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 2017

CIT CENTER FOR INNOVATIVE TECHNOLOGY

VGIN Virginia Geographic Information Network

CGIT Center for Geospatial Information Technology

VirginiaTech

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Introduction

Led by the Center for Innovative Technology (CIT) and its partners, the Commonwealth of Virginia continues to work towards the goal of ubiquitous, affordable broadband access. In 2017, Virginia's population with access to broadband remains at 96% and the Commonwealth continues to rank within the top ten nationally in average connection speed, average peak connection speed and broadband adoption.

CIT's Broadband service line, which is charged with providing broadband technical assistance to unserved localities throughout the Commonwealth, helped to drive broadband expansion and promote broadband awareness in 31 localities through its nationally-recognized methodology, tools and resources. As the only resource in Virginia that is solely focused on expanding broadband access and adoption, CIT Broadband continues to promote and create opportunities for Virginia, as well as its localities, to be a leader in broadband.

The Broadband Advisory Council worked diligently to assess barriers to broadband and identify goals and strategies for improving broadband access in the Commonwealth. As a result of its 2017 work, the Broadband Advisory Council has advised the Governor that the Commonwealth's top broadband priority should be expanding access to the unserved, and the council has submitted a number of recommendations to support this priority.

The Virginia Broadband map continually evolves to incorporate available federal data to present broadband availability, demand, and assets. CIT and its partners, Virginia Geographic Information Network (VGIN) and Virginia Tech's Center for Geospatial Information Technology (CGIT) continue to create and maintain broadband tools and resources in order to better equip Virginia localities in their quest for improved broadband access and services.

The Virginia broadband team has made great strides in 2017 to improve broadband in the Commonwealth. This report highlights Virginia's current broadband environment, initiatives and activities that have occurred in the past year, broadband-related state legislation, and federal legislation and activities.

Legislative Mandate

§ 2.2-225 (Secretary of Technology) Monitor the trends in the availability and deployment of and 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.

Virginia Standings

National Broadband Standings

The Q1 2017 Akamai State of the Internet report ranks Virginia among the top ten in numerous categories; however, Virginia's rank fell from 2016 in regards to average peak connection speed.

- **Virginia improved from #9 to #8 nationwide in average connection speed with a 17% year-over-year change.**
- **Virginia fell from #4 to #7 nationwide in average peak connection speed with a 20% year-over-year change.**

	State	Q1 2017 Avg. Mbps	QoQ Change	YoY Change
1	District of Columbia	28.1	5.2%	17%
2	Delaware	25.2	13%	19%
3	Massachusetts	23.8	9.6%	20%
4	Rhode Island	23.7	5.7%	19%
5	Maryland	22.3	10%	21%
6	New Jersey	22.2	8.9%	20%
7	New York	22.0	6.8%	22%
8	Virginia	21.1	14%	17%
9	Pennsylvania	20.8	11%	22%
10	Utah	20.7	4.1%	4.9%

	State	Q1 2017 Peak Mbps	QoQ Change	YoY Change
1	Delaware	111.0	n/a	20%
2	District of Columbia	110.5	n/a	19%
3	Massachusetts	106.8	n/a	23%
4	Maryland	106.1	n/a	26%
5	Rhode Island	104.5	n/a	25%
6	New Jersey	104.5	n/a	26%
7	Virginia	101.8	n/a	20%
8	Wyoming	98.2	n/a	46%
9	New York	98.0	n/a	25%
10	Washington	97.0	n/a	23%

The report also ranked Virginia 8th nationwide in broadband adoption of 10mbps, 15 mbps and 25mbps.

