



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

Executive Summary

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. Engineering, Design, Cost Estimates
5. Organization & Operation Options
6. Funding Strategies

A significant catalyst in arriving at the proposed solutions 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.*

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. Such a partnership is intended to use funds in a fiscally responsible manner and take advantage of the typical funding opportunities while minimizing the need for other long term funding.

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 following options without getting cooperation and buy-in from the areas service providers.



Bath and Highland Counties, VA Menu of Last Mile Connection Solution Options

Least Effort →

Least Expense →

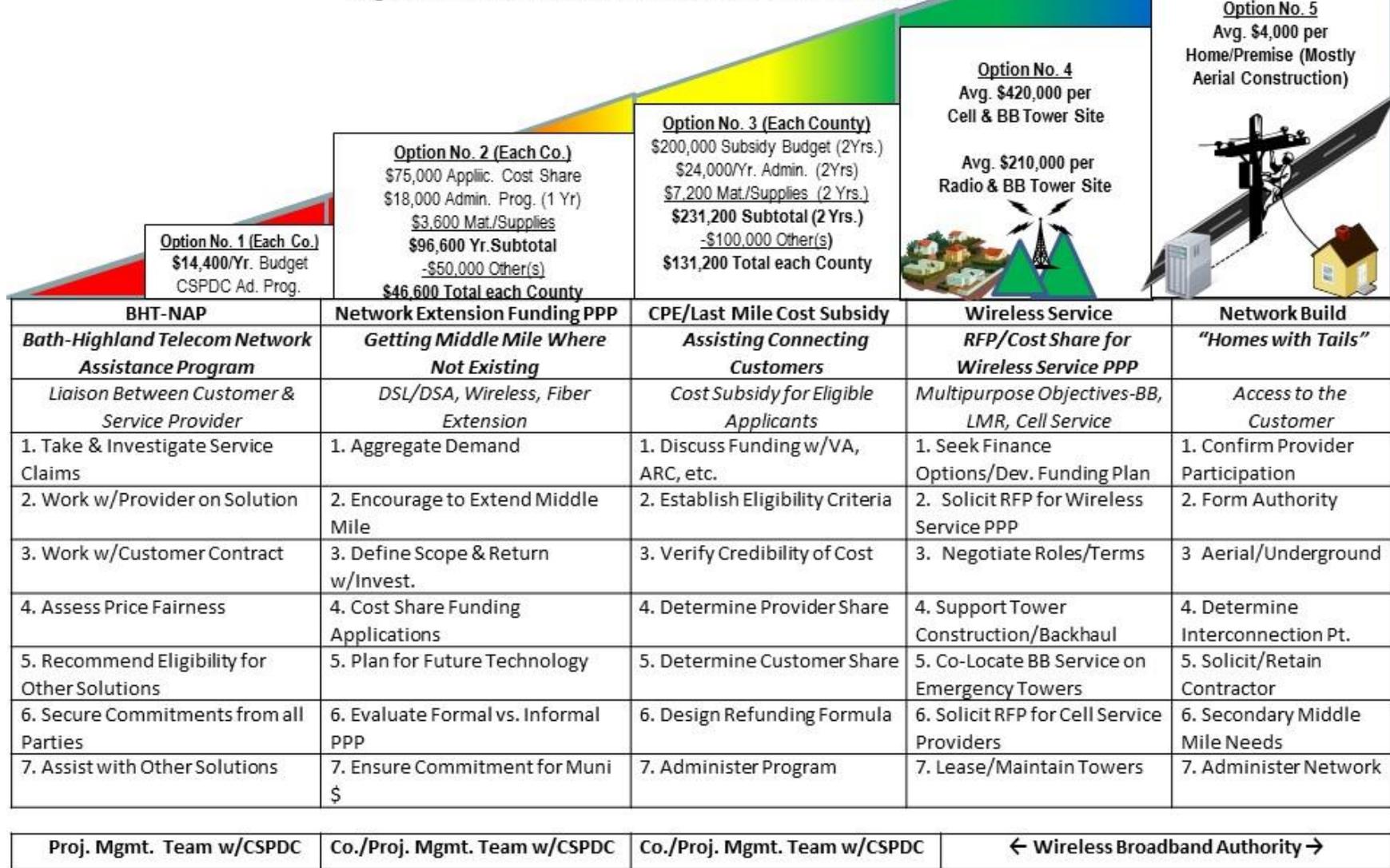
Least Direct Impact →

Longest Time to Reach Outcome → Shortest Time to Reach Outcome

Most Expense

Most Direct Impact

Most Effort



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.

