						0						0	0	
	TDS	87	25	1	15	2	130						0	130	

	Unsure, handled by company						0						0	0	
	Verizon	6					6	2					2	8	
	Verizon Wireless	1					1				1		1	2	
	WildBlue						0		1				1	1	
	I don't know	2					2	1	3				4	6	
	No Answer	6	2				8	6	4		1	1	12	20	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#5	**Which of the following best describes the type of Internet service you subscribe to at this location?**														
	Cable Modem	4			1		5	3	5				8	13	
	Cellular service or mobile card	4					4	1			1		2	6	
	Dial-up phone line	10			1		11	3			1		4	15	
	DSL	100	27	2	30	1	160	76	59	3	20	4	162	322	
	Fiber	2	2				4	1	2				3	7	
	I don't know	3	1			1	5	1					1	6	
	ISDN (Business)		1				1						0	1	
	No Internet service	8					8	7				1	8	16	
	Other (please specify)						0		1				1	1	
	Satellite or Microwave	16	7		8		31	4	3		3		10	41	
	T1 Line		1				1		3				3	4	
	T-1/DS3						0	0	1				1	1	
	wired 10mb symmetrical DSL		1				1						0	1	
	Wireless (from Service Provider)	16	8		5		29	3	3		1		7	36	
	No Answer	5					5	2	3		1		6	11	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#6	**To the best of your knowledge, how much are you currently paying per month just for Internet access?**														
	Under $30	6	0	0	1	0	7	15	8	0	4	0	27	34	
	$30-$50	69	13	0	20	0	102	42	21	0	9	1	73	175	
	$51-$70	50	1	0	11	0	62	14	2	0	6	0	22	84	

	$51 - $100	0	15	0	0	0	15	0	24	0	0	0	24	39	
	$71-$100	22	1	0	11	1	35	13	1	1	2	3	20	55	
	$101 - $300	2	10	0	1	0	13	2	10	1	3	0	16	29	
	$301 - $500	0	1	0	0	0	1	0	0	0	0	0	0	1	
	$501 - $1,000	0	2	0	0	0	2	0	1	0	0	0	1	3	
	$1,001- $1,500	0	1	0	0	0	1	0	1	0	0	0	1	2	
	Over $1,500	0	1	0	0	0	1	0	0	0	0	0	0	1	
	Not sure	0	1	0	0	0	1	0	5	0	0	0	5	6	
	I don't know	5	1	2	0	1	9	3	2	1	1	0	7	16	
	No Internet access	8	0	0	1	0	9	6	0	0	0	0	6	15	
	No Answer	6	1	0	0	0	7	6	5	0	2	1	14	21	
	Total	168	48	0.1	45	2	265	101	80	3	27	5	216	481	
	How important is Internet access to you/your household or business?														
#7	No Opinion	2	0	0	0	0	2	4	0	0	0	0	4	6	
	Not important	6	0	0	0	0	6	4	0	0	0	1	5	11	
	Somewhat important	33	0	0	1	1	35	29	0	0	4	0	33	68	
	Very important or critical	122	6	2	44	1	175	63	11	3	23	4	104	279	
	No Answer	5	42	0	0	0	47	1	69	0	0	0	70	117	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#8	**How many computers, tablets, iPads, wireless phones, and/or other devices utilize an Internet service at this location?**														
	No Answer	0	42	0	0	0	42	0	69	0	0	0	69	111	
	0	14	0	1	0	0	15	10	0	0	3	1	14	29	
	1	25	0	0	2	0	27	24	1	0	4	0	29	56	
	2	24	1	0	2	0	27	20	2	1	1	0	24	51	
	3	21	1	0	5	0	27	19	3	1	5	2	30	57	
	4	28	0	0	12	1	41	4	0	0	6	0	10	51	
	5	23	0	0	8	0	31	9	2	0	2	0	13	44	
	6	14	1	0	6	0	21	5	0	0	3	0	8	29	
	7	6	0	0	6	0	12	2	1	0	2	0	5	17	
	8	4	0	0	4	0	8	3	0	0	1	0	4	12	
	9	3	0	0	0	0	3	2	0	0	0	0	2	5	
	10	2	1	1	0	1	5	2	0	0	0	1	3	8	
	12	3	0	0	0	0	3	0	0	0	0	1	1	4	
	14	1	0	0	0	0	1	1	0	0	0	0	1	2	
	15	0	0	0	0	0	0	0	1	0	0	0	1	1	

	20	0	2	0	0	0	2	0	0	0	0	0	0	2	
	25	0	0	0	0	0	0	0	1	0	0	0	1	1	
	100	0	0	0	0	0	0	0	0	1	0	0	1	1	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
	In the past 6 months, which of the following activities have you performed online and/or conducted at this location? *(Check all that apply)*														
	Travel	114	4	1	40	1	160	67	7	1	22	3	100	260	
	No Answer	54	44	1	5	1	105	34	73	2	5	2	116	221	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
	Health-Medical	128	4	2	40	1	175	74	6	2	22	1	105	280	
	No Answer	40	44	0	5	1	90	27	74	1	5	4	111	201	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
	Purchase	137	4	2	44	0	187	84	10	3	25	4	126	313	
	No Answer	31	44	0	1	2	78	17	70	0	2	1	90	168	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
	Sold	17	5	0	22	0	44	19	4	0	12	1	36	80	
	No Answer	151	43	2	23	2	221	82	76	3	15	4	180	401	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
	News	129	6	2	42	1	180	74	9	3	24	4	114	294	
	No Answer	39	42	0	3	1	85	27	71	0	3	1	102	187	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
	Major Buy	97	4	2	37	1	141	64	6	1	20	2	93	234	
#9	No Answer	71	44	0	8	1	124	37	74	2	7	3	123	247	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
	Teacher	28	1	1	14	0	44	20	1	0	4	0	25	69	
	No Answer	140	47	1	31	2	221	81	79	3	23	5	191	412	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
	Job	35	1	0	14	1	51	11	0	1	4	0	16	67	
	No Answer	133	47	2	31	1	214	90	80	2	23	5	200	414	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
	Online Ed	38	1	1	12	0	52	20	3	2	8	2	35	87	
	No Answer	130	47	1	33	2	213	81	77	1	19	3	181	394	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
	Gov Web	93	6	2	39	1	141	56	8	3	20	4	91	232	
	No Answer	75	42	0	6	1	124	45	72	0	7	1	125	249	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
	School Info	48	2	2	18	0	70	22	3	1	6	1	33	103	
	No Answer	120	46	0	27	2	195	79	77	2	21	4	183	378	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
	Banking	112	4	0	35	0	151	59	8	2	20	2	91	242	
	No Answer	56	44	2	10	2	114	42	72	1	7	3	125	239	

	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
	Video	94	4	1	29	1	129	56	5	1	17	4	83	212	
	No Answer	74	44	1	16	1	136	45	75	2	10	1	133	269	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
	School Work	33	1	0	11	0	45	17	1	1	3	0	22	67	
	No Answer	135	47	2	34	2	220	84	79	2	24	5	194	414	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
	E-mail	150	6	2	44	2	204	87	11	3	26	4	131	335	
	No Answer	18	42	0	1	0	61	14	69	0	1	1	85	146	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
	Social Media	112	5	1	38	2	158	59	6	1	18	4	88	246	
	No Answer	56	43	1	7	0	107	42	74	2	9	1	128	235	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#10	**Please rate your current speed of connection (bandwidth):**														
	Somewhat Dissatisfied	39	10	2	13	0	64	23	17	1	4	0	45	109	
	Somewhat satisfied	55	26	0	15	2	98	41	39	2	17	2	101	199	
	Very Dissatisfied	48	7	0	17	0	72	8	6	0	4		18	90	
	Very satisfied	12	5	0	0	0	17	18	15	0	0	2	35	52	
	No Answer	14	0	0	0	0	14	11	3	0	2	1	17	31	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#11	**Please rate the customer service and support from your provider:**														
	Somewhat Dissatisfied	28	2	0	13	1	44	9	1	0	5	0	15	59	
	Somewhat satisfied	81	2	0	22	1	106	33	4	2	9	2	50	156	
	Very Dissatisfied	23	0	1	7	0	31	3	0	0	1		4	35	
	Very satisfied	23	2	1	3	0	29	45	6	1	10	2	64	93	
	No Answer	13	42	0	0	0	55	11	69	0	2	1	83	138	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#12	**How would you describe your overall satisfaction with your current Internet service?**														
	Somewhat Dissatisfied	38	1	2	17	1	59	22	4	1	6	0	33	92	
	Somewhat satisfied	64	2	0	14	1	81	40	4	2	15	2	63	144	
	Very Dissatisfied	41	1	0	14	0	56	5	0	0	4	0	9	65	
	Very satisfied	13	2	0	0	0	15	23	3	0	1	2	29	44	
	No Answer	12	42	0	0	0	54	11	69	0	1	1	82	136	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	

	Reason for dissatisfaction?														
	Connection Slow/ Not Enough Band-width	59	17	0	8	0	84	24	32	0	7	0	63	147	
	Lack of Technical Support	6	3		1		10	4	1				5	15	
		↑ 1-Prob w/E-mail; 1-Poor Cust Supp; 8-SL conn/Not enough BW (spd)	↑ 2-Unrel Serv; 1-comment "Random disconnects and general lack of cable internet"; 1-Poor Cust Serv		↑ 1-Prob w/E-mail; 1-Poor Cust Supp; 1-SL conn/Not enough BW (spd)			↑ 2-Poor Cust Supp; 2-SL conn/Not enough BW (spd)							
#13	Poor Customer Support	3	1		2		6				1		1	7	
		↑ 3-SL conn/Not enough BW (spd)	↑ 1-Unrel Serv; 1-SL conn/Not enough BW (spd)		↑ 1-SL conn/Not enough BW (spd)										
	Price Too High	53	4		14	1	72	20	11	2	10		43	115	
		↑ 21-Unrel Serv; 10-Lack Tech Supp; 6-Prob w/E-mail; 10-Poor Cust Serv; 28-SL conn/Not enough BW (spd)			↑ 6-Unrel Serv; 5-Lack Tech Supp; 2-Prob w/E-mail; 4-Poor Cust Supp; 9-SL conn/Not enough BW (spd)			↑ 5-Unrel Serv; 1-Lack Tech Supp; 2-Prob w/E-mail; 2-Poor Cust Serv; 11-SL conn/Not enough BW (spd)	↑ 1-SL conn/Not enough BW (spd)	↑ 1-Lack Tech Supp; 1-SL conn/Not enough BW (spd)	↑ 3-Unrel Serv; 1-Lack Tech Supp; 2-Prob w/E-mail; 3-Poor Cust Serv; 7-SL conn/Not enough BW (spd)				
	Problem w/E-mail	5	1				6	6				1	7	13	

	↑ 3-SL conn/Not enough BW (spd)						↑ 4-SL conn/Not enough BW (spd)				↑ 1-SL conn/ Not enough BW (spd)			
Unreliable Service	32	7	2	20	1	62	9	4	1	4	1	19	81	
	↑ 4-Lack of Tech Supp; 1-Prob w/E-mail; 3-Poor Cust Supp; 28-SL conn/Not enough BW (spd)	↑ 1-Lack of Tech Supp	↑ 1-Lack of Tech Supp; 1-Poor Cust Supp; 2-SL conn/Not enough BW (spd)	↑ 5-Lack of Tech Supp; 4-Problem w/E-mail; 4-Poor Cust Supp; 17-SL conn/Not enough BW (spd)	↑ 1-Poor Cust Supp		↑ 6-SL conn/Not enough BW (spd)	↑ 1-SL conn/Not enough BW (spd)		↑ 4-SL conn/Not enough BW (spd)	↑ 1-SL conn/ Not enough BW (spd)			
Other		7				7		12				12	19	
No Answer	10	8	0	0	0	18	38	20	0	5	3	66	84	
Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
Other Comments:	1	All of the above.					1	ALL OF THE ABOVE						
	1	data cap and expense					1	connection occasionally too slow						
	1	internet not available if cloudy					1	could always be faster						
	1	issues with getting upgrade from local TDS					1	Heavy usage slows down service and can't get all 4mbps						
	1	Occasionally goes down. But, that is rare. Speed is fine.					1	Lose internet connection at least 2 or more times a month						

		1	Price too high, poor customer service, lack of tech support, unreliable service					1	none						
		1	required to subscribe to telephone service also					1	Occasionally I need to disconnect and reconnect						
		7						1	Price, Speed & Reliability						
								1	priced too high and poor customer service						
								1	Size of files that can be emailed						
								1	slow, not accessible sometimes, weather affected						
								1	Unreliable and price too high for product provided						
								12							
#14	**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	25	2	0	4	0	31	6	1	0	4	0	11	42	

	↑3 Also Indicated "Too Expensive)	↑1 Also indicated "Too Expensive "		↑ 1 Also indicated both "Too Expensive" and "Not Reliable/Secure"; 1 Also indicated both "Too Expensive" and "Lack of Internet service set-up support"; 1 Also indicated "Too Expensive"						↑ 1 Also indicated "Too expensive" and "Not reliable/secure" and "Using Internet elsewhere" and "Lack of Internet service set-up support" and "Lack of computer set-up and use support" and "Not interested in this service"				
Too Expensive	8	0	0	1	0	9	7	0	0	3	0	10	19	
	↑ 1 Also indicated "Lack of Computer Set-Up and Use Support"			↑ 1 Also indicated "Not Reliable/secure"			↑ 1 Also indicated "Using Internet Elsewhere"; 1 Also indicated "Not Interested in this Service"							
Not Reliable/Secure	2	0	0	0	0	2	1	0	0	0	0	1	3	
Using Internet Elsewhere	1	0	0	0	1	2	1	0	0	0	0	1	3	
Lack of Internet Service Set-Up Support	3	0	0	0	0	3	0	0	0	0	0	0	3	

		↑ 2 Also indicated "Lack of Computer Set-up and Support"													
	Lack of Computer Set-Up and Use Support	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Not Interested in this Service	2			1		3	2				1	3	6	
	Other	0	0	0	0	0	0	0	0	0	0	0	0	0	
	No Answer	127	46	2	39	1	215	84	79	3	20	4	190	405	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#15	**If affordable wireless high-speed Internet access was available in your community, how likely would you be to subscribe to this service?**														
	Very Likely	126	6	1	37	1	171	55	4	2	18	4	83	254	
	Somewhat Likely	25	0	0	3	1	29	24	3	1	8	0	36	65	
	Not Likely	6	0	0	2	0	8	9	2	0	0	1	12	20	
	No Answer	11	42	1	3	0	57	13	71	0	1	0	85	142	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#16	**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	44	0	0	2	1	47	29	3	1	8	2	43	90	
	$101-$125	41	1	0	15	0	57	29	3	1	7	1	41	98	
	$126-$150	32	1	0	8	0	41	16	0	0	3	1	20	61	
	$151-$175	14	2	0	8	0	24	4	0	0	5	0	9	33	
	$176-$200	10	1	0	5	0	16	7	1	0	1	0	9	25	
	$201-$299	7	0	0	2	0	9	1	0	0	0	0	1	10	
	$300 or more	0	0	0	1	0	1	0	0	0	0	0	0	1	
	Not Interested	8	0	0	3	0	11	10	2	1	1	1	15	26	
	No Answer	12	43	2	1	1	59	5	71	0	2	0	78	137	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#17	**What changes or improvements to your community's communications technology would best meet your needs? Please share any other comments about your Internet service:**														
#18	**Do you have cellular phone service?**														
	Yes	137	6	1	39	2	185	64	5	3	20	4	96	281	
	No	26	0	1	6	0	33	36	6	0	6	1	49	82	

