Broadband Activities in the Commonwealth

An Annual Status Report

Presented to:

Governor Terry McAuliffe,

The General Assembly of Virginia, and the

Joint Commission on Technology and Science

December 9, 2014

Contents

Legislative Mandate

§ 2.2-225 (Secretary of Technology) – Monitor the trends in the availability and deployment of an access to broadband communications services, which include, but are not limited to, competitively priced, high-speed data services and internet access services of general application, throughout the Commonwealth and advancements in communications technology for deployment potential. The Secretary shall report annually by December 1 to the Governor and General Assembly on those trends.

§ 2.2-2699.4. (Broadband Advisory Council) The Council shall have duty to annually report to the Governor and the Joint Commission on Technology and Science on the progress towards the goal of universal access for businesses and on the assessment of Commonwealth broadband infrastructure investments and utilization of Council-supported resources to promote broadband access.

Executive Summary

The Commonwealth of Virginia, through the Center for Innovative Technology, its partners, and the efforts of broadband providers and localities and regions continue to work to extend the reach and benefits of broadband access to all of our citizens. Broadband is an essential component of our economic competitiveness, and it stands to transform Community Anchor Institutions (CAI) across the Commonwealth: our K-12 schools and renowned institutions of higher education, our healthcare providers, our public safety facilities, and our public libraries.

In the past year, an in-depth analysis was released detailing the regional economic impact of the federal government's investment in advanced broadband technology and services throughout the Commonwealth. Some of the impact was immediate, especially with regards to education, while other benefits continue to accrue. Broadband is increasingly creating economic development opportunities, connecting residential communities, and carries significant potential to improve health outcomes and lower healthcare costs in rural and remote areas. An update of this analysis is included in this report.

The Office of Telework Promotion and Broadband Awareness (OTPBA) launched a new website at http://www.wired.virginia.gov. This cornerstone in the effort to expand availability of affordable broadband level telecommunications services – and drive awareness of the benefits of broadband – provides an easy-to-use "roadmap" format, built to serve multiple audiences including small business, individuals, localities and legislators.

Virginia's first broadband awareness and adoption pilot project resulted in a robust suite of resources added to the website. A series of Broadband Planning Strategies Workshops were held in more than a half-dozen communities across the Commonwealth, unveiling mapping and planning tools and resources developed under NTIA-funded projects, helping communities

overcome broadband access obstacles by educating community leaders on how to achieve last mile solutions.

Our work also continues to fuel the Broadband Availability Maps both for the Commonwealth of Virginia and at the national level, and provides critical data for counties seeking to enhance broadband coverage. Another key focus is working to identify remaining coverage gaps as they relate to healthcare providers and the readiness of the Commonwealth for the broad implementation of Health IT initiatives including electronic health records (EHR), Telehealth programs, and health information exchange (HIE).

The Commonwealth of Virginia and its partners are committed to bring adequate and affordable broadband to all Virginians. This report highlights the initiatives and activities that have occurred in 2014.

Broadband Advisory Council

The Broadband Advisory Council was established to help determine the Commonwealth's goals for broadband and how best to achieve them. The council was created from a recommendation from by the Broadband Roundtable (established by Governor Kaine in 2007) to accelerate the deployment of affordable broadband connectivity. The council was codified during the 2009 legislative session (HB2423).

The council is comprised of 11 members, two are ex-officio: four legislators, five citizen members, the Secretary of Technology, and the Secretary of Commerce and Trade. The council members are:

Delegate Kathy Byron (Chair)
Delegate Scott Surovell
Delegate James Leftwich
Senator Charles Carrico
Secretary Karen Jackson
Secretary Maurice Jones
Ray LaMura, President of the Virginia Telecommunications Association
R. Bryan David, Executive Director of Virginia's Region 2000 Partnership
Gary P. Schwartz, Director of Telecommunications for the Rappahannock Electric Cooperative
Duront Walton, Executive Director of the Virginia Telecommunications Industry Association
Tyrone W. Franklin, County Administrator, Surry County

Staff: Caroline Stolle (CIT), Sandie Terry (CIT)

The Broadband Advisory Council met on September 22, 2014 at The Center for Advanced Engineering and Research in Forest, VA. The Council heard presentations on the status of Center for Innovative Technology broadband projects, VCTA broadband recommendations, and an overview of recent Virginia Broadband Provider meetings in Richmond. The Council is scheduled to meet again in November in Richmond.

The Broadband Advisory Council met again on November 24, 2014 at the Patrick Henry Building in Richmond, VA. The Council heard presentations on the status of FirstNet, the results of the EducationSuperHighway initiative, and a response to a citizen inquiry regarding potentially unfair service rates.

Virginia Activities and Standings

National Broadband Leadership – The 2014 Akamai *State of the Internet* Report ranks Virginia in the top ten across all 5 key indicators.

- Virginia ranks second in both average connection speed and average peak connection speed.
    - In average connection speed, Virginia continued a multi-year ascent, from #8 (2012), to #3 (2013), to the current position as #2. Average connection speed increased 33% year-over-year.
    - In average peak connection speeds, Virginia broke into the top ten in 2013 ranking #6, and currently is ranked #2 after a 37% year-over-year gain.

	State	Q2 '14 Avg. Mbps	QoQ Change	YoY Change
1	Delaware	16.2	24%	50%
2	Virginia	14.6	6.0%	33%
3	Washington	14.2	13%	40%
4	District of Columbia	13.9	8.3%	23%
5	Massachusetts	13.8	5.8%	24%
6	Connecticut	13.7	17%	37%
7	Rhode Island	12.9	-0.4%	30%
8	New Hampshire	12.8	4.2%	20%
9	Utah	12.8	5.8%	24%
10	Oregon	12.8	9.4%	42%

Figure 17: Average Connection Speed by State

	State	Q2 '14 Peak Mbps	QoQ Change	YoY Change
1	Delaware	62.5	21%	49%
2	Virginia	59.4	10%	37%
3	District of Columbia	59.4	15%	21%
4	Massachusetts	58.5	12%	27%
5	New Jersey	57.5	17%	39%
6	Connecticut	56.9	21%	42%
7	Washington	56.6	13%	26%
8	Rhode Island	56.2	5.7%	38%
9	Maryland	55.5	15%	88%
10	New Hampshire	52.9	13%	21%

Figure 18: Average Peak Connection Speed by State

- In terms of high broadband connectivity, Virginia entered the top ten in 2014 for the first time.
    - Virginia ranks #7 in high broadband with 49% of the population with access to >10 Mbps connectivity, with a 59% year-over-year gain.
    - Virginia ranks #9 in broadband connectivity, with 81% of the population enjoying access to >4 Mbps speeds.

	State	% Above 10 Mbps	QoQ Change	YoY Change
1	Delaware	65%	33%	81%
2	Rhode Island	55%	0.6%	51%
3	Massachusetts	55%	1.1%	31%
4	Connecticut	54%	16%	68%
5	New Jersey	53%	11%	57%
6	New Hampshire	53%	1.2%	32%
7	Virginia	49%	9.5%	59%
8	New York	47%	7.4%	47%
9	Washington	47%	4.8%	51%
10	Michigan	46%	2.1%	84%

Figure 19: High Broadband (>10 Mbps) Connectivity, U.S. States

	State	% Above 4 Mbps	QoQ Change	YoY Change
1	Delaware	95%	2.8%	2.7%
2	Connecticut	92%	8.1%	13%
3	Rhode Island	92%	0.6%	3.1%
4	Hawaii	87%	1.0%	22%
5	New Hampshire	84%	-0.5%	1.3%
6	New Jersey	83%	2.8%	10%
7	Massachusetts	83%	-0.4%	0.1%
8	South Dakota	82%	-0.2%	6.7%
9	Virginia	81%	0.7%	7.5%
10	New York	81%	-1.2%	-2.1%

Figure 20: Broadband (>4 Mbps) Connectivity, U.S. States

- In a new category, Akamai also assigns Virginia a #9 national ranking for "4K Ready" connectivity, with 25% of the population with access to >15 Mbps speeds, representing a 91% year-over-year increase.

	State	% Above 15 Mbps	QoQ Change	YoY Change
1	Delaware	35%	35%	158%
2	Massachusetts	29%	6.2%	68%
3	New Hampshire	26%	5.3%	60%
4	District of Columbia	26%	17%	51%
5	New Jersey	26%	20%	137%
6	Connecticut	25%	27%	110%
7	Washington	25%	11%	82%
8	Rhode Island	25%	1.4%	132%
9	Virginia	25%	15%	91%
10	Oregon	23%	18%	100%

Figure 21: 4K Ready (>15 Mbps) Connectivity, U.S. States

Total Population with Broadband Coverage – Based on highlighted data collected by CIT and partners, Virginia Tech and VGIN, the following chart shows the progression of expanding broadband coverage to citizens across the Commonwealth of Virginia from 2010 to 2014. Data was collected from the fall data submissions unless otherwise noted.

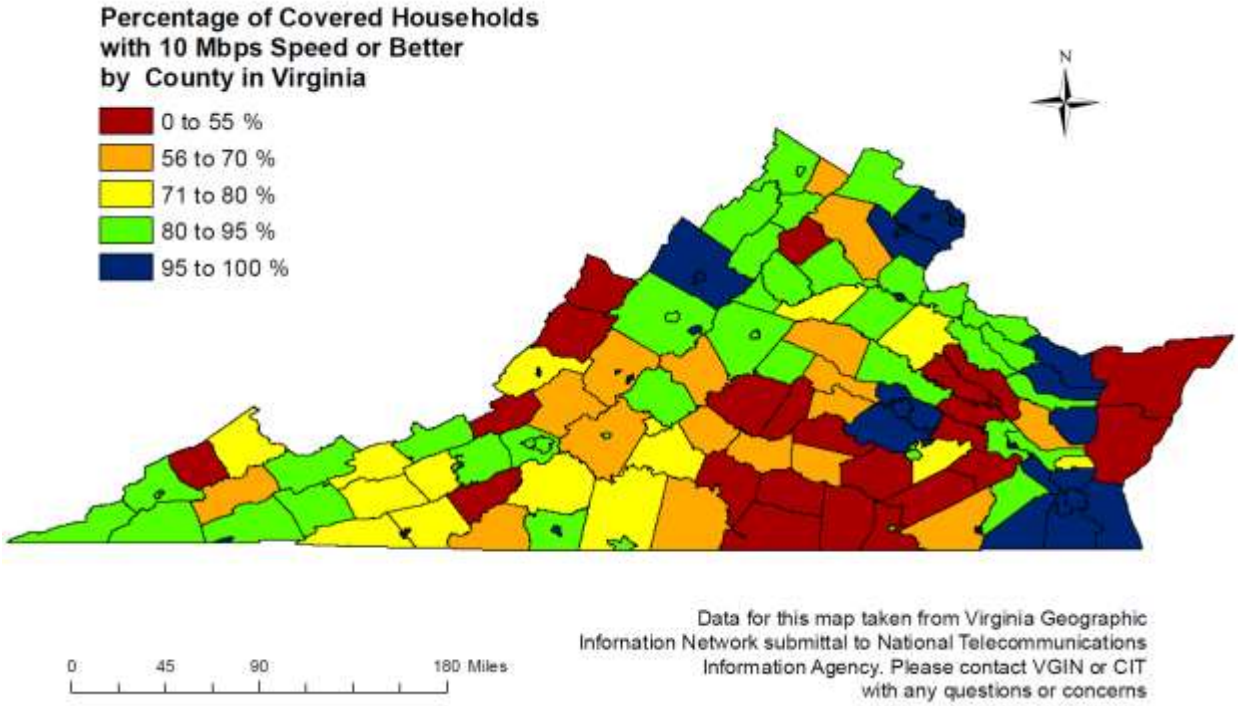
Commonwealth of Virginia: Percentage of the Population with Access to Broadband

	Population of the State	Population in Blocks < 2 Sq. Miles	Total Population with Coverage	Percentage with Coverage	Population with Three or More Coverage Options	Percentage with Three or More
2010	8,001,024	7,623,663	2,540,371	33%	1,109,501	44%
2011	8,001,024	7,623,663	4,921,140	65%	2,096,695	43%
2012	8,001,024	7,623,663	7,295,983	96%	3,796,677	52%
2013	8,001,024	7,623,663	7,377,735	97%	3,871,329	52%
2014	8,001,024	7,623,663	7,471,189	98%	3,959,730	53%

* 2011 Fall data was estimated by taking an average of the data from Spring 2011 and Spring 2012.

* The representations contained herein are for informational purposes only. Best efforts are undertaken to ensure the correctness of this information, however, all warranties regarding the accuracy of the map and any representations or inferences derived there from are hereby expressly disclaimed. The Virginia Center for Innovative Technology (CIT) and its partners neither assure nor accept any liability for the accuracy of the data. Those relying upon this information assume the risk of loss exclusively for any potential inaccuracy. All errors and omissions brought to the attention of the CIT will be promptly corrected.