Virginia Broadband Coverage

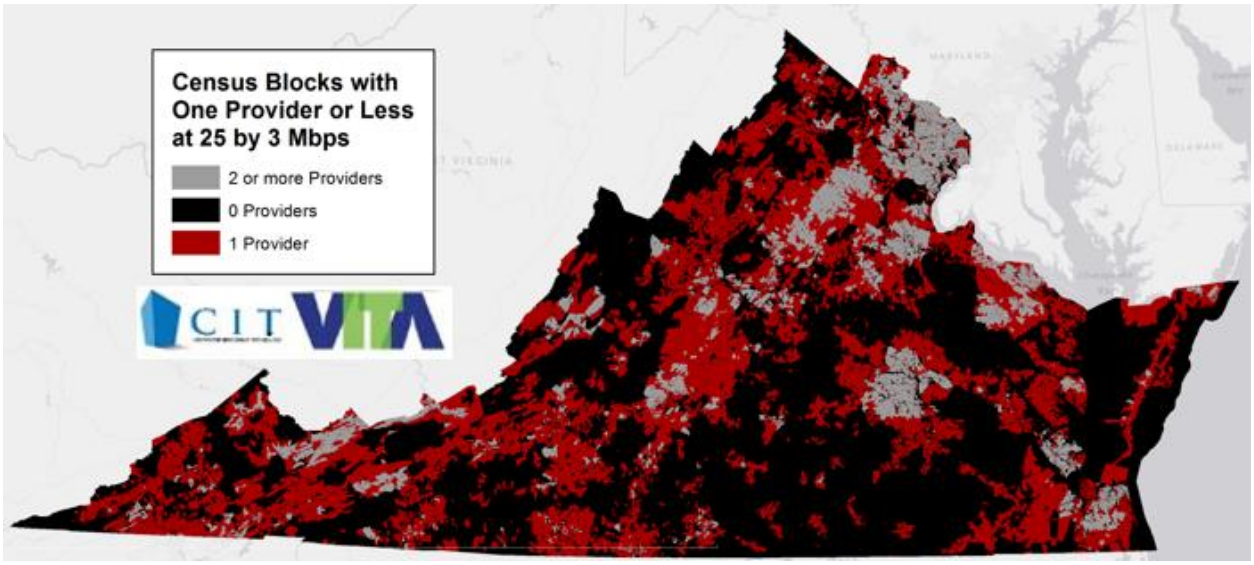
Based on data collected by CIT and partners, Virginia Tech and VGIN, the following chart shows the progression of expanding broadband coverage to citizens across the Commonwealth of Virginia from 2010 to 2017. This data was collected in June 2016 and is based off of the Federal Communications Commission's (FCC) 477 data, which is provider-submitted data and is often overstated due to federal reporting requirements. The numbers pertaining to the earlier years are skewed since it took several years to collect data from all providers.

Year	Population of the State	Total Population with Coverage	Percentage with Coverage
2010	8,001,024	2,540,371	32%
2011	8,001,024	4,832,810	60%
2012	8,001,024	7,283,916	91%
2013	8,001,024	7,339,793	92%
2014	8,001,024	7,379,999	92%
2015	8,001,024	7,747,705	92%
2016	8,001,024	7,752,806	96%
2017	8,001,024	7,712,665	96%

It is important that citizens have options in regards to Internet service providers in order to ensure quality of service and competitive pricing. The following chart shows the average number of providers delivering broadband as defined by the FCC (25Mbps download and 3Mbps upload) per census block for the blocks that have coverage. According to this data, all but 1 locality in Virginia have fewer than 2 broadband providers per census block.

Number of Providers per Census Block	Number of Localities	Percentage of Localities in this class	Households	Percentage of Households in this class
>= 0 and < 0.5	36	26.87%	333,089	9.90%
>= 0.5 and < 1	57	42.54%	1,098,933	32.66%
>= 1 and < 1.5	21	15.67%	444,910	13.22%
>= 1.5 and < 2	19	14.18%	1,482,518	44.06%
>= 2	1	0.75%	5,489	0.16%