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

Introduction

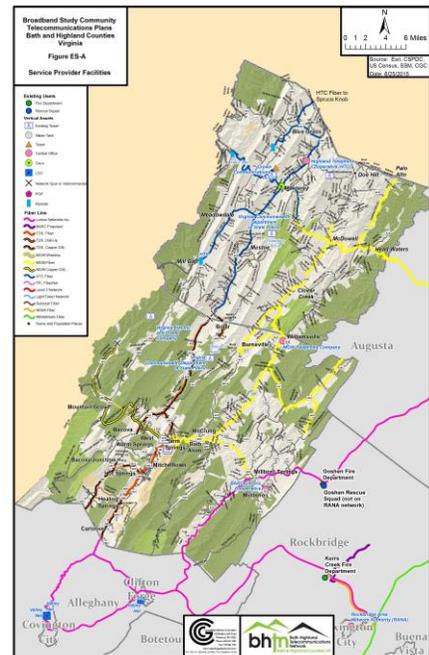
A rural Counties broadband Needs Assessment reviews population density, the locations of business, schools and colleges, hospitals, libraries and other strategic community anchor institutions to target the design of communications infrastructure to provide connectivity to these critical facilities. The 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.

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.

Figure ES-A: Service Provider



Highlights of Survey Response in the Study Area (abbreviated summary of some of the survey responses)

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%

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:

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
- When combining Residence & Residence w/Home-Based Business, the largest Annual Household Income range is more than approx. \$59,000 followed by the 2nd largest % being the lowest range of approx. \$31,300 or less
- Over 93% of Residences have Internet Access and almost 74% consider Internet Access Very Important or Critical
- 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
- 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

Business Use 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
- Over 96% of Businesses have Internet Access & 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-Very Likely to Subscribe to Wireless High Speed Internet Access if Affordable & Available
- Business No. of Employees at Location:
1 to 4 50.7% 5 to 9 10.7% None 7.9%

Figure ES-B: Internet Connections

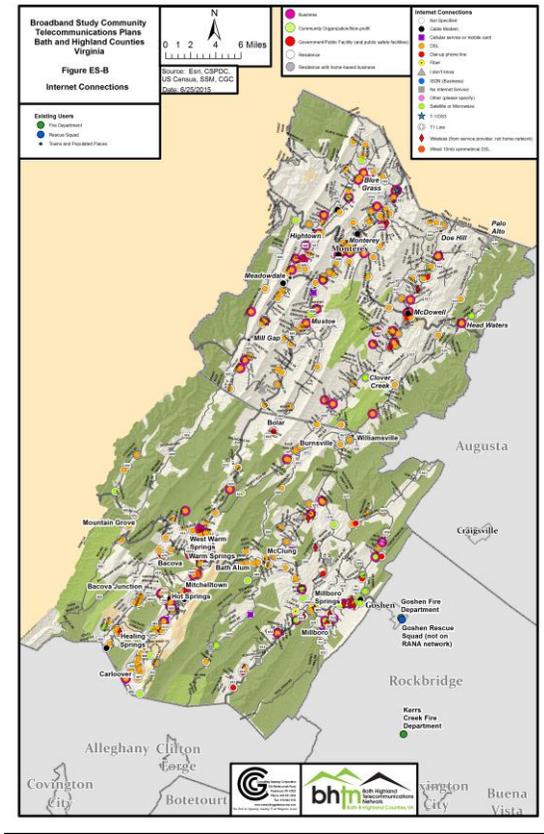
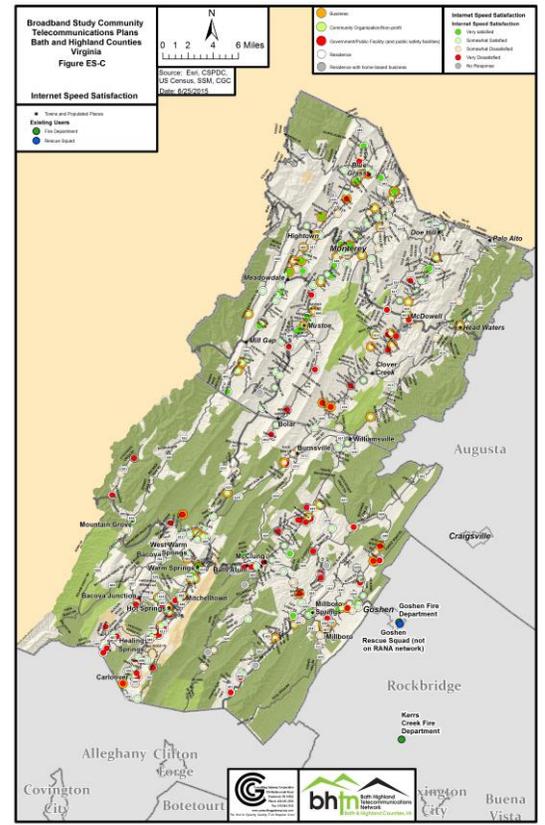


