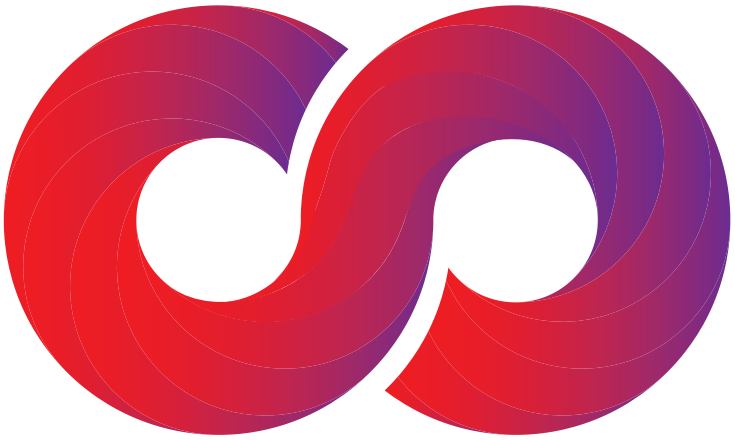

commonwealth connect

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Report on Commonwealth Connect: Governor Northam's Plan to Connect Virginia

Table of Contents

I. Introduction 3

A. The Case for Investing in Universal Broadband Access and the Broadband Landscape in Virginia 3

B. Governor Northam's Vision 3

C. Virginia Efforts to-date 3

II. Executive Summary 4

A. The scope of the problem 4

B. Summary of policy recommendations 4

C. Invest in Virginia's Broadband Effort 5

D. How the program works 6

III. Broadband 101 / Definitions 6

IV. Current Broadband Availability 9

A. What is known about broadband availability statewide 9

B. What isn't known and why 9

C. Using Statistics to Define the Scope of the Problem 11

D. What "Functionally Universal" Coverage Means 11

E. Broadband Affordability 12

V. Non-State and Local Actors 12

A. Private-sector providers in VA 12

B. Public sector providers in VA 12

C. Cooperatives and Mid-Atlantic Broadband 14

D. Virginia's Investor-owned electric utilities 19

VI. How Other States are Increasing Broadband Availability 19

A. State Funding 19

B. Regulatory Activity 21

C. Neighboring States 21

VII. Virginia Broadband Programs 23

A. The Virginia Telecommunications Initiative (VATI) 23

B. Tobacco Commission's Broadband Programs 25

C. Office of Broadband Promotion 26

VIII. Fund Deployment, Methodology, and Timeline for Project Awards 26
A. VATI as the Primary Mechanism for Deployment of Funds 26
B. Assumptions and Timeline 27
C. Year by year infrastructure spending estimates 28
IX. Complementary and Related Issue and Policy Areas 30
A. Education 30
B. Healthcare 31
C. Public Safety 31
D. Transportation 32
X. Policy Recommendations 33
A. Policy Improvements within the Executive Branch 33
B. Legislative Changes Recommended: 34
C. Policy Challenges not yet met but necessary for full-deployment 36
D. How this all fits together 37
XI. Appendix A: Overview of State and Federal Government Programs funding Broadband 38

I. Introduction

A. The Case for Investing in Universal Broadband Access and the Broadband Landscape in Virginia

Virginia's overall broadband internet infrastructure is robust. Northern Virginia has the largest collection of data centers in the world. In fact, approximately 70% of all internet traffic by data volume flows through Northern Virginia. This existing infrastructure positions the Commonwealth to connect Virginians to an education and workforce training system ready to leverage all of our citizens' talents, increase Virginia small businesses' efficiency and effectiveness, and enable new healthcare technologies and service models. Faster, more reliable connectivity allows first responders and law enforcement to access data that could save lives and increase safety. Virginia is poised to build on the tremendous tech sector wins already accrued to become a new hub for global technology industries, the single sector most likely to drive state, national, and global economic growth in the coming decades.

Unfortunately, access to broadband is dispersed unevenly. A digital divide still affects the economic prospects, social connectivity, and educational opportunities available to hundreds of thousands of Virginians. If we are going to ensure all Virginians share in this prosperity, we must ensure citizens who don't currently have access are brought online as quickly and affordably as possible.

