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

October 1, 2015

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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

Led by the Center for Innovative Technology (CIT) and its partners, the Commonwealth of Virginia continues to work towards Governor McAuliffe's goal of ubiquitous, affordable broadband access and ensuring its citizens and localities are realizing the benefits broadband brings. Access to and adoption of reliable broadband provides a locality the opportunity to grow in almost every arena. Broadband impacts all areas of community life including local government, healthcare, education, economic development, public safety and overall quality of life.

For the past five years Virginia broadband activities have almost entirely been funded by federal dollars. In February 2015 the federal NTIA state broadband initiative grant ended. However the General Assembly, for the first time, allocated funding to maintain the state broadband program viewing it as critical to the resolution of the digital divide in Virginia. Through this state funding, CIT continues its broadband access data collection, development of resources to assist localities in planning efforts and staffing of the Broadband Advisory Council, all of which help drive broadband expansion and adoption in Virginia.

The Virginia broadband team, comprised of CIT, Virginia Geographic Information Network (VGIN), and the Center for Geospatial Information Technology (CGIT), continued its work in assisting localities to expand broadband access and adoption through the development of tools, resources, and promoting broadband-friendly legislation.

CIT released its Strategic Broadband Plan in early 2015 which outlines statewide strategic goals and CIT activities designed to achieve these goals. As part of this plan and its mission, CIT released a Strategic Broadband Roadmap white paper and infographic which provide step-by-step guidelines for localities seeking to expand broadband coverage and prepare for future capacity to support the community's education, economic development, public safety and healthcare goals.

Despite the closeout of the national mapping program the team was able to work with Virginia broadband providers and encourage continued participation in the Virginia mapping program. For the first time in five years broadband providers were asked to submit their data to the Commonwealth without the encouragement of federal agencies. Fortunately many chose to continue to participate and the team released the latest update to the map.

Additionally, the team continues to release multiple online tools to assist localities in their planning efforts, directly assisted counties, citizens and organizations, and facilitated several broadband-related assessments.

Although the team has made great strides in 2015 and previous years to improve broadband in the Commonwealth there's still work to be done. This report highlights the initiatives and activities that have occurred in the past year as well as identifying the needs that remain.

Broadband Advisory Council

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 purpose of the council shall be 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 from by the Broadband Roundtable (established by Governor Kaine in 2007) and was codified during the 2009 legislative session (HB2423).

This year the General Assembly passed HB 2207 which added additional members to the council including: 1 additional member from the House, 1 additional member from the Senate, the Secretary of Agriculture and Forestry, the executive director of the Center for Rural Virginia, and a representative from the Virginia Wireless Internet Service Providers Association (WISPA). In addition to the new council members the bill also added an additional staff member from DLS.

The council is now 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 Scott Surovell
Delegate James Leftwich
Delegate Randy Minchew
Senator Charles Carrico
Secretary Karen Jackson
Secretary Maurice Jones
Secretary Todd Haymore
Ray LaMura, President of VCTA
Duront Walton, Executive Director of VTIA
Christy Morton, Executive Director of the Center for Rural Virginia
Jimmy Carr, President of Virginia Everywhere
Jane Dittmar, Chair of the Albemarle County Board of Supervisors

Staff: Caroline Stolle (CIT), Sandie Terry (CIT), Lisa Wallmeyer (DLS)

The Broadband Advisory Council met on May 1, 2015 in Richmond. The council heard presentations regarding the 2014 Virginia Libraries Assessment, broadband mapping challenges and federal broadband issues, a public-private partnership success story, and the Center for Innovative Technology's Strategic Broadband Plan including the allocation of the state funds against that plan.

The Broadband Advisory Council met on July 13, 2015 in Richmond. The council heard presentations regarding the Education Superhighway K-12 Assessment, the status of and success

stories from the BIP/BTOP funded infrastructure, an overview of HB 2207, and a FOIA review. The council conducted its annual officer election and elected Delegate Byron as Chair and Senator Ruff as Vice Chair.

The council met on September 3, 2015 in Richmond. The council discussed CenturyLink's acceptance of Connect America Phase II Federal (FCC) funding , HB 2325, escalating Railroad crossing fees for fiber/cable, HB 2352, cable company investments in Virginia, barriers to cable deployment, and what 14 other states are doing to facilitate broadband investments and deployments.

The council plans to meet again in November 2015. There are requests to hear from the railroads regarding the escalating fees and from VDOT regarding prescriptive easements at the November meeting.

Virginia Standings and Activities

Standings

National Broadband Leadership

The 2015 Akamai *State of the Internet* Report ranks Virginia in the top ten across all 5 key indicators.

- **Virginia remained at #2 nationwide in average connection speed with a 34% increase year-over-year.**
- **Virginia remained at #3 nationwide in average peak connection speed with a 47% increase year-over-year.**

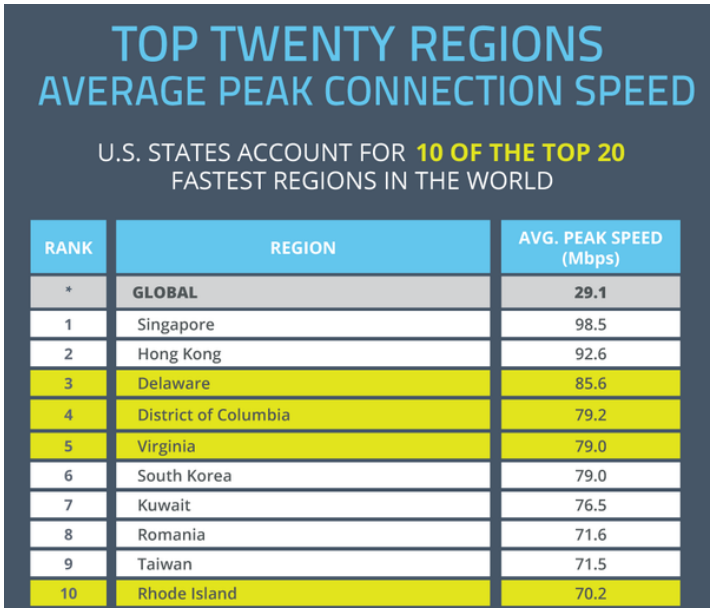
	State	Q1 2015 Avg. Mbps	QoQ Change	YoY Change
1	Delaware	18.6	13%	42%
2	Virginia	18.5	4.2%	34%
3	District Of Columbia	17.3	20%	35%
4	Utah	15.7	12%	30%
5	Massachusetts	15.4	8.3%	18%
6	Rhode Island	15.4	8.9%	19%
7	Washington	14.8	11%	19%
8	Oregon	14.1	9.4%	21%
9	Wisconsin	14.0	14%	21%
10	North Dakota	14.0	9.7%	19%