	I don't know	2	0	0	0	0	2	0	0	0	0		0	2	
	No Answer	3	42	0	0	0	45	1	69	0	1	0	71	116	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#19	**Name of the company providing your cellular service?**														
	AT&T	2	0	0	2	0	4	2	1	0	0	0	3	7	
	AT&T/Verizon	1	0	0	1	0	2	0	0	0	0	0	0	2	
	Consumer Cellular	0	0	0	0	0	0	1	0	0	0	0	1	1	
	Net 10	1	0	0	1	0	2	1	0	0	0	0	1	3	
	Ntelos	6	0	1	0	0	7	1	0	0	0	0	1	8	
	REPUBLIC WIRELESS	0	0	0	0	0	0	1	0	0	0	0	1	1	
	Sprint	1	0	0	0	0	1	1	0	0	0	0	1	2	
	Straight Talk	5	1	0	4	0	10	1	0	0	0	1	2	12	
	T-Mobil	0	0	0	0	0	0	1	0	0	0	0	1	1	
	Tracfone	14	0	0	0	0	14	12	1	0	2	0	15	29	
	Verizon	108	5	0	33	1	147	46	4	3	17	3	73	220	1 Highland Resident reported Verizon (Network Extender)
	Verizon/Sprint	0	0	0	1	0	1	0	0	0	0	0	0	1	
	Verizon/Tracfone	1	0	0	0	0	1	0	0	0	0	0	0	1	
	Verizon / Sprint / AT&T	0	0	0	0	0	0	0	0	0	1	0	1	1	
	US Cellular	1	0	0	0	0	1	0	0	0	0	0	0	1	
	No cellular service	8	0	1	1	0	10	10	0	0	2	1	13	23	
	I don't know	6	0	0	0	0	6	1	0	0	0	0	1	7	
	No Answer	14	42	0	2	1	59	23	74	0	5	0	102	161	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#20	**Do you have reliable cellular coverage when using it at this location?**														
	Yes	58	2	0	16	2	78	31	2	3	2	2	40	118	
	No	97	4	2	29	0	132	54	5	0	19	3	81	213	
	I don't know	5	0	0	0	0	5	3	0	0	0	0	3	8	
	No Answer	8	42	0	0	0	50	13	73	0	6	0	92	142	
		168	48	2	45	2	265	101	80	3	27	5	216	481	
#21	**What is your age? (the person actually filling out the survey)**														
	0	6	6	1	0	1	14	2	9	1	0	3	15	29	

21	2	0	0	0	0	2	1	0	0	0	0	1	3	
23	0	0	0	1	0	1	1	0	0	0	0	1	2	
25	1	0	0	1	0	2	1	0	0	0	0	1	3	
26	0	0	0	0	0	0	1	0	0	0	0	1	1	
27	2	0	0	0	0	2	0	0	0	0	0	0	2	
28	2	0	0	0	0	2	0	0	0	0	1	1	3	
29	1	0	0	0	0	1	0	0	0	0	0	0	1	
30	1	0	0	0	0	1	1	0	0	0	0	1	2	
31	1	0	0	0	0	1	0	0	0	0	0	0	1	
32	0	0	0	3	0	3	1	0	0	0	0	1	4	
33	1	0	0	0	0	1	0	0	0	0	0	0	1	
34	0	0	0	0	0	0	0	0	0	1	0	1	1	
35	1	0	0	2	0	3	0	0	0	1	0	1	4	
36	2	0	0	0	0	2	1	0	0	0	0	1	3	
37	0	0	0	2	0	2	1	0	0	0	1	2	4	
38	2	0	0	0	0	2	1	0	0	1	0	2	4	
39	3	0	0	2	0	5	1	0	0	0	0	1	6	
40	1	0	0	1	0	2	1	0	0	0	0	1	3	
41	1	0	0	1	0	2	0	0	0	1	0	1	3	
42	1	0	1	1	0	3	0	0	0	1	0	1	4	
43	3	0	0	0	0	3	1	0	0	0	0	1	4	
44	2	0	0	1	0	3	0	0	0	0	0	0	3	
45	3	0	0	1	0	4	1	0	0	1	0	2	6	
46	3	0	0	0	0	3	1	0	0	0	0	1	4	
47	5	0	0	0	0	5	0	0	0	1	0	1	6	
48	2	0	0	0	0	2	0	0	0	2	0	2	4	
49	0	0	0	0	0	0	2	0	0	0	0	2	2	
50	2	0	0	3	0	5	1	0	0	0	0	1	6	
51	4	0	0	3	0	7	4	0	0	0	0	4	11	
52	3	0	0	1	0	4	2	1	0	0	0	3	7	
53	4	0	0	0	0	4	5	1	0	0	0	6	10	
54	3	0	0	1	0	4	1	0	0	2	0	3	7	
55	4	0	0	1	0	5	2	0	0	2	0	4	9	
56	3	0	0	1	0	4	3	0	0	1	0	4	8	
57	2	0	0	0	0	2	4	0	0	1	0	5	7	
58	8	0	0	1	0	9	3	0	0	0	0	3	12	
59	3	0	0	0	1	4	5	0	0	1	0	6	10	
60	5	0	0	2	0	7	2	0	1	1	0	4	11	
61	2	0	0	2	0	4	3	0	0	0	0	3	7	
62	6	0	0	1	0	7	2	0	0	0	0	2	9	
63	2	0	0	1	0	3	5	0	0	0	0	5	8	

	64	7	0	0	3	0	10	2	0	0	2	0	4	14	
	65	6	0	0	0	0	6	7	0	0	0	0	7	13	
	66	6	0	0	1	0	7	5	0	0	2	0	7	14	
	67	5	0	0	2	0	7	2	0	0	1	0	3	10	
	68	5	0	0	2	0	7	3	0	1	0	0	4	11	
	69	5	0	0	0	0	5	1	0	0	1	0	2	7	
	70	3	0	0	0	0	3	1	0	0	0	0	1	4	
	71	6	0	0	1	0	7	2	0	0	0	0	2	9	
	72	2	0	0	0	0	2	2	0	0	0	0	2	4	
	73	3	0	0	0	0	3	2	0	0	0	0	2	5	
	74	7	0	0	2	0	9	3	0	0	0	0	3	12	
	75	1	0	0	0	0	1	0	0	0	1	0	1	2	
	76	2	0	0	0	0	2	1	0	0	0	0	1	3	
	77	2	0	0	1	0	3	1	0	0	0	0	1	4	
	78	0	0	0	0	0	0	0	0	0	1	0	1	1	
	79	0	0	0	0	0	0	1	0	0	1	0	2	2	
	80	1	0	0	0	0	1	3	0	0	1	0	4	5	
	81	1	0	0	0	0	1	1	0	0	0	0	1	2	
	82	1	0	0	0	0	1	0	0	0	0	0	0	1	
	83	4	0	0	0	0	4	0	0	0	0	0	0	4	
	84	2	0	0	0	0	2	2	0	0	0	0	2	4	
	85	0	0	0	0	0	0	1	0	0	0	0	1	1	
	86	0	0	0	0	0	0	0	0	0	0	0	0	0	
	87	0	0	0	0	0	0	0	0	0	0	0	0	0	
	88	1	0	0	0	0	1	0	0	0	0	0	0	1	
	89	1	0	0	0	0	1	0	0	0	0	0	0	1	
	94	0	0	0	0	0	0	1	0	0	0	0	1	1	
	No Answer	0	42	0	0	0	42	0	69	0	0	0	69	111	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#22	**What is the number of people living in this household?**														
	0	5	6	1	0	1	13	1	9	3	0	4	17	30	
	1	29	0	0	3	1	33	27	0	0	4	0	31	64	
	2	93	0	0	21	0	114	52	0	0	13	0	65	179	
	3	17	0	0	7	0	24	11	0	0	5	1	17	41	
	4	15	0	0	5	0	20	9	2	0	3	0	14	34	
	5	8	0	0	5	0	13	0	0	0	1	0	1	14	
	6	1	0	0	3	0	4	1	0	0	1	0	2	6	
	15	0	0	1	0	0	1	0	0	0	0	0	0	1	
	22	0	0	0	1	0	1	0	0	0	0	0	0	1	
	No Answer	0	42	0	0	0	42	0	69	0	0	0	69	111	

	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#23	**How many children (under 18) live in this household?**														
	0	143	6	2	29	2	182	87	9	3	22	4	125	307	
	1	11	0	0	5	0	16	6	1	0	2	1	10	26	
	2	12	0	0	4	0	16	8	1	0	0	0	9	25	
	3	2	0	0	6	0	8	0	0	0	2	0	2	10	
	4	0	0	0	1	0	1	0	0	0	1	0	1	2	
	No Answer	0	42	0	0	0	42	0	69	0	0	0	69	111	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#24	**How many persons 62 years or older live in this household?**														
	0	74	6	2	27	2	111	41	11	3	14	5	74	185	
	1	46	0	0	8	0	54	32	0	0	3	0	35	89	
	2	46	0	0	10	0	56	28	0	0	10	0	38	94	
	3	1	0	0	0	0	1	0	0	0	0	0	0	1	
	4	0	0	0	0	0	0	0	0	0	0	0	0	0	
	65	1	0	0	0	0	1	0	0	0	0	0	0	1	
	No Answer	0	42	0	0	0	42	0	69	0	0	0	69	111	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#25	**Are there any disabled persons residing at this household?**														
	No	136	0	1	39	0	176	86	2	1	25	1	115	291	
	Yes	25	0	0	3	0	28	11	0	0	1	0	12	40	
	No Answer	7	48	1	3	2	61	4	78	2	1	4	89	150	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
	Disability No.														
	0	147	6	2	43	2	200	92	11	3	26	5	137	337	
	1	18	0	0	0	0	18	9	0	0	1	0	10	28	
	2	3	0	0	2	0	5	0	0	0	0	0	0	5	
	3	0	0	0	0	0	0	0	0	0	0	0	0	0	
	4	0	0	0	0	0	0	0	0	0	0	0	0	0	
	No Answer	0	42	0	0	0	42	0	69	0	0	0	69	111	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#26	**Does anyone in your household use the Internet to complete school assignments or job training course work?**														
	No	114	0	0	30	1	145	81	0	0	20	1	102	247	
	YES (2 or 4 year college)	24	0	0	2	0	26	4	0	0	2	0	6	32	
	YES (K-12)	18	0	0	10	0	28	9	2	1	2	0	14	42	
	YES (K-12) YES (2 or 4 year college)	0	0	0	0	0	0	0	0	0	1	0	1	1	

	YES (K-12), YES (trade school)	1	0	0	0	0	1	0	0	0	0	0	0	1	
	YES (trade school)	7	0	1	2	0	10	4	0	0	2	0	6	16	
	No Answer	4	48	1	1	1	55	3	78	2	0	4	87	142	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#27	**Which County is your address located in?**														
		168	48	2	45	2	265	101	80	3	27	5	216	481	
#28	**Bath County Residents ONLY ANNUAL HOUSEHOLD INCOME:*(Check only one)***														
	$31,300 or Less	35	0	0	5	1	41	0	0	0	0	0	0	41	
	$31,301-$35,800	9	0	0	3	0	12	0	0	0	0	0	0	12	
	$35,801-$40,250	12	0	0	4	0	16	0	0	0	0	0	0	16	
	$40,251-$44,700	9	0	1	1	0	11	0	0	0	0	0	0	11	
	$44,701-$48,300	2	0	0	0	0	2	0	0	0	0	0	0	2	
	$48,301-$51,900	6	0	0	2	0	8	0	0	0	0	0	0	8	
	$51,901-$55,450	9	0	0	3	0	12	0	0	0	0	0	0	12	
	$55,451-$59,050	5	0	0	2	0	7	0	0	0	0	0	0	7	
	More than $59,050 No Answer	62 19	0 48	0 1	22 3	0 1	84 72	0 101	0 80	0 3	0 27	0 5	0 216	84 288	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
	Highland County Residents ONLY ANNUAL HOUSEHOLD INCOME: *(Check only one)*														
	$31,150 or Less	0	0	0	0	0	0	17	1	0	3	0	21	21	
	$31,151-$35,600	0	0	0	0	0	0	6	0	0	0	0	6	6	
	$35,601-$40,050	0	0	0	0	0	0	5	0	0	1	0	6	6	
	$40,050-$44,500	0	0	0	0	0	0	3	0	0	1	0	4	4	
	$44,501-$48,100	0	0	0	0	0	0	2	0	0	0	0	2	2	3 Highland Residences answers with Bath County Data Range
	$48,101-$51,650	0	0	0	0	0	0	1	0	0	1	0	2	2	
	$48,301-$51,900						0	3					3	3	

	$51,651-$55,200	1	0	0	0	0	1	6	0	0	1	0	7	8
	$55,201-$58,750	0	0	0	0	0	0	4	0	0	1	0	5	5
	More than $58,750	0	0	0	0	0	0	37	1	0	13	1	52	52
	No Answer	167	48	2	45	2	264	17	78	3	6	4	108	372
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481
#30	**Please check the type of business conducted at this location *(Check one):***													

	Accounting/ Architecture/ Engineering/ CONSULTING /LEGAL/	0	2	0	7	0	9	0	3	0	0	0	3	12	Architect,/Engineering, Business/Personal Finance, Contractor/Construction, Wholesale Trade; Architect,/Engineering, Business/Personal Finance, Contractor/Construction, Wholesale Trade; Architecture/Engineering, Legal, property management; Non-classified: Legal; Surveying; Government; Business and Personal Finance; Consultant; Other: Consulting; Legal, Immigration and IRS; Business/Economic Development/Personal Services, Real Trade/Wholesale; Business/Economic Development/Personal Services

	Agricultural/ Forestry/Mining (Including Associated Finance/Insurance/Real Estate, Construction, Services, Other Associated Economic Dev. Activities)	0	5	0	5	0	10	1	13	0	10	0	24	34	Agriculture/Forestry Mining; Agricultural/Forestry/Mining; Business/Economic Development/ Personal Services; Agriculture/Forestry/Mining, Finance/Insurance/Real Estate, Other: Non-profit
	Automotive/ Engine Repair/Welding	0	1	0	3	0	4	0	0	0	0	0	0	4	business transactions for automotive repair shop; Small Engineer Repair; automotive repair shop
	Business and Personal Finance/ECONOMIC DEVELOPMENT	0	5	0	1	0	6	0	3	0	0	0	3	9	
	Communication/ Technology	0	0	0	4	1	5	0	1	0	1	0	2	7	Communication/ Technology, Retail Trade
	Contractor/Construction	0	1	0	2	0	3	0	4	0	2	0	6	9	
	Education	1	4	1	1	0	7	1	1	0	0	0	2	9	Education (PK thru 12); Education (PK thru 12); Higher Educaiton; Non-Profit Educational Organization
	ENTERTAINMENT/ HOBBIES	0	0	0	1	0	1	0	0	0	1	0	1	2	Other: Dance School; Art/Media/Entertainment