The uneven distribution of broadband assets is the result of the costs of deploying broadband infrastructure relative to population densities. When many Virginians live in close proximity, it makes economic sense for the private sector to use capital to serve those customers. However, for areas with lower densities, the cost of the infrastructure outweighs the potential revenue that could be gained from customers. In those areas, without government intervention, citizens would not be served.

B. Governor Northam's Vision

Recognition of the lack of broadly-shared access to the new digital society and economy is what led Governor Northam to announce his vision of a Commonwealth in which everyone has the infrastructure necessary to access the internet. It is the Governor's vision that the Commonwealth should achieve functionally universal broadband coverage within 10 years.

C. Virginia Efforts to-date

The two agencies that have deployed the most capital to support broadband connectivity are the Virginia Tobacco Region Revitalization Commission ("Tobacco Commission") and the Virginia Department of Housing and Community Development ("DHCD"). Governor Northam appointed the Tobacco Commission's Executive Director to be his Chief Broadband Advisor, and the Chief Deputy of DHCD to be Deputy Broadband Advisor. Along with a team pulled from multiple secretariats and state agencies, this group has been

planning, meeting with stakeholders, developing policy recommendations, and improving ongoing programs within government to keep Virginia on track to meet the Governor's vision.

This plan is designed to outline a more detailed strategy to extend broadband access to every Virginian. The push to expand broadband services to everyone who needs and wants them will require a huge amount of effort by players from across Virginia: localities, telecommunications and technology companies, utilities, civic organizations and their citizen members, and members of federal, state, and local government.

We also will need more data collection, effort, and financial resources to realize the Governor's vision. Thus, citizens of the Commonwealth should expect more detail and better projections in future versions of the plan, as data is collected and programs are refined through implementation. Noting that, the current plan is based on reasonable assumptions, extensive stakeholder input, and is in keeping with best practices from other states.

II. Executive Summary

A. The scope of the problem

Existing maps, including some mandated by the federal government, are not reliable to assess the extent of broadband coverage and gaps in that coverage.[1] Private-sector providers are also reluctant to offer what they consider proprietary data within their coverage maps. As a result, the first attempt at gauging the scope of the problem has been estimated. It appears that there are around 660,000 homes and businesses needing connections.[2] This will be refined as new data is collected via local planning efforts. More detail on where broadband is available can be found on page nine and a detailed look at the scoping analysis can be found on page 11.

B. Summary of policy recommendations

Deployment of broadband in the aggressive fashion necessary to accomplish the Governor's goal will necessitate three things beyond general coordination and program management improvements:

1) Significantly increased state financial support for the Virginia Telecommunications Initiative ("VATI") program and future efforts to reduce the cost of broadband infrastructure, totaling at least $250 million over the coming 10 years; **2)** Enactment of

[1] Federal maps compiled by the FCC suffer from an insufficient granularity as well as potentially misleading coverage areas. This is discussed in more detail later in this report.

[2] Virginians without access to high-quality broadband connections, and an unknown associated number of businesses. Given the need to connect both homes and businesses, the initial scoping assumes that combining disconnected Virginians into households will be offset by the need to connect businesses, leaving the number of necessary connections at 660,000.

policy changes that reduce the cost of private-sector broadband infrastructure; and **3)** Support for local governments in the creation of strategic local planning around a shared goal of functionally universal access.

Non-legislative policy changes:

1. **Create Index of Vertical and other Potentially Valuable Assets:** The Commonwealth will create an index of publicly controlled, state and local vertical assets, property, and rights of way sufficient to blanket VA in wireless signals.

2. **Request and Support Local Broadband Plans:** Require that a locality have adopted a granular plan for universal broadband coverage within 10 years, in order to access state funding support.

3. **Ensure VDOT continues to improve its conduit policy:** VDOT should expand its "dig once" policy to include more robust conduit installation and availability.

4. **Ease attachment of wireless equipment to state property:** Require that all new state-owned buildings are designed to allow for towers or other vertical assets to which fixed wireless equipment may be attached or located on the premises at low or no cost.