Figure 12: Average Connection Speed by State

	State	Q1 2015 Peak Mbps	QoQ Change	YoY Change
1	Delaware	85.6	14%	65%
2	District Of Columbia	79.2	20%	54%
3	Virginia	79.0	7.5%	47%
4	Rhode Island	70.2	8.6%	32%
5	Massachusetts	69.7	6.3%	33%
6	Utah	67.9	13%	50%
7	North Dakota	66.9	8.2%	45%
8	Washington	66.4	15%	32%
9	Maryland	64.4	12%	34%
10	California	64.3	11%	47%

Figure 13: Average Peak Connection Speed by State

The report also **ranked Virginia 5th worldwide in average peak connection speed.**



TOP TWENTY REGIONS
AVERAGE PEAK CONNECTION SPEED

U.S. STATES ACCOUNT FOR **10 OF THE TOP 20**
FASTEST REGIONS IN THE WORLD

RANK	REGION	AVG. PEAK SPEED (Mbps)
*	GLOBAL	29.1
1	Singapore	98.5
2	Hong Kong	92.6
3	Delaware	85.6
4	District of Columbia	79.2
5	Virginia	79.0
6	South Korea	79.0
7	Kuwait	76.5
8	Romania	71.6
9	Taiwan	71.5
10	Rhode Island	70.2

Total Population with Broadband Coverage

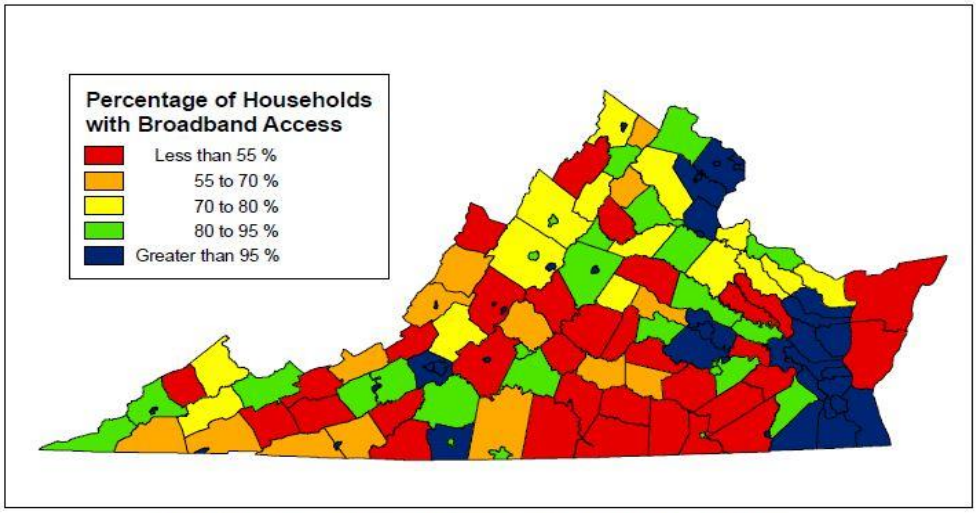
Based on highlighted data collected by CIT and partners, Virginia Tech and VGIN, the following chart shows the progression of expanding broadband coverage to citizens across the Commonwealth of Virginia from 2010 to 2015. The 2015 data was collected in the spring and is based off of provider-submitted data which is often overstated. The progression of coverage in the chart below is a combination of broadband expansions and the growth and fluctuations of provider participation in our data collection.

	Population of the State	Total Population with Coverage	Percentage with Coverage	Population with Three or More	Percentage with Three or More
2010	8,001,024	2,540,371	33%	1,109,501	15%
2011	8,001,024	4,832,810	63%	2,183,018	29%
2012	8,001,024	7,283,916	96%	4,110,563	54%
2013	8,001,024	7,339,793	96%	4,358,605	57%
2014	8,001,024	7,379,999	97%	4,395,236	58%
2015	8,001,024	7,356,578	96%	4,342,839	57%

* 2015 marked the beginning of a new submission and data model for Virginia broadband reporting, and there was a slight decline in provider participation (particularly the larger wireline providers) as there are no longer federal requirements to participate. Overall coverage should improve if data collection participation returns to previous levels in the future.

Virginia's Un/Underserved Localities

In January 2015, the FCC changed the definition of broadband from 4 mbps download and 1 mbps upload to 25 mbps download and 3 mbps upload. Based on this new definition, **46% of Virginia localities are now considered underserved (62 localities total).** The map below shows the percentage of households by locality with access to at least 25mbps/3mbps.