Virginia Localities with Underserved Areas – Over 40% of Virginia localities continue to have significant underserved areas. Those localities have 20% or greater total households without fixed broadband access. Twenty-three counties have fewer than 55% of households with access to 10 Mbps speed or better across the Commonwealth.



Business – CIT released an in-depth report in December 2013 outlining the regional and economic impact of the federal government's investment in advanced broadband technology and services throughout the Commonwealth. In addition to presentation of findings related to Virginia's national leadership position on key broadband indicators and the demonstrated role of broadband to spur jobs and innovation in rural and economically distressed areas, the report included anecdotal evidence based on scores of interviews with awardees of federal project funding as well as regional planning commission members, county administrators, economic development directors, community development directors and business broadband customers.

Case studies presented in the report included examples of new or enhanced broadband capacity directly influencing the start-up, expansion, or relocation of businesses ranging in scale from home-based operations to a state-of-the-art data center. This diversity of economic impact related to expanded broadband throughout previously unserved and underserved regions were often the result of public-private partnerships supporting the projects. The report also provides case studies of CAI impact in healthcare, K-12 and higher education, and public safety.

The report, posted at http://www.wired.virginia.gov, concludes with continuing challenges for broadband adoption in the Commonwealth, including last mile connectivity, lack of competition, and the need to further drive awareness and adoption.

In October, all awardees of federal project funding were again interviewed with regards to economic impact, CAI access and residential adoption, since many of the federally funded network builds did not begin delivering service until spring 2014. Updated findings are included in the Broadband Infrastructure Deployment and Impact section of this report.

Education – In June, a partnership was announced between the Commonwealth of Virginia, the Virginia Department of Education, and EducationSuperHighway. Recognizing that broadband access in Virginia schools is critical to creating a stronger workforce and a more competitive economy, the partnership will aim to connect all K-12 students across the Commonwealth to high-speed broadband. Specifically, working with state agencies, service providers, and partners across Virginia, EducationSuperHighway will provide recommendations that will ensure all schools meet the president's ConnectED goal of 1 Mbps/student by 2018. Virginia was one of only two states selected by EducationSuperHighway to participate in a state broadband pilot in 2014 and has the opportunity to emerge as a leader and role model for K-12 connectivity nationwide.

In Phase 1 of the Virginia K-12 Broadband Connectivity Project, 97% of divisions participated in data collection, allowing EducationSuperHighway to determine that only 33% of divisions and 23% of students meet the 2014 connectivity goals for Internet access, and that Virginia divisions pay 26% more for connectivity than the national sample.

Initial analysis highlights the opportunity to help divisions procure the bandwidth they need today, and to position them to meet rapidly increasing bandwidth for digital learning, as reflected in the FCC's 2018 connectivity goals. The next phases of work of the Virginia K-12 Broadband Connectivity Project will focus on learning more about the challenges facing divisions, and explore innovative opportunities to reduce costs and upgrade connectivity for every school.

Healthcare – The fifth annual online Broadband and Health Information Technology (IT) Usage Survey kicked off in October 2014. The survey received support from the Secretaries of Health and Human Resources and Technology as well as strong promotion among the following key healthcare associations in the Commonwealth: MSV; Community Health Care Association; VRHA; VDH; VHCA; VCAL; VAHC; VAFC; VACSB; VPHA; VDSS; VMGMA; VHHA[1]. Once completed, a report will be submitted and the data will be used to update the Virginia Health IT map which is available at: http://www.wired.virginia.gov/broadband/coverage-maps/.

[1] Medical Society of Virginia; Community Health Care Association; Virginia Rural Health Association; Virginia Department of Health; Virginia Community Healthcare Association; Virginia Center for Assisted Living; Virginia Association of Home Care and Hospice; Virginia Association of Free and Charitable Clinics; Virginia Association of Community Service Boards; Virginia Pharmacists Association; Virginia Department of Social Services; Virginia Medical Group Management Association; Virginia Hospital & Healthcare Association.

The information will also be used to help decision makers in the Commonwealth assess gaps in coverage to support Health IT initiatives including EHR, Telehealth, and HIE adoption in hospital, physician practice, clinic, and other healthcare facilities. The survey also addresses demonstration of "Meaningful Use" as defined by the Centers for Medicare and Medicaid Services (CMS).

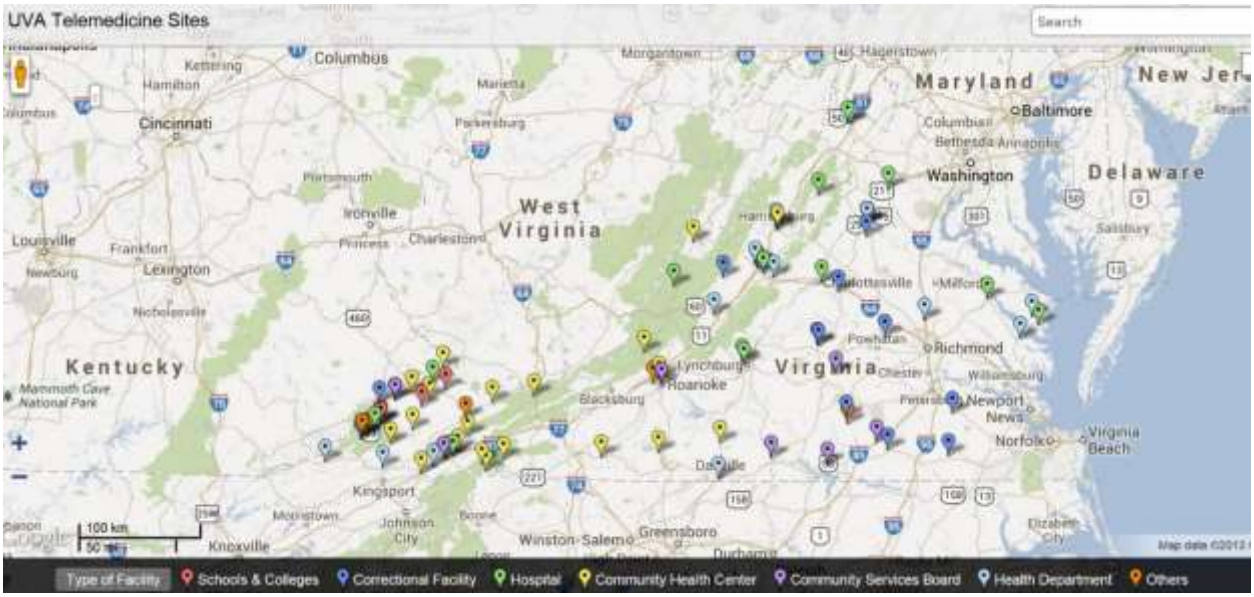
The 2013 report showed Virginia's continuing national leadership in Telehealth and broadband speeds. Important findings also included that Virginia jumped from 5th to 3rd in its national ranking for hospital-based adoption of EHR over the two prior years.

HIE in Virginia was the focus of a report released in January, providing an analysis of HIE best practices on a national level and an update on adoption in Virginia. Rigorous HIE utilization is a requirement of satisfying Stage 2 Meaningful Use requirements as they relate to the CMS EHR Incentive Program. At that point, the Commonwealth's statewide HIE, ConnectVirginia, was shown as "on plan" to achieve implementation targets envisioned by a comprehensive strategic plan developed by the Virginia Health Information Technology Advisory Commission (HITAC) in 2010.

Healthcare was also prominently featured in a December report on the broadband providers from across the Commonwealth benefiting from the Broadband Initiatives Program (BIP) and Broadband Technology Opportunities Program (BTOP). In 2013, CIT and Broad Axe met with each funded provider to gain insight on their project and status, and conducted interviews with stakeholders including healthcare providers.

The report found that rural health systems were successfully connecting outlying physician practices to hospitals enhancing point-of-care services and administrative integration with EHR and HIE. Other findings included dramatic savings for tens of thousands of citizens with regards to transportation for medical appointments, with the University of Virginia Center for Telemedicine calculating that patients had been spared 8.66 million miles of travel related to 33,000 encounters as of the report's release. Initiatives related to critical care, such as stroke treatment, as well as patient education for prenatal, diabetes and other chronic patients are improving health outcomes for these high-risk, high-cost groups.

Further research conducted in 2014 related to BIP and BTOP providers highlighted continuing benefits of broadband initiatives in previously unserved and underserved areas. Clinical experts in over 45 medical specialties at the University of Virginia Hospital provide telemedicine services to patients across the Commonwealth.



Telemedicine clinic sites served by the University of Virginia Health System

Similarly, the Telemedicine Center at Virginia Commonwealth University provides specialty care in 16 areas through alliances with 30 Virginia Department of Corrections' facilities, the Virginia Center for Behavior Rehabilitation, and health providers associated with Community Memorial Health Center in South Hill, Centra Health System in Lynchburg, Danville Regional Medical Center, Southern Virginia Regional Medical Center in Emporia, Riverside Health System, and Valley Health System in Winchester.

The Mid-Atlantic Telehealth Resource Center (MATRC), based at the University of Virginia, provides technical assistance and other resources across eight states and the District of Columbia representing more than 53 million people. MATRC has served as a leader in ensuring the extension of Telemedicine services to remote, rural areas and medically underserved urban communities, and is focused on expanding Telemedicine services to fully leverage its potential.

These services include mobile broadband applications (enhancing ambulance-based care, concussion testing for high school sports, bringing remote primary care into K-12 schools, expansion of care for Veterans from community and regional health centers, and mental health assessments from courts, jails and hospitals), increased consults to areas lacking specialists, direct-to-home consults, partnering with companies to bring healthcare to the work site for at-risk populations in heavy industrial jobs, and expanding Telemedicine in long-term care environments to generate savings for Medicare patients.

In addition to these Telemedicine services, which typically link providers to patients via "live" video, effective remote patient monitoring solutions have successfully emerged in the Commonwealth. These solutions leverage the increased availability of broadband to the home and support larger-scale population health initiatives by monitoring and coordinating care for vulnerable patients, both those at risk of acute events like a hospital readmission and those with chronic disease management needs. For example, a post-acute remote patient monitoring

and care coordination program at the University of Virginia Health System called C3 has demonstrated significantly lower readmission rates, and has effectively integrated post-acute patient trends into the Health System's EHR platform, improving the connectivity from hospital to home.

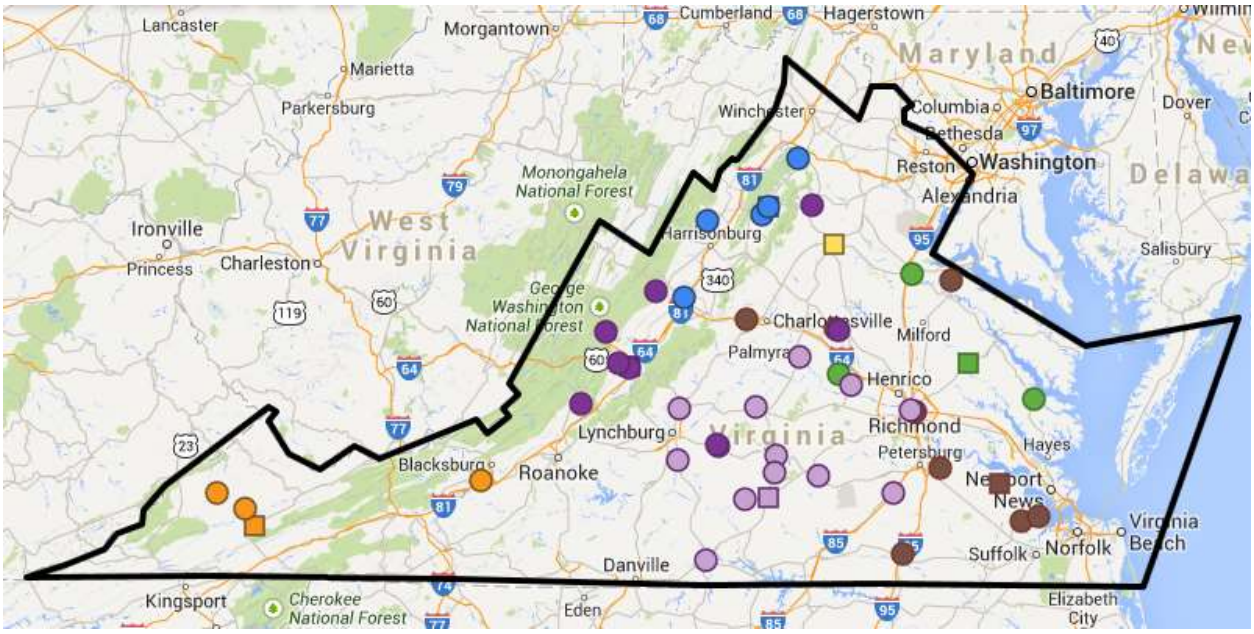
Virginia Broadband Mapping and Planning

Regional Workshops

CIT and Virginia Tech co-hosted a series of regional workshops during the first and second quarters of 2014 unveiling mapping and planning tools and resources developed under NTIA-funded projects.