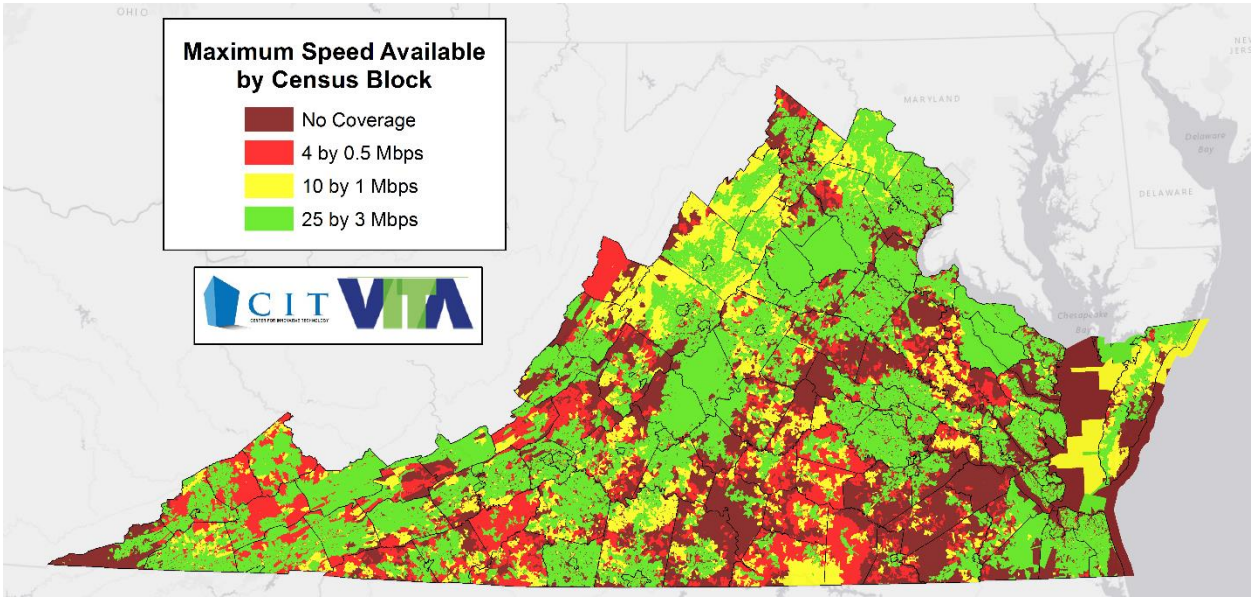
The following map depicts the average number of broadband providers per census block as defined by the FCC (25mbps download and 3 mbps upload).



Virginia's Unserved Localities

According to the latest data, 58 Virginia localities have less than 80% of households with access to 25mbps download and 3mbps upload (FCC's broadband definition), and 38 Virginia localities have less than 80% of households with access to 10mbps download and 1mbps upload.

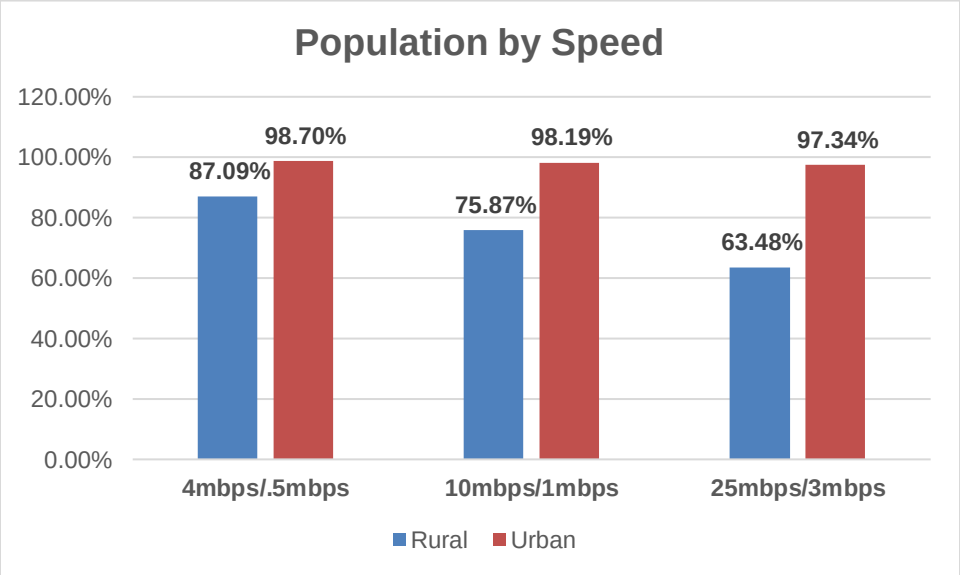
The map below depicts the maximum speed available by census block.



Urban vs. Rural Population

Based on the FCC's 477 data, the following chart shows the difference in coverage between urban and rural population based on different speed definitions.