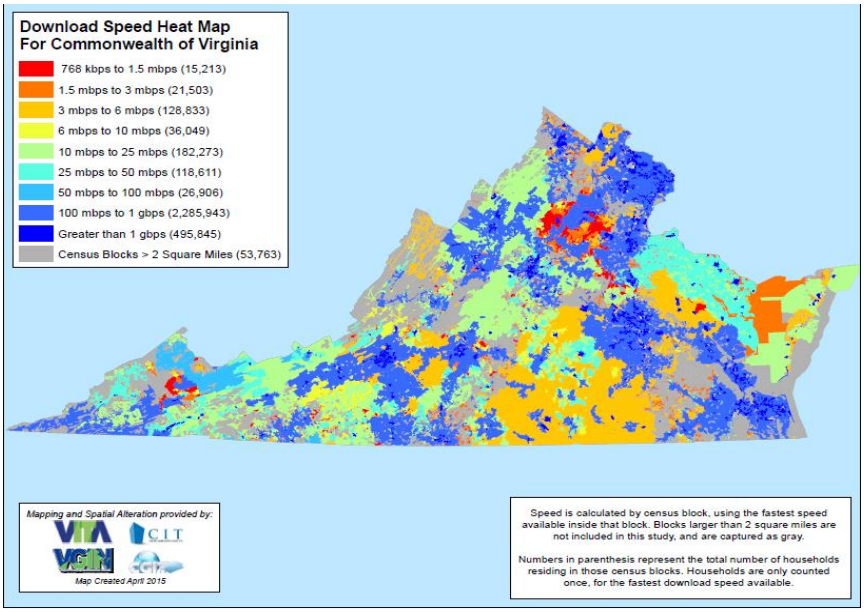


Percentage of Households with Broadband Access

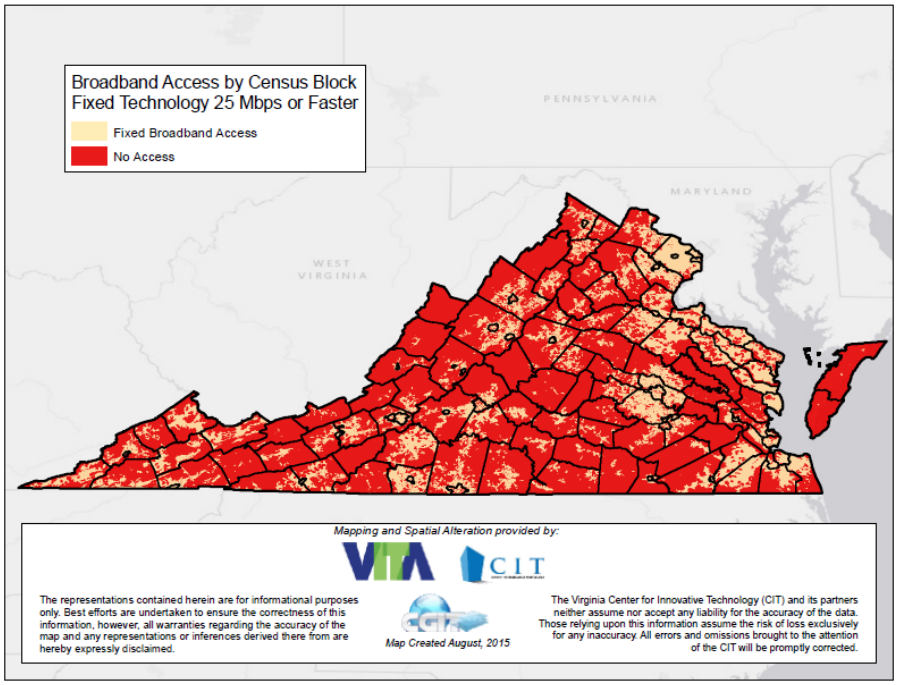
The FCC definition of broadband access is a download speed faster than 25 Megabits per secondand an upload speed faster than 3 Megabits per second

Map Created January 2015

The following map displays fixed broadband (not cellular or satellite) based on the maximum advertised speed available by census block. Census blocks larger than 2 square miles are displayed in gray due to the data being too unreliable (based on federal reporting rules) for large census blocks.



Additionally, the map below shows access to fixed broadband of 25 Mbps (the new FCC definition) or faster by census block.



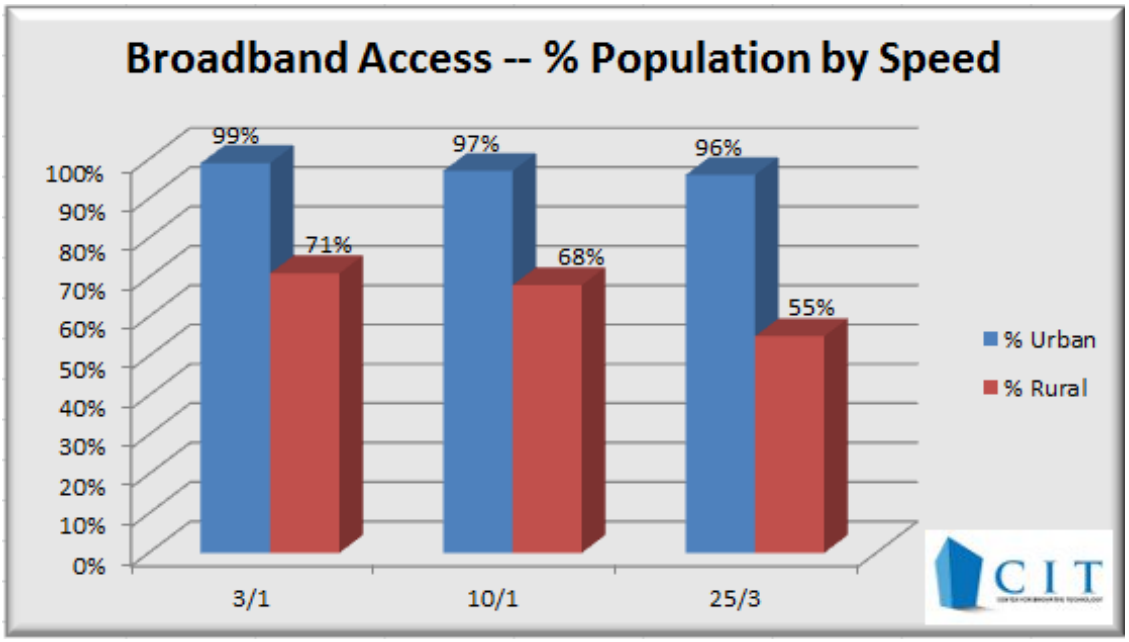
Urban vs. Rural Population

Based on data collected by CIT and partners, Virginia Tech and VGIN, the following chart shows the difference in coverage between urban and rural population based on speeds.

The first speed, 3mbps download/1mbps upload was a former definition of broadband. The second, 10mbps download/1mbps upload is the minimum speed requirement for the Rural

Broadband Experiments and the Connect America Fund Phase I. The third, 25mbps download/3mbps upload is the FCC's new definition of broadband.

- **55% of Virginia's rural population does not have broadband according to the FCC's definition.**
- **29% of Virginia's rural population does not have access to broadband by any definition.**



Activities

Education

EducationSuperHighway

In June 2014, 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, conducted in fall 2014, 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.

In Phase 2, conducted in winter 2015, EducationSuperHighway visited 18 divisions and each of the eight superintendents' regions and interviewed tech directors and superintendents. Through these interviews, they identified the common barriers to digital learning which are: staff time and expertise, specific funding rules, negotiation/vendor relations, and leadership/local politics.

Phase 3 kicked off in spring 2015 and is focused on researching and applying best practices to meet the specific needs of Virginia. EducationSuperHighway supported a consortium pilot of 15 divisions exploring options to consolidate demand and increases efficiency. Through this process broadband providers helped schools affordably buy bigger circuits and as a result 5 divisions were able to upgrade their bandwidth.

	Before Negotiations			After Negotiations			
School District	Speed	MRC	$/Mbps	Speed	MRC	$/Mbps	Contract End
Greene County	100 Mbps	$3,750	**$37**	1000 Mbps	$4,470	**$4.5**	**2018**
Orange County	250 Mbps	$3,775	**$15**	1000 Mbps	$5,800	**$5.8**	**2016**
Nelson County	200 Mbps	$3,986	**$20**	1000 Mbps	$5,900	**$5.9**	**2020**
Appomattox County	100 Mbps	$4,167	**$42**	200 Mbps	$1,900	**$9.5**	**2016**
Fluvanna County*	100 Mbps	$1,525	**$15**	200 Mbps	$943	**$4.7**	**2018**

*WAN circuits

Phase 4 is scheduled for fall 2015 and will run until fall 2018. In this phase EducationSuperHighway will provide technical expertise and support to VDOE and divisions as they implement adopted solutions.