Legislative recommendations:

1. **Leverage a smart grid for middle-mile service:** Implementation of this idea will be complex, and may require additional development, but legislation permitting electric utilities to lease additional communications capacity in unserved areas, created during the construction of a "smart grid" will dramatically lower the costs of service provision.

2. **Create a FOIA exemption for DHCD's VATI program:** Proprietary information submitted to the VATI program should be shielded from disclosure.

3. **Give budgetary "rollover" permission to the VATI program:** Making the VATI funding non-reverting will improve funded programs through efficiencies of scale.

C. Invest in Virginia's Broadband Effort

In addition to policy changes, Virginia will need to change what it invests in broadband access to achieve functionally universal broadband coverage within a decade. Details related to scoping and how increased funding will be deployed can be found in on page 27.

1. **Increase VATI Funding to at least $50 million for each succeeding year:** the Virginia Telecommunications Initiative should be seen as the primary vehicle by which Virginia is incentivizing the creation of new infrastructure in areas where it

hasn't been previously economically efficient for the private sector to do so. This will keep Virginia on track for complete coverage.

2. **Ensure that the Virginia Tobacco Region Revitalization Commission continues its last-mile program, allocating at least $5 million annually:** The Tobacco Commission has been a key player in rural broadband deployment, and can continue to supplement state efforts by increasing the speed at which connections are made within its footprint.

3. **Provide additional funding for the Office of Broadband Assistance for the purpose of increasing local planning capacity:** This is a necessary funding component of the requirement that local comprehensive plans include plans for universal broadband coverage. This funding could come from VATI, provided it is in the context of a local planning grant and if the General Assembly includes language authorizing such in the budget. Between increased capacity in the Office of Broadband Assistance, as well as availability of other funding for technical assistance and planning grants to hire consultants, the broadband plan requirement is not an unfunded mandate and will yield both leverage for state/local efforts and invaluable data.

D. How the program works

When all of these elements come together – state-funded local plans that identify specific needs, costs, and scoping; robust state funding to support infrastructure construction; leveraging of utility infrastructure to reduce the cost of many hard-to-reach areas; and coordination of all efforts through a state-level broadband team – the Commonwealth should be able to close the broadband connection gap within the timeframe Governor Northam is seeking.

III. Broadband 101 / Definitions

Broadband is the common term applied to any data connection that enables a large amount of data to be transmitted – via any medium, fiber-optic, radio or microwaves, etc. Simply put, broadband refers to internet connections that can allow access to web pages or downloads at high speeds.

In Virginia, having access to high-speed internet is defined as having access to a network that can transmit data at speeds of greater than 10 megabits per second download and 1 megabit per second upload. This is in contrast to previous iterations of internet networks that utilized "dial-up" technologies and reached maximum speeds of 56 kilobits per second, but below the Federal Communications Commission's (FCC) definition of high-speed internet access of 25 megabits per second download and 3 megabits per second upload.

The various devices and transmission media over which the data travels can be owned and managed by a variety of different actors – or vertically integrated by one provider. Last

Mile providers are Internet Service Providers (ISPs) who, as the name suggest, provide internet service to home or business. Middle-mile providers manage aggregated traffic between ISPs and backbone networks, while backbone operators manage very large data routes.

Types of technology that can achieve these speeds vary, but all ultimately require access to the fiber optic backbone of the Internet. Fiber optic cables are currently the gold standard and are made up of thin strands of glass or plastic known as optical fibers. Coaxial cables, copper and dedicated subscriber lines (DSL) are other forms of cable technology used to transmit data. Abandoned television frequency, also known as TV Whitespace, 4G data (cellular), satellite, and fixed wireless technologies all work to connect without wires to a backbone made of fiber.

Virginia's incentive funding programs are technology neutral and focus exclusively on the speed and latency of data transfer, not the methodology by which the data is transferred.

While all data ultimately travels on a fiber backbone, there are several business models for providing broadband to a community. Private sector providers (ISPs) generally own and operate their own networks and physical infrastructure. Wireless Internet Service Providers (WISPs) generally purchase "middle mile" access from another network operation and affix their transmission equipment to a tower or other vertical asset. Many municipal providers operate as a traditional ISP, but were created as an authority by (a) local government(s); while others do not provide last-mile service but rather offer economic development prospects or local governments access to subsidized Internet services. Finally, electric cooperatives are non-profit entities that were a key tool for rural electrification and are playing an active role in connecting many of their customers in currently unserved territories.