Finance/Insurance/Real Estate	0	3	0	2	0	5	0	4	0	1	0	5	10	
Other: Firearms	0	0	0	0	0	0	0	0	0	1	0	1	1	
Government	0	1	1	0	0	2	1	2	2	0	0	5	7	
Health Care/Medical/EMS	1	2	0	0	0	3	0	2	0	0	1	3	6	Health Care/EMS
History/Museum	0	0	0	0	0	0	0	0	0	0	1	1	1	
HOSPITALITY/Hotel/Lodging	0	1	0	1	0	2	0	1	0	3	0	4	6	Other:; Other:; Vacation Rental/Lodging; Other: Bed & Breakfast; Non-classified: Manage a B&B Inn and rental properties and a 1400 farm
Manufacturing	0	0	0	0	0	0	0	1	0	0	0	1	1	
Photographer/Media & Video Production/Streaming	0	0	0	3	0	3	0	0	0	0	0	0	3	Other: Photography/Journalism/Videography; professional photographer; Non-classified: Youtube/Streamer
Ministry	0	0	0	1	0	1	0	0	0	0	0	0	1	
NEWSPAPER/WRITING/PUBLISHING	0	1	0	1	0	2	0	1	0	1	0	2	4	Newspaper; Publishing; Writing/Publishing; Non-classified: Writer and consultant
Non-classified	2	0	0	2	1	5	0	0	0	1	1	2	7	Family Company;
Non-classified: Electric	0	1	0	0	0	1	0	0	0	0	0	0	1	

	Cooperative													
	Non-Profit	0	3	0	0	0	3	0	10	0	0	1	11	14	Other: Non-Profit w/Business
	OTHER (Unspecified)	0	14	0	0	0	14	1	26	0	0	0	27	41	Other: Skilled Craft;
	Retail/Wholesale Trade (Both)	0	0	0	0	0	0	0	4	0	0	0	4	4	
	Retail Trade	1	0	0	7	0	8	1	1	0	3	0	5	13	Sales; Direct Sales
	Slaughter	0	0	0	0	0	0	0	1	0	0	0	1	1	
	Telecommuter	1	0	0	0	0	1	0	0	0	0	0	0	1	
	Water Systems (Testing and Treatment)	0	0	0	0	0	0	1	0	0	0	0	1	1	Water Testing & Treatment system Sale & Installation;
	Wholesale Trade	0	1	0	1	0	2	0	0	0	0	0	0	2	
	No Answer	162	3	0	3	0	168	95	2	1	3	1	102	270	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#31	**How many employees work at this location?**														
	0	163	0	0	9	0	172	95	1	1	10	2	109	281	
	1	4	2	0	22	1	29	5	0	0	11	2	18	47	
	2	1	0	0	9	0	10	1	1	2	5	0	9	19	
	3	0	0	0	2	0	2	0	2	0	1	0	3	5	
	4	0	0	0	0	1	1	0	2	0	0	0	2	3	
	5	0	1	0	1	0	2	0	1	0	0	0	1	3	
	6	0	0	0	0	0	0	0	1	0	0	0	1	1	
	8	0	1	0	2	0	3	0	1	0	0	0	1	4	
	9	0	0	0	0	0	0	0	1	0	0	0	1	1	
	12	0	1	0	0	0	1	0	0	0	0	0	0	1	
	14	0	0	0	0	0	0	0	1	0	0	0	1	1	
	15	0	0	1	0	0	1	0	0	0	0	0	0	1	
	30	0	0	0	0	0	0	0	0	0	0	1	1	1	
	43	0	1	0	0	0	1	0	0	0	0	0	0	1	
	45	0	0	1	0	0	1	0	0	0	0	0	0	1	
	1 to 4	0	23	0	0	0	23	0	48	0	0	0	48	71	
	10 to 19	0	1	0	0	0	1	0	3	0	0	0	3	4	
	100 to 249	0	1	0	0	0	1	0	0	0	0	0	0	1	
	20 to 49	0	5	0	0	0	5	0	1	0	0	0	1	6	

	5 to 9	0	7	0	0	0	7	0	8	0	0	0	8	15	
	50 to 99	0	1	0	0	0	1	0	2	0	0	0	2	3	
	None	0	4	0	0	0	4	0	7	0	0	0	7	11	
	No Answer	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#32	**Do you utilize a VPN (Virtual Private Network) for employees to work from home?**														
	Yes or VPN Connections	1	11	0	3	0	15	1	12	1	2	0	16	31	
	No	5	5	1	38	1	50	4	8	1	20	3	36	86	
	I don't know	0	0	1	1	1	3	0	0	0	2	0	2	5	
	No Answer	162	32	0	3	0	197	96	60	1	3	2	162	359	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#33	**How difficult is it to find employees with computer, software, and Internet skills from the local area?**														
	Very Difficult	2	1	0	6	0	9	0	0	0	4	0	4	13	
	Somewhat Difficult	2	3	1	10	1	17	2	4	1	3	3	13	30	
	Not Difficult	0	2	1	11	1	15	1	5	1	3	0	10	25	
	N/A	0	0	0	2	0	2	0	0	0	5	0	5	7	
	No Answer	164	42	0	16	0	222	98	71	1	12	2	184	406	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#34	**How difficult is it to find and provide the appropriate training for employees in computer, software, and Internet applications?**														
	Very Difficult	3	2	0	7	0	12	0	0	1	2	0	3	15	
	Somewhat Difficult	1	2	2	8	2	15	2	3	0	5	2	12	27	
	Not Difficult	0	2	0	11	0	13	1	5	1	3	1	11	24	
	N/A	0	0	0	2	0	2	0	0	0	5	0	5	7	
	No Answer	164	42	0	17	0	223	98	72	1	12	2	185	408	
	Total	168	48	2	45	2	265	101	80	3	27	5	216	481	
#35	**Please describe any Internet use and/or Internet-based business service that you would provide if you had access to improved Internet:**														
	Comment	2	2	1	19	0	24	1	2	0	11	3	17	41	
	No Answer	166	46	1	26	2	241	100	78	3	16	2	199	440	
		168	48	2	45	2	265	101	80	3	27	5	216	481	

	Q35 - 1	Advertising and customer communicatio n.	Increased business volume which could result in increased job opportuni ties in the area	Streaming video is an upcoming need.	Am in beginning phases of opening a hedge fund that will have global impact. Will require greater reliability and higher bandwidth at this location. Or, will have to move the business elsewhere. Critical, critical business fail if I cannot obtain more			sales and advertising	Interactive website		all of us would work, play or research online at the same time. Right now if more than 2 of us are online it gets too slow	Research, communi- cation			
	1	I like TDS, just want faster broadband	online ordering		direct retail sales				Reservations, wireless access for guests, accounting, ordering		Ebay seller	We do well to have telephone and mailbox. I am church treasurer, and I filled out this form. I live in Staunton, VA			
	1				don't know						Electronic publishing	would be more attractive to potential new tenants			
	1				Educational website						I would sell equipment and stuff online				
	1				Entertainmen t.						it would help me greatly with music, video, and				

											TIME!				
	1				expanded consulting with private and public sector clients						maybe use QuickBooks				
	1				Faster service and no lost connections in the middle of a transaction.						N/A				
	1				I currently hire a weekly assistant who works/lives out of town to assist me on assignments and to do the high demanding internet software I need and to send photographic files I cannot do from my home. I travel to a Richmond location once weekly just t						no comment				
	1				I would be better able to support my existing customers.						online reservations				

1				I would do presentations and meetings over the internet. I would produce videos and webinars for customer consumption. Personally, I would also stream more videos over the internet and use services such as Netflix Streaming along with any other service						WEB-EOC contact with VDEM in Richmond				
1				more usage						would be able to telecommute more-more efficient.				
1				online business										
1				Online Sales										
1				online sales										
1				Road Works										
1				Streaming live conferences, etc.										
1				Video conferencing, File transfers, Virtual collaboration in real-time										
1				we do not purchase the package we need because it is too expensive. Data is limited and										

					speed is unreliable										
	1				would be able to offer it to guests and hunters that stay with us in turn the service would generate more income										

Appendix C: Residential and Business Survey Comments

What changes or improvements to your community's communications technology would best meet your needs? Please share any other comments about your Internet service:

COMMENTS

Faster speed and reliable service

Fibers need to be upgrade to increase the speed. We were told that it may not be for another 6 months, which is unacceptable. We are paying for 15 Mb/s, and we are getting between 1-8 Mb/s. Both of us work from home, and this is unacceptable. We have had ongoing connection issues since moving here 2 years ago.

Reliable, high speed and locally provided internet service and maintenance

I feel that this area would be best served by replacing the old copper lines with fiber optical ones

I'd like to see faster internet service in the Burnsville/Williamsville area and would be willing to pay a little more for it

Needs to be faster and more dependable.

Faster internet service and cell phone reception is critical to me.

MGW needs to have some serious competition! Cell phone service is needed.

I do a lot of demonstrations and collaborative meetings online. So I need consistent/reliable service without interruptions and I need much faster speeds.

Reliable fast-speed service

speed, cannot stream, cannot load videos.

faster and more reliable service. Billed for DSL but can not download assignments or even return finished work to Duke. Unreliable for Skype or Facetime to talk to Grandchildren or relatives outside of Bath. Can't set up my business at home because of unreliable speed. We need both. and it would be nice if TDS service people didn't act like servicing your home was an inconvenience

Cannot even get wireless cell phone service. Need access urgently

wireless phone service is not reliable and sometimes none. internet access is sometimes none at all.

More Bandwidth

Expanded cell service

BROADBAND

Just having something that was reliable and fast would be great and at an affordable price.

would like to have cell service @ my home there is service less than 2 miles from my home

need cell phone service

Better Internet speed, lower costs, most of the time our DSL is as slow as Dial Up.

Cell phone service in this area would be great.

It would be nice if the tech support was more locally based, although the phone people are usually helpful. When things go wrong late at night or weekends, sometimes it takes a very long time before someone answers and I just give up.

Reliable, fast internet connection

Better rates with steady internet speed

I am an elderly woman living alone without relatives near me. I need some sort of electronic coverage that will let me access anyone if I fall while walking in the woods. Adequate cell phone service would be helpful and would likely allow me to stay in this area well into my old age.

Would like to have a reliable internet service. Would like to be able to access sites and not be "kicked off" in the middle of a transaction. Faster speeds are necessary.

HIGHER SPEED CONNECTIONS

the need for faster speed to every household not just the ones close to major highways or towns

High speed municipal broadband and/or wifi because local service provider will not invest to build out this system.

Affordable pricing and reliable service

Reliable and consistent 3+ Mbps service. MGW claims that we should be able to get that speed, but we cannot and they don't know why.

I understand that we are fortunate to even have such service in a rural area, and that providers have higher expenses per customer to provide that service. However, I feel that the speed is way too slow for the amount paid, and that I have never heard anything from my provider as to options for higher speed at any price.

I would like faster internet access. Don't personally watch TV so wouldn't take advantage of that

more reliable and better internet speeds

Faster internet for more jobs in the area, better tech support, and customer support. Overall- It needs to upgrade with the time NOW not in the 90's.

Cell service. TV, if it’s affordable.

We need faster internet in Bath County. We just relocated to the area this past June and the internet services is very poor. When you call the customer services internet they do not understand band width and they think they have the fasted speed. I was paying $25.00 less each month for internet services that was ten times faster. My daughter's homework takes longer because we cannot get services between 8pm and 11:30 pm. TDS should only make customers pay $15.00 a month for the services they provide. We have to use our cell phone as a hot spot to download information.

television services

Within the last several weeks the internet service has been horrible...very, very slow. Customer support has always been great! Internet has been almost unaccessable.

MGW's infrasctructure is old and needs to be updated. Our internet is not fast enough to stream from the internet. Unfortunately, MGW is the only option in our area other than satellite. The technicians are terrible and unhelpful.

Provide our area with unlimited internet service. re: #16 We pay Verizon wireless based on internet GB usage. We pay Verizon for our land-line phone. We pay Dish for our TV.

We need wireless/cell service through out the county. There are many places in the county that you do not have cell service. We need competition for internet service in the county. TDS has a bandwith issue. After 6 PM until about midnight, the internet connection slows down to unusable speed.

Too little too late with internet service, should have happened before now.

Since we have DSL, we're OK, but a faster connection would always be nice!

Moving to Blue Grass valley soon. Improved cellular service in this area would meet our cell phone and Internet needs

More bandwidth. It is impossible to use the internet around dinner time.

SPEED (Band Width) MG-W is the only provider for Phone or Internet Service in the Mountain Grove area, their services are exstreamly poor! If there was an alternative provider MG W would be out of business.

Avalibility of cell service hot spots throughout the area

cell and emergency service radios need to be better. I am a volunteer fire member and have very little radio service in my area. Hard to find out where to go for emergency calls.

Competition in the marketplace is number one. We need choices, and the service and speed would improve. TDS has a monopoly in our area as the only solution. Speed, service, and most importantly, price have no competition.

Cell Tower

We would like to have fiber optic with the hope it would improve the speed and reliability of our service. Our service frequently disconnects. It is impossible to satisfactorily stream.

unlimited data

MGW tries hard with its limited resources, but there are serious issues. Lack of reliability is a critical fault. Reliability has decreased substantially since we moved here ten years ago. Low bandwidth is increasingly a problem as the entire world moves digital. I cannot use VOIP and open a web site simultaneously. I cannot send documents larger than a few pages as PDF. Forget about watching video. Reliability failures are increasingly impacting my business and ability to function in our digital age. Having said all this, I live six miles from a switch on a farm, so it is all relative. The reliability issue, lack of bandwidth, however, are increasingly impacting my business and our ability to happily live in a connected world.

Having reliable internet service is important.

While I am generally satisfied with bandwidth, network latency and DNS services are slower than desired.

We need internet service with more bandwidth that would be reliable 24 hours a day. Our current service is only up to acceptable speed in the early morning. The service starts to slow down in the afternoon and is little better than dial up speed during the weekday evenings....typically, 1 to 5 Mbps instead of the 15 Mbps that I am paying for. It's very, very frustrating.

Access to services that would allow you to bundle phone, internet, TV at an affordable rate from several different providers so that we have a choice.

We have slower Internet speeds than most third world countries. It's inexcusable.

My cell phone service and Internet are both poor. The Internet is unreliable, even when functioning fine I can not watch a youtube video. This impacts my college work. I also typically lose Internet when it rains. Cell phone service is critical, I can not make a call at my house.

Even though I live in Harrisonbug, I am originally from Monterey in Highland County. I am self-employed as a video producer, and fast internet service is crucial to running my business. I hope to move my business to Highland County within the next ten years. Currently, slow internet there is a huge detterent for those like myself that want to start a business that relies on online communications. I believe faster internet service will be a huge key to attracting more business owners and entrepreneurs to the area. Thank you for allowing me to provide input!

higher upstream speed

low cost reliable internet that doesn't seem like dial up

Faster and reliable internet is crucial for conducting business as a consumer or as a business in today's online world

Local rural internet providers have a difficult time providing similar urban offered services at 'low' prices. HTC does very well in providing services to their customers.

Need reliable connections and speeds. Tds presently says the need to do updates but have consistantly over the past year or so, failed to do so. Connections are scarce and speed is verrrrrrrrry slow!

reliable connection that stays connected. No pay TV service on package service.

A high quality, reliable high speed internet service!

greater bandwidth and greatly improved telephone service

I work from home and rely on functioning internet. My connections drops all the time. I need something fast and something that stays connected. I am not so interested in the combination package as mentioned in # 16 above.

Higher speeds than DSL at reasonable prices would greatly meet our needs.

Developmental students at DSLCC should ideally have high speed internet since the course is online and it usually requires more than class time to do the work.