Appomattox After School Wireless Connection Program

The Appomattox County Public Schools conducted a survey in December 2014 to determine the student population's internet connectivity. The results showed that 59% of students do not have internet access at home, excluding mobile wireless. In addition to affecting homework assignments and digital learning opportunities, the school system has begun issuing iPads to students but due to the fact that not all students can access the internet after school, and in order to avoid inequities in learning they are not permitted to take the devices home.

Thinking outside the box to resolve this issue, in 2015 the school system set out to provide county-owned, free wireless internet access after school hours for the students. Appomattox County Public Schools planned and began building a fiber network connecting schools and county offices. County administration and the school system teamed up and merged their information technology services with the school technology staff supporting all county technology needs. County administration and the school system together executed a

memorandum of understanding for the technology services, eliminating duplication of effort, combining resources and leveraging assets.

The school's network is separated from the county's network through implementation of virtual local area network configurations. The school system in partnership with the county, has established a phased county wide initiative to provide students with free wireless access after school.

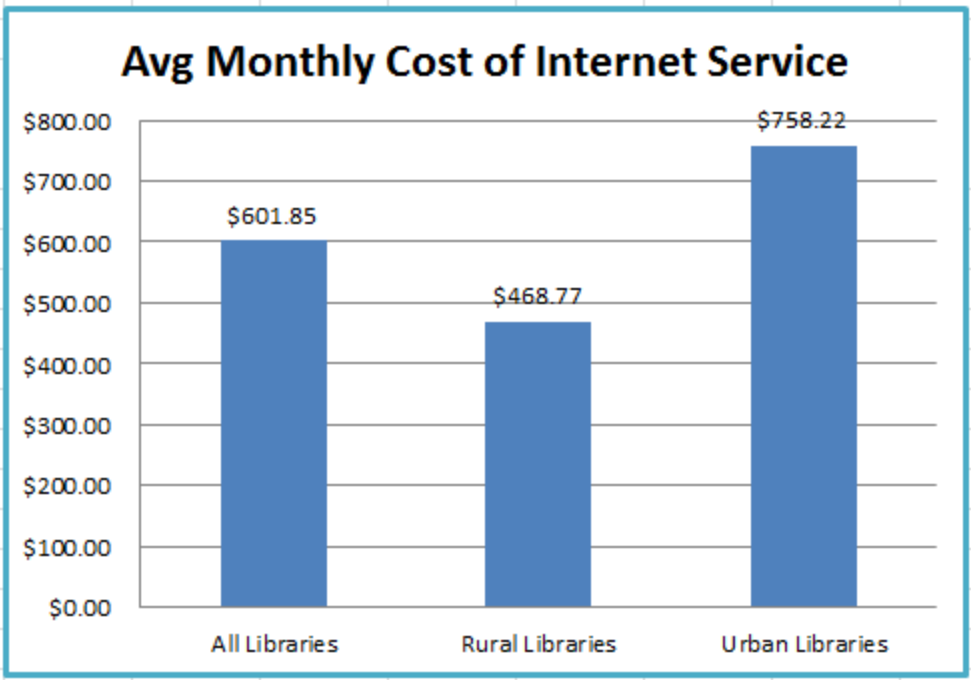
By partnering with the county administration, the school system will be able to provide internet connectivity to students, many of whom would otherwise be without internet access after school hours. In addition to expanding the iPad program, the school system will be able to utilize other internet-based education programs to insure their students have the same opportunities as students in less rural areas.

Libraries

CIT and partners, Accelerate Virginia and VGIN, worked with the Library of Virginia to conduct speed test campaigns and map the results for the past few years. In 2014, we worked with the Library of Virginia to incorporate broadband related questions in their annual survey of all libraries and merged these survey responses with the speed test data. This combined data and information gathering provides a more comprehensive look at Virginia libraries from the broadband access and usage perspective. The areas of focus were: internet costs, download speeds, digital literacy training offerings, and patrons use of the internet. The 2014 Virginia Libraries Broadband Assessment can be found at: http://www.wired.virginia.gov/wp-content/uploads/News-Events/2015/2014-Virginia-Library-Assessment.pdf

Cost of Internet Access

As this was our first comprehensive annual assessment of the libraries we determined we need to gather additional data to be able to perform a complete cost analysis. In 2015 we will include additional questions in the Library of Virginia survey and we will be able to access the FCC data collected on telecommunications for libraries. We averaged the monthly costs (before applying e-Rate discounts) across rural and urban libraries. Urban area libraries average paying $758 per month for Internet service whereas rural area libraries average only $466. There are many factors that contribute to this cost such as bandwidth purchased and proximity to upstream fiber.



We examined which libraries are paying more than the state average. Approximately one-third (30%) of the urban area libraries are paying higher than the $758 per month cost and 39% of the rural area libraries are paying more than the $466 average.

Digital Literacy Training

Broadband adoption is important to ensure all citizens have the ability to realize the benefits of broadband and for making the business case for broadband access expansion into unserved areas. Digital literacy is the lack of knowledge of how to use a computer, how to access the Internet, how to make purchases online, how to protect yourself online, etc., and can be a huge barrier to adoption. Rural areas struggle with insufficient broadband access because incumbent providers cannot make the business case for deployments due to less dense population and typically lower adoption rates.

The assessment found that over **half of rural libraries and a quarter of urban libraries offer no digital training at all**. Considering that one of the barriers to broadband deployment in rural areas is the lower subscription rates due to lack of adoption, it would benefit all rural areas to provide digital literacy training to increase the demand.

Download Internet Speed

Internet speed is an important factor in determining the applications a particular Internet connection can support. Applications such as online meetings, streaming video and gaming require greater capacity than checking email or visiting websites. The Internet download speed test data indicates:

- Almost 60% of library patrons experience speeds that no longer qualify as broadband.

- Urban libraries averaged 27Mbps, 69% report slower speeds.
- Rural libraries averaged 15 Mbps, 60% report slower speeds.

Patrons' Primary Use of Public Access Computers

Libraries should emphasize the benefits of broadband through awareness and digital literacy training offerings. Patrons' primary usage reported is entertainment in rural areas whereas the primary use in urban areas is for work and education. We believe this is a direct correlation to the lack of digital literacy knowledge of how to leverage the Internet to realize meaningful benefits.