The Broadband Planning Strategies Workshop focused on helping communities overcome broadband access obstacles by educating community leaders on how to achieve last mile solutions. Content included top-level updates on broadband in Virginia, a case study of public-private partnership, an overview of the updated broadband Toolkit and associated broadband deployment planning tools. Each workshop included 30-45 minutes of Q&A to discuss challenges specific to each participating community. Custom mapbooks including broadband coverage maps and vertical asset maps were also provided for each participating community.

Locations for the Broadband Planning Strategies Workshop included Luray (17 attendees), St. Stephens Church (8), Lexington (27), Lebanon (9), Keysville (30), Surry (23), and Culpeper (22). The following color-coded map provides the event locations (squares) and related communities of origin of attendees (circles).



Map of Locations and Attendees of the Broadband Planning Strategies Workshop

Resources from the Broadband Planning Strategies Workshop are available for download at wired.virginia.gov/toolkit/. Highlights of feedback from the workshops included:

"Thanks for copies of the slides and your offer for further assistance. Our Broadband Authority will be populated with representatives on Monday the 7th. I will be one of them and I've already been appointed the 'champion' by the Chairman of the Board of Supervisors who was at the session. So, to answer your question - is there anything you can do to help - Oh Yeah! I'm getting my arms around your website and plan to send a synopsis of the site to all the new players once they are announced. After that, I'll need help with the inventory of existing facilities, mapping locations, organizing a county wide speed test, and getting Yes/No answers from embedded suppliers (Verizon/Comcast) on their willingness to 'partner' with us."

"Great job! Very informative"

"Very insightful. Thanks!"

"All Good!! Thank you!"

"Case studies were very beneficial"

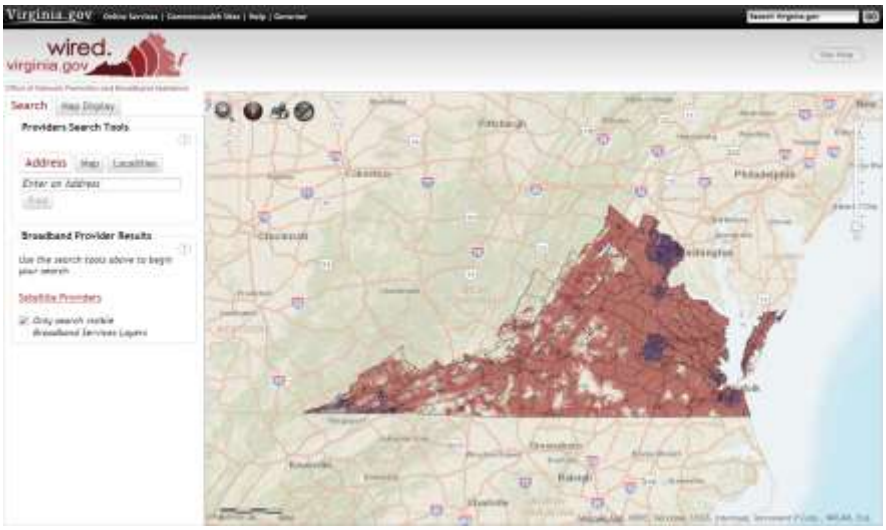
"It was GREAT!"

"Very good workshop. Well planned and very focused!"

Mapping

In March 2014, the Commonwealth of Virginia released a fourth edition of its broadband

availability map. The map is a collaborative effort between CIT, the Virginia Information Technology Agency (VITA)'s Virginia Geographic Information Network (VGIN), and Virginia Tech's Center for Geospatial Information Technology (CGIT) program. The map allows users to search by address and view a list of providers or technology type available at that particular location. A link to the map can be found on the Office of Telework Promotion and Broadband Assistance (OTPBA)'s website: http://www.wired.virginia.gov/broadband/coverage-maps/. Below is a screenshot of the interface:



During 2014, CIT and partners, Virginia Tech's CGIT and VGIN continue to submit data and update the map on a biannual basis to improve both the accuracy and usability of the map. CIT and VGIN worked this past year to improve and expand the Community Anchor Institution (CAI) dataset by increasing collection and gathering speed test data developed by CGIT. CAIs are locations that local populations can use to access broadband services, such as libraries, schools, and government buildings. These locations can be invaluable for citizens living in rural or underserved areas. Starting in 2015, CIT and partners Virginia Tech's CGIT and VGIN will continue to submit data and update the map on a biannual basis to improve both the accuracy and usability of the map.

Integrated Broadband Toolbox

CIT and Virginia Tech's CGIT are coordinating a number of activities of the state broadband initiative into an Integrated Broadband Toolbox (Integrated Toolbox). This activity began in 2012 as the "Advanced Broadband Toolbox (Toolbox)" and is planned to be completed in February, 2015. The initial Toolbox combined statewide digital terrain and surface models, a broadband speed measuring/reporting tool, a map book creator, Virginia's inventory of vertical assets, and spatially referenced broadband policy information. This suite of tools is available at http://www.wired.virginia.gov/broadband/resources/. The Integrated toolbox will include the above tools while integrating them all into one navigation screen and adding capabilities to view radio frequency (wireless) propagation models and a web based 3D viewer.

A state-wide **Vertical Assets Inventory Toolkit (VAIT)** was developed and brought online in May 2012 and is updated on a regular basis. The VAIT serves as a repository of location information for structures that have the potential to serve as wireless broadband transmission sites. The aim of the Toolkit is to assemble a database of both traditional sites (e.g. radio transmission towers), and non-traditional sites (e.g. silos, tall buildings, water towers, etc.) which may be suitable as candidate locations for the installation of wireless broadband transmission equipment.

The repository provides information for tall structures that have the potential to serve as wireless transmission sites and aims to bring owners and managers of these sites together with wireless internet service providers in order to facilitate the integration of broadband and information technology into state and local economies.

The Vertical Assets Inventory includes federal and locally-sourced assets through regional campaigns and partnerships including the Virginia Municipal League (VML) to include VML-insured water towers in the database.

The current Vertical Assets Inventory can be found here: http://www.wired.virginia.gov/wp-content/uploads/Broadband/Virginia-Resources/VerticalAssets14.pdf.

Part of the Integrated Toolbox is an **RF propagation tool** that calculates generic coverage estimates for various wireless broadband technologies including fixed wireless, 3G, 4G, LTE, and LTE Advanced. The model generates RF propagation coverage estimates for planning purposes as well as modeling current service provider coverage. Estimates for received signal strength are provided in a GIS format that allows for ease of integration and analysis with other statewide spatial data.

The RF propagation models were used by the broadband team to estimate wireless coverage for more than a dozen Wireless Internet Service Providers (WISPs) who did not have the technical capability or staff to provide their coverage estimates for the state and national mapping initiative. This allows a more complete representation of the broadband coverage in Virginia and puts these WISPs "on the map" for discovery by businesses and individuals. This tool is still currently under development and will be part of the Integrated Toolbox.

The **Virginia Broadband Policy Database** application allows users to select a point on a map that represents a potential wireless tower or equipment installation site, and then obtain a report on the national, state, and local policy guidelines or restrictions that may be applicable for that location. This information is of critical importance in planning the placement of wireless towers or other wireless equipment installations.

Additionally, VGIN has been creating geospatial address data for providers that reported by Census Block only, particularly blocks greater than two square miles. The objective of this effort is to move all providers towards the same reporting structure as well as improve the accuracy of the data. In addition, as part of the Broadband Integrated Toolbox, a "broadband 3D viewer" web application has been developed to assist with broadband tower placement planning activities. To support the three dimensional perspective, VGIN also implemented a statewide

"Digital Surface Model" representing buildings and trees above the surface of the earth. Combined with man-made cultural features and terrain features, the surface model can support many facets of broadband planning previously unavailable to decision makers. The terrain data and surface model data will also improve the accuracy of the modeling of wireless signals, both for reporting fixed wireless coverage and validation of reported cellular coverage.

Building upon the successes of the broadband mapping program, Virginia Tech's CGIT is currently developing **Broadband Map Books** http://www.wired.virginia.gov/broadband/coverage-maps/. A Map Book consolidates the various data layers from Virginia's interactive broadband availability map for each county as well as to create new views of related information into a format suitable for broadband planning initiatives. To date, each county, city, planning district and congressional district map book products consist of the following predefined broadband themes: Cable Wireline services, DSL Wireline services, Fiber Optic, Fixed Wireless services, 4G Wireless Services, Mobile Wireless services, Accelerate Virginia Speed Test locations, Vertical Assets locations, Community Anchor Institutions, and Population density by Census tract.

Additional county themes currently under construction include the identification of local facilities such as public safety and healthcare sites, and the identification of locations where various broadband services overlap, such as where Cable and DSL Wireline services are both available – information that is integral to community broadband assessment and planning.

Additional Broadband Activities

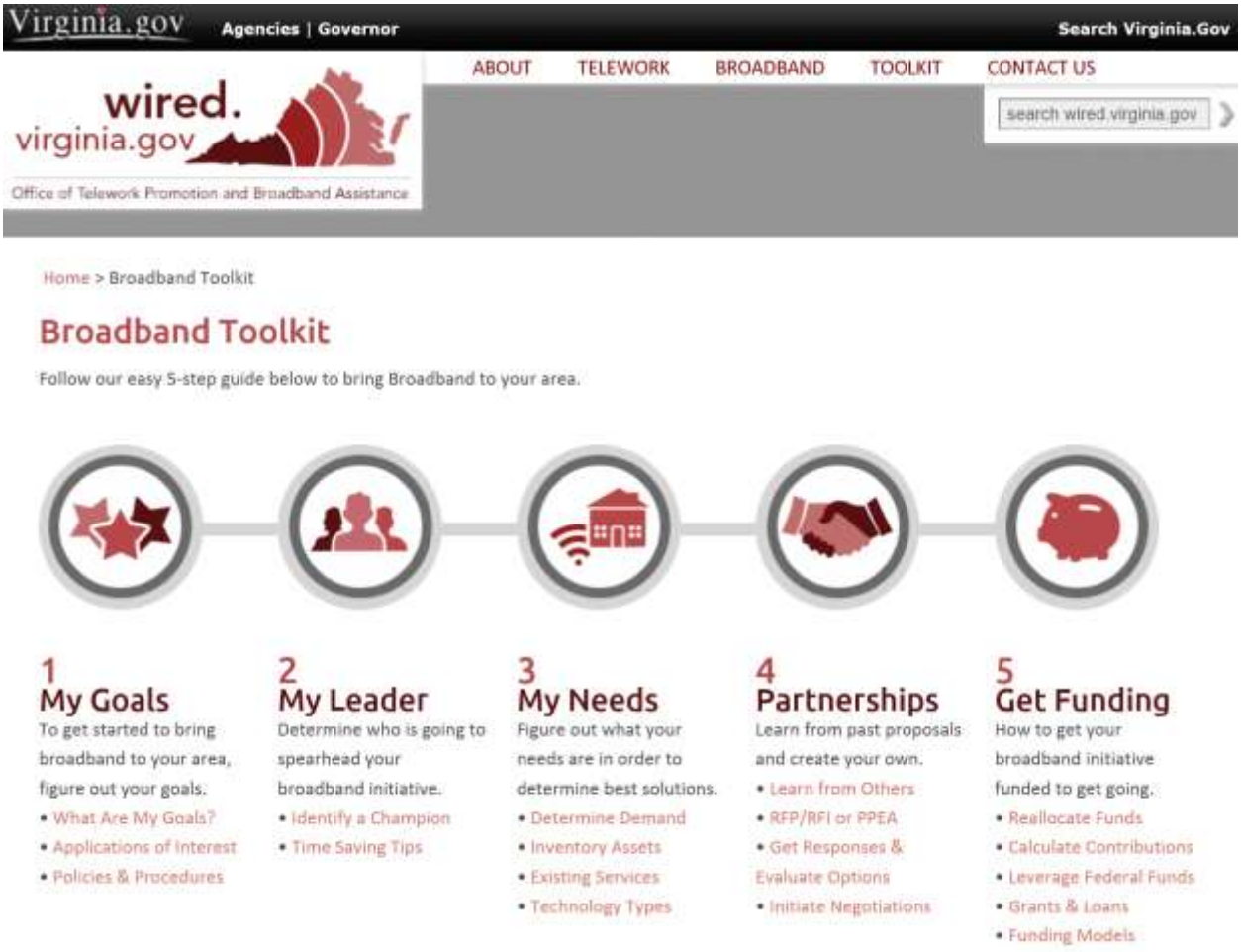
Technical Assistance: Broadband Awareness and Adoption

Providing all citizens and businesses with affordable broadband is a necessity and a goal of many communities and governments. In addition to broadband availability, though, citizens and businesses must be aware of, and prepared to leverage, the many benefits that having broadband affords them.

Over the past year, CIT has created new digital resources for audiences across the Commonwealth, and provided direct assistance to numerous counties, towns and Planning Districts to address the need for broadband awareness and adoption.

In February, OTPBA launched a fully redeveloped website at http://www.wired.virginia.gov. A key asset in continuing efforts to expand availability of affordable broadband level telecommunications services and drive awareness of the benefits of broadband, the streamlined and more robust website was redesigned to be responsive to mobile devices and provide users with significantly expanded resources.