- **The percentage of rural population with 25/3 rose slightly from 62.4% in 2016 to 63.48% in 2017.**
- **Approximately 12.91% of Virginia's rural population does not have access to broadband by any definition.**



Broadband Advisory Council

Introductory Background

The Broadband Advisory Council was established as an advisory council, within the meaning of § 2.2-2100, in the executive branch of state government. The Council's purpose is to advise the Governor on policy and funding priorities to expedite deployment and reduce the cost of broadband access in the Commonwealth. The Council was created from a recommendation by the Broadband Roundtable, established by Governor Kaine in 2007, and was codified during the 2009 legislative session (HB2423). The Council's duties include:

- Monitor the broadband-based development efforts of other states and nations in areas such as business, education, and health;
- Advise the Governor, Secretary of Technology, and the General Assembly on policies and strategies related to making affordable broadband services available to every Virginia home and business;
- Monitor broadband-related activities at the federal level;
- Encourage public-private partnerships to increase the deployment and adoption of broadband services and applications;

- 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;
- Periodically review and comment on the quality, availability, and accessibility of state-maintained or funded broadband resources and programs, including but not limited to: Virginia Resources Authority Act funding of the "Online Community Toolkit"; the Center for Innovative Technology's mapping and outreach initiatives; investments made through programs administered by the Department of Education, Department of Housing and Community Development, Department of Public Rail and Transportation, and the Tobacco Indemnification and Community Revitalization Commission; and
- Monitor regulatory and policy changes for potential impact on broadband deployment and sustainability in the Commonwealth.

The Broadband Advisory Council is comprised of 14 members: four delegates; 2 senators; Secretaries of Technology, Commerce and Trade, and Agriculture and Forestry; and representatives from Virginia Cable Telecommunications Association (VCTA), Virginia Telecommunications Industry Association (VTIA), Center for Rural Virginia, Virginia Chapter of WISPA, and local government. The council members are:

Delegate Kathy Byron (Chair)
Senator Frank Ruff (Vice Chair)
Delegate Jennifer Boysko
Delegate James Leftwich
Delegate Randy Minchew
Senator Charles Carrico
Secretary Karen Jackson
Secretary Basil Gooden
Secretary Todd Haymore
Ray LaMura, President of VCTA
Duront Walton, Executive Director of VTIA
Christy Morton, Executive Director of the Center for Rural Virginia
James Carr, CEO of All Points Broadband
Jane Dittmar, Chair of the Albemarle County Board of Supervisors

Staff: Chuck Kirby (CIT), Caroline Luxhoj (CIT), Jean Plymale (CIT), Jeff Sharp (DLS)

Summary of 2017 Meetings

The Broadband Advisory Council met on May 31, 2017 in Richmond, Virginia. The Council heard presentations regarding public broadband funding and privately funded networks, the Department of Housing and Community Development's (DHCD) Virginia Telecommunications Initiative (VATI) grant, CenturyLink's Connect America progress, and CIT Broadband Activities.

On August 24, 2017 the Broadband Advisory Council held a Retreat in Forest, Virginia. During this Retreat, the Council focused on identifying broadband priorities in the Commonwealth, highlighting broadband barriers, and objectives for the Council to utilize as a basis for its recommendations to the Governor that focus on expediting deployment and reducing broadband costs.

The final Broadband Advisory Council meeting for 2017 was held on October 23, 2017 in Chesapeake, Virginia. The Council engaged in presentations from the Virginia Tobacco Region Revitalization Commission regarding its Last Mile Broadband Program, the City of Virginia Beach regarding its Hampton Roads Regional Broadband Strategy and Trans-Atlantic cables, and DHCD regarding the GO Virginia initiative and an update on the VATI grant. The Council also discussed opportunities for broadband-related legislation in the 2018 legislation session.