HealthCare

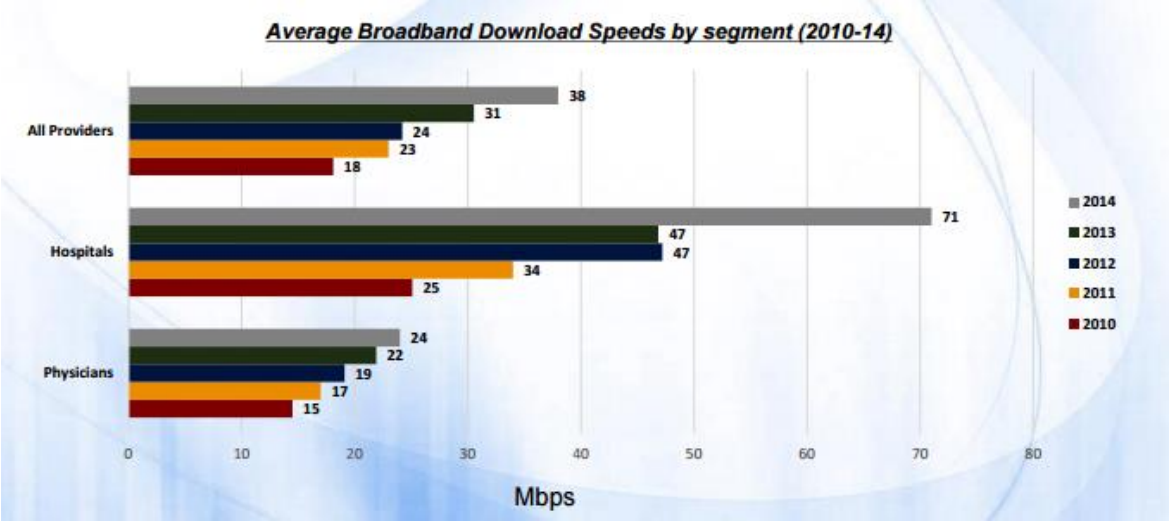
The fifth annual online Broadband and Health Information Technology (IT) Usage Survey kicked off in October 2014[1]. The survey received support from the Secretaries of Health and Human Resources and Technology as well as strong promotion among the following key healthcare associations in the Commonwealth: MSV; Community Health Care Association; VRHA; VDH; VHCA; VCAL; VAHC; VAFC; VACSB; VPHA; VDSS; VMGMA; VHHA[2].

This information is used to help decision makers in the Commonwealth assess gaps in coverage to support Health IT initiatives including Electronic Health Records (EHR), Telehealth, and Health Information Exchange (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 2014 report showed Virginia continues to outperform other states and national benchmarks in statewide broadband connectivity speeds, rising from 8th (2012) to 3rd (2013) to the current ranking of 2nd in average download speeds. Within the Commonwealth, average broadband speeds have nearly tripled since 2010, from below 5Mbps to the current 14.6Mbps.

[1] This assessment had not been fully completed by the time the last annual report was submitted which is why it is included in this year's report.

[2] 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.



Broadband, though relevant for all HealthIT capabilities, is perceived by healthcare providers as most important for the implementation of EHRs. Among hospitals, utilization of EHRs is nearly universal and 94% of physicians are utilizing EHR capabilities.

As EHR adoption is firmly established, more effective utilization and confidence regarding the demonstration of Meaningful Use among hospitals and physicians is increasing, 78% for hospitals and leaped from 65% (2013) to 87% for physicians. HIE is also generating increasing momentum the report showed increases in participation in HIE for both hospitals and physicians at 57% and 40% respectively.

The full report and the updated Virginia HealthIT map can be found at http://www.wired.virginia.gov/broadband/initiatives/health-it/.

Virginia Broadband Mapping and Planning

NTIA's state grant program, State Broadband Initiative (SBI), closed in February 2015. This marked the conclusion of the federally-funded broadband mapping and planning activities and the transition to state-funded activities. With this transition came the freedom to explore new statewide broadband activities and allowed CIT to continue with the broadband mapping program in a way that would best serve the Commonwealth.

Additionally, having completed the federally-funded, contractual planning activities, CIT was able to leverage the lessons learned from the SBI program to create a strategic broadband plan which outlines critical broadband goals for the commonwealth and CIT activities designed to achieve these goals.

Mapping

Broadband Mapping in the Commonwealth: History

In 2008 the Commonwealth, as recommended by the Commonwealth's Broadband Roundtable, recognized the need for statewide broadband mapping and completed its first mapping initiative.

The first-generation map, created with the assistance of VGIN and Virginia Tech, and a myriad of private sector partners was the only state map in the U.S. to be based on "address-level" data, and developed at no cost to the citizens. This initiative placed Virginia amongst the national broadband mapping leaders, and provided the basis for current broadband initiatives.

As a result of the American Recovery and Reinvestment Act (ARRA), in 2010 the National Telecommunications and Information Agency (NTIA) awarded Virginia's designated broadband entity, CIT and partners, VGIN and Virginia Tech, a State Broadband Initiative (SBI) grant which provided just under $4 million for broadband mapping. The purpose of this funding was to build on the initial 2008 map, provide additional verification and validation, and align Virginia data with requirements for inclusion in the National Broadband Map.

In 2011, the Commonwealth released a second edition of its broadband availability map, which in addition to including more providers' data, this map, unlike the previous version of the map, allowed users to search by address and view a list of providers available in that particular location. Over the following years, the Virginia broadband team, CIT, VGIN and Virginia Tech, worked tirelessly to update the map to reflect the state's ever-changing broadband footprint, increase broadband provider participation, and constantly work to improve the map's accuracy.