Currently, we cannot stream after 8pm and checking email or social media is e.x.t.r.e.m.e.l.y slow. Not owning a tv, everything we watch is streamed online. When bundling services, please make available non-tv options.

More reliable service

Need to be able to stay connected

MGW is crap they are concerned about spreading there service to other areas and don't care about the people that founded them, I have nothing but trouble from them from there incredibly old barely functional phone lines, to there snail like dsl service, to there horrible attitudes in there billing department, they have the area hard wired for fiber, but won't use it for the millboro community. So my advice is to get rid of them and get someone who is serious about providing service.

We would like to get internet service but the cost is too high.

20GB monthly download threshold limitations are unreasonable for the cost of $111.00 per month

More bandwidth. System is slowing down at critical times.

require a minimum of 3mb to 5mb download speeds and 1mb upload speed

some cellular service even if corridor based on major roadway

We have no cell signal. Have AT&T accounts with iphone and ipads, but cannot access internet/email, etc.

I purchased the highest speed offered and can not use it to watch netflix. From 7pm on at night it will not work long enough to watch even 39 minutes of a show. If you call tds, you can sit for over an hour and not talk to anyone while on hold. If you finally reach a person, they will not give you a credit for the service that you can't use because they say that you haven't complained enough. I have down graded because tds can not provide service. They shouldn't advertise a service and charge for it if they can not provide the service

more bandwidth, and higher speeds. Better and more consistent access to streaming media sites (i.e. netflix), less throttling of internet traffic

Subsidize the internet to make it more affordable

improved cellular coverage throughout the county, esp along Routes 220 & 250 while traveling

More bandwidth and easier connection to tech support. Lumos is very accessible, TDS is inaccessible.

(If you get this form twice from this address, it's because the internet died in the middle of me trying to submit...)

Faster

Faster more reliable internet service

More reliable internet service.

Greater bandwidth, greater speed, & more reliability are needed to bring rural internet access to a level comparable to that in city areas.

Cell reception in Millboro and surrounding areas would be an astronomical improvement! And while satellite internet is an improvement to our previous fixed wireless, for a home business that relies on it: it is expensive, there is a data cap and overages are expensive, it is not reliable, and the delay of signal impacts our communication abilities. We are limited in our ability to carry on real-time real world business. We have to cap our internet expenses at $100 per month. To obtain the ideal amount of access per month would fall into the above $101-300 range, and so the business is impacted negatively.

This area is lacking in consistent cell phone coverage throughout the area. In order to bring in business you need high speed internet as well as reliable cell phone coverage. This rural area is lacking what suburban and urban areas have in regards to high speed internet and cell phone coverage.

Having a choice in providers would create competition and better service. High speed internet is essential for rural communities.

Dependable, all weather service.

It would be great if our community were able to offer all of the residents the same type of internet instead of it being in certain areas you can get high speed and in other areas your only option is dial up. We have to purchase satellite internet which is very costly and is limited to the amount of usage you can have each month. This makes conducting a home based business or taking online video courses a problem.

fiber optic cable

Reliable broadband service is critical to economic development efforts of the county. I just discontinued service from TDS because of the congestion on their service resulted in very low bandwidth, particularly in the evenings. To my knowledge TDS has no plans to replace their aging infrastructure. Also their customer support is terrible. Businesses considering relocation to Bath County are going to place a high priority on the availability of broadband services and with fiber being installed in Alleghany County and other nearby communities, Bath is greatly disadvantaged with the poor broadband service now available. Internet access over a cellular network is too expensive for business and a lower cost solution is required.

My first preference would be fiber-optic internet service. I have had DSL in the past and it was fine because I was across the street from the "hub" and got reliable service. Being in Millboro, a Network Extender (Verizon) is required for sustained service. I work from home the majority of the week and utilize/need the internet for business reasons too. Having a newborn son and family living out of state, having enough speed to Skype would make living here helpful.

Greater bandwidth is needed. Prefer wired connections in school facilities for reliability. ***Please note that #8 above should be 600--your survey would not allow that number***

It is nearly impossible to take advantage of online technology services such as gaming or downloading television/movies. The download time is too long or times out.

More reliable service and faster speeds. We experience frequent interruptions in service, which are a nuisance, and can be a problem especially when completing online school assignments (especially timed assignments/tests).

The only thing better than DSL would be fiber optics. Can't say that I need it but if they are going to update the system fiber optics is much faster, more secure, underground which has many benefits including not destroying the beautiful scenery and views of the county which locals and tourists seek, and is much healthier compared to wireless. Wireless is extremely bad for the health of the citizens, the environment and bees, etc. Children are even more at risk than adults but many adults are becoming hypersensitive to it and are developing severe health problems. I will not buy or support any wireless service and would even consider suing any service close enough to me that would affect my health. For more info on wireless, go to electricsense.com where they have lots of interviews with doctors and scientist who are experts on the subject. I would definitely pay more money for a wired service than a wireless one and would never support a wireless service. You can't buy your health.

Eliminate monopolies set up by government! Allow open market, free trade and competition.

faster service for computer

bandwidth speed main problem

internet service with MGW is a joke! Not reliable at all, they promise a certain speed and that's what you pay for, but you never get the speed

more radio towers, more towers, more cell towers

lower price on everything

fiber optics or wireless

don't want pay TV, faster broadband

TDS can't help or won't help; a widow who lives alone would like a way to keep in touch

we need to have this service County-wide

very dissatisfied, so slow can't load up a lot of sites, no streaming movies… it sucks!

FASTER

need more competition

I do not want internet but knowit is important for others

faster internet

fiber would be great

basic telephone service is too expensive

wireless service improvement

cell service

faster

would like to have the internet, telephone, and TV all together on one bill

faster service for computer

I pay for the highest speed internet and only get half of that

better cell service and faster internet service

more than one option, better cellular service

the lines installed by TDS (phone lines) are old and unreliable, etc

TDS supplies TV, internet, and phone. I pay $170 a month. Too expensive

I'm not sure

faster internet without drops and better conection

better speed

faster, more reliable service. Need more than one company to provide to keep service up and cost down

very slow- freezes up a lot

most important aspect of our future business plans. More cell towers

cannot rely on it

every corner of bath county should have an internet service and reliable cell service at a reasonable cost- it is a technology world

we appreciate being able to have it without having a land line phone. Price is reasonable

faster

broadband capacity with reliable 6-10+ Mbps

we need a tower in this area- Internet without obligated contract would be beneficial

have a package below $200

goes out quite often

faster internet service would be appreciated, and more affordable packages

Spped- hard for downloading information and uploads also, pauses at times

Dial-up is very slow. Would be great to have better internet service in our area at a reasonable cost, not too high.

High-Speed Cable or FTTH to support reliable, high-speed residential service

Speed working better, and cell service in case phone is off and you need 911

too expensive

we need fiber optics extended to our location, more spped and bandwidth

need to have service ina ll areas

paying for 5G and not getting it because our location, lines are over-maxed

extended cell phone services & internet

you have to keep resetting router- improvement in all areas

ability to stream and not lose connection, speed

reliable high-speed in an Industrial Park

wouldn't be any dropped calls and internet would be more reliable

1- faster and consistent internet, 2- TV options other than Sat, 3- better cell service

make it easy to get high-speed at a reasonable cost

fast reliable service at a decent price

fiber optic or DSL

Likely, if not MGW. I pay for 3-5 Mb and MGW tells me I can't get 3-6 Mb where I live, So I only get 2.5- when it’s working.

service via satellite or cell phone tower; County wide cell service

all of my office work for my business is done in my home including business calls

continuous threats of malware, security, and identity take away from the appeal of online activity

less expensive internet, or same price with higher speed. Better cell coverage

hi speed internet at reasonable price

faster, internet kicks off sometimes

higher speed internet and more variety of cell service

We need cell phone service in the whole community!!!

more cell servie

cell phone service over a broader area

competition and more reliable, faster service

cell phone service

everyone needs a cell tower in McDowell, can't believe we don't by now

at advanced age with limited eye sight, special services would be needed

only available option I know is TDS which is expensive and not fast enough. They are very hard to get on the phone when help is needed

faster internet service

We're a small country church. We don't have a church office or secretary to work in it.

higher speed

lose service quite often, especially on weekends and holidays

reliability of connection

unreliable connection

better internet

higher bandwidth, lower cost

need cell service in the Blue Grass area

service great, but slow

drops out, very inadequate speed

I don’t want anything else that I got to pay money for.

Would like service to be concistant not off/on anytime

cell phone service for the whole county

faster speed, internet help for older customer

we need wireless, we travel. We need a tower so we have intenet service all the way to staunton.

need more reliable electrical service, more direct after hours dervice

service is ofter very slow in evenings and when it rains

TV not necessary, more cellular, better price for higher speeds

fiber optic or faster internet

it should be more pervasive in the entire highland area, not just in Monterey.

better tech support/faster service

lower price for current or higher speed

make it faster & more reliable

too slow, often stops, some weather change

a long trunk line so businesses could come here (internet dependent businesses)

Please describe any Internet use and/or Internet-based business service that you would provide if you had access to improved Internet:

BUS_COMM

Increased business volume which could result in increased job opportunities in the area

Electronic publishing

I would do presentations and meetings over the internet. I would produce videos and webinars for customer consumption. Personally, I would also stream more videos over the internet and use services such as Netflix Streaming along with any other services on an Apple TV. Such as products and services offered through iTunes.

Faster service and no lost connections in the middle of a transaction.

Research, communication

would be able to offer it to guests and hunters that stay with us in turn the service would generate more income

Advertising and customer communication.

Entertainment.

sales and advertising

Am in beginning phases of opening a hedge fund that will have global impact. Will require greater reliability and higher bandwidth at this location. Or, will have to move the business elsewhere. Critical, critical business fail if I cannot obtain more reliable and greater bandwidth internet connection.

I would be better able to support my existing customers.

Interactive website

I would provide local businesses in the Highland and Batch County areas with video to market their trade online. Videos would be place on social media websites such as Youtube or Facebook to attract a wide audience.

I currently hire a weekly assistant who works/lives out of town to assist me on assignments and to do the high demanding internet software I need and to send photographic files I cannot do from my home. I travel to a Richmond location once weekly just to have adequate internet access and meet with my assistant. I could hire an assistant locally if I had local fast reliable internet service

expanded consulting with private and public sector clients

Online Sales

Ebay seller

Reservations, wireless access for guests, accounting, ordering

direct retail sales

Streaming video is an upcoming need.

Educational website

Video conferencing, File transfers, Virtual collaboration in real-time

Streaming live conferences, etc.

***the answer to #31 above is 140. The survey wouldn't allow this number.

I like TDS, just want faster broadband

more usage

Road Works

we do not purchase the package we need because it is too expensive. Data is limited and speed is unreliable

online sales

online ordering

don't know

online business

it would help me greatly with music, video, and TIME!

would be able to telecommute more- more efficient.

maybe use QuickBooks

I would sell equipment and stuff online

We do well to have telephone and mailbox. I am church treasurer, and I filled out this form. I live in Staunton, VA

no comment

N/A

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all of us would work, play or research online at the same time. Right now if more than 2 of us are online it gets too slow

WEB-EOC contact with VDEM in Richmond

would be more attractive to potential new tenants

online reservations

7.0 Bath County Appendices

Appendix D: Bath County History

HISTORY

Excerpts taken from http://www.bathcountyva.org/assets/Comprehensive_Plan_whole_document_-_7-23-07_edits.pd f

On December 14, 1790, Bath County was created from parts of Augusta, Botetourt, and Greenbrier Counties. Much like its namesake, the English resort city of Bath, Bath County was to become a resort land of national reputation because of its mineral waters. With the formation of the State of West Virginia in the nineteenth century, Bath County became one of the western boundary counties of Virginia.

Early Settlement Patterns

In the early 1700's, western Virginia was very sparsely inhabited. In the lower valley of the South Branch there was a clan of Shawnees, about 150 in total, which was a significant population concentration at that time. For Native Americans, the Valley of Virginia represented a hunting ground. In order to attract deer, buffalo and elk, the Indians burned the grass at the end of each hunting season to keep the area in a condition of prairie. The bottom lands of the Jackson, Cowpasture and Bull Pasture river basins were utilized in this manner for much of the Indians' tenure in Bath County.

The European/American settlement of Bath County began during the 1700's. As was much of the inland mountainous region of the Middle Atlantic, Bath County was settled by members of dissenting Protestant sects escaping religious persecution. The earliest settlers in Bath County were Scotch- Irish Presbyterians from Ulster, Ireland. Among these first settlers was the family of John Lewis, the "father" of Bath County. First settling in the area north of Staunton, Lewis moved west into the Cowpasture area in the 1740's. The Lewis family was followed by other large landholders, some of whose names are still used as place names – such as Jackson and Dickenson.

Between 1746 and 1750, settlers established large farms of several hundred acres. Subsequent surveys in 1750 and 1755, however, showed that few newly formed tracts numbered over one hundred acres. Many of these surveys were for already established landholders or their offspring. Historically, the major portion of the large tracts has been concentrated in the more fertile valleys of the Cow pasture and Jackson Rivers.

Early in the nineteenth century, Bath County was beginning to acquire, along with its permanent agricultural residents, a number of part-time residents who came to the numerous mineral springs in the County. As early as 1750, Thomas Walker, a physician, naturalist, and later guardian of Thomas Jefferson, recorded that he found six invalids using the waters at Hot Springs for medicinal purposes. In 1766, Cuthbert Bullit erected a hotel at Hot Springs; portions of it remained until 1901. Several years after the hotel construction, Bullit petitioned that fifty of his acres be laid off into lots and a town established. The actual drawing for lots took place in 1794, but the proposed town did not become a resort center until Dr. Thomas Goode purchased the old hotel in 1832. By 1835 there were bath houses, several rows of cabins, and a reputation for very good table fare.

In 1880, M. E. Ingalls, president of the Chesapeake and Ohio Railway, purchased the Warm, Hot, and Healing Springs. In 1890, he formed the Virginia Hot Springs Company, and named the existing hotel at Hot Springs, "The Homestead." The company constructed a railroad spur of twenty-five miles to connect Hot Springs with the main line of the Chesapeake and Ohio at Covington. The company also made numerous improvements to the old

hotel until fire destroyed it in 1901. The present Homestead was built soon after the fire and its tower was constructed in the late 1920's. During the early part of World War II, the Homestead served as an internment for Japanese officials from the Washington delegations and eastern consulates. Since construction of the Homestead, Hot Springs has been a major Bath County resort center.

Neighboring Warm Springs, however, was the better known resort in the nineteenth century. Warm Springs was already a nationally known summer gathering place for elite society from the South. Planters from the Gulf States, as well as other distant points, traveled by canal boat and stage coach to the mountain resort for the summer months. Many well-to-do Virginians also visited the "springs" for all or part of the warmer months to partake of not only the waters, but of the social life as well.

Virginians from the Tidewater region, like the planters from the Deep South, came as much to escape the yellow fever and cholera epidemics of the lowlands as they did to bathe and socialize. Mountainous Bath County provided a safe, healthy environment for those wealthy enough to make the long journey for the summer social season. The white frame bath houses that still remain are visual reminders of Warm Spring's nineteenth century prominence. Other springs such as Healing Springs and Bath Alum attracted limited numbers of summer residents in the early nineteenth century, but Warm Springs remained the prime resort of the area for the rest of the century.