Priority and Recommendations

Based on thoughtful presentations made to the Council, and copious research reviewed, The Broadband Advisory Council advises the Governor that *the Commonwealth's top broadband priority should be expanding access to the unserved.*

To expedite deployment and reduce costs, the Council has identified a number of broadband barriers that currently affect the Commonwealth including: geography, affordability, fragmented permitting, fees and zoning, trenching, conduit related to bridges and tunnels, and pole attachment/make-ready fees. To address these barriers, the Broadband Advisory Council recommends the following to the Governor:

- Reduce cost to access
- Encourage Public-Private Partnerships
- Public funding:
    - Emphasize cost-effectiveness with respect to other factors
    - Allocate in a way that does not compete with privately-financed infrastructure
    - Provider and technology neutral
    - Increase VATI funding and provide measurements for funded projects
- Reduce regulatory barriers
- Establish 'dig once' legislation
- Educate localities and citizens
    - Include broadband at the Rural Summit, VACO/VML Summits
    - Encourage economic developers to reach out to prospective businesses to help them meet their broadband needs
    - Conduct regional BAC meetings
- Ensure that state resources are devoted to the unserved
- Monitor federal opportunities

Conclusion

The Broadband Advisory Council takes its responsibility very seriously to advise the Governor on policy and funding priorities to expedite deployment and reduce the cost of broadband access in the Commonwealth.

By prioritizing broadband access to the unserved and ensuring that logistical barriers are addressed through a variety of policy and funding recommendations to the Governor, the Broadband Advisory Council believes that the Commonwealth will continue to be competitive by "Building A New Virginia Economy."

Technical Assistance

CIT Broadband is a state-sponsored program, charged with providing broadband technical assistance to unserved localities throughout the Commonwealth. CIT strongly believes that the most efficient way (in cost and time) of expanding broadband is through public-private partnerships. CIT leverages its nationally-recognized methodology called *The Broadband Path* to facilitate public-private partnerships that will address a locality's unique broadband needs.

Additionally, CIT serves as a repository of broadband information (ex. broadband funding, best practices, coverage maps and stats), a liaison between elected officials, providers, localities and citizens, and an enabler of locality-led broadband initiatives.

CIT's Broadband Path

It is important for localities to understand their broadband needs, assets, priorities, and goals before pursuing a broadband expansion project. However, most localities do not have the resources or expertise to accurately collect the data and identify the best solution.

Based on experience in the field and unique relationships with broadband providers and localities, CIT developed a methodology called *The Broadband Path*. The Broadband Path is a three-step process to 1) perform a comprehensive broadband assessment, 2) help the locality determine its needs and goals, and 3) facilitate a public-private partnership through a Request for Proposal (RFP). CIT's Broadband Path is distinctive because it produces tangible, goal-driven, fiscally achievable broadband solutions **at no cost to the locality**. Below is more information regarding the three phases of the Broadband Path.

Broadband Assessment

In the broadband assessment phase, CIT identifies community broadband needs based on an evaluation of the locality's current broadband coverage, available capacity, current and future demand, local assets and resources, and local policies that may be hindering broadband expansion. CIT works with the locality to conduct a citizen broadband survey in order to gain an understanding of its citizens' and business' Internet usage and needs.

Decision Points

Based on the needs identified during the Broadband Assessment phase, CIT facilitates the locality's adoption and prioritization of goals, decision regarding the role the locality wishes to have in a partnership, and identifies options for funding and meeting the goals.