Broadband Mapping in the Commonwealth: Post-SBI

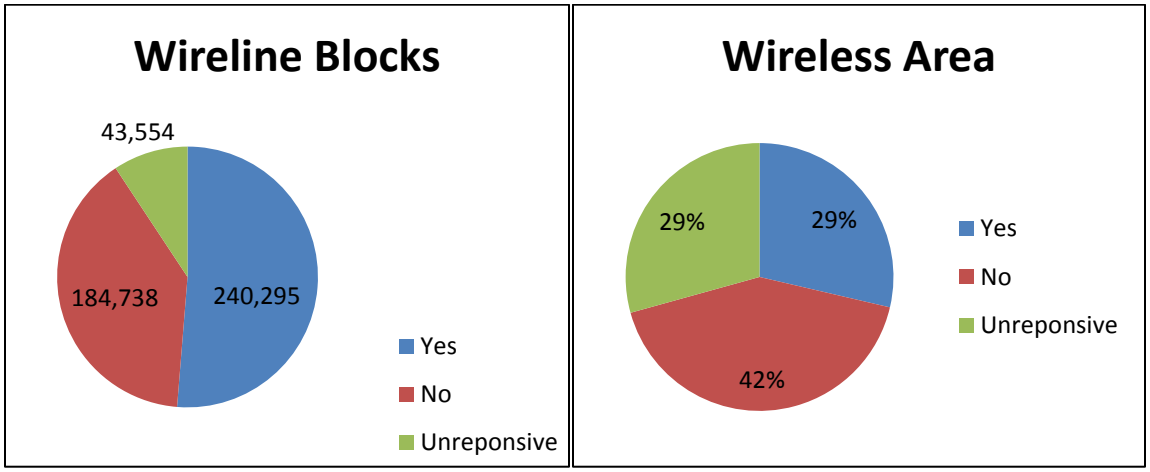
Under the direction of the NTIA, the mapping program focused on showing a picture of coverage through the lens of the provider. In order to capture these coverage areas, providers were contacted and data requests were formulated, all with the legitimacy that comes from a federal grant or federal program. The SBI program closed out in February 2015 and its funding has ended.

The data model for the federal program was focused on ensuring the participation of broadband providers. This was flawed for two reasons. First, it allowed providers to define their own coverage areas, and implicitly authorized them to overstate their coverage areas. Second, it utilized a simple data model that was incapable of capturing the small-scale granularity that is necessary for increasing availability and service to the underserved areas. These compromises might have been necessary to ensure large-scale participation on the behalf of the providers, but they were at the expense of the maps' accuracy and therefore blunted the efforts of states to improve broadband service.

Now that the SBI program has ended, states can define their own data models and create their own programs, but in Virginia we are faced with a difficult transition. The federal government will continue to track broadband availability, and now has explicitly compelled providers to submit data to the FCC through form 477. The information submitted through this form is less granular than the old data model from NTIA, and the FCC will not release raw or unprocessed data to the states. Because of this Virginia has requested data directly from providers however, this means that providers would have to submit their data twice to different entities, maintain separate Non-Disclosure Agreements, and maintain different data models. Many providers are reluctant to commit to that level of cost and effort.

CIT and team decided to continue the mapping program using FCC 477 data from any provider willing to share their data. Several of the larger wireline providers chose not to provide their data to the Commonwealth. Therefore, previously processed data from those providers will be retained and will be visually indicated in the map that the data is from fall 2014.

As of April 2015, 27 providers have agreed to continue participating in the Virginia broadband mapping effort, 9 have declined. Within the group that has declined are some of Virginia's largest providers including Verizon, Comcast and AT&T. Although the majority of providers have agreed to participate, without the larger providers' data the map will not be able to provide a comprehensive up-to-date view of broadband access. CIT and team will continue to work towards full provider participation.



The above charts show the number of census blocks that fall within participating, nonparticipating and unresponsive providers' service territories.

Planning

CIT's Strategic Broadband Plan

With the closeout of the SBI planning activities, and the Governor's allocation to CIT Broadband for fiscal years 15 and 16, CIT defined new goals and activities to address broadband access and utilization in the Commonwealth.

The Vision

To compete in today's economic environment, Virginians must have broadband access to be able to participate in the global economy, leverage digital learning technologies to expand educational opportunities, benefit from advances in health information technology, reduce environmental impact by teleworking, facilitate entrepreneurship and innovation while living in a safe environment no matter where they reside. We must leverage connectivity to realize the benefits of broadband, meet the broadband demands of today and ensure the infrastructure is in place to support the future bandwidth demands in the most efficient and cost effective way. To meet this

challenge we must understand what we have, where we are deficient, and implement a comprehensive broadband plan for Virginia's future.

Virginia Broadband Plan Overview

The following is an overview of the Strategic Broadband Plan. All of the goals and activities listed in the plan are considered extremely important to the expansion and promotion of broadband in Virginia; however, due to budget constraints not all activities are currently funded. The non-funded activities are highlighted in red.

Goal	**Activity**
1.1 Increase deployments in unserved areas	1.1.1 Research and share partnership models and best practices for broadband network deployments.
	1.1.2 Work with underserved areas to facilitate needs assessment and strategic planning to expand broadband access.
	1.1.3. Provide the state and localities with mapped broadband coverage and infrastructure to facilitate initiatives to expand access.
	1.1.4. Foster public private partnerships to facilitate broadband expansions while lowering costs and leveraging all broadband technologies.
1.2 Facilitate regional initiatives for next generation networks (high capacity and fully redundant backbones).	1.2.1. Facilitate and support regional collaboration on next generation network assessment and planning.
	1.2.2 Monitor planning efforts to identify "shovel ready" initiatives and potential funding options to facilitate more rapid deployments.
1.3 Generate and aggregate demand to facilitate the business case for investments in infrastructure.	1.3.1 Work with localities and regions to implement broadband awareness campaigns to communicate access options and benefits.
	1.3.2 Work with localities and regions to aggregate community anchor broadband demand to identify needs and potential buying power.
	1.3.3 Research and evaluate the feasibility of creating a solution to capture and report unmet demand on an ongoing basis either at the state level or local/regional levels.
1.4 Facilitate broadband infrastructure deployments by reducing barriers and costs.	1.4.1 Lower the costs of broadband infrastructure deployment through streamlined, efficient and effective policies and procedures at both the state and local levels.
	1.4.2 Map state and local owned assets to support sharing and avoid overbuilding infrastructure.
	1.4.3 Inventory, publish and maintain listing of broadband funding opportunities.
1.5 Research and support consideration of state incentive options to encourage infrastructure	1.5.1 Research, evaluate options and recommend state incentive programs focused on unserved areas.