The site provides an easy-to-use "roadmap" format, built to serve multiple audiences including small business, individuals, localities and legislators. The 5-step process creates a linear framework for nearly 20 content areas, helping users assess goals, identify champions for a broadband initiative, determine demand versus existing assets and services, consider partnerships, and understand the process to secure funding.



The new site features a dynamic Coverage Maps application enabling searches of specific Virginia addresses to check for broadband coverage, alongside enhanced tools and more than two dozen links to additional resources. Since its launch, there have been nearly 19,000 unique visitors to the site, and the total number of visits exceeds 66,000 – reiterating the value of the Toolkit and other associated content.

In November, CIT released the results of the first broadband awareness and adoption pilot project, including resources and strategies to assist local and regional governments in expanding the 21st Century infrastructure that enhances a community's economic opportunities and quality of life.

Based in large part on a report and recommendations to the King and Queen County broadband working group, including results of an in-depth direct mail survey of more than 500 county households, the strategies are intended to provide local and regional officials with community-based programs to increase overall broadband adoption. King and Queen County began installation of a fixed wireless broadband network in 2013, which is expected to reach 100% of residents by 2015.

The report and associated resources – which detail strategies to increase adoption among non-adopters, low income non-adopters, student family non-adopters, and business non-adopters – are available online at http://www.wired.virginia.gov/broadband/broadband-adoption/.

Throughout 2014, CIT representatives presented at major association conferences, uniting leaders representing both the public and private sector across the Commonwealth. Highlighted events include:

- Virginia Association of Planning District Commissions annual conference in Richmond
    - As a result of the event, CIT is working closely with three Planning District Commissions (George Washington Regional Commission driven by the University of Mary Washington's strategic plan to ensure adequate broadband to support the planned business development areas throughout the region, Central Shenandoah Planning District, and the Thomas Jefferson Planning District)
- Virginia chapter of the American Planning Association annual conference at Wintergreen
- Virginia Wireless Internet Service Provider Industry conference in Richmond featuring Secretary Jackson
- Commonwealth Planning & Zoning Conference in Richmond
- Virginia Association of Counties Annual Conference in Bath County

Technical Assistance: Indian Country Broadband Mapping

Virginia was selected by NTIA to reach out to Native American tribes throughout the country and provide assistance in collecting and submitting broadband availability data. Under the overall direction of CIT, a team of professionals has been assembled to accomplish this task: Native American Capital, LLC (NAC), a Virginia-based, Native American-owned consultancy with extensive relationships throughout Indian Country, was subcontracted with the assignment to reach out as widely as possible to Indian Country (tribal) telecoms and Native American opinion leaders with a stake in improving Native American tribes' broadband access; the technical mapping subcontractors are Virginia Geographic Information Network (VGIN) and Virginia Tech's Center for Geospatial Information Technology (CGIT).

CIT and NAC have developed the most extensive and accurate database of Indian Country broadband contacts ever assembled. The project is now in closing and technical outreach has been completed, led by VGIN. CIT and partners were working to facilitate the collection of tribal telecom coverage data for inclusion in the National Broadband Map (NBM) through a sustained presence at conference panels within Indian Country.

Many contacts were made and data was submitted to the NTIA, though the data collected fell short of expectations with regards to impact on the NBM. For closeout of this project CGIT is preparing a report to document why tribal participation was not as widespread as hoped and also to provide additional analysis of broadband in Indian Country to include all current federally recognized tribes. Additional statistical analysis areas are to include: population densities, urban/rural classifications, broadband area coverage, socio-economic factors, and physical limitations within federally recognized tribal boundaries.

Veterans Health and Broadband Access

The Virginia Tech Institute for Policy and Governance (VTIPG), in collaboration with CIT, Broad Axe Technology Partners, and Virginia Tech's CGIT, published an extensive series of research reports in June 2014 titled, "Veterans and Broadband Access in Virginia: Implications for Healthcare Planning and Policy." The project, funded by the 2009 American Recovery and Reinvestment Act, was a collaboration between the Virginia Tech Institute for Policy and Governance, the Virginia Center for Innovative Technology and the Virginia Tech Center for Geospatial Information Technology. The project examined broadband initiatives, in the contexts of telemedicine, electronic health records and health information exchange that impact Virginia veteran's health care access, services and outcomes. Further, the project examined the geospatial dynamics of the availability and delivery of broadband enabled services to veterans.

The reports detail key findings and recommendations in three categories: broadband infrastructure and technology, health care services and coordination, and program and policy actions. In the first category, the study recommends state, federal and private investment in broadband infrastructure and technology; information outreach to veterans regarding security protocols for electronic health records and health information exchange; technologies to support information sharing across health systems; and increased web-based appointment scheduling applications for VA health services.

To improve healthcare access, the study recommends expansion of broadband-enabled services in rural areas; outreach and education among veterans and providers on the benefits of broadband enabled technologies; training collaboration by stakeholders; and integrated networks of care between the VA system and community providers. Finally, recommended program and policy actions include increasing insurer coverage of services, improving provider knowledge on broadband-enabled services and billing methods, and developing universal standards for provider credentials.

While the Veterans Health Administration has led development and utilization of broadband enabled health technologies, such as telehealth, electronic medical records and health information exchange, only 17% of Virginia veterans received health care services from the VA health system last year. For these veterans and the 83% of Virginia veterans who receive services from other health systems coordination of health services between systems and insurers can be greatly improved by broadband technologies.

The reports are published online at http://www.wired.virginia.gov/broadband/initiatives/health-it/.

Accelerate Virginia / Outreach

Accelerate Virginia is a statewide initiative of the Virginia Tech eCorridors program to engage and educate the public and raise awareness about broadband availability in Virginia. Accelerate Virginia supports the Virginia State broadband mapping initiative by collecting consumer Internet performance measurements that complements and adds additional insight to the broadband data currently collected by the state from service providers.

The eCorridors Accelerate Virginia Internet speed test provides a platform for citizens and businesses within the Commonwealth to measure the performance of their Internet connections and record their results on a map. In addition, users of the speed test are presented with a summary report and metrics that provide a richer understanding of the capabilities and quality of their Internet connections. Since the State Broadband Initiative began, eCorridors Accelerate Virginia has collected over 10,000 speed tests in Virginia and has collected data from 132 of the 135 counties and independent cities in the Commonwealth.

eCorridors provided support for the following CIT broadband strategy planning efforts:

- Participated in all 7 broadband planning strategies workshops; Luray, St. Stephens Church, Lexington, Lebanon, Keysville, Surry, and Culpeper Virginia
- Coordinated and conducted the collection of Internet performance data for Virginia's public libraries to support of eRate funding initiatives.

eCorridors has also actively supported Virginia's State Broadband Initiative by:

- Providing broadband planning support to the Augusta County, Green County, Isle of Wight County, Orange County, New River Planning District Commission, City of Roanoke, Town of Blacksburg, and Prince George County
- Continues to support the Broadband Planning and Analysis Toolbox applications.
- Collaborated with Dr. Jeff Reed, Taeyoung Yang, and Bob Bailey for a project related to broadband for public safety using long term evolution (LTE) technology including funds provided by eCorridors and partners as initial seed funding
- Providing ongoing staff support for Virginia Tech's participation in GigU and US Ignite.

New Projects

The Virginia Broadband Team works with citizens, businesses, counties, and regions through Planning District Commissions to identify and connect them with broadband providers in their area. New projects, not funded by the American Reinvestment and Recovery Act or building new capacity beyond that created by ARRA-funded projects, are currently underway:

Central Shenandoah Planning District Commission Bath/Highland Broadband Project – On behalf of Bath and Highland Counties, the CSPDC applied for and received a CDBG regional planning grant for a telecommunications planning project. Planning grant funds will be used to

develop strategies and identify resources for addressing the gaps in broadband services. A Broadband Telecommunications Management Team has been established and is working towards developing a Community Telecommunications Plan which will include a needs assessment analysis, broadband education and application development, last mile connectivity solutions, preliminary engineering and cost estimates, organizational and operational recommendations, and funding strategies for future implementation projects.

Northern Neck Planning District Commission Broadband Planning Study – The NNPDC has completed a Regional Broadband Study assessing the need for broadband services within the region and preliminary engineering. A Broadband Authority has been formed to pursue ways to implement the plan. A wireless broadband pilot program was completed to test a licensed wireless frequency. The NNPDC and the Authority are currently working with a local wireless service provider to deploy this licensed wireless frequency regionwide.

George Washington Regional Commission – The GWRC is working to meet the strategic plan set by the University of Mary Washington, focused on ensuring there is adequate and affordable broadband for all planned business development areas in the region. The GWRC is also evaluating provider options to expand access in unserved areas and better facilitate broadband deployments. The Broadband Team is working with local governments to map assets (towers and fiber) to determine what existing infrastructure could be leveraged to contribute to a regional broadband ring to provide high capacity, fully redundant service to the business development areas. The next meeting with the region is scheduled to take place in November.

Thomas Jefferson Planning District Commission – The TJPDC is working with local governments to map assets, review policies and aggregate demand.

Testimonials

Following are excerpts of in-bound communications regarding the work of the Virginia Broadband Team over the past year.

"I want to again thank you for all the help you have been providing the Middle Peninsula. Without your eyes and ears, we would still be spinning in circles."

Lewis Lawrence
Executive Director, Middle Peninsula Planning District Commission

"I want to thank you for all the effort and personal interest you have put into our radio problems. With your background you truly understand our issues. My Chief Deputy Joe McLaughlin, NK Fire and Rescue Chief Opett, and I have literally traveled the Commonwealth looking for funding. As you would expect with little success. However, we have made everyone aware of our communication issues and hopefully we will get some help down the road. I want you to know you have gone above and beyond to try and help us with this issue. I know I speak for the others when I say THANKS."

F. W. "Wakie" Howard, Jr.
Sheriff, New Kent County

"I would also like to express our gratitude for the attendance of Sandie Terry at our 2014 summer conference. More important than her attendance however is her untiring commitment to bringing broadband solutions to every corner of Virginia."

Tim Ware
Executive Director, George Washington Regional Commission

"Thank you again for your presentations. Clearly you are laying ground work for helping the underserved areas. You offered to send the presentation you used in the county meetings. It sounds like you really understand the challenges in the counties."

Lon Welchel
Resident attending a Regional Workshop

"We appreciate all that you and the CIT staff do!"

Dennis Reece
COO and Assistant General Manager, Citizens Telephone Cooperative

"The work you have done for us has been outstanding."

Jim Kelley
BARC Electric

"First, thank you very much for the time and effort invested in the presentation today. I know that you have enjoyed catalyzing the broadband utility expansion in Virginia, it shows... As I overheard conversations after the meeting – there were plans for testing, policy updates in comp plans, and plans to collaborate across county lines. Great job!"

Jim Charapich
President/CEO, Culpeper Chamber of Commerce

Broadband Infrastructure Deployment and Impact

Broadband providers from across the Commonwealth garnered approximately $155 million (total) from the Broadband Initiatives Program (BIP) and Broadband Technology Opportunities Program (BTOP) programs. In 2014, CIT and Broad Axe met with each funded provider to gain more insight on their project and status. Information below captures reporting from those meetings, in addition to research and interviews conducted with regards to economic impact, CAIs and residential adoption. Maps are provided from the 2013 impact assessment.

Overview

Broadband now flows to – and through – most economically distressed counties of the Commonwealth.

- The Governor's Commission on Economic Development and Job Creation cited the number one strategy to improve economic development in areas hardest hit by the economic downturn as "Develop strategies to expand deployment of high-speed broadband and other infrastructure improvements."

- Southwest Virginia is a principal beneficiary

    - Broadband initiatives have reached the vast majority of counties located in the mountainous westernmost region of the Commonwealth

    - Federally-funded broadband providers headquartered in the region include Bristol Virginia Utilities, Citizens Telephone Cooperative, and Scott County Telephone Cooperative

    - Additional counties north of this traditionally defined area – including Nelson, Page and Rockbridge Counties – launched broadband projects as well

- Southern and Eastern Virginia also gained critical infrastructure

    - More than 600 new fiber miles extend through 26 counties via Mid-Atlantic Broadband Communities Corporation

According to the Thomas Jefferson Institute for Public Policy, the benefits of expanding access, bandwidth and speeds of broadband are "vast and vital, particularly for Virginia's rural areas.

- Broadband is a key decision point for business expansion and relocation

- Broadband enables "long-tail" strategies for small businesses with a niche good or service to reach a scaled market without geographic boundaries

- Services – call centers, back-office processing, and information technology – can be remotely provided at competitive costs

Last mile connectivity remains a significant challenge in wake of completed projects across the Commonwealth.