Bath County, like neighboring Highland County, has been a grazing region from its earliest days. The large river farms comprised nearly all of the tillable land in Bath County and gave the County a more aristocratic social structure than most mountainous areas. Hunting, instead of farming, however, was the basis of livelihood for a number of early Bath County residents living in the areas least suited to farming. Hunters had access to plentiful game (especially buffalo, bear, and turkey). Skins sent to seaports, as well as the bounty from killing wolves, provided a reliable cash return for Bath County hunters.

The first dwellings in the County consisted of small log cabins with the roofs made of long riven shingles held down by weight poles. Later homes were made of hewn logs, and many were covered with frame siding. A few wealthy planters built high-style brick houses such as the Greek revival house at Hidden Valley.

Because Bath County has attracted visitors since the early nineteenth century, it has escaped the isolation of many Appalachian counties. Through the years many families have built fine homes or rustic cottages to use as part-time dwellings. Historically, there have been three generalized groups of people in the County: a small number of farmers, tourists and second-home residents, and a laboring class that primarily provides services for tourists and part-time residents.

Historic Landmarks

Each of the periods of Bath's colorful history has left the County with a number of historic buildings and sites. If not identified and preserved, historic sites are often lost to posterity through deterioration and neglect.

Based on information obtained from the former Comprehensive Plan, as well as the Bath County Historical Society, Inc., 49 significant historical sites have been identified throughout the County. These sites are listed below. To date, seven Bath County sites have been designated as both State and National Historic Landmarks. These are Warinickton Hidden Valley Farm, Gristmill Inn Springs, Warm Springs Bath Houses and Pools, Homestead Hotel, Homestead Dairy, Sitlington House, and the Old Millboro School. The County acknowledges the important role historical landmarks play in benefiting the area's culture, economy, and tourism industry and encourages local preservation initiatives. Refer to **Tools for Preserving Bath County's Rural and Historic Character** in the Land Use chapter of this Plan. Bath County Historic Landmarks

* Included on the Virginia Landmarks Register and the National Register of Historic Places

1) Back Creek Bridge
2) Gatewood House
3) Lake Moomaw
4) Cameron Clerk's Office
5) Folly Farm
6) Bacova Church
7) Bacova Houses
8) Bacova Post Office
9) Mayse House
10) Warinickton Hidden Valley Farm*
11) Bath Courthouse & Sheriff's Office
12) Bath County Historical Office
13) Gristmill Inn Springs*
14) Anderson Cottage
15) The Chimneys
16) Tannery and Shields House
17) Christ Episcopal Church
18) Warm Springs Presbyterian Church
19) Warm Springs Inn
20) Warm Springs Bath Houses & Pools*
21) Oakley Farm
22) Boxwood Farm
23) Gramercy Farm
24) Maple Ridge
25) The Homestead Hotel*
26) St. Luke's Episcopal Church
27) Shrine of the Sacred Heart
28) Virginia Hotel
29) Homestead Dairy*
30) Malvern Hall
31) Healing Springs Hotel
32) Mustoe House
33) Virginia Hotel Bolar
34) Bath Alum House & Barn
35) Mclung House & Store
36) Williamsville Presbyterian Church
37) Green Valley
38) River Uplands
39) Big Bend Farm
40) Windy Cove Presbyterian Church
41) Windy Cove Farm
42) Fort Lewis
43) Sitlington House*
44) Nimrod Hall
45) Camp Mont Shenandoah
46) Millboro Springs Girls College
47) Old Millboro School*
48) Rock Rest
49) Wilderness Farm

Appendix E: Bath County Demographics

Bath County Demographics (From http://www.bathcountyva.org/about-bath-county.html)

Population as of 2011: 4,652 Median age: 48

Median household income: $52,500 Real Estate Tax Rate $0.48 per $100 assessed value

Personal Property Tax Rate $0.35 per $100 assessed value

Community Profile Bath County

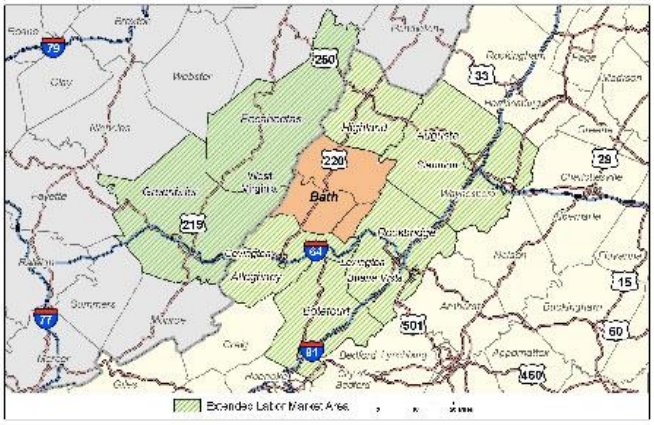
Virginia

Location

Bath County is located 75 miles north of Roanoke and 143 miles west of Richmond, the state capital.

Bath County is located in the Allegheny Mountains in west-central Virginia. It is bounded by the West Virginia state line. The county is known for its natural beauty and its unique way of life associated with an abundance of warm natural springs. The county's economy is primarily tourist-oriented.

Roanoke is 75 miles south and Richmond, the state capital, is 143 miles east.



VIRGINIA ECONOMIC DEVELOPMENT PARTNERSHIP

Every reasonable effort has been made to assure the accuracy of this report through the use of standardized, reliable data sources, including the community. However, the Partnership provides this information "as is," and therefore, assumes no liability arising from the use of this report or data.

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Appendix F: Bath County Economics - (Bath County Economy summary from Comp Plan)

The median household income in the County in 2007 is $35,437, for one person, and $50,625 for a family of four. While the household income on average countywide has risen nearly 24% (after adjusted for inflation) over the past 20 years, it still lags behind the statewide average by 25%. Overall, Bath County is outpacing neighboring Highland County with a slightly higher Adjusted Gross Income and Income Per Capita over the past 10 years.

While only 7.9% of the people in Bath County were living under the poverty level (below the state average of 9.6%), a relatively large 27.5% of the families below the poverty level had a female head-of household.

The total civilian labor force in the county fell nearly 10% from 1993 to 2003 as the labor force jumped over 11% statewide. Unemployment dropped significantly from 9.2% to 5.3% during that same 10-year span.

The local economy was fueled by a sizable 23.5% of the workforce being employed in the "industry" category of "Arts, Entertainment, Recreation, Accommodation, and Food Services" far outpacing the state and regional norms. "Education, Health, and Social Services" was the sector with the second highest percent employment (15.5%) while Construction was third (11.7%).

The "Service" sector as a whole comprises a whopping 58% of Bath County's workforce filling needed jobs in the hotel/motel, restaurant, and tourism industries. The "Information" sector of the economy lags as the lowest sector accounting for less than 1% of the total jobs, however, it offers the highest average wages.

Wages in Bath County in all sectors of the economy increased a modest 10.4% (after adjusting for inflation) from 1993 to 2004, only half as fast as wages increased in neighboring Highland County (21.7%) over the same time period with both counties trailing the state average of 25.4%.

Though it makes up just 7% of the County's economy, one category where the wages in Bath County exceed the state average (by 16%) is the "Transportation, Communications, and Utilities" sector.

The County logged about $72,246,000 in taxable sales in 2003 up a strong 27.5% from 1993 with the highest increases logged in hotel/motel revenues.

The total number of farms in the County fell from 135 to 124 over the 15 years from 1987 to 2002. However, the total number of acres farmed stayed relatively the same, decreasing less than 1% over that time frame. Over 95% of the agricultural products sold from Bath County farms in 2002 were livestock and poultry with less than 5% accounting for crop sales.

Appendix G: Bath County Education

EDUCATION

Of all government expenditures, education is by far the most important and, as in most localities, the largest single item in the County budget. The quality of schooling our children receive shapes their lives as individuals, and is also a major determinant in attracting new residents to the County and retaining current ones.

School Facilities

Bath County is home to two elementary schools, Millboro Elementary and Valley Elementary. Millboro Elementary, located in the village of Millboro between Goshen and Warm Springs, enrolled 175 students in 2006-2007. Since construction of the school was completed in 1989, it is considered a modern facility, wired for technology (voice, video, and data resources). The school, however, is in need of an auditorium, which was included in the School Board's capital improvements plan for funding for several years, but was not approved for funding as a capital project.

Valley Elementary, on the other hand, was built in the 1960s and underwent extensive renovations and received a large addition, completed in 2001. The $3.5 million project included a new wing for four classrooms, a technology lab, and a science lab. It also benefited from the relocation of an upgraded media learning center and new wiring for online resources. Valley Elementary, located just south of Hot Springs, enrolled 280 students in 2006-2007.

Bath County High School, which houses grades 8-12, had an enrollment of 345 students in 2006-2007. The original school, built in 1954, has had several additions and is currently undergoing an $8.7 million renovation begun in 2006 that includes new windows, HVAC, a new roof, and ADA/accessibility upgrades. Funding for these items is included in the School Board's five-year capital improvements plan.

Educational Programs

The Bath County School Board directs a program of public education for approximately 765 students. Course offerings have been designed to serve the needs and interests of individual students, as well as meet overall educational goals as defined by the School Board long-range plan, the Virginia Standards of Quality, Standards of Accreditation, and applicable Federal standards. As of 2006-07 school year, all County schools remain fully accredited based on the Federal and Virginia assessments, including Standards of Learning, and No Child Left Behind. County schools provide a full spectrum of services for regular and special needs children. Mainstream and special education teachers work closely with school psychologists and child study teams to ensure successful placement and progress for all children. In addition, counseling services are available to all students so as to support educational, sociological, psychological, and career needs.

Bath County schools also provide creative outlets for students. Enrichment programs, such as special drama activities and music programs, are offered to all students. Programs for gifted students include extension activities, as well as participation in "Destination Imagination" and "Future Problem Solving" competitions. At the high school level, advanced students meeting the entrance qualification are eligible to participate in the Jackson River Governor's School for Math, Science, and Technology. This half-day program is based at Dabney S. Lancaster Community College in Clifton Forge, and students travel to that program daily, returning to Bath County High School for the remainder of the instructional day. Bath County students participate in the Field Biology Regional Governor's School at Dabney S. Lancaster Community College in Clifton Forge, and the Massanutten Regional Governor's School in Harrisonburg every summer. Two students from the County are selected to attend each school. The gifted program also funds special requests for students to attend activities such as space camp and enrichment camp. In addition, advanced placement courses and dual enrollment opportunities are available for all academically advanced students.

The Distance Learning program at BCHS is used extensively for dual enrollment classes. This compressed-video based lab, opened in 2001, is also used for professional staff development and is available for community/local business use, as well. Vocational training is available at the Mertz Career and Technical Education Center located at Bath County High School for students planning to enter the labor force immediately after graduation. Career and Technical Education courses are offered in auto mechanics, vocational agriculture, business management, life management skills, family management, food occupations, hospitality and tourism, CADD (computer-aided drawing and design), technology, small engine repair, and building trades. A dual enrollment program in welding at Dabney S. Lancaster Community College is available for seniors. The above courses correlate well with curriculum requirements at the local Dabney S. Lancaster Community College.

School Enrollment and Ranking

In school year 2006-07, total enrollment in Bath County's public school system was 765 students.

All three schools continue to meet full Virginia Standards of Learning accreditation, and continue to exceed No Child Left Behind – Adequate Yearly Progress standards, for full accreditation.

Education Spending In order to provide local students with quality schooling, Bath County has been forced to allot a disproportionately high ratio of local monies (versus State funding) to education. In recent years, excessive

local allocation has been necessary to counteract effects of the formula used by the State in determining funding assistance. The formula, called the composite index, consists of variables representing each locality's adjusted gross income, retail sales, property values, average daily membership (number of students), and population. Because of the County's relatively high proportion of local revenues, as compared to its relatively small population size and average daily membership, Bath's composite index is very high, resulting in very low State funding.

Higher Education

The number of high school seniors with plans for post-secondary education at the time of graduation is positive.

Although there is no institution of higher learning in Bath County, there are several colleges and universities relatively nearby. These include liberal arts schools such as Eastern Mennonite University and Bridgewater College, located in the Harrisonburg area, and Mary Baldwin College in Staunton. Dabney S. Lancaster Community College which offers both day and night classes, is located in Clifton Forge. Blue Ridge Community College is in Weyers Cave. Washington and Lee University and Virginia Military Institute are located in Lexington, and James Madison

University, is nearby in Harrisonburg. In addition, the University of Virginia in Charlottesville and Virginia Tech in Blacksburg are each approximately two hours away. Also within the two hour driving range are Roanoke College and Hollins College, in the Roanoke area, as well as Davis and Elkins College in Elkins, West Virginia.

Appendix H: Bath County Government & Finance

The primary local revenue sources for the County are property and other taxes comprising 63% of all local revenues. Public Service Corporation taxes, service charges, certain fees, fines, grants, and other miscellaneous sources account for the additional local revenues. Expenditures generally consist of 3 categories: the general fund (for all general operations), special revenue funds (earmarked for a certain purpose such as education), and capital project funds (used for acquisition or construction of major capital facilities).

The County's total Maintenance, Operations, and Capital expenditures were $14,821,582 in FY2007/2008 up 6.4% from FY1999. Education expenditures account for 40% of County expenditures. For example, elementary, secondary, and other instruction comprises 73.4% of the $9,701,518 proposed to be spent on Education in FY2007. Operations and Maintenance increased by 1.8%, School Food increased by 1.9%, and Transportation Services increased by 2.2% in a budget that is proposed to be low in growth for FY2007/2008. Bath County significantly decreased its total outstanding debt from $1,924,825 in FY02 to $514,650 in FY06 – which results in a low $104.00 of net bonded debt per person. This number will increase in future years as the $8.74 million for renovations to Bath County High School are assumed. Local revenues collected from the categories of "Permits, Fees, & Licenses" and "Fines and Forfeitures" are well below the state per capita average. In the past few years, while direct federal aid and local revenues have increased, funds from the state have decreased 1% as the school population has declined.

8.0 Highland County Appendices

Appendix I: Highland County History

Highland County History *(From Comprehensive Plan)*

Highland County is one of four Virginia counties named for its natural features. Settlement began about 1745 when immigrants of both German and Scots-Irish descent began to push up the tributaries of the South Branch of the Potomac and the James Rivers. The county's remote and isolated location was noted by early land speculators. One such petition to the Colonial Governor of Virginia asking for a grant of 50,000 acres on the "… head branches of the James River…" noted that "… the lands are very remote and lying among great mountains being about 200 miles from any landing…"*

Efforts to create a new county from the territory of Bath and Pendleton were begun in 1839 and continued in 1840. In both years, polls failed to capture a majority in the two parent counties.

In 1838, the area was opened to development by the completion of the Staunton-Parkersburg Turnpike. The road was built and sited by the famous engineer, Claudius Crozet, who believed the Pike would benefit the State by retaining and increasing its western population, clearing and settling an extensive territory, and adding to the State's revenues by the enhanced value of land through which the road would pass. His vision was accurate and the Turnpike served as a major artery through the Allegheny Mountains for more than 100 years.

Finally, in 1847, Highland was created with its seat located in a patch of woods and laurel thickets between two straight creeks. The site was located on Bell's farm at the house and tavern of John Cook. Carved from Pendleton and Bath, the county consists of 422 square miles and has the highest average elevation of any county east of the Mississippi River.