deployment in unserved areas.	1.5.2. Support initiatives to create a limited state tax exception for broadband infrastructure. (per Governor's New Virginia Economy Plan)
2.1. Encourage and support state/regional/local broadband awareness campaigns.	2.1.1. Maintain an inventory of resources for marketing materials and suggestions for sharing information.
	2.1.2. Market and share our inventory of resources with local governments and regional PDCs.
	2.1.3. Work with PDCs to ensure each region is actively conducting awareness campaigns in served areas
2.2. Encourage and support regional/local community based programs to expand digital literacy.	2.2.1. Provide a clearinghouse of digital literacy resources and assistance programs.
	2.2.2. Market and share our inventory of resources with local governments and regional PDCs.
	2.2.3. Inventory Commonwealth libraries and schools to assess the digital literacy training opportunities.
	2.2.4. Work with localities that are deemed deficient in digital literacy offerings to expand training opportunities.
2.3. Encourage and support regional/local community based programs that lower the cost barrier to adoption.	2.3.1. Evaluate carrier subsidy programs per locality.
	2.3.2. Inventory PC refurbishment programs across the Commonwealth.
	2.3.3. Provide models and best practices of community based PC refurbishment programs to PDCs and localities.
2.4. Assess and facilitate expansion of digital learning across all school divisions and digital literacy at libraries.	2.4.1. Facilitate assessment and consumption of federal funding opportunities for schools and libraries.
	2.4.2. Assess the connectivity of Virginia schools and map results by locality.
	2.4.3. Assess and report the implementation of digital learning technologies across all Virginia school districts.
	2.4.4. Annually assess how Virginia schools rank nationally in broadband capacity and adoption of digital learning technologies.
2.5. Assess and facilitate the expansion of health information technology and telehealth across the Commonwealth.	2.5.1. Assess healthcare provider connectivity, the adoption of health IT and telehealth technology and map results.
	2.5.2 Annually rank Virginia healthcare providers nationally in connectivity and adoption of health IT and telehealth technologies.
2.6 Coordinate with state and local public safety organizations to identify specific broadband requirements to facilitate the implementation of Next Generation 911.	

Improving Broadband Access and Utilization in Virginia

In July 2015, CIT released its "Improving Broadband Access and Utilization in Virginia" white paper. The purpose of this document is to leverage the knowledge and resources gained from working in the field and with subject matter experts and provide recommendations in order to help facilitate locality-led broadband access and utilizations efforts. This document was designed to be applicable to all localities in Virginia and therefore has breadth not depth.

In addition to the white paper, CIT released its "Strategic Broadband Roadmap" which is an infographic and a companion piece to the white paper. The Roadmap was designed to serve as a quick, step-by-step reference sheet to the recommendations provided in the white paper.

The Strategic Broadband Roadmap is below and both documents can be found at http://www.wired.virginia.gov/broadband/resources/.

Broadband Adoption White Paper

In June 2015, CIT released its "Improving Broadband Adoption" white paper which outlines strategies and recommendations for locality-led broadband adoption programs. Based on commonly reported barriers and a pilot adoption project conducted in King & Queen County, the white paper defines goals and provides recommendations on how localities can achieve these goals in order to promote broadband adoption.

The primary goals are:

1. ***Remove or reduce the cost barrier*** to allow those citizens who otherwise would have access to take advantage of broadband services.

2. ***Increase awareness of non-adopters of broadband*** to help them understand how being online can benefit their day to day lives as well as educating these citizens on the services that are available to them.

3. ***Establish relevance for non-adopters of broadband*** by making services available online that can benefit non-adopters giving them a reason to be online as well as those citizens who are already online.

4. ***Continue to improve availability of wireless broadband services*** in areas where this service or other broadband service is not currently available.

The white paper is a downloadable version of the web-based adoption tool, both the white paper and the online adoption tool can be found at www.wired.virginia.gov.

Integrated Broadband Toolbox

CIT and 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" and concluded with CIT-NTIA funding in Feb 2015. Since then development has continued with funding from CIT to incorporate dynamic updating capabilities for the **MapBook Portal** as well as a broadband survey (**SurveyCardinal**) and a speed-testing tool (**DataCardinal**) available in both browser and mobile platforms. The Integrated Toolbox also 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.

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 in order to facilitate the integration of broadband and information technology into state and local economies. **VAIT 2.0** was released in early 2015 to include dynamic daily updates from current FCC data and a more intuitive user interface. 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.

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 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 **Dynamic Mapbook Portal** once released.

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 is optimized for both desktop and mobile devices.

In order to obtain consistent, unbiased internet speed data CGIT released **DataCardinal** to measure internet speed tests across Virginia. Results from this test can be viewed spatially and is available on desktop and Android devices.

Building upon the successes of the broadband mapping program, CGIT currently hosts the **Broadband Map Books** tool. 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 health care 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.

The current suite of tools is available at http://www.cgit.vt.edu/broadband.html. The **Dynamic Mapbook Portal** is the next iteration in the Integrated Toolbox that will include data generated from the above tools while integrating them into one navigation screen and adding capabilities to view radio frequency (wireless) propagation models and a web based 3D viewer.

Technical Assistance

CIT Broadband is dedicated to assisting every Virginia locality achieve ubiquitous, affordable broadband. The team provides assistance throughout the Commonwealth whether it be directly working with a locality or developing tools and resources with every locality in mind. Although we're certain there are more that have been indirectly assisted, the following is a list of 31 localities, associations, commissions and authorities that received direct assistance in 2015.

Localities:
Albemarle County
Appomattox County
Bedford County
Caroline County
City of Roanoke
Culpeper County
Dinwiddie County
Giles County
Greene County
Hanover County
Isle of Wight County
King and Queen County
King William County
Loudoun County
Louisa County
Nelson County
New Kent County
Stafford County

Other:
Accomack-Northampton Planning District Commission
Central Shenandoah Planning District Commission
George Washington Regional Commission
Middle Peninsula Planning District Commission
New River Valley Planning District Commission
Thomas Jefferson Planning District Commission
Virginia Association of Planning District Commissions (VAPDC)
Center for Rural Virginia
Virginia Association of Counties (VACO)
VACO Region 10 &11
Virginia School Board Association (VSBA)
Region 2000
Roanoke Valley Broadband Authority

In addition to those listed above, the team also directly assisted 24 citizens with broadband-related issues.

DHCD Community Development Block Grant (CDBG) Planning Grant

Localities need to have a strategic broadband plan that identifies areas for future deployments and identifies opportunities for partnerships with the providers to leverage funding strategies and provide a solid business case for broadband services expansions.

The Virginia Community Development Block Grant (CDBG) Planning Grant program provides support to localities for developing clearly-articulated strategies for identifying and addressing their greatest community development needs. Under this program, eligible localities may apply for assistance to help address a range of issues, telecommunications being one.

The following is a list of localities that have been awarded a CDBG Planning Grant. A number of other localities have sought funding through this grant and were not awarded due to the eligibility criteria. In the future we plan to report on which funded plans have been acted upon.