- Funding and construction of last mile access solutions is a significant concern
    - Virginia citizens have proximity but lack real benefit at home or work
    - Students who have broadband at school but not home are limited in their ability to participate and lack "extension of the classroom"
    - CAIs are not uniformly connected, and many CAIs are bound to multi-year contracts precluding their utilization of new networks
    - While some projects catalyzed partnerships with existing providers to address last mile challenges, not all broadband authorities benefit from such relationships
    - Authorities are seeking assistance in planning and generating local stakeholder agreement regarding efforts to pursue additional funding for last mile solutions

- Awareness and adoption remain far from realized in locations with access
    - The "take rate" in areas with broadband access and last mile connectivity is estimated at 55-70%, with certain demographics and socioeconomic groups trailing in adoption
        - Senior citizens
        - Low-income families
        - Adults with low educational attainment
        - Underemployed
    - The delta between those with access and those connected poses a legitimate long-term threat to the economy
        - As time passes, the opportunity costs related to lacking high-speed Internet grow in terms of access to employment, education, and general transactional inefficiencies associated with daily life
    - Programs for generating awareness and enhancing rates of adoption are becoming an increasing focus to maximize recent public and private investment in expanding the reach of broadband across the Commonwealth

Scott County Telephone Cooperative

Grant Specifics

- Source: RUS
- Type: Infrastructure
- Nature: FTTP
- Amount: $17.4M w/$7.45M federal loan
- Recipient: SCTC
- Grant Date: September 28, 2010
- Expiration July 1, 2015
- Completion Target: On time and on budget
- Goal: 850 miles; including 5,000 residents and 100 businesses.
- Percent of Goal: 60%

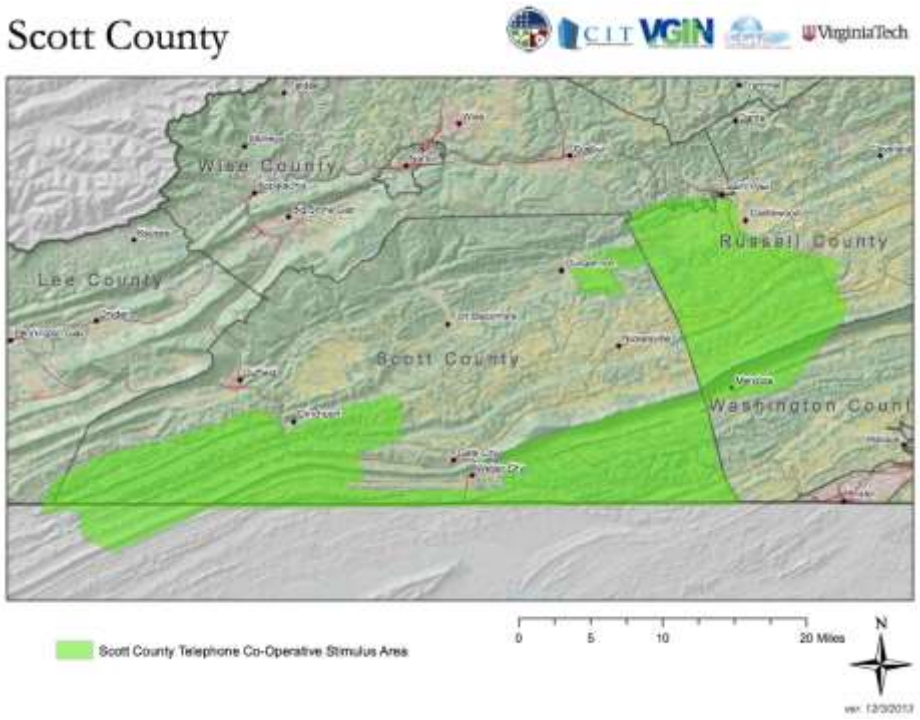
Geography and Coverage

- SCTC's optical network goes to or passes 385 business customers, 2,932 broadband customers, 3,350 IP video customers, 5,600 IP dial-tone customers, and 1,428 cable customers

- Expansion plans will pass an additional 5,000 customers, including 100 new business customers

- Project will extend service to 250 square miles of rural Virginia with 100% coverage, including more than a dozen farming communities

- Vast majority of installations will occur January 2015 – July 2015, with expectations of 50% or higher take rate for broadband services



Achievements and Impact

- The Virginia Coalfield Coalition (VCC) Wireless 4G Project has entered Phase 2 in 2014. The initiative is a partnership with LENOWISCO PDC and VCC, working with Verizon Wireless in collaboration with Bristol Virginia Utilities and Scott County Telephone Cooperative. Phase 1 provided back haul services to 27 existing Verizon towers in the Coalfields region. Phase 2 involves the construction of 11 new towers, 8 of which have been completed and put into service. The PDCs and VCC have received $13.5 million in Tobacco Commission funding and a $1.5 million loan from VCEDA to add to an approximately $15 million investment by Verizon to bring 4G cell service to the Coalfields region.
    - When completed, the region will be one of the first rural areas in the nation with 4G service, greatly improving the region's economic development efforts.
- The U.S. Department of Agriculture awarded a $3 million Community Connect Grant to Scott County Telephone Cooperative in October, to establish a broadband network in Caney Ridge and the surrounding area in Dickenson County.
- Scott County Telephone Cooperative is one of the launch partners of LIT Networks, extending their reach to key peering and interconnection points in Atlanta and Northern Virginia.

Page County Broadband Authority

Grant Specifics

- Source: NTIA
- Type: Infrastructure
- Nature: Middle Mile
- Amount: $1,648,941
- Recipient: Page County Broadband Authority • Grant Date: March 25, 2010
- Expiration December 31, 2013
- Completion Target: On Time
- Goal: 6.75 miles of lateral fiber, 5 microwave links (totaling 26.25 miles)
- Percent of Goal: 100%

Geography and Coverage

- Network will span Page County from Rileyville in the north to the town of Shenandoah in the south
- Network will pass within 500 feet of every county and town facility, school, library, public safety institution and healthcare facility, and Lord Fairfax Community College, totaling 53 CAIs
- Fiber lines will be maintained within the towns of Luray, Shenandoah and Stanley
- Regional broadband authority continues to discuss next steps to leverage towers to expand coverage

Achievements and Impact

- The Page County Broadband Authority does not provide any retail services on the network, instead benefiting from a public/private partnership launched with the Shenandoah Long Distance Telephone Company (Shentel).
- Shentel provided matching funds toward the $4 million budget and is contracted to handle all technical and implementation aspects of the initiative. Shentel has also signed a dark fiber lease agreement 50% of the total active fiber strand-miles.
- Valley Health System leverages broadband to connect to multiple healthcare providers across the community, including Page Memorial Hospital and the Page Rural Health Center in Stanley, as well as the Telemedicine Center at Virginia Commonwealth University
- The Northwestern Community Services Board, which provides outpatient-based behavioral health care serving the City of Winchester and the counties of Clarke, Frederick, Page, Shenandoah and Warren, was able to upgrade 2 T1 lines with a 5 MB private Ethernet line, specifically benefiting their clinic in Luray
- Lord Fairfax Community College provides over 300 fully interactive and instructor-led online courses, including 5 Associates of Arts and Sciences degrees offered completely online, and programs offered in large part online spanning Fine Arts, Philosophy & Religion, Science, Information Systems Technology, and Health Science
- Page County Public Schools leverage enhanced access to high speed broadband to incorporate the PowerSchool web-based student information system for administrators, teachers and students

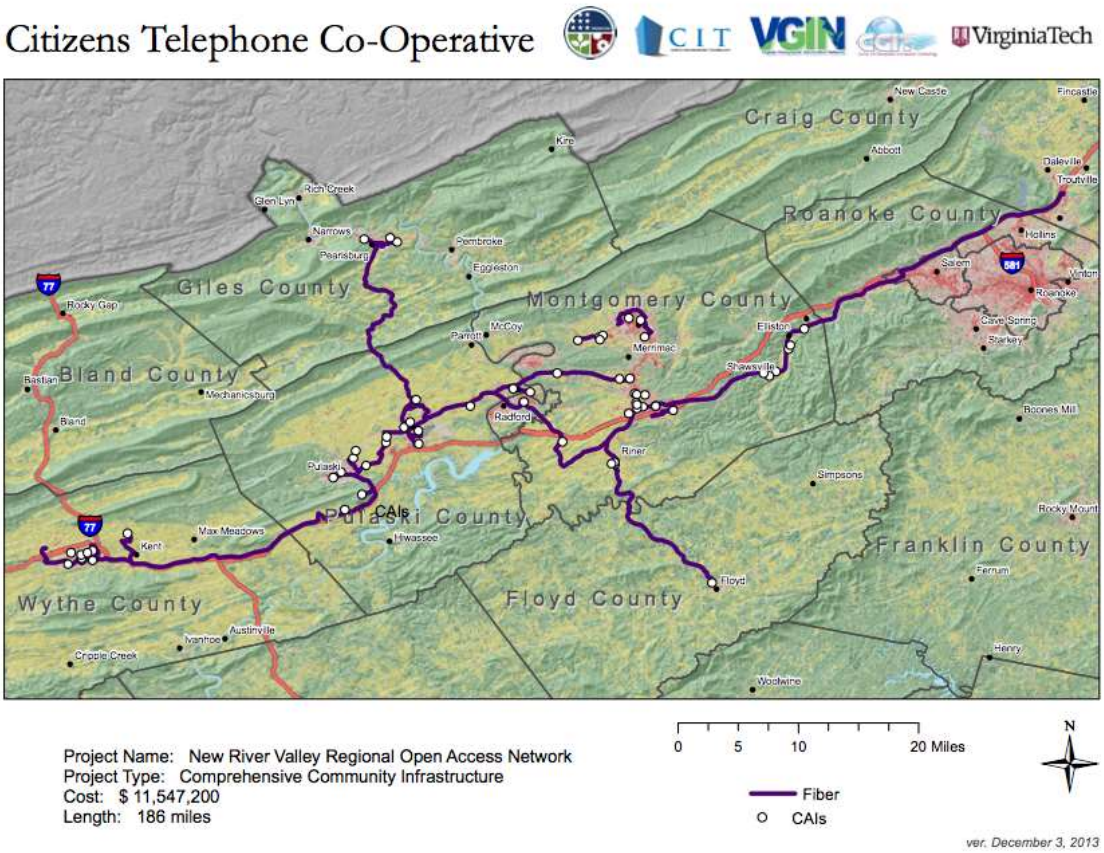
Citizens Telephone Cooperative, Inc. (a.k.a. Citizens)

Grant Specifics

- Source: NTIA
- Type: Comprehensive Community Infrastructure
- Nature: Middle Mile
- Amount: $9,237,760
- Recipient: Citizens Telephone Cooperative, Inc.
- Grant Date: Aug 1, 2010
- Expiration July 31, 2013
- Completion Target: On Time
- Goal: 200 miles thru 7 counties, 57 CAIs
- Percent of Goal: 100%

Geography and Coverage

- New River Valley – Regional Open Access Network (NRV-ROAN) placed 200 miles of open access fiber network (200 Gbps) running through 7 counties
    - Floyd
    - Roanoke
    - Montgomery
    - Pulaski
    - Wythe
    - Giles
    - Botetourt
- Network addition includes 8 primary interconnection points strategically positioned to provide service to unserved and/or underserved areas and tie into other open access fiber networks



Achievements and Impact

- Citizens Telephone Cooperative is one of the launch partners of LIT Networks, extending their reach to key peering and interconnection points in Atlanta and Northern Virginia.
- Built 1 Gb VLAN to every school in Montgomery County, and all but one school in Pulaski County.
    - VLAN significantly reduces bandwidth and hardware overhead costs for the school systems.
    - A new pilot project at Floyd County High School – Student Connect – is providing high speed internet for $10/month to qualifying students on the free or reduced price lunch program. Students have home access to the VLAN on the FCHS network, replicating the access students enjoy at school with the same firewalls and protections with regards to content.
- In addition to 57 CAIs, access provided to 68,000 homes and 1,300 businesses.
    - More than 40 CAIs have connected to the network.
    - Citizens has connected 20 towers providing new LTE coverage.

    - Citizens provided VDSL (very high bit rate digital subscriber line) access in the town of Floyd, the first time high speed Internet has been made available to local residents and businesses.
    - Replaced two T1s for New River Community College with 1 Gb VLAN connection between Dublin and Christiansburg campuses, enabling real-time interactive video classroom instruction.
- The new Floyd County Innovation Center is a 15,000 square foot facility opened in Fall 2013 in part catalyzed by the new diverse fiber routes and high capacity related to the Citizens project.
    - It is central to a major jobs initiative to reverse high outbound commuting statistics for local residents (7 in 10 residents work outside Floyd County).
    - A 2009 survey of wages paid by jobs within municipal borders showed Floyd County ranked 4th lowest in the state.
- More than a dozen businesses, many relocating to or expanding in the region served by Citizens, are current customers on the network. Industry sectors represented include:
    - Air data measurement for aircraft
    - Financial services
    - Automotive services
    - Legal services
    - Electromagnetic, mechanical and control technologies for machinery
    - Biotech
    - Manufacturing
    - Packaging
    - Private mental health services
    - Free Clinic healthcare services
    - 3-D microwave architecture
    - Packaging
- The Center for Digital Government and the National Association of Counties announced Roanoke County as a 2014 Digital County Survey winner. The 12th annual survey recognized leading examples of counties using technology to improve services and boost efficiencies, highlighting Roanoke County's partnership with state and federal law enforcement agencies in a data-driven approach to crime prevention.