By the time of the Civil War, Highland was able to enlist more than 500 men into the Confederate Army. Fewer than a dozen joined the Union side. On 8 May 1862, a significant battle was fought at the small village of McDowell that resulted in Stonewall Jackson repulsing Union General Milroy and preventing Federal forces from advancing on Staunton. The battlefield at McDowell remains essentially unchanged, save for the growth of trees. The historic character of two ante-bellum brick homes in the village, and the Presbyterian Church (which served as headquarters and hospital) remains essentially the same. The names of some soldiers were carved into the bricks of the church and remain visible today.

The county was thought to be on the verge of a growth spurt in the late 1800s and early 1900s when plans were afoot to build a railroad into Highland. When the railroad failed to materialize and investors lost significant sums, the promise of industrial growth faded. Highland has remained essentially an agrarian community.

Currently three sites in the county are eligible for listing on the National Register of Historic Places and the Virginia Landmarks Register -- The Highland Center, the Highland Inn and the Mansion House. The Highland Historical Society, located in the Mansion House at McDowell, maintains information on these and other historic properties. The Society serves the county as the principal repository for Highland County artifacts and documents related to its history

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* Oren F. Morton, *A History of Highland County, Virginia*, Regional Publishing Co., Baltimore, MD, 1985; p. 61.

Appendix J: Highland County Demographics

Understanding past, present, and future county demographic trends provides an essential framework for community planning. Specific trends have measurable impact on our land use requirements, transportation network, public services, zoning, and schools.

General Population

Historical Trends — With a peak population of 5,647 people in 1900, Highland County experienced the majority of its growth before the start of the 20th century. According to annual estimates, the county population decreased by 3.8 percent between 1990 and 2000 and then between 2000 and 2010; it decreased significantly again by 8.5%.

Source: *2010 Census

	1990	2000	2010
Total Population	2,635	2,536	2,321*
Population Change	-10.3%	-3.8%	-8.5%

In 2010, 98.9% of residents were white. The population is almost evenly divided between males and females with females slightly edging out males according to the ACS 5 year estimates. This gender distribution mirrors statewide figures, while statewide the population is 72.3% white.

Source: *2010 Census
****2005-2009 ACS 5 year Estimate**

	1990	2000	2010
White	2,630	2,517	2,289*
Black	3	5	6*
Hispanic	5	13	18*
Males	1,304	1,254	1,173**
Females	1,331	1,282	1,226**

Population Projections — The population was 2,321 in the year 2010. The projection for 2020 is 2,400 residents, and for 2030, it is 2,330 residents.

Source: Virginia Employment Commission
****Actual**

	1990	2000	2010	2020	2030
Population Projection	2,635*	2,536*	2,321*	2,400	2,330

Migration Factors

Aside from annexation, there are two ways a community sustains its population. One is to maintain a higher number of births than deaths (natural increase); the other is to have new residents move in from elsewhere (migration.)

The county population is decreasing as a result of natural change. As such, the county is unique among counties in our comparison. Generally, when population changes are the result of inward migration, one or more "push-pull" factors are at work. These may include family changes, housing affordability, educational opportunities, cultural and recreational outlets or job availability. However, in Highland County, the trend is for residents to leave the County in search of employment or to continue their education.

Population Distribution

Highland County is the least populated county in Virginia. The small population, coupled with a relatively large land area, results in a very low population density. According to 2010 Census, the population density per square mile for the three primary areas in the county was: Blue Grass (3.97), Stonewall (3.93), and Monterey/Town of Monterey (11.61).

Population Characteristics

Households — Highland's total population decreased by 13.7 percent from 1980 to 2000, but the number of households increased by 2.0 percent. By 2010, the total population in Highland decreased yet again to 2,321, while the number of households increased by 8.9%.

Age — Age is an essential tool of community analysis because many resident needs and behaviors are life-cycle related. Highland's median age increased significantly from 34.3 in 1980 to 40.7 in 1990 and to 46.0 in 2000. By 2010, the median age again increased significantly to 50.

Source: 2010 Census

	1990	2000	2010
Median Age	40.7	46.0	50.0

A significant trend in the county's age distribution through 2030 is the projected *decrease* in various age groups up through middle age, with a projected *increase* in the number of late middle age and retirement age residents.

These trends have a substantial impact on Highland's workforce and economic status, as well as affecting county services such as the school system. Since Highland's proportion of child-bearing aged adults is shrinking, the total number of young children can be anticipated to decrease over the next few years. Our school enrollment and class size will reflect this trend.

An increasingly older population also presents additional challenges. One important example is the availability and accessibility of medical care in support of this growing population segment.

Planning reflects the needs and desires of the county population. A stable population that gets increasingly older will have a different impact on the nature of county planning compared to a growing county with upward trends in all age categories.

Appendix K: Highland County Economics - (Highland County summary from Comp Plan)

Economic Indicators

Major indicators widely used in establishing an economic snapshot of a community include trends in demographics, the labor force, unemployment, underemployment and income. The population in the county is about 2273 residents. Of these, over 1,136 participate in the civilian labor force. Unemployment was 10.5% in March 2009, with median family income in 2008 of $38,088.

Major Economic Sectors

Government

Government workers, primarily comprised of school system employees, hold 27.6% of the jobs in Highland. Many of these jobs offer benefits which provide strong foundations for working families. Growth may come from attracting additional state or federal jobs to this area.

Services

Services to individuals, businesses, government establishments and other organizations provide 23.2% of the jobs in Highland. Many self-employed residents work in this sector. Opportunities for growth include adapting to changing demographics, capitalizing on increased tourism and getting ahead of economic trends.

Wholesale and Retail Trade

This category consists mostly of retail trade and accounts 9% of the jobs in Highland. There are specialty businesses that cater to the tourism trade and other businesses that are sufficient to meet the basic everyday needs of the residents. However, due to Highland's low population, large retail outlets do not locate here so many residents travel an hour or more to shop in larger localities. Growth may come from expanding tourism and finding ways to offer more products locally.

Construction

Construction provides 10.1% of the jobs in Highland. An expanding local economy and changing demographics may hold the key to increased opportunities in this area.

Manufacturing

Manufacturing provides 5.3% of the jobs in the county. Most of these businesses involve lumber and wood products. Growth may come from additional processing of these products.

Agriculture and Forestry

Agriculture and forestry provide 6.6% of the jobs in Highland but have been instrumental in developing the natural character of the county. Many residents have expressed an interest in maintaining this rural, agricultural character. The number of farms, acreage farmed and farm incomes have remained relatively constant while the value of agricultural and forest lands has increased dramatically; thereby increasing the tax burden on the agricultural sector. The lack of diversity in Highland County's economy makes it difficult to find other sources of revenue in lieu of real property taxes.

Finance, Insurance and Real Estate

This sector provides over 8.3% of the jobs in Highland and they are statistically the highest paying in the county. The real estate market has been strong as buyers from the more metropolitan areas seek to own property in a

different environment. The county has two locally owned banks that serve the needs of both individuals and businesses. Both banks have expanded in recent years while providing solid employment opportunities.

APPENDIX L: HIGHLAND COUNTY EDUCATION

Educational Programs

Highland County Schools provide special education programs for identified students with learning and developmental disabilities, emotional disturbances, and physical limitations. In addition, speech/language and early childhood services are provided. Counseling services are also available to all students to support educational, sociological, and psychological and career needs.

Enrichment programs are offered to all classes and the Challenge Program serves identified gifted and talented students through programs including, but not limited to, mentoring, independent studies and special projects. Advanced placement courses are offered at the high school level through regular classroom coursework, as well as the school's distance learning laboratory. Approximately 25% of the students take at least one A.P. course.

Expanded course offerings for high school students include dual enrollment courses with Southwest Community College, Dabney Lancaster Community College, and Blue Ridge Community College.

Vocational education courses are offered in business, agriculture and carpentry. Approximately 70% of high school students take at least one vocational course. Highland County Schools offer courses in art, music and band, and co-curricular clubs in drama and 12 other student interest areas. Approximately 90% of the students participate in at least one co-curricular club. The athletic program consists of 11 sports.

No Child Left Behind

The No Child Left Behind (NCLB,) federal legislation, requires that all public schools make Adequate Yearly Progress (AYP) for student performance in statewide tests in reading and math. Since its enactment, Highland County Public Schools have made AYP.

In 2010, the Commonwealth's annual measurable objective for English, mathematics, history and science was 70% passing. Highland County Public Schools' (HCPS) pass rate was 95% in English, 95% in mathematics, 92% in history and 94% in science. Attendance rates for schools was set at 95%, HCPS had 96% attendance for the year. The final scorecard was graduation percentage. The Commonwealth's level was 77% and HCPS students achieved a 96% graduation rate.

Higher Education

According to the Central Shenandoah Planning District Commission, 72.8% of the County's full-time residents have at least a high school diploma. The pursuit of higher education has been a priority for Highland County public schools. For example, in the class of 2010, approximately 90% of graduates pursued post-secondary education programs.

While there is no institution of higher learning in Highland County, there are several colleges and universities located within a two (2) hour drive of Monterey. These include liberal arts schools such as Davis and Elkins College in Elkins, WV (61 miles from Monterey) and Mary Baldwin College in Staunton, VA (43 miles from Monterey.) Blue Ridge Community College, which offers both day and night classes, is in Weyers Cave, VA (59 miles from Monterey). Washington and Lee University and Virginia Military Institute are located in Lexington, VA (80 miles from Monterey;) and James Madison University, Eastern Mennonite University and Bridgewater

College are situated in the Harrisonburg, VA area (61 miles from Monterey.) In addition, the University of Virginia is located in Charlottesville (82 miles from Monterey).

Support Groups

REACH is a grassroots community group (teachers, business leaders, parents and citizens) searching for ways to support the sustainability of the Highland County Public Schools, specifically through alternative funding options and by increasing the county and student population.

GRASP is a non-profit scholarship program funded by generous individuals, businesses and foundations to help students become aware of financial opportunities for higher learning.

Highland County Government and Finance

Highland County Revenues

Healthy Highland County revenues enable the County to finance operations, provide services, and build upon capital improvement funds.

In 2010, local revenue represented 46% of total revenues; while state and federal revenues represented 54% of total revenues. Primary types of county revenue are taxes, fee, fines, service charges and grants. The most significant local revenue source is real property tax, which in 2010 contributed 76% of locally-generated county revenue. The primary allocation for County revenue has historically been education, generally comprising 60% of the total annual county budget.

Interlocal Relationships

Highland County is served by the Central Shenandoah Planning District Commission (CSPDC). The CSPDC assists the County with a variety of projects and provides forums through which the County participates in many regional projects. Other multi-jurisdictional organizations serving Highland County include agencies such as the Shenandoah Valley Partnership, Valley Community Services Board, and Valley Program for Aging Services and others.

Federal and State Relationships

Federal and State regulations and mandated programs are important factors in determining many daily operations of local government. In some cases, local assistance needed to comply with these regulations and mandates is supplied in the form of funding from the Federal and State governments. In other instances, Federal support is channeled through the State. However, some regulations and mandates are not financially supported by Federal or State governments. Consequently, Highland County must develop new revenue sources to meet insufficiently- or unfunded-mandates. Examples of state-mandated programs are present in the areas of building inspections, education, sanitation and health services, public safety, welfare and social services.

Military Airspace in Highland County

All armed forces service branches currently use the airspace above Highland County for training missions. The military operations area is controlled by the Air Force at Langley Air Force Base and is designated as the Evers MOA. Military Training Routes (MTR) currently cross the western portion of the county with authority to fly as low as 2000’ AGL; however, they frequently fly as low as 300’ AGL.

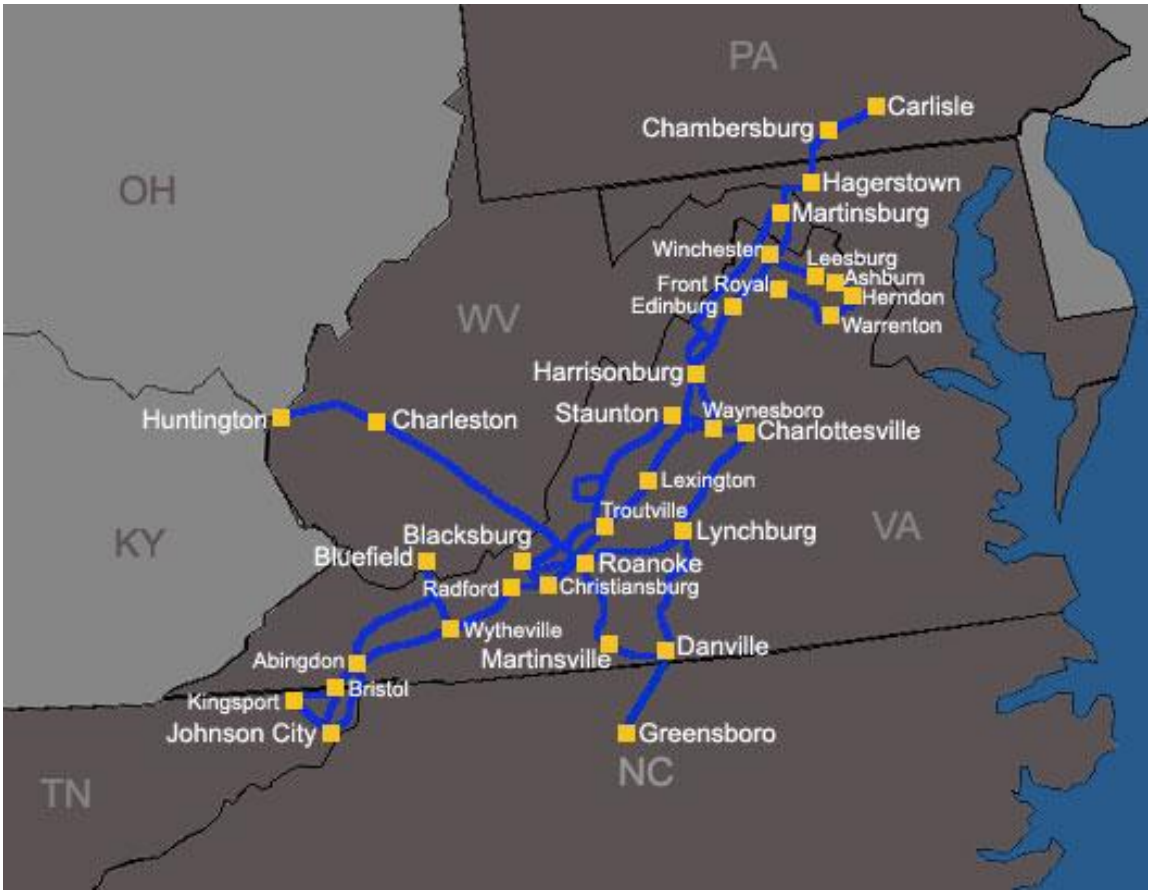
Valley Net

The Valley Network Partnership, d.b.a. ValleyNet, is a provider of fiber transport capacity along fiber routes in Pennsylvania, Virginia, West Virginia, Tennessee, North Carolina, and Florida. The Valley Network Partnership if operated by Local Exchange Carriers (LECs) whose service territories fall along the route. Those carriers originally joined forces for the purpose of providing traditional TDM circuits to Inter-exchange Long Distance Carriers (DS-1s and DS-3s). ValleyNet also offered multiplexing and drop and insert capabilities.

Now, the network uses the latest state of the art fiber optic technologies that include DS1, DS3, OC3, OC12, OC48 and OC192 services. ValleyNet provides services to Inter-exchange Carriers (IXCs) POPs, LEC LSOs, wireless cell sites, data centers as well as on-net building locations (please see the ValleyNet Building List on this site for a complete listing of all the locations).