Definitions:

Broadband: A digital connection permitting a large amount of data to be transmitted over a connection within a certain amount of time, generally referenced in terms of both download speeds – the speed at which a user's computer receives data – and upload speeds – the speed at which a user's computer can send data to a remote computer or website.

Wireline: A connection between a computer and the internet that runs entirely on wires, without any portion being transmitted through the air.

Fixed/mobile Wireless: A wireless data connection that involves a transmitter and receiver that are fixed in place. This is in-contrast to mobile/cellular wireless connections in which a tower broadcasts in all directions and a receiving device can be moved. Fixed wireless connections have higher data densities than do mobile wireless connections.

Backhaul: The connection between a remote portion of a network and the network backbone. In the context of this report it is referring to the fiber optic connections between towers providing wireless service and the internet.

Backbone: The robust, non-customer-facing portion of the internet by which the majority of data is transmitted. Conceiving of the internet as a circulatory system, these would be the major veins and arteries.

Middle Mile: Connections between backbone and last-mile connections are referred to as middle mile. These networks can be vertically integrated by a network operator who also owns backbone and last mile connections, or operated independently, connecting backbone and last mile networks. Conceiving of the internet as a circulatory system, these would be the large veins and arteries that distribute blood to and from the capillaries. It's important to remember that middle mile is a business model, not a physical description – a middle mile network could extend to within feet of a final customer, or end many miles away.

Last Mile: The portion of the internet that connects an end-user to the broader network, the last mile is a term given to the fibers or wireless signals that connect customers. Conceiving of the internet as a circulatory system, these would be the capillaries.

Microwave/Millimeter Wave/TV Whitespace: Types of wireless data transmission.

Coaxial: A type of electrical cable that has an inner conductor surrounded by a tubular insulating layer, surrounded by a tubular conducting shield. This is the medium by which cable television was originally distributed.

Fiber: In this context, a reference to fiber optic strands, which are a type of cable capable of carrying pulses of light – representing data – at very high speeds. These pulses can be read by specialized equipment.

Dark Fiber: A dark fiber or unlit fiber is an unused optical fiber. The dark strands can be leased to individuals or other companies who want to establish optical connections among their own locations.

Lit Fiber: Fibers currently used and operated. These networks are either being used or are available to another user without that user needing to operate a network themselves.

Take Rate: The rate at which offered services are purchased by potential customers. If a fiber optic company lays fiber past 10 locations and 7 purchase that company's services, then that region has a 70% take rate.

Smart Grid: An electricity supply network that uses digital communications technology to detect and react to local changes in usage.

Telehealth: The use of digital information and communication technologies, such as internet-connected computers or phones, to access health care services remotely and manage your health care. A video-conference with a psychiatrist would be a telehealth service.

Resource Sharing Route: Properties in which telecommunications providers are able to locate their equipment and potentially allow the property owner the use of some portion of that equipment.

IV. Current Broadband Availability

A. What is known about broadband availability statewide

Broadband access in Virginia, as tracked by FCC data looks encouraging at first glance, though the numbers are misleading. According to the data, 96.9% of Virginians have access to some form of connection, 95.2% having low speed connections offering at least 10 Megabits per Second (Mbps) download by 1 Mbps upload, and 91.7% having access to a high speed broadband connection offering at least 25 Mbps download by 3 Mbps upload.[3]

There is good reason to believe these numbers are exaggerated, as discussed below. Separating census blocks into rural and urban classifications shows different coverage statistics. For the purpose of this report, an urban block is any census block that wholly or partially overlaps a metropolitan statistical area (MSA).

In urban areas, the coverage percentages and speed tiers are relatively consistent: ~99% have access to the internet at any speed, 98.7% have at least a slow connection (10 by 1 Mbps), and 98.1% have access to a high-speed connection (25 by 3 Mbps).

In rural areas however, there is a drop-off between slow and high-speed access: 89% have access to the internet at any speed, 81.9% have access to a slow connection (10 by 1 Mbps), and 68% have access to a high-speed connections (25 by 3 Mbps).