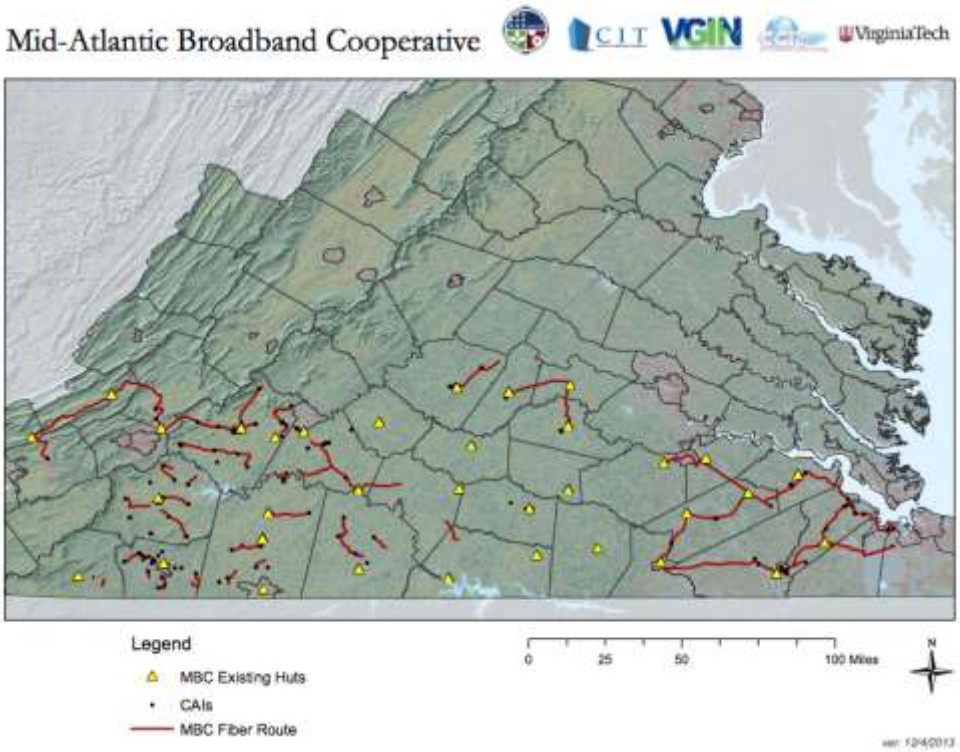
Mid-Atlantic Broadband Communities Corporation

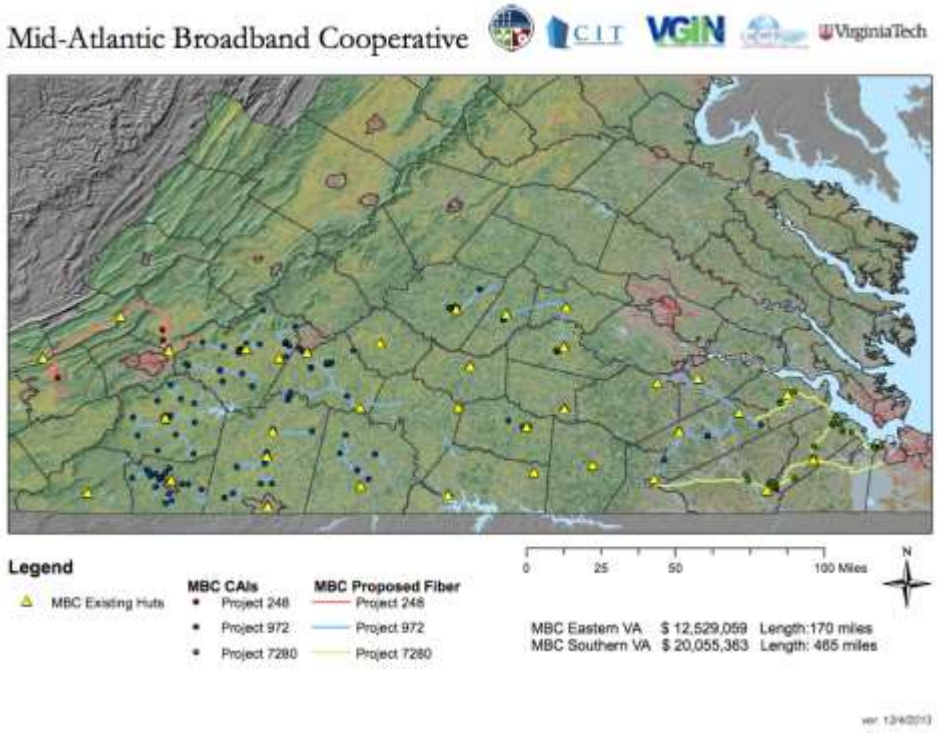
Grant Specifics

- Type: Infrastructure
- Nature: Middle Mile Fiber
- Amount: (1) $10,023,247 (East) (2) $16,044,290 (South); (3) $5,540,000 (VT) Total: $31,607,537
- Recipient: MBC (South and East), Virginia Tech Foundation (VT) (MBC was sub-recipient and placed fiber)
- Grant Dates: South: 2/02/10; VT: 2/02/10 East: 08/01/2010
- Expiration: South: 06/30/2013; VT: 06/30/13 East: 07/31/2013
- Completion Target: On Time
- East: 174 fiber miles, South: 428 fiber miles & VT: 106 fiber miles with range of CAIs
- Percent of Goal: 100% for all three grants

Geography and Coverage

- New Eastern coverage
  - 9 counties
  - 19 CAIs
  - 4 new nodes (interconnection points)
  - 4 circuits turned up
- South coverage
  - 17 counties
  - 118 CAIs
  - 6 new nodes
  - 54 circuits turned up
- Virginia Tech related coverage
  - 6 counties (SW Virginia)
  - 2 CAIs
  - 3 new nodes
  - 5 circuits turned up





Achievements and Impact

- MBC announced the launch of LIT Networks in September, a collaboration of seven regional fiber providers – managed by MBC – to deliver diverse, scalable and affordable

optical transport services to smaller markets in the Mid-Atlantic and Southeast. The collaborative involves federal awardees Citizens Telephone Cooperative, Bristol Virginia Utilities, and Scott County Telephone Cooperative. The members contribute dark firber to LIT Networks, extending the reach of members to key peering and interconnection points in Atlanta and Northern Virginia.

- Microsoft Corporation announced in June that it will invest a further $346.7 million to expand its data center in Mecklenberg County and create 90 new jobs in the area. This marks the third expansion project for the data center since 2010 and will bring Microsoft's total capital investment to more than $1.3 billion in the area. The data center is served by MBC.
- Virginia Tech is now directly connected to the Virginia Tech Carilion School of Medicine in Roanoke, and to the MBC network in Bedford. The connection to Bedford increases the speed and reliability of access for engineering, technology, and entrepreneurial endeavors related to the university by private and public sector interests in Northern Virginia and outside the region. Overall, the higher capacity services enable remote teaching, video conferencing, enhanced testing, and significant improvements related to telemedicine services and utilization of EHR and HIE.
- The Martinsville Informational Network (MINet Solutions) has become a popular alternative to other area data communications providers, providing the affordable and reliable high speed broadband access to fuel many success stories in the City of Martinsville, Henry County, and Patrick County. MINet Solutions, which started as a simple network to help the City electric company monitor and communicate with digital equipment being installed on the grid, was transformed through a partnership with MBC.
    - Memorial Hospital of Martinsville & Henry County utilizes the 10 Gbps optical network to transport data between the main hospital site and four satellite facilities within the local network. MBC was also able to leverage assets outside the MINet Solutions footprint to bring six additional medical facilities on the same Local Area Network as the Hospital.
    - Rivers Community Bank, headquartered in the City of Martinsville, connected all of their local facilities including three outside the MINet footprint. Because of the demanding security and performance requirements of the financial industry, Rivers Bank needed to integrate voice, video, and data onto a single network that provides secure, rapid and around-the-clock access.
- Kinex Telecom in Farmville has enjoyed similar success as a Competitive Local Exchange Carrier. Morgan Lumber Company is a Kinex Telecom customer that has leveraged a low latency fiber connection that more than triples their previous bandwidth, enabling more efficient order processing and fulfillment, alongside streamlined administrative operations.

- Surry County partnered with MBC for the installation of a municipal-owned fiber network, providing numerous financial and reciprocal benefits during build-out. Surry County's fiber network lit in November 2013, servicing all County government operations and the Surry Library. The County's wireless network, facilitated by the fiber-based network, is anticipated to be online and offering services to residential customers in 2015. Two local businesses partnered with Surry County to meet prescribed benchmarks – the creation of at least 30 jobs – as a funding condition for a VDHCD grant that enabled a private contractor to connect the companies to the network.
    - Edwards Ham now maintains their call center in Surry County due to the availability of broadband, and launched a state-of-the-art e-commerce platform in late 2013. Edwards Ham now provides full catalog access, consolidating wholesale and retail sites in one location, and leverages full social networking and multimedia capabilities.
    - WindsorONE, makers of wood trim boards and moldings, has begun the expansion of their Surry County physical plant site. Business partners funding the project considered broadband a key element.
    - The prescriptive job requirement of the funding – 30 jobs – is currently exceeded by 500%: 150 jobs created and counting.
- The Meherrin Regional Library System, a two-branch system serving Brunswick and Greensville Counties and the City of Emporia, offers 20 public access computers and maintains more than 10 staff computers. Without a reliable high speed connection, the libraries could not provide adequate services to patrons and struggled from an administrative standpoint. MBC network now provides affordable and reliable service to the Meherrin system.

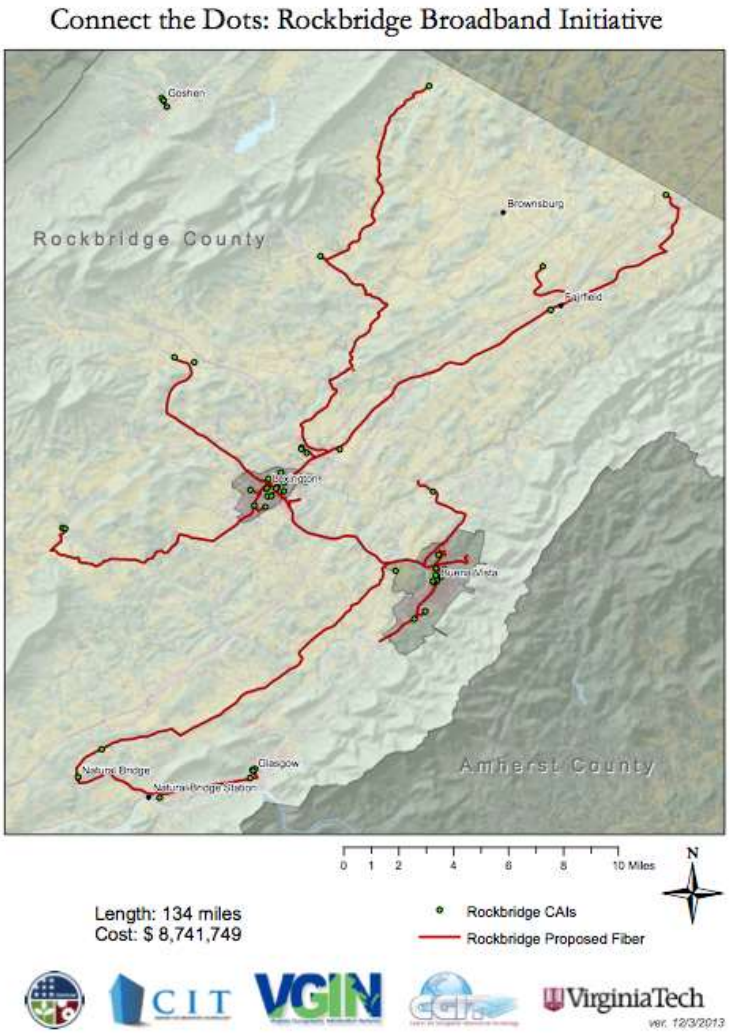
Rockbridge Area Network Authority

Grant Specifics

- Source: NTIA
- Type: Infrastructure
- Nature: Middle Mile
- Amount: $6,993,399
- Recipient: RANA (Rockbridge Area Network Authority)
- Grant Date: August 1, 2010
- Expiration: Expiration December 31, 2013
- Completion Target: September 30, 2013
- Goal: 70 miles, 53 targeted CAIs and 84 additional business drops
- Percent of Goal: 100%

Geography and Coverage

- New fiber backbone bisects Rockbridge County
    - Raphine in the north through Lexington and Natural Bridge to Glasgow in the south
    - Buena Vista in the east to Kerr's Creek in the west
- Comprehensive initiative mitigates long history of communications challenges related to mountainous terrain and single provider
- Two service providers currently on network – Rockbridge Global Village and Blue Ridge Internetworks – with four others engaged in discussion



Achievements and Impact

- New major East Coast long-haul provider is leasing empty duct across the county, generating enough income to make the network sustainable through 2015
- More than 186 customers now on the network – including 24 new residential customers generated in October 2014 – with an emphasis on business connections in downtown Lexington
- New jurisdictional incentive created to incentivize new residential subdivisions to connect, with two new subdivisions joined to the network
    - The municipal Connection Line of Credit program is a funding program between the cities of Lexington and Buena Vista and the County of Rockbridge. The three municipalities agreed to fund a program whereby RANA borrows funds to build last mile drops to businesses and residents. These borrowings are done on a project-by-project basis and involve RANA, the service providers, and the end

customers. The process results in a no-interest loan, fully repaid by RANA to the municipalities within three years. The biggest successes have been neighborhoods that band together to do collective drops all at one time and share the cost of the build.