Along with the traditional TDM services, ValleyNet offers Ethernet and Gig wave circuits (50Meg, 100Meg, 1 GigE, 2.5 and 10 Gig waves

Valley Net Intra-Network Service Map



Carrier Services | Intra-Network Services

- POP Locations and IXC Access
- Detail POP Locations
- Intra-Network Service Map

- Ethernet & GigWave Services
- Custom Networks & Collocation
- Inter-Network Services

One Lumos Plaza
Suite 300
Waynesboro, VA 22980
Phone: (540) 946-3525
Fax: (540) 885-6009

Service Description

- Non-Switched Digital Fiber Optic Transmission Services
- DS1, DS3, OC3, OC12, OC48, and OC192 Transmission Speeds
- Multiplexing and Drop-and-Insert Services Available

Technical Description

- Fiber - Single Mode
- Speed - 560 Mbps and 1.12 Gbps

For a price quote please contact a ValleyNet representative at 540.946.3525

Valley Net Inter-Network Service Map

Carrier Services | Inter-Network Services

- Inter-Network Service Map
- Detail POP Locations

- Ethernet & GigWave Services
- Custom Networks & Collocation
- Intra-Network Services

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Suite 300
Waynesboro, VA 22980
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Service Description

- Non-Switched Digital Fiber Optic Transmission Services
- DS1, DS3, OC3, OC12, OC48, and OC192 Transmission Speeds
- Multiplexing and Drop-and-Insert Services Available

ValleyNet offers fiber optic services at the DS-1 (1.544 megabits per second), DS-3 (44.736 megabits per second) and OC-N levels on an inter-network basis through fiber connections to the DDR Broadband Network (comprised of Access/On, PalmettoNet and USCarrier), Elantic Telcom, Kentucky DataLink (KDL), CityNet and Telcove that support customer requirements on and inter-network basis in North Carolina, South Carolina, Kentucky, Alabama, Georgia, West Virginia, Pennsylvania, Virginia and Ohio. These services are supported with a single point of contact for billing, service provisioning and maintenance. A single invoice is provided for all services. ValleyNet also offers multiplexing, drop and insert capabilities. ValleyNet offers Inter-Network Services at competitive prices between the following locations:

VIRGINIA

Abingdon	Ashburn	Berryville	Blacksburg
Bland	Charlottesville	Christiansburg	Danville
Edinburg	Front Royal	Harrisonburg	Herndon
Greenwood	Leesburg	Lexington	Lynchburg
Marion	Martinsville	Radford	Roanoke
Staunton	Stephens City	Troutville	Warrenton
Waynesboro	Winchester	Whytheville	

A capacity lease is available between ValleyNet and its customers that provides flexibility to meet the customers' needs now and in the future. Around the clock network monitoring and maintenance are provided as an integral part of our fiber optic network service. Trouble reports for ValleyNet Intra and Inter Network Services are processed 24 hours per day, seven days a week at the centralized ValleyNet Network Control Center at (800) 825-9638. For a price quote please contact a ValleyNet representative at 540.946.3525.

Partners

www.valleynet.com

SHENTEL
Always connected to you

CenturyLink™
Business

CenturyLink

From one of the most trusted names in the industry, CenturyLink's vast and facilities-based network gives CLEC resellers, wireless carriers and IXCs unmatched reliability, responsiveness and security for all of their telecommunications needs.
For more information, visit their web site at: http://www.centurylink.com/wholesale/

DDR
Broadband Networks

ValleyNet and the DDR Broadband Networks Partnership

ValleyNet is also a partner in the DDR Broadband Network (comprised of Access/On, PalmettoNet, US Carrier and ValleyNet). The DDR Broadband Networks Partnership supports customer requirements in 11 Mid-Atlantic and Southeastern states: Pennsylvania, Virginia, West Virginia, Ohio, Tennessee, North Carolina, South Carolina, Kentucky, Alabama, Georgia and Florida.
For more information, contact one of the DDR Broadband Networks representatives at 866.203.8656 or visit their web site at: http://www.ddrbroadbandnetworks.com for additional information.

LUMOS NETWORKS | *Our Technology Comes With People*

LUMOS Networks

Lumos Networks now owns a 5,800 route-mile regional fiber optic network and participates in partnerships that directly connect our networks with many of the largest markets in the mid-Atlantic region. In 2011, Lumos Networks expanded their network with the purchase of significant fiber optic and network assets from FiberNet. For more information, visit their web site at: http://www.lumosnetworks.com/carrier

ShenTel

No matter what the size of your business, ShenTel provides fiber optic and internet solutions to meet their entire customer's current and future needs. From personal use to transportation of vast amounts of bandwidth (up to 10 Gigabit Ethernet) over long distances, ShenTel provides the communications infrastructure required to support their customer's networks with the most bandwidth possible. For more information, visit their web site at: http://www.shentel.com/pages/solutions/network/home.php

Carrier Services

- TDM fiber optic circuits (DS-1, DS-3, C-3, OC12, OC48 and OC192)
- Ethernet and Gig Wave circuits 50Meg, 100Meg, 1GigE, 2.5 and 10 Gig Waves
- Multiplexing and Drop-and-Insert capabilities
- ValleyNet offers a comprehensive set of services to meet your communication requirements from sales, engineering, provisioning, installation and maintenance
- The ValleyNet customer list includes IXCs, LECs, wireless, cable providers, as well as federal and state government agencies
- ValleyNet is committed to providing highly intelligent, advanced network technology solutions while continuing to provide the highest level of customer responsiveness

Advantages of doing business with ValleyNet

- State-of-the-art fiber optic facilities
- Avoidance of capital investment
- Responsive provisioning time frame (normally 10 business days or less)
- 24 hour network monitoring and maintenance
- Centralized Network Control Center
  - Toll-free trouble reporting
- Single point of contact for
  - Administration
  - Engineering
  - Maintenance
  - Sales
- A single monthly bill
- Confidentiality of information
- Competitive rates including:
  - Term discounts
  - Volume discounts

For a price quote please contact a ValleyNet representative at 540.946.3525.

Carrier Services | Custom Networks & Collocation

- Ethernet & GigWave Services
- Intra-Network Services
- Inter-Network Services

One Lumos Plaza
Suite 300
Waynesboro, VA 22980
Phone: (540) 946-3525
Fax: (540) 885-6009

ValleyNet offers Custom Networks & Collocation

ValleyNet is supported by a very experienced staff of telecommunications engineers and technicians who can architect solutions to meet your specific requirements. ValleyNet's custom approach covers all aspects of private transport networks, which includes a comprehensive design for space and power to meet your needs. For a price quote please contact a ValleyNet representative at 540.946.3525.

POP Locations

Virginia

Abingdon	Danville	Lynchburg	Troutville
Ashburn	Edinburg	Marion	Warrenton
Berryville	Front Royal	Martinsville	Waynesboro
Blacksburg	Harrisonburg	Radford	Winchester
Bland	Herndon	Roanoke	Whytheville
Charlottesville	Leesburg	Staunton	

Get in Touch 1-800-320-6144
HELP@LUMOSNET>COM
One Lumos Plaza
Waynesboro, VA 22980
www.lumosnetworks.com

Our Technology Comes with People

Lumos Networks is a fiber-based service provider in the Mid-Atlantic region. We provide leading-edge data, broadband, voice and IP services over an expanding fiber optic network. We follow a strategy of being first to our regional markets with technology and services first introduced in metropolitan areas by national service providers. Lumos Networks delivers communications services with excellence, innovation, and integrity.

The most accessible people

The Lumos Networks team understands that long-term customer relationships, reliability and accountability are foundations for our success. We are committed to local relationships and measure our performance by the prosperity of our communities and the business success of our customers. We live and work in the areas where you do business. Lumos Networks engineers, service technicians and customer advocates work side by side with your business to provide customized network solutions and implementation support. We listen. We care. We are trusted advisors.

The most advanced technology

Lumos Networks has a hundred-year history of innovative product offerings and exceptional customer service. Our product offerings include high-speed transport, wavelengths and Metro Ethernet. Our diversified portfolio is attractive to carriers with needs for transport and fiber to the cell site and to regional enterprise customers seeking high-quality data and IP services and interconnection to data centers in our region.

Lumos Networks offers a complete suite of data and voice products supported by approximately 7,414 fiber-route miles in Virginia, West Virginia, and portions of Pennsylvania, Maryland, Ohio and Kentucky. We use an on-network service strategy that ensures redundancy and reliability. High-quality SONET, IP and Ethernet network architectures satisfy the most complex communication needs

Our Communities Community

At Lumos Networks we believe that serving our local communities is crucial in establishing a successful business as well as adhering to our mission and core values. We strive to build our reputation with customers, partners, employees, and other stakeholders as a good corporate citizen. This is accomplished by working with strong community organizations such as Chambers of Commerce, economic development groups and technology councils.

We also support non-profit organizations and events that promote the health, education, and general welfare of our local citizens. Lumos Networks truly appreciates all of our customers and community partners, and we relish every opportunity to give something back to those who support us.

Our Mission

Provide next generation communication solutions over an ever expanding advanced fiber optics network while:

Continuing to be the leader in addressed market share and customer satisfaction

Achieving top-tier return on investment for shareholders in terms of EBITDA margin

Providing an environment where employees can excel and be rewarded for exceptional team and individual performance

Our Core Values

CUSTOMER-FIRST

Pursue excellence as defined by our customers
Recognize that customer satisfaction is each employee's responsibility
Exceed expectations of customers and partners
Continually question how actions will impact our customers
Strive to deliver the highest value to our customers

INTEGRITY

Be rigorously honest and truthful in all of our dealings
Maintain high ethical standards
"Walk the talk", our actions match our words

TEAMWORK

Commit to the success of the team
Take accountability for team results
Meet all commitments made to the team
Accept the obligation to perform at your personal best
Trust and have confidence in your teammates to perform
Communicate openly and constructively with team members
Treat others with respect at all times
Approach decisions from a consolidated Company perspective
Support team decisions, once reached

CONTINUOUS GROWTH

Strive for continuous improvement in efficiency and effectiveness in all that we do
Ensure processes have been thoroughly developed and tested prior to implementation
Rigorously review our processes to identify potential areas of improvement

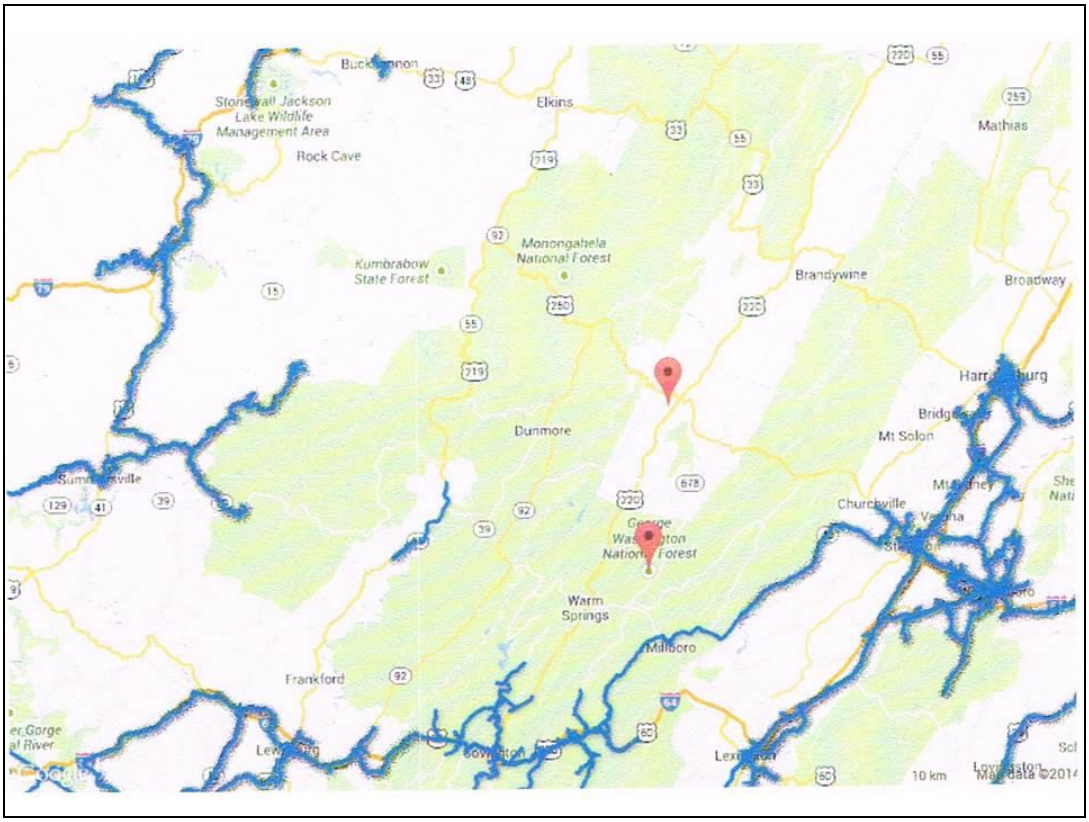
OWNERSHIP

Accept responsibility for delivery on commitments
Ensure that encountered problems are resolved in a satisfactory and timely manner
Own the customer's problem until it is resolved
Act as if the business were your own

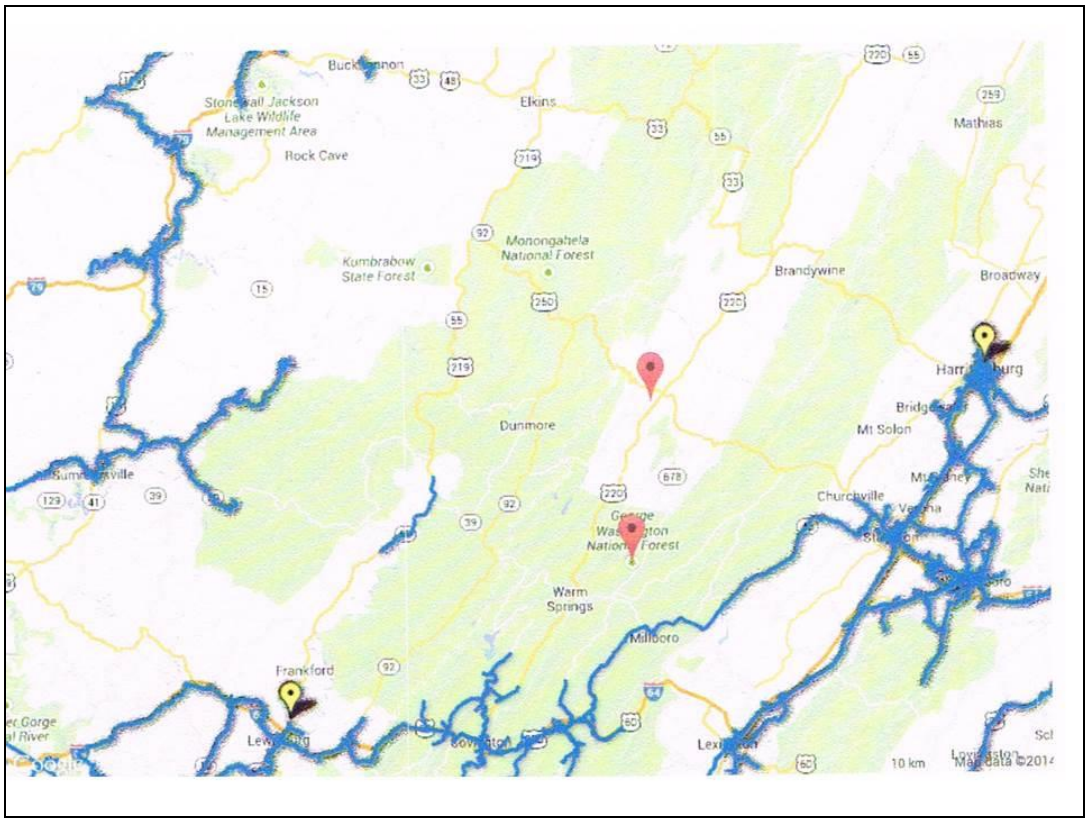
EMPLOYEE GROWTH

Foster personal and professional development
Maintain a supportive and healthy work environment
Encourage balance between work, family, friends, and community
Respect the value that individual differences offer