Figure ES-C: Internet Speed Satisfaction



Gap Analysis Summary 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.

Education

- Public Schools have a Tablet Take Home Program-Information is Uploaded to the Cloud and Pushed onto Tablets.
- Affordability is a Large Component of Enhancing Internet Capabilities.
- **Biggest Ed Problem:** Many Students at Home Lack Necessary High Speed Internet Connections-**72% of Residence surveys do not use Internet to Complete School Assignments or Job Training.**

The solution to the biggest obstacle facing Education in Bath and Highland Counties **is addressing High Speed Connectivity issues at the homes of the students and teachers.**

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 (i.e., viewing higher resolution radiology images) requires higher bandwidth access.

The biggest obstacles to healthcare related issues is in adequate bandwidth for remote diagnoses and consultation between medical professionals and doctor-patient, as well as keeping up with developing, storing and protecting the privacy of electronic medical records. **The solution to Healthcare gaps is an overall better communications infrastructure in the counties**, offering higher speed and more reliable bandwidth that can handle video imaging & large data transfer.

Library

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

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

Public Safety Education Resources

- The need to address Public Safety Radio Communications issues in both Counties could provide potential funding or cost sharing opportunities associated with communication towers.
- Numerous training courses are available online through FEMA, Dept. of Homeland Security, U.S. Fire Administration and the VA Dept. of Emergency Management.

Community Intranet

- Municipalities should implement and Citizens should be encouraged to utilize a robust community Portal as their start page, where they can get instant news and information.
- Opportunities for computer & job workforce training, seminars/workshops should be featured
- Key to the Portals success are links to school districts, community health providers, online learning sites, & local businesses (incl. info vital to considering a new business relocation)
- All businesses should be represented and links to business web sites provided.
- The current Eastern Shore Portal in VA (www.virginiaeasternshoreportal.com) is a good example to a community intranet, residents can access community information.



E-Government/E-Commerce

- 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, 7.2% have visited a government site. Such broad use provides great opportunities to promote e-government and e-commerce services
- Municipalities can make kiosks available for their citizens to see, feel & experience ‘broadband’.

E-Commerce

- The County’s downtown districts are located a considerable distance from main transportation routes (low flow of commerce “passing through”)
- Businesses must be proactive in marketing their products and services
- Home-based businesses should also be included on the Community Portal.

Training on Internet Use

- **Training should include hands-on workshops**, placing an item for sale on an online auction such as eBay.
- Training should be aimed at businesses as to where and how to market their business online.
- Entry level training should continue to be low to no-cost to encourage many to participate. Libraries should organize opportunities for training classes that are Internet specific; i.e., selling online & using search engines for research.

Lead by Example

- Local businesses that have established websites and are conducting e-commerce are the perfect spokespersons for educating others on advantages of technology.
- Organize business leaders by the Chamber of Commerce, promoted through workshops, marketed via. the Portal.
- Local networking groups provide support for business success & new ones should be encouraged.