GRANTEE	Year	AWARD	FUNDING
PAGE CO.	2007	$25,000	State
NELSON CO.	2007	$25,000	State
PENNINGTON GAP TOWN	2007	$25,000	State
CARROLL/GALAX/GRAYSON	2007	$275,000	State
EASTERN SHORE BROADBAND	2007	$38,000	State
BLACKSTONE TOWN	2007	$50,000	State
PRINCE GEORGE CO.	2007	$25,000	Federal
SURRY COUNTY	2007	$25,000	Federal
CHARLOTTE COUNTY	2007	$25,000	Federal
GREENSVILLE COUNTY	2007	$25,000	Federal
HALIFAX TOWN	2007	$25,000	Federal
DANVILLE CITY	2007	$25,000	State
CHILHOWIE TOWN	2007	$75,000	State
BUENA VISTA CITY	2008	$3,500	State
CHARLOTTE COUNTY	2008	$40,000	State
LOUISA COUNTY	2008	$35,000	State
LUNENBERG COUNTY	2008	$35,000	State
MADISON COUNTY	2008	$40,000	State
NELSON COUNTY	2008	$45,000	State
NORTHERN NECK PDC	2008	$150,000	State
NORTHAMPTON COUNTY	2008	$35,000	State
PAGE COUNTY	2008	$45,000	State
TAZEWELL TOWN	2008	$10,000	State
WEST POINT TOWN	2008	$5,000	State
SURRY COUNTY	2008	$25,000	Federal
TAZEWELL TOWN	2008	$25,000	State
WEST POINT TOWN	2008	$25,000	Federal
EASTERN SHORE VIRGINIA BROADBAND	2008	$200,000	State

AUTHORITY			
GREENSVILLE CO.	2009	$25,000	State
STUART TOWN	2009	$25,000	State
POWHATAN CO.	2010	$25,000	State
WARREN COUNTY	2011	$25,000	Federal
FREDRICK COUNTY	2012	$30,000	Federal
CHARLES CITY COUNTY	2013	$25,000	Federal
BATH COUNTY	2014	$40,000	Federal

Accelerate Virginia

Accelerate Virginia was 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 supported the SBI program in Virginia by collecting consumer Internet performance measurements that complemented and added additional insight to the broadband data collected by the state from service providers. Additionally, Accelerate Virginia captured information on broadband connectivity at Virginia schools and libraries.

With the end of the federal NTIA state broadband initiative grant in February 2015 the partnership with Virginia Tech's eCorridors program also ended. In order to continue to collect Internet performance measurements, the Virginia broadband team created DataCardinal, a new Internet speed test to replace the eCorridors Accelerate Virginia Internet speed test.

Broadband-Related Activities at the Federal Level

Net Neutrality

On February 26, 2015 the FCC voted to adopt Net Neutrality and it took effect on June 12th. Net Neutrality reclassifies broadband from an information service to a telecommunication service which opens the door for broadband regulations. The main regulations ban:

- Blocking - broadband providers may not block access to legal content, applications, services, or non-harmful devices.
- Throttling – broadband providers may not impair or degrade lawful Internet traffic on the basis of content, applications, services, or non-harmful devices.
- Paid-prioritization - broadband providers may not favor some lawful Internet traffic over other lawful traffic in exchange for consideration (i.e. no fast lanes).

The FCC states broadband will not be subject to all regulations under Title II and the goal is to establish framework for regulatory action while simultaneously encouraging broadband investment, innovation and deployment.

Connect America Fund Phase II

In January 2015, the FCC moved forward with its second phase of the Connect American Fund (CAF). The CAF came from the 2011 reforms of the Universal Service Fund. In the first phase of the program, the FCC invested more than $438 million to bring broadband to 1.6 million people with no fixed broadband option.

In the second phase, the FCC is offering approximately $9 billion over the course of five years to expand broadband in rural areas at a minimum download speed of 10 mbps. The funding is offered to price cap landline telephone service providers to expand digital subscriber line (DSL) service in high cost areas. The service providers had the option to decline the funding in which case the funding will be made available to other providers through a competitive bidding process.

There was $46 million available to the Virginia incumbents (Verizon, CenturyLink and Fairpoint). CenturyLink and Fairpoint have accepted the funding available to them. With the funding CenturyLink will provide broadband to 49,000 households and businesses and Fairpoint will provide broadband to 2,440 households and businesses, all in high-cost markets in Virginia.

FCC Updates Broadband Definition

In January 2015, the FCC changed the definition of broadband from 4 mbps download and 1 mbps upload to 25 mbps download and 3 mbps upload. The latest definition is 6 times faster than the original definition which was established in 2010, just 5 years ago. With the change, 46% of Virginia localities are now considered underserved.

FCC Incentive Auction

In August 2015, The FCC adopted the Incentive Auction bidding procedures public notice which sets March 29, 2016 as the start date of the first ever incentive auction. This Incentive Auction is a voluntary, market-based means of repurposing the 600 MHz broadcast TV spectrum by encouraging licensees to voluntarily relinquish spectrum usage rights in exchange for a share of the proceeds from an auction of new licenses to use the repurposed spectrum.

The FCC will release detailed information on the application process and announce the reverse auction opening bid prices this fall.

Broadband Opportunity Council

In March 2015, President Obama established the Broadband Opportunity Council. The council is an interagency working group established to promote broadband investment and coordinate broadband policy across the federal government. The council's key mandates are:

- Create an inventory of federal programs/funding options that currently support broadband or could be modified to do so.
- Examine existing government policies and regulations to recommend changes to remove barriers.

- Solicit input on ways to incentivize broadband investment, drive competition, and remove barriers at the community level.

BroadbandUSA

In addition to the Broadband Opportunity Council, President Obama established BroadbandUSA. This group is comprised of the former federal SBI team and is intended to share lessons learned, best practices, and tools from the SBI program in order to provide technical assistance to communities.

State Broadband-Related Legislative Activities

HB2207- Broadband Advisory Council; increases membership.
Patron: Del. Margaret Ransone with support from co-patrons Del. Kathy Byron, and Del. Steve Landes

Summary: Changes the membership of the Broadband Advisory Council (the Council) by (i) removing three nonlegislative citizen members: one citizen representative from the Virginia Telecommunications Industry Association and two at-large members and (ii) adding one member of the House of Delegates, one member of the Senate, one nonlegislative citizen member who is a representative of small Internet service providers, and the executive director of the Center for Rural Virginia as an ex officio member. The bill also directs the Division of Legislative Services to provide additional staff support to legislative members serving on the Council.

SB1377- State-owned communication towers; charges for use.
Patron: Sen. Emmett Hanger

Summary: Department of General Services; state-owned communication towers; charges for use. Removes the requirement that the amount charged to lease use of a state-owned communication tower be commensurate with the amount paid for use of comparable space on similar towers.