Broadband Requirements

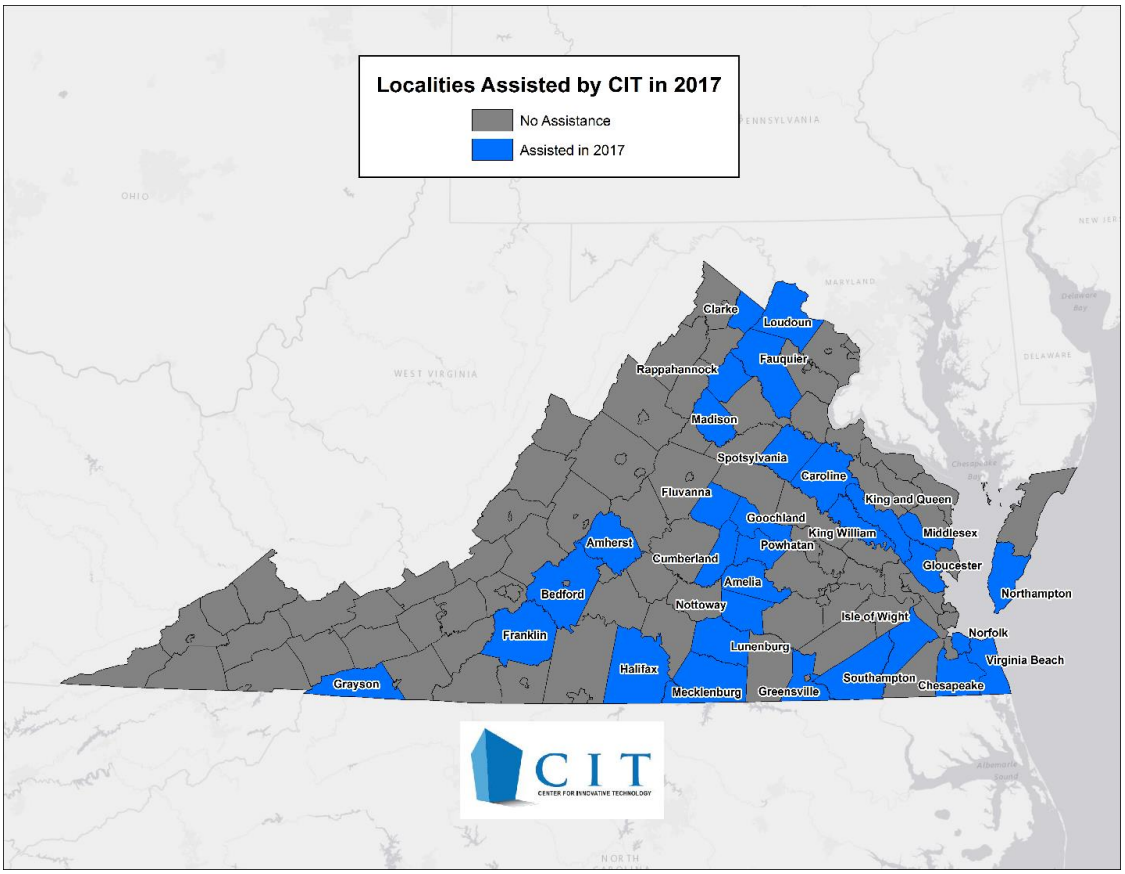
Once the previous phases are complete, CIT works with the locality to develop a Request for Proposals (RFP) and disseminates the RFP through CIT's channels. CIT does not participate in the proposal review process, however, it has developed a set of guidelines the locality can use to help ensure that the provider selected will be the best fit for that locality.

Localities Assisted

In 2017, CIT partnered with 15 localities to assist them through *The Broadband Path*. The majority of these localities are still working through the path, however, 3 localities – Powhatan, Amelia and Halifax – completed the path and successfully established public-private partnerships.

Additionally, CIT provided technical assistance through a variety of ways to 16 other Virginia localities.

The map below depicts the localities CIT assisted in 2017.



Virginia Broadband Mapping and Planning Tools

CIT and its partners, Virginia Tech's Center for Geospatial Information Technology (CGIT) and Virginia Geographic Information Network (VGIN), have created and are maintaining a number of tools and resources designed to facilitate broadband expansion. These tools and resources are housed within the Integrated Broadband Toolbox (Integrated Toolbox). This activity began in 2012 as part of CIT's State Broadband Initiative (SBI) grant and enhancements have continued to be made including incorporating dynamic updating capabilities for the MapBook Portal and broadband survey (SurveyCardinal). The Integrated Toolbox includes statewide digital terrain and surface models, a map book creator (Broadband Map Books), Virginia's inventory of vertical assets (VAIT 2.0), and spatially referenced broadband policy information (Virginia Broadband Policy Database).

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. This tool can now be found as a stand-alone tool (http://www.projects2.cgit.vt.edu/BroadbandPolicy/) and also within the Virginia Broadband Availability Map and Integrated Broadband Planning and Analysis Toolbox (https://projects.cgit.vt.edu/IntegratedToolbox/).

A state-wide Vertical Assets Inventory Toolkit (VAIT) serves as a repository of location information for structures that have the potential to serve as wireless broadband transmission sites. The aim of this solution 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 in order to facilitate the integration of broadband and information technology into state and local economies. The VAIT tool 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. Asset locations can also be displayed within the Virginia Broadband Availability Map and Integrated Broadband Planning and Analysis Toolbox as an interactive layer to compare locations vs other themes/layers. CGIT worked with several localities to refine locations of their vertical assets in order to get better data precision above and beyond what the FCC provides.