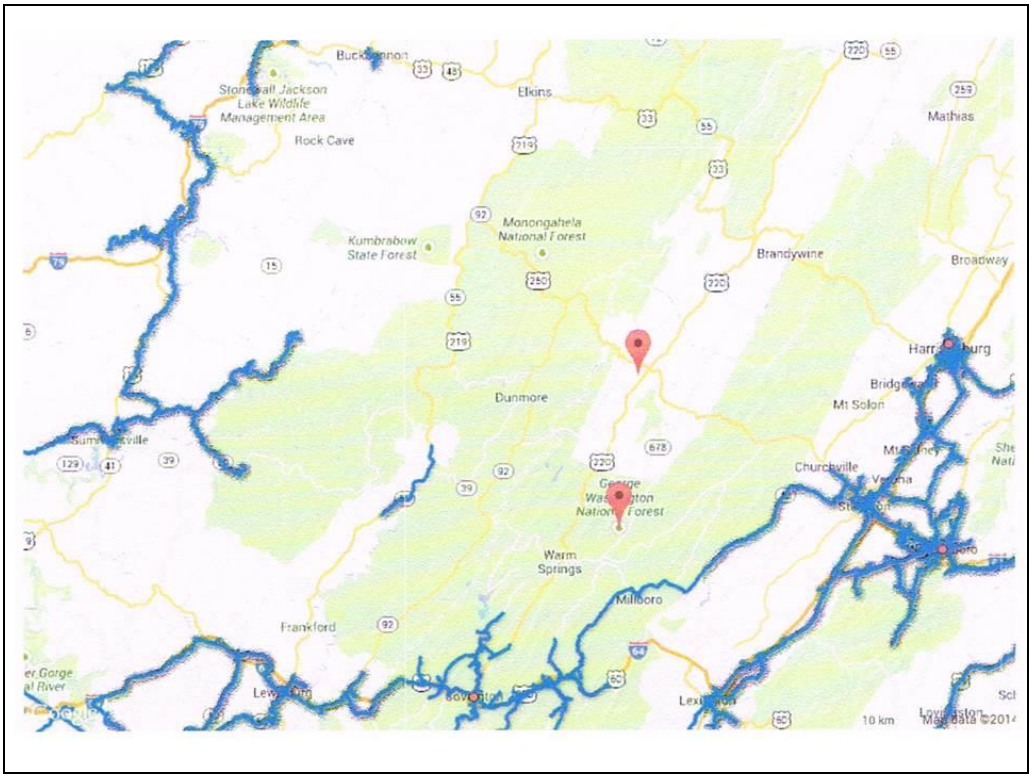
FIBER NETWORK



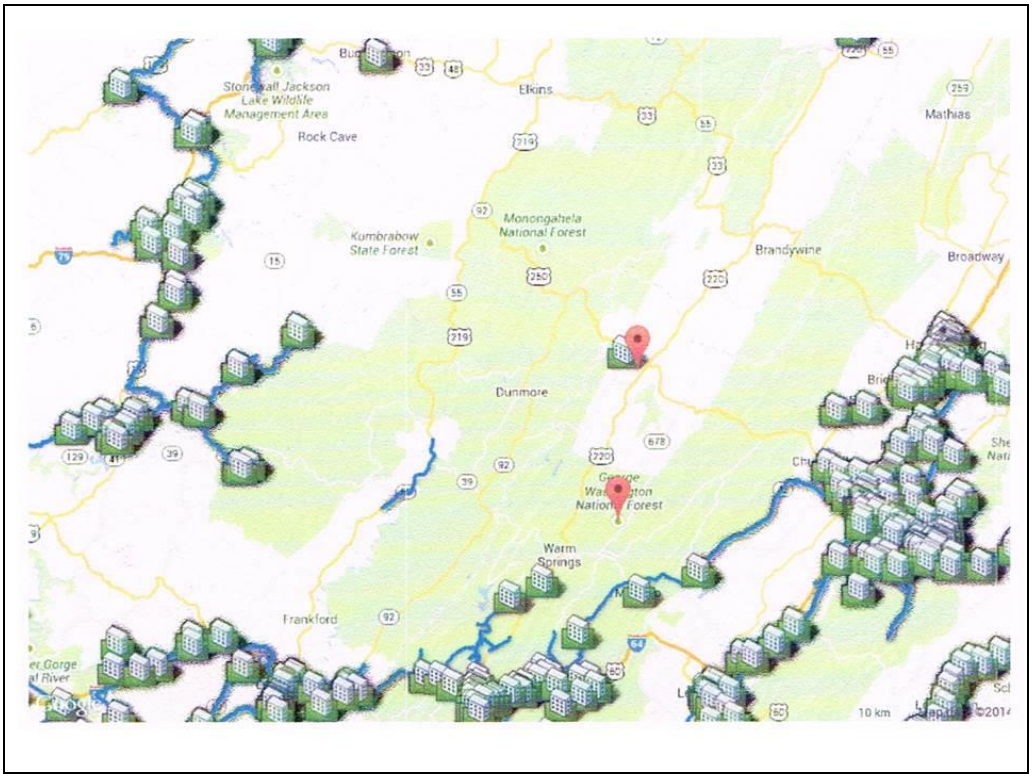
DATA CENTERS



COLOCATIONS



LIT BUILDINGS



PRODUCTS

Ethernet/MPLS >Many organizations need high-performance, resilient, point-to-point connectivity to run the key applications they depend on to serve their customers. We have the services and network experience needed to find a solution for your business and support your applications.

IP/Voice >

Voice Solutions from Lumos provide a converged voice and data platform to connect your network and create transport efficiency. Businesses benefits from flexible services, expanded local calling plans, competitive long distance rates and 24x7 monitoring. Plus, you get local, dedicated people who can customize the right services for your business and be available for support and implementation whenever you need it.

Transport >

Content is exploding, online transactions are growing exponentially, cloud applications abound, and the need for information storage and business continuity is greater than ever. In this environment, content and data are king, which means bandwidth is too. Enterprise and carriers must have high capacity connectivity to move these mountains of information.

Access >

To keep business moving and protect against outages, many organizations want resiliency for their on-net access to the Lumos network. Our Local Ring Enhancement (LRE) service meets this need by providing route and hardware diversity that can be added on to Lumos' standard on-net, SONET and Metro Ethernet access.

Data Center Services >

Reduce your operating costs by selecting Lumos Networks Colocation Service placing your network equipment in our secure and environmentally controlled data center. Get the bandwidth, power, security and safety you need at a fraction of the cost.

High Speed Internet >

In today's business world, resilient high-speed Internet connectivity is a must-have for corporate systems and presence with customers. Your web site and servers, email program, video conferencing service, hosted applications, file transfers, and more hinge on your Internet connection. And, when your web traffic is unexpected high, you may require extra bandwidth to access the Internet in order to keep operations running smoothly.

TV >

Our fiber optic network is delivered directly to your Home. Get connected for the future, today! Life-like digital quality picture and sound. So real it's unreal. Free High-Definition, no additional fees or expensive equipment to buy. More channels with all your favorite programs!

Phone >

Home Phone Plans. Talk and surf the web at the same time! Service available with long distance, voicemail and many calling features.

Broadband >

Residential Home Broadband. Click or contact us for more information about our high speed DSL internet. Our trusted advisors and professionally-trained technicians will install everything you need to establish a secure home network, including the Lumos Networks-provided router. Free 24/7 telephone tech support, or in-home service when required at no additional charge.

Bundles >

Residential Home Bundles. Bundle our home phone, TV and/or broadband services together and save! Triple Play, Double Play, Value Pack and more! Click for more information or call 1-800-262-2200.

Broadband Internet Service >

Businesses today demand Internet speeds that meet the constantly changing need for very high bandwidth. Larger multimedia files are being uploaded and downloaded. More peer-to-peer networking is required. Today's cloud services such as social networking with increased interactivity, collaboration and data sharing need even more bandwidth. Plus, the volume of remote data backup and storage files increase daily.

Carrier Ethernet >

Carrier Ethernet (CE) 2.0 MEF certification for E-Access identifies Lumos Networks as the first U.S provider to have met the stringent requirements that the MEF demands for certification. In addition to E-Access service, Lumos is also MEF 2.0-certified for E-Line, E-LAN, and E-Tree services. Certification means you can depend on services provided at the highest standards with consistent networks and equipment.

IP Voice >

Our IP Voice solutions provide a converged voice and data platform to connect your network and create transport efficiency. Businesses benefits from flexible services, expanded local calling plans, competitive long distance rates and 24x7 monitoring. Plus, you get local, dedicated people who can customize the right services for your business and be available for support and implementation whenever you need it.

Carrier Access >

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Hospitality TV Service >

Our Hospitality Package is specifically designed for businesses with common TV viewing areas in restaurants, sports bars, country clubs, or break rooms. It's also great for waiting areas in a doctor's office or auto service center.

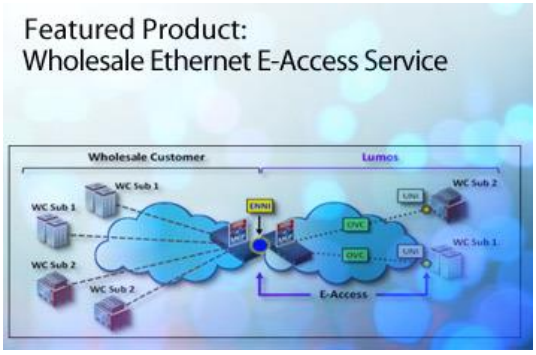
Small Business Bundles >

We offer bundled packages to our small business customers. Combine our broadband internet and IP voice products into a money saving package.

CONTACT US >

"Lumos has become a strategic partner by providing us an Internet service that meets our current needs and allows us to scale into the future."

CUSTOMER SOLUTIONS



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COPY OF LUMOS DATA CENTERS

Name	Street	City	State	Zip	Lat	Long
ALPHA TECHNOLOGIES	2020 UNION CARBIDE DR	SOUTH CHARLESTON	WV	25303	38.36344	-81.68648
EQUINEX	21715 FILIGREE CT	ASHBURN	VA	20147	39.01649	-77.45907
ADVANCED TECHNOLOGIES (ATS)	107 ERSKINE LN	SCOTT DEPOT	WV	25560	38.45235	-81.92848
CARPATHIA HOSTING	1175 N MAIN ST	HARRISONBURG	VA	22801	38.45917	-78.85722
TERREMARK	18155 TECHNOLOGY DR	CULPEPER	VA	22701	38.45678	-77.98184
DUKENET	301 S ELM ST	GREENSBORO	NC	27401	36.07032	-79.79272
GREENBRIER COMMUNICATIONS	840 N JEFFERSON ST	LEWISBURG	WV	24901	37.8382	-80.41595
IRON MOUNTAIN	1137 BRANCHTON RD	BOYERS	PA	16061	41.09303	-79.91108
365 MAIN	100 S COMMONS	PITTSBURGH	PA	15212	40.45058	-80.00375
365 MAIN	2500 ALLEGHENY CENTER	PITTSBURGH	PA	15212	40.26909	-80.00244
DQE	322 4TH AVE	PITTSBURGH	PA	15222	40.43917	-80.00028
LEVEL 3	8851 PARK CENTRAL DR	RICHMOND	VA	23227	37.64672	-77.43847
WV NET	837 CHESTNUT RIDGE RD	MORGANTOWN	WV	26505	39.63334	-79.95
Peak 10	8801 PARK CENTRAL DRIVE	RICHMOND	VA			

COLOCATION LIST

LUMOS NETWORKS
Our Technology Comes with People

April 2013

LUMOS NETWORKS DATA CENTERS

DATA CENTER	Address	City	State	ZIP	Latitude	Longitude
Waynesboro Exchange	524 W. Broad St.	Waynesboro	VA	22980	38.069789	-78.890507
Charlottesville River Road	1147 River Road	Charlottesville	VA	22901	38.039245	-78.456523
Covington Exchange	342 N. Court Ave	Covington	VA	24426	37.793050	-79.996563
Harrisonburg POP	771 Chicago Ave	Harrisonburg	VA	22802	38.459257	-78.874365
Lynchburg POP	800 W. Main St.	Lynchburg	VA	24064	37.415840	-79.142400
Charleston Greenbrier	1200 Greenbrier St.	Charleston	WV	25311	38.359217	-81.593544

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 counties 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 Bath and Highland County, VA Broadband Study Project Management Team
- Central Shenandoah Planning District Commission, Staunton, VA
- Staff, elected officials and citizens of Bath County, VA and Highland County, VA
- Emergency Response Center and Staff for Bath and Highland County, VA
- Bath County Comprehensive Plan (www.bathcova.org/Compplan)
- Highland County Comprehensive Plan (www.highlandcova.org/Compplan)
- Commonwealth of Virginia Housing and Community Development
- Consulting Gateway Corporation, Fleetwood, PA
- Dewberry Engineers, Inc. Glen Allen, VA
- MLMapping Wyomissing, PA
- BARC Electric Cooperative, Millboro, VA
- Highland Telephone Cooperative, Monterey, VA
- Lumos Networks Waynesboro, VA
- MGW Telephone Williamsville, VA
- TDS Telecommunications Corporation Madison, WI
- ValleyNet (Partnership of Century Link, Lumos Network and Shentel) Waynesboro, VA
- Verizon, New York, NY
- Service Corps of Retired Executives, Virginia www.score.org
- COMMUNITY PROFILE Bath County, Virginia by Virginia ECONOMIC DEVELOPMENT PARTNERSHIP www.YesVirginia.org
- COMMUNITY PROFILE Highland County, Virginia by Virginia ECONOMIC DEVELOPMENT PARTNERSHIP www.YesVirginia.org
- Virginia Employment Commission www.vec.virginia.gov
- Virginia Small Business Development Center (VASBDC) www.virginiasbdc.org
- http://www.cspdc.org and http://www.bathcountyva.org
- http://www.discoverbath.com
- http://quickfacts.census.gov
- http://www.highlandcova.org

Consulting Gateway Corporation
356 Maidencreek Road
Fleetwood, PA 19522
Phone: 484.651.2366
Fax: 610.944.1102

Consulting Turn-key Solutions and Project Management Services

Telecommunications • Private/Open Access Networks • Fiber Optics • Wireless • Security • Cameras • RFID • Emergency-911 Planning • Interoperability • Utility Provisioning Services • Infrastructure Management • SCADA • Strategic Planning • Business Modeling • Marketing/Education Programs • GPS-CAD-GIS Mapping • Public Works and Transportation Engineering • QA-QC Programs • Operations Consulting • Information Technologies (IT) • Funding Applications • Facility-Site Engineering and Development • Mechanical, Plumbing, Electrical • Project and Construction Management • Design, Specifications, Bid Documents