  - The municipalities put a total dollar limit on the program but the model can be extended through general program dollars and ad hoc opportunities.
  - On Route 11 North to Natural Bridge, the hotel and caverns are connected but the addresses along Route 11 are not. A CLOC program is under consideration to connect these addresses to help catalyze additional development leveraging the private investment in Natural Bridge.

- All four local institutions of higher learning are now on the network: Washington & Lee University, Virginia Military Institute, Southern Virginia University, Dabney Lancaster Community College
  - Washington & Lee is a RANA partner, leveraging the network to provide 1Gb service connections to previously unconnected parts of the University community
  - Virginia Military Institute is leveraging the Co-Location Center and network to house redundant servers and connect parts of the VMI community
  - Southern Virginia University is using the availability of RANA fiber to stream video of their athletics events to keep alumni engaged and drive financial support for the Unviersity. The insititution is also moving redundant servers to the Co-Location Center and will use the RANA network as a key component of their own network to support growth off campus
- All three public K-12 school systems in Rockbridge County are using the RANA network with E-Rate certified service providers. Across the school systems, bandwidth has increased by several orders of magnitude at net dollar savings of approximately half of the expenditure related to ILEC connected T-1 services
- The availability of affordable and reliable bandwidth has begun to generate traction in the business community
  - HTV360.com, a video-based advertising business started in 1985 that was able to move a core editing component of the business to Rockbridge County from Northern Virginia – they are now investing in a studio and supporting local business activities
  - Hull's Theater is one of the few remaining drive-in movie theaters in Virginia. A transition to digital was required to show new films, which required a reliable and affordable high-speed connection. Hull's is on the RANA network and leveraging the connection to expand their business offerings to simulcasts of live concerts and other entertainment taking place worldwide.

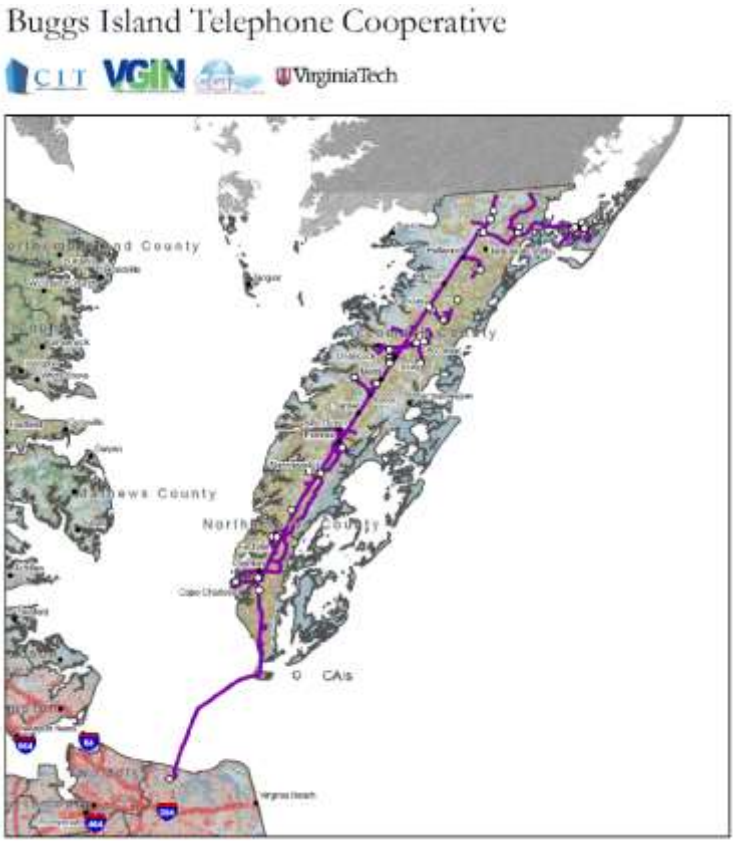
Buggs Island Telephone Cooperative

Grant Specifics

- Source: NTIA
- Type: Infrastructure
- Nature: LTE
- Amount: $18,983,648
- Recipient: Buggs Island Telephone Cooperative (BIT)
- Grant Date: April 1, 2010
- Expiration: September 30, 2014
- Completion Target: Revised Broadband Plan approved by funding agencies September 5, 2013
- A further no-cost, nine-month extension request was submitted by BIT which would extend project expiration to June 30, 2015. Approval pending.

Geography and Coverage

- BIT to roll out 4G LTE on ten towers, providing high-speed broadband service in Amelia, Brunswick, Lunenberg, Mecklenburg, and Nottoway Counties
- Proposed extension projects to serve 10 CAIs, 1,368 residential households, and 232 businesses by the end of the proposed extension period of June 30, 2015



Achievements and Impact

- BIT began providing commercial services to the public in July 2014
- By the end of Q3 2014, BIT served 1 CAI, 146 residential customers, and 13 businesses
- BIT joined the NetAmerica Alliance in January 2014
    - Alliance provides access to shared expertise among members deploying 4G LTE service
    - Initiatives include a 3-year project plan to guide network development and 7-year comprehensive financial plan
    - Alliance is expected to help BIT mitigate business and technology risk to yield successful and profitable deployment of 4G LTE service

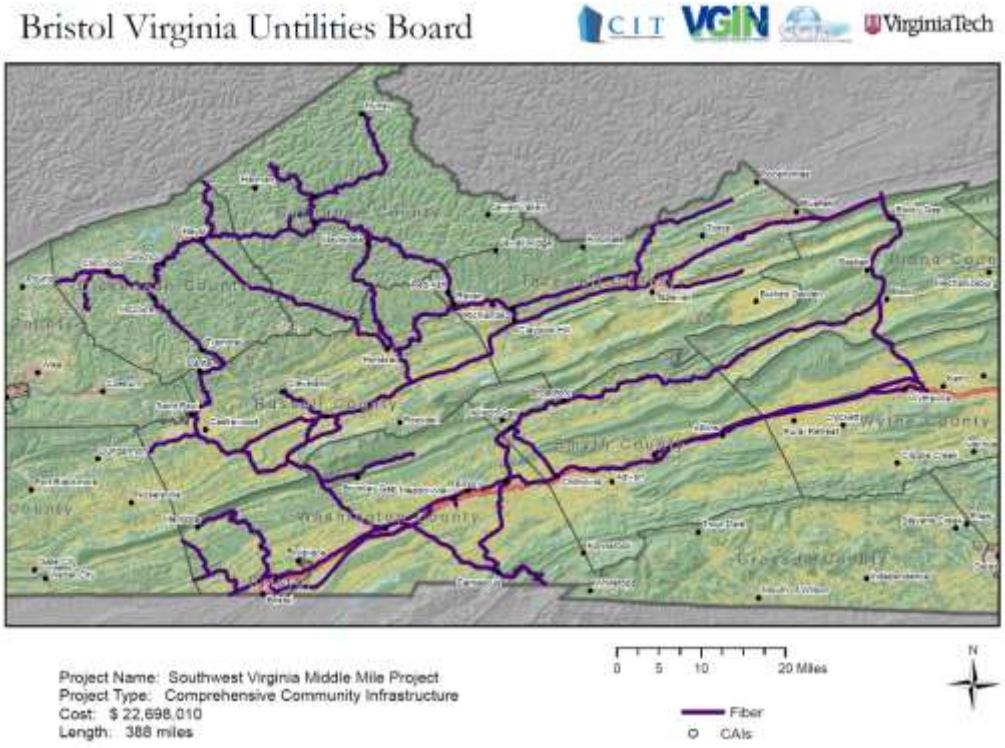
Bristol Virginia Utilities

Grant Specifics

- Source: NTIA
- Type: Infrastructure
- Nature: Middle Mile
- Amount: $ 22,698,010
- Recipient: BVU Board (Authority)
- Grant Date: July 1, 2010
- Expiration June 30, 2013
- Completion Target: On-time and under budget
- Goal: 339 miles to connect or improve service to 120 CAIs, 5600 residents, 220 businesses
- Percent of Goal: 100%

Geography and Coverage

- Service to 8 counties in SW Appalachian Virginia, 7 qualifying as economically distressed
    - Bland
    - Buchanan
    - Dickenson
    - Russell
    - Smyth
    - Tazewell
    - Washington
    - Wythe
- Middle mile access achieved to 11,400 SW Virginia homes, businesses and CAIs that were categorized as unserved or underserved – surpassing goals of grant



Achievements and Impact

- Achieved nearly 40% subscription rate among the 1,200 homes in the previously unserved and underserved areas of SW Virginia covered by the project
- New build out areas in FY 2015 include Cleveland and Damascus
    - Cleveland build out is complete and moving to in-service status in November
    - Damascus build out is in construction phase, waiting on make ready work from the local power provider. Route expected to be in-service in December
    - BVU anticipates adding more connections to these two areas in 2015
- BVU is working to establish last-mile connections to the 11,400 households, businesses and CAIs situated along the middle mile routes utilizing its own resources.
    - Goal includes appropriating approximately $450,000 per year to continue these efforts to connect communities along the middle mile routes.
    - In 2014, BVU is on target to reach its goal of providing last-mile connectivity to 450 entities.

    - As part of this project, BVU installed 49 last-mile distribution cabinets and 567 last-mile network access points.

- The Open Technology Institute's Cost of Connectivity 2014 report compared Bristol to other leading U.S. cities including Chattanooga, Tennessee and Kansas City, Missouri, with regards to their abilities to deliver download speeds to customers that compare to the fastest cities in the world such as Seoul, Hong Kong and Tokyo. The report identified Bristol as one of "just a few bright points of light in an otherwise dim constellation" in terms of offering high bandwidth at affordable costs.

Nelson County Broadband Authority

Grant Specifics

- Source: NTIA
- Type: Infrastructure
- Nature: Middle Mile and Wireless Towers
- Amount: $1,826,646
- Recipient: Nelson County Board of Supervisors (Authority)
- Grant Date: March 16, 2010
- Expiration February 28, 2013 •Completion Target: On Time
- Goal: 31 miles; 3 towers; 13 CAI
- Percent of Goal: 100%

Geography and Coverage

- Network extends along strategic transportation corridors considered key to long-term economic development
    - Route 29 from Colleen Business Park in Arrington to Route 6
    - Route 6 west to Route 151

- Route 151 north to Rockfish Volunteer Fire Department in Afton, just south of the Nelson/Albemarle County line

- Tower sites provide for implementation of wireless services in Afton, Arrington and Massies Mill areas with ability to expand coverage through the implementation of point-to-point wireless backhaul to additional relays in areas unable to receive services directly from the towers

Achievements and Impact

- CAIs receiving direct connections to the new network include 5 county government facilities, three K-12 schools, the Blue Ridge Medical Center, Afton Family Medicine, Nelson Rescue, Nelson County Service Authority, and the Nelson Memorial Library.
    - Blue Ridge Medical Center is now able to deploy telemedicine capabilities and enhance collaboration with healthcare specialists at the University of Virginia
    - Afton Family Medicine has connected in a similar fashion to its affiliate hospital, Martha Jefferson Hospital, and its health system, Sentara

- Emergency services personnel communicate and transmit vital patient data in real-time from ambulance transport to the hospital, enabling the right teams of physicians and nurses to prepare to begin treatment within seconds of patient arrival and help transport crew deliver care en route to the hospital
- Access to high speed internet at lower cost has allowed the school system to dedicate more technology funds to hardware, software and training and leverage a greater universe of teaching and learning tools
- The school division utilizes more than 2,200 computers division-wide, including approximately 1,600 netbooks or small-form laptops used in grades 3-12 for classroom-based multimedia learning. The additional 600 computers are used by teachers, aides, and administrative staff. The system utilizes 150 wireless access points, as well as a dedicated Internet service ring creating greater reliability and redundancy.
- The 1Gb speed of service enabled utilization of VOIP for a 250 phone system.
- Further expansion of the network into areas that are underserved or unserved would allow the schools to pursue established plans for a 1:1 device strategy for all high school students.