Part of CGIT's capability is an RF propagation service 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. Currently this service is provided on an as-needed basis. During FY17 CGIT performed RF propagations for several localities in Virginia and delivered reports summarizing recommendations on how to improve current broadband coverage based on existing and potential vertical asset locations.

Additionally, RF propagation models have been used by the broadband team to estimate wireless coverage for 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. These services are currently available to any WISP who would like an unbiased coverage map and results can be included in the Virginia Broadband Availability Map and Integrated Broadband Planning and Analysis Toolbox.

For better feedback and engagement with individual jurisdictional needs in Virginia, CGIT developed SurveyCardinal - a browser based survey that helps CIT identify broadband needs across the state. This tool was leveraged heavily during the Governor's RUOnlineVA campaign in collecting over 15K survey responses and helped to identify where broadband coverage is most needed in Virginia.

Building upon the successes of the broadband mapping program, CGIT currently hosts the Broadband Map Book Portal that resides within the Virginia Broadband Availability Map and Integrated Broadband Planning and Analysis Toolbox. 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, Copper Wireline services, Reported Dead Zones, DSL Wireline services, Fiber Optic services, Fixed Wireless services, 4G Wireless Services, Mobile Wireless services, DataCardinal Speed Test results, Community Anchor Institutions, RUOnline Results, Vertical Assets locations, Community Anchor Institutions, and Population density by Census tract.

The current suite of tools is available at http://www.cgit.vt.edu/broadband.html.

State Broadband-Related Legislative Activities

HB 2108 - Virginia Wireless Services Authority Act; rates and charges.

Patrons: Kathy J. Byron (chief patron), Jennifer B. Boysko, Timothy D. Hugo, James A. "Jay" Leftwich

Summary: Provides that a wireless services authority may fix rates, fees, and charges for services provided, or facilities owned, operated, or maintained by the authority, for which the authority has received loan funding. Currently, an authority may do so only if it has issued revenue bonds. A similar change authorizes rates to be set at levels to provide for payment of loans. The measure also requires each authority to maintain records demonstrating compliance with certain provisions and to make the records available for inspection and copying by the public pursuant to the Virginia Freedom of Information Act.

SB 1282 - Wireless communications infrastructure; procedure for approved by localities.

Patron: Ryan T. McDougle (chief patron)

Summary: Provides a uniform procedure for the way in which small cell facilities on existing structures are approved by localities and approved and installed in public rights-of-way. The measure includes provisions that establish requirements applicable to the location of micro-wireless facilities. The measure also addresses restrictions by localities and the Department of Transportation regarding the use of public rights-of-way or easements and specifies when a permittee may be required to relocate wireless support structures.

Broadband-Related Activities at the Federal Level

Federal Broadband Legislation

Below is a list of some of the broadband-related bills that have been introduced thus far at the federal level.

S.277 - Rural Telecommunications and Broadband Service Act of 2017

Summary: A bill to establish a Rural Telecommunications and Broadband Advisory Committee within the Federal Communications Commission.

Latest Action: Senate - 02/02/2017 Read twice and referred to the Committee on Commerce, Science, and Transportation.

H.R.800 - New Deal Rural Broadband Act of 2017

Summary: This bill amends the Rural Electrification Act of 1936 to establish a rural broadband office within the Department of Agriculture (USDA) and authorize new grants and loans for developing broadband in rural, underserved, and tribal areas.

Latest Action: House - 02/24/2017 Referred to the Subcommittee on Commodity Exchanges, Energy, and Credit.

S.1363 — Rural Broadband Deployment Streamlining Act

Summary: Summary in progress.

Latest Action: Senate - 06/15/2017 Read twice and referred to the Committee on Energy and Natural Resources.

S.742 — Community Broadband Act of 2017

Summary: This bill bars state, local, or tribal governments from prohibiting or inhibiting such government entities or their affiliates from serving as "public providers" of

telecommunications services or advanced telecommunications capabilities to any person or any public or private entity.

Latest Action: Senate - 03/28/2017 Read twice and referred to the Committee on Commerce, Science, and Transportation.