Business Investment in Workforce Training

- 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.

Computer Training

- Limited opportunities within the Counties for job resources and computer use training. Businesses, schools and community organizations with expertise should be approached about providing such training as a community service.

Help Desk Support

- While 66.3% of Residents describe **Customer Service & Support** -Very or Somewhat Satisfied, more than 26% describe **Customer Service & Support as Somewhat Dissatisfied (16.1%) or Very Dissatisfied (10.0%)**. Service providers should be approached about ways (personal interaction, chat lines, text, e-mail, extended support hrs. etc.) to improve local help desk issues

Computer Equipment

- Since only 7.9% of the Residential services indicated 0 devices (computer, tablets, iPads, phones, or other devices utilizing the Internet), the **cost of these devices does not seem to be the biggest problem, but rather lack of high speed connection with 45.8%**. Until higher speed connection exist at homes, **it is important to ensure high speed connections exist at publically accessed facilities** (libraries, schools, local government, etc.).



Funding

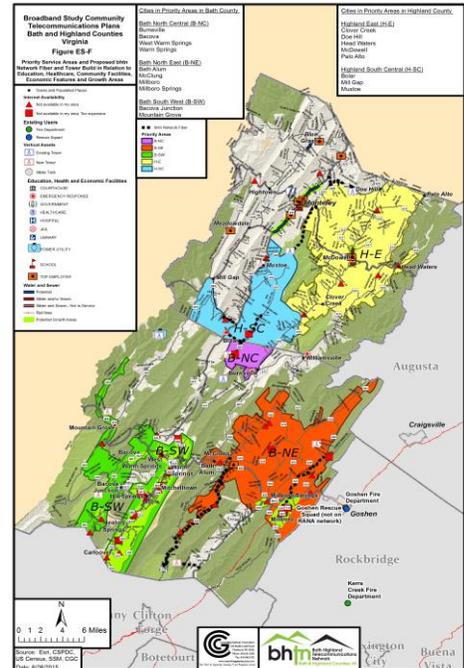
- Nearly all local sources are confined by a lack of available funding resources. Grant opportunities do exist but many require extensive research and preparation beyond current staffing time and focus primarily on planning studies rather than implementation of solutions. It is suggested to continue to use the services of the Central Shenandoah Planning District Commission (CSPDC) when possible due to skill sets and resources available.

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.

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.

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



Collaboration Partners and Projects

Reasons for the private sector to consider collaboration with public sector:

Monetary Incentives

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

Regulatory Incentives

- Electric Companies providing transmission services must comply with 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



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.

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. The counties will most likely not recover all the capital and operating expenses associated with these options.

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 Quiet Zone and control over use of spectrum. In addition, there was no real interest in the project from a wireless service provider. Wireless signal propagation modeling was not part of the scope of this strategic plan. 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. 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).

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. 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 (“Homes with Tails”). Given the valuable resources the Central Shenandoah Planning District Commission offers the counties (such as GIS mapping, preparing funding applications, meeting coordination and moderating, etc.), the consultants recommend the Counties’ utilize the CSPDC in furthering Options No. 1, 2 and/or 3.

Funding Strategies

Typical funding resources previously used in strategies for financing telecommunications network initiatives include:

1. USDA-RUS Telecommunications Funding Programs
 - ❖ Community Connect Grants
 - ❖ Expansion of Rural 911 Service Access Loans & Loan Guarantees
 - ❖ Farm Bill Broadband Loans & Guarantees
 - ❖ Telecommunications Infrastructure Loans & Guarantees
 - ❖ Distance Learning & Telemedicine Grants
 - ❖ Public TV Digital Transition Grants
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.)



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), and the role the counties would play. 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.

Not all regions of the study area have ubiquitous broadband. 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 will take interest in providing services but to date, none have expressed interest.

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 changes from time to time and comments are being taken for the definition 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.

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.

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.

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 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.

Closing

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 Geographic Information System (GIS) and use it as a management tool over the broadband issues. 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. 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 the Counties.

Acknowledgments

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