- The office of Economic Development is actively utilizing installed and potential expansion of the network to attract and retain businesses, especially home-based businesses and those tied to the "Agricultural Tourism" sector.
  - Nelson County was able to extend high speed Internet services to the LOCKN Music Festival via a new fiber connection to the festival site. The festival hosted 30,000 people over four days and temporarily employed hundreds of workers and created a demonstrable halo effect on the local and regional economies. The availability of the network was a deciding factor in the festival sponsor's recent purchase of additional adjacent land and plans to expand the festival to multiple genres and dates during the calendar year.
  - Wineries, breweries and hard cideries represent a growing part of the economic development picture for Nelson, and all are supported by broadband.
  - Connectivity increases marketing capability, communications, service delivery, and enhances the sense of accessibility of the region, located midway between Charlottesville and Lynchburg.
  - The Nelson County Broadband Authority provided connectivity to the Colleen Business Park, site of a new $2 million, 50-employee operation for Blue Mountain Brewery. Also located in the park are California Sidecar (maker of motorcycle sidecars), the Nelson County Service Authority, and offices for the Central Virginia Electrical Cooperative

Commonwealth Programs and Resources

Below are Virginia resources that have been excerpted from the Virginia Broadband Resources Inventory. The full report can be found at: http://otpba.vi.virginia.gov/broadband_National%20Resources.shtml.

Organization	Affiliation	Mission
CIT	Commonwealth of Virginia State Chartered Non-Profit; Secretary of Technology	Operates Innovation and Entrepreneurship Investment Authority (IEIA), for technology-based economic development strategies focused on commercialization and seed funding to assist in the launch and growth of technology companies and job creation.
Center for Geospatial Information Technology and eCorridors	Virginia Tech	A broadband mapping project in which individual users provide usage information about Internet accessibility in their communities. Data collected is used to identify areas in need of broadband infrastructure investment.

Virginia Geographic Information Network (VGIN)	Virginia Information Technologies Agency (VITA)	Foster the creative utilization of geographic information and oversee the development of a catalog of GIS data available in the Commonwealth.
Virginia Department of Housing and Community Development	Executive Branch of the Commonwealth of Virginia	Create safe, affordable, and prosperous communities to live, work, and do business in Virginia.
Virginia Health Quality Center	Non-profit healthcare consulting firm.	Create solutions that make a measurable difference on individual and community health.
Virginia Resources Authority	Commonwealth of Virginia State Chartered	Provides innovative, cost-effective and sustainable financial solutions to build vibrant and healthy Virginia communities.

Virginia Tobacco Indemnification and Revitalization Commission	Commonwealth of Virginia General Assembly	Revitalize communities in Virginia whose economies have historically been dependent on tobacco production using funds by an endowment created with payments from the 1998 legal settlement between 46 state attorneys general and the major tobacco manufacturers.
Appalachian Regional Commission	Partnership of federal, state, and local government.	Facilitating access to advanced telecommunications infrastructure for all Appalachian communities.
Mid Atlantic Broadband Communities Corporation	Dept of Commerce grant-based with matching and later a total of $34M from Virginia Tobacco Commission (VTC).	Provides high capacity opertical transport services from Atlanta, GA to Washington, DC to assist in economic revitalization efforts
Agriculture and Forestry Industries Development Services Fund (AFID)	Virginia Department of Agriculture and Consumer Services	Establish a new economic development tool for agriculture and forestry value-added or processing projects

Virtual Virginia	Virginia Department of Education	The program offers middle and high schools access to online courses for students who might, through no fault of their own, have challenges getting the coursework they want or require.
Selected Counties	Self	Among wide range of services and assistance to constituents, rural counties and entities representing broadband projects aim to deliver broadband access, connectivity improvements and related services to constituent groups
Virginia Telehealth Network	Virginia Department of Health - Office of Rural Health	Grant-based public/private consortium to advance the adoption, implementation, and integration of telehealth and related technologies into models of healthcare to support the delivery of quality care and improve access to care for all Virginians.

American Telemedicine Association	Self/Membership	To promote professional, ethical and equitable improvement in health care delivery through telecommunications and information technology.
Mid-Atlantic Telehealth Resource Center (MATRC)	UVA Center for Telehealth via HRSA grant	To provide technical support and other resources within the following mid-Atlantic states: Delaware, Kentucky, Maryland, North Carolina, Virginia, Washington DC and West Virginia in order to advance the adoption and utilization of telehealth within the MATRC region.

ConnectVirginia	Health Information Exchange (HIE) for the Commonwealth funded from VDH & DHS Office of the National Coordinator for Health Information Technology (ONC); Led by Community Health Alliance, Inc.	To foster and sustain trust, collaboration and information sharing among consumers, providers and purchasers of healthcare services in the Commonwealth of Virginia, leading to measurable improvement in outcomes and cost-effective delivery of services.
Virginia HIT Regional Assistance Center	VHQC - Non Profit administering Virginia's Medicare Quality Improvement Contract	Provide comprehensive, low-cost technical assistance to primary care providers to facilitate adoption and integration of EHRs into the patient care process, and attainment of meaningful use.

VA HIMSS	National HIMSS	To be the trusted source for knowledge, advocacy, leadership, collaboration and community in the advancement and management of healthcare information and technology in directing and shaping the healthcare industry that will improve healthcare delivery.

Broadband-Related Activities at the Federal Level

113th Congress

Ten pieces of legislation directly related to the issue of federal assistance for broadband deployment in unserved areas are in various stages of consideration by the 113th Congress.

P.L. 113-6 (H.R. 933). Consolidated and Further Continuing Appropriations Act, 2013.Funds the broadband loan program at $4 million (supporting a loan level of approximately $42 million) and the Community Connect grant program at $10.372 million. Signed by President March 26, 2013.

P.L. 113-79 (H.R. 2642). Agricultural Act of 2014. Reauthorizes the broadband loan and loan guarantee program through FY2018 at $25 million per year. Signed by President February 7, 2014.

H.R. 1639 (Gibson). Amends the Rural Electrification Act of 1936 to authorize loan/grant combinations under RUS broadband program. Introduced April 18, 2013; referred to Committee on Agriculture and Committee on Energy and Commerce.

H.R. 1685 (Matsui). Broadband Adoption Act of 2013. Amends the Communications Act of 1934 to reform and modernize the Universal Service Fund Lifeline Assistance Program. Introduced April 26, 2013; referred to Committee on Energy and Commerce.

H.R. 1947 (Lucas). Federal Agriculture Reform and Risk Management Act of 2013. Section 6105 would reauthorize the broadband loan and loan guarantee program through FY2018 at the current level of $25 million per year. Introduced May 13, 2013; reported by Committees on Agriculture and Judiciary.

H.R. 2410 (Aderholt). Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2014. Provides $5.5 million to subsidize a loan level of $42.146 million for the broadband loan program, and $10.111 million for the Community Connect grant program. Introduced June 18, 2013; reported by House Committee on Appropriations (H.Rept. 113-116).

H.R. 4800 (Aderholt). Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2015. Provides $4.5 million to subsidize a loan level of $24.077 million for the broadband loan program and $10.372 million for the Community Connect grant program. Introduced June 4, 2014; reported by House Committee on Appropriations (H.Rept. 113-468).

S. 954 (Stabenow). Agriculture Reform, Food, and Jobs Act of 2013. Includes the establishment of a new grant program in combination with the existing loan and loan guarantee program authorization, which is extended at $50 million per year through FY2018. Passed by Senate June 10, 2013.

S. 1244 (Pryor). Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2014. Provides $4 million to subsidize a loan level of $30.651 million for the broadband loan program, and $10.372 million for the Community Connect grant

program. Introduced June 27, 2013; reported by Senate Committee on Appropriations (S.Rept. 113-46).

S. 2389 (Pryor). Agriculture, Rural Development, Food and Drug Administration, and Related Agencies Appropriations Act, 2015. Provides $6.435 million to subsidize a loan level of $34.43 million for the broadband loan program, and $10.372 million for the Community Connect grant program. Introduced May 22, 2014; reported by Senate Committee on Appropriations (S.Rept. 113-164).

Source: Congressional Research Service, "Broadband Internet Access and the Digital Divide: Federal Assistance Programs," September 19, 2014.

2014 Commonwealth Legislation

HB 1270 - Center for Rural Virginia; broadband report. Creates the Center for Rural Virginia, pursuant to Virginia Code 2.2-2720, to prepare a rural broadband underserved area report. (Minchew)

HB 1165 - Department of Small Business and Supplier Diversity. Eliminates the Department of Small Business and Supplier Diversity and re-creates the Department of Minority Business Enterprise and the Department of Business Assistance. In order to assist the rural communities of the Commonwealth, the Authority shall develop a program for reviewing existing economic development programs of rural communities, upon request. (Spruill)

SB 308 - Broadband and other telecommunications services; provision by localities. Expands the area within which a locality may provide broadband and other services to the zone within 100 miles of the geographic boundaries of its electric distribution system. Current law limits a locality to the area within 75 miles of its electric distribution system. (Vogel)

HB1699 - Tangible personal property tax; computer equipment and peripherals used in data centers. Creates a separate classification, for purposes of permitting localities to set a lower personal property tax rate, on computer equipment and peripherals used in a data center. This bill is identical to SB 1133. (Comstock)

SB1133 - Tangible personal property tax; computer equipment and peripherals used in data centers. Creates a separate classification, for purposes of permitting localities to set a lower personal property tax rate, on computer equipment and peripherals used in a data center. This bill is identical to HB 1699.(McDougle)

HB2115 - Telephone carriers; intrastate switched access charges. Eliminates a provision that prohibits incumbent local exchange carriers from adding additional elements, or from increasing the charge for existing elements, of intrastate switched access charges. (Comstock)

Source: Virginia Legislative Information System: http://lis.virginia.gov/lis.htm

Pole Attachment Costs

A current proceeding before the Virginia State Corporation Commission (PUE-2013-00055) will determine rates with regards to attachments to electric cooperative poles pursuant to legislation passed in 2012. The legislation amended Virginia Code 56-466.1, authorizing the Virginia State Corporation Commission to determine just and reasonable pole attachment rates when the parties are unable to reach agreement following good faith negotiations. The Commission will take into consideration any effect of such rates on deployment or utilization, or both, of broadband and other telecommunications services, the interests of the electric cooperatives' members, and the overall public interest. The case status remains active, though the Final Order was issued on October 24, 2014. The Final Order is accessible at http://docket.scc.state.va.us/CyberDocs/quickstart.asp?SHOW=view:139455

Appendix A – Technical Assistance Provided to Localities in 2014

New Kent County – needed funding for public safety radio system upgrade due to dead areas throughout the county, the inability to use cellular during Interstate 64 traffic incidents and their responsibility handling traffic on I-64 should an evacuation situation occur on the peninsula. We connected New Kent Sheriff with the 911Wireless team, Secretary of Public Safety and others.

Nelson County – We handled several constituent calls to the Governor's office due to their inability to obtain broadband service. Blue Ridge Internetworks provides broadband service from the BTOP funded fiber build and Stewart Computer Services provides fixed wireless. We ensure they are aware of both providers and suggest attendance at the Broadband Authority meetings.

Northern Neck – We spoke with Delegate Ransone several times to explain the NTIA rules behind the provider reported coverage that we map and provide information and advice.

Secretary of Technology – We provided various broadband statistics throughout the year as requested.

Several Planning District Commissions – We provided information and funding totals available through the FCC's Rural Broadband Experiments. This information included funding and maps of eligible census blocks by locality and information about the program. We offered encouragement for PDCs to share the information with localities and hold discussions with incumbent providers.

Albemarle County – We participated in the county's Broadband Task Force providing coverage maps, coverage statistics, vertical asset inventory, survey instrument and survey results data analysis, funding information and general advice.

George Washington Regional Commission – We are working with the region on a strategic broadband initiative set by the University of Mary Washington to ensure adequate and affordable

broadband for all planned business development areas throughout the region. We have provided coverage maps, statistical data, funding information, technology and vendor options and facilitated several regional public leadership meetings. We are continuing this work in hopes we can identify existing infrastructure that could be leveraged to support a high-capacity, fully redundant network to serve the business areas.

Central Shenandoah Planning District – We facilitated a regional meeting to discuss broadband in the region, options for improving access and facilitated discussion to determine interest in a regional initiative.

Roanoke Valley Alleghany Regional Commission – We have provided coverage data, funding information and general broadband advice.

Charlotte County – We provided coverage maps, provider contacts and general guidance.

Augusta County – We provided a list of all the Virginia WISPs to assist in their search for a private partner.

Dinwiddie County – We provided sample RFPS to assist with their formation of public-private partnership with a fixed wireless provider and contact information for MidAtlantic Broadband.

Bedford County – We have provided coverage maps, data and general guidance.

King and Queen County – We conducted a Broadband Awareness and Adoption project which included a Needs Assessment and final recommendations for the implementation of community programs to address the barriers to adoption.

BARC Electric Coop – We provided coverage data and mapping data to assist in their assessment of future expansions.

Isle of Wight – We provided coverage maps, survey instrument, speed testing and general guidance.

King George – We provided coverage maps, vertical asset inventory and general guidance.

Middle Peninsula Planning District Commission – We continue to provide general guidance and advice.

Rockbridge County – Provided vertical asset inventory data and general guidance.