S.228 —Small Business Broadband Deployment Act of 2017

Summary: This bill exempts for five years any small business broadband Internet access service provider with no more than 250,000 subscribers from the enhancements to the transparency rule of the Federal Communications Commission (FCC) under which any person engaged in the provision of broadband Internet access service must disclose publicly accurate information regarding the network management practices, performance, and commercial terms of its broadband Internet access services sufficient for:

- consumers to make informed choices regarding their use; and
- content, application, service, and device providers to develop, market, and maintain Internet offerings.

The FCC shall report to specified congressional committees, within 180 days after enactment of this bill, its recommendations (together with supporting data) on whether:

- this exception should be made permanent, and
- the definition of "small business" for these purposes should be modified.

Latest Action: Senate - 01/24/2017 Read twice and referred to the Committee on Commerce, Science, and Transportation.

H.R.288 —Small Business Broadband Deployment Act

Summary: This bill exempts for five years any small business broadband Internet access service provider with no more than 250,000 subscribers from the enhancements to the transparency rule of the Federal Communications Commission (FCC) under which any person engaged in the provision of broadband Internet access service must disclose publicly accurate information regarding the network management practices, performance, and commercial terms of its broadband Internet access services sufficient for:

- consumers to make informed choices regarding their use; and
- content, application, service, and device providers to develop, market, and maintain Internet offerings.

The FCC shall report to specified congressional committees, within 180 days after enactment of this bill, its recommendations (together with supporting data) on whether:

- this exception should be made permanent, and

- the definition of "small business" for these purposes should be modified.

Latest Action: Senate - 01/11/2017 Received in the Senate and Read twice and referred to the Committee on Commerce, Science, and Transportation.

Federal Broadband Activities

Connect America Fund Phase II

The Connect America Fund Phase II (CAF-II) is part of the Commission's reform and modernization of its universal service support programs. In 2015, ten price cap carriers accepted an offer of Phase II support calculated by a cost model in exchange for deploying and maintaining voice and broadband service in the high-cost areas in their respective states.

Moving forward, CAF-II will use competitive bidding to efficiently support deployment of networks providing both voice and broadband service, thereby expanding broadband availability to millions more unserved Americans.

Budget:
$198 million in annual support (a total of $1.98 billion for 10 years).

Support Term:
10 years of support; support disbursed in equal monthly installments.

For more information: https://www.fcc.gov/connect-america-fund-phase-ii-auction

FCC Broadcast Incentive Auction and Post-Auction Transition

On March 29, 2016, the FCC commenced the first-ever "incentive auction" designed to repurpose spectrum for new uses. Authorized by Congress in 2012, the auction used market forces to align the use of broadcast airwaves with 21st century consumer demands for video and broadband services.

The auction preserves a robust broadcast TV industry while enabling stations to generate additional revenues that they can invest into programming and services to the communities they serve. And by making valuable "low-band" airwaves available for wireless broadband, the incentive auction will benefit consumers by easing congestion on wireless networks, laying the groundwork for "fifth generation" (5G) wireless services and applications, and spurring job creation and economic growth.

Auction Results:
Bidding in the auction closed on March 30, 2017, repurposing 84 megahertz of spectrum – 70 megahertz for licensed use and another 14 megahertz for wireless microphones and unlicensed

use. The auction yielded $19.8 billion in revenue, including $10.05 billion for winning broadcast bidders and more than $7 billion to be deposited to the U.S. Treasury for deficit reduction.

Current Status:
On April 13, 2017 the Commission released a public notice formally closing the auction and beginning the 39-month period during which time some TV stations will need to transition to new channel assignments. This website offers details on how the transition works and how it will impact viewers as well as resources for TV stations, winners of new mobile wireless licenses, and other stakeholders. The Commission will update the site as new information becomes available.

For more information: https://www.fcc.gov/about-fcc/fcc-initiatives/incentive-auctions

Federal Broadband Funding

In June 2017, The National Telecommunications and Information Administration's (NTIA) BroadbandUSA released the *"BroadbandUSA: Guide to Federal Funding of Broadband Projects"* which contains all federal funding programs for broadband-related projects. The guide can be found here: https://www2.ntia.doc.gov/files/ntia_guidetofedfunding_062317.pdf