Competition also appears to be very low among broadband providers, as companies generally invest in areas where they can be the sole source of service. In general, a lack of competition can lead to higher costs and lower service quality. Forty-seven percent of Virginians live inside a census block with one or no provider at the high-speed level (25 by 3 Mbps or above), only 52.2% have access to two or more options, and only 1.6% of Virginians have access to three or more options for service providers.

B. What isn't known and why

<u>Private provider wireline maps are not consistently reliable:</u>

The primary issue with FCC data is the lack of details related to coverage by wireline providers. The FCC requires broadband companies to report their data, but the rules for designating an area as covered are very loose. If a provider's service is utilized by at least one address inside of a census block, the provider may list that census block as fully

[3] The FCC's form 477 is the device by which ISPs detail their customer coverage. As detailed below, there are serious flaws in these reports. The data can be accessed here: https://www.fcc.gov/general/broadband-deployment-data-fcc-form-477

covered by their service. In rural Virginia, census blocks can be extremely large (up to 117 square miles), which can lead to misleading maps. Previous submission guidelines allowed providers to designate a block as covered if they were capable of delivering service within a 10-day period if requested, regardless of the potential cost, which permitted even more areas that aren't currently served to be claimed as served areas. Feedback from surveys and website traffic on the Virginia Broadband Availability Map[4] show that service is not available in many places where the federal maps suggest otherwise.

While providers submit data every six months, the latest dataset available from the FCC was information submitted in June 2017, and released in September 2018, a fifteen-month delay between submission and publication. This could mean that recent service changes do not show up in the latest updated version of mapping based on FCC 477 data. This can create issues if the latest speed and availability information are needed to assist decision-making.

It is likely that partnerships with local planners and governments will yield a better wireline coverage understanding once that data has been collected.

Private provider wireless maps also are not reliable:

Wireless coverage is even more overstated than wireline due, in part, to the nature of wireless service and a business incentive (the desire to present their networks as comprehensive) for providers to present a map showing maximum coverage with few service gaps.

It is worth noting that, under current definitions and standards, mobile services (services delivered through cellular phones), do not count as broadband. There will be fixed wireless services (connections delivered between towers and homes or businesses) that qualify as broadband for state purposes.

Including the location and range of towers, along with submitted GIS data, would allow analysts to create a coverage map that takes into account distance from towers, area geography, topography, and other factors.

Additionally, there are two noteworthy unknowns regarding wireline and wireless service. First, the Commonwealth does not have information regarding pricing for broadband services. Competition and service are relatively poor, especially in rural areas where there is generally only one option, but there is not currently a system or data to determine if price is a significant hurdle to access availability. Second, there is little information on adoption, so while a provider may be delivering access to a particular service area, there is no way to determine if people are using it. It should be noted that connection percentages likely are much lower than availability because of these two factors.

[4] The Virginia Broadband Availability Map is a cooperative endeavor of CIT and Virginia Tech. While this tool is currently the best available map of coverage, it is based on flawed input data, and should be regarded as incomplete at best. It can be found here: https://broadband.cgit.vt.edu/IntegratedToolbox/

C. Using Statistics to Define the Scope of the Problem

The difficulty of precisely defining the scope of the unserved population has long hindered the availability of rural broadband. *Perfect* scoping of the problem isn't necessary.

Thus, this report takes a statistically derived approach. While direct access to reliable fiber maps and wireless propagation coverage is a challenge, the Commonwealth can use available data to make reliable estimates of likely need and costs.

According to USDA's Economic Research Service, Virginia has a rural population of approximately 1,041,000.[5] According to the 2015 FCC rural broadband report, approximately 64% of Virginia's rural population lacks access to broadband.[6] Thus, approximately 660,000 Virginians need broadband access. Given the need to connect both homes and businesses, the initial scoping assumes that combining disconnected Virginians into households will be offset by the need to connect businesses, leaving the number of necessary connections at 660,000.

A statistical approximation isn't as good as a complete survey of coverage matched to GIS data, but that would be a complex, costly, and time consuming undertaking. By the time a full survey was completed, the map would be out of date and no longer accurate. If past behavior is the best predictor of future behavior, private-sector providers will continue to protect what they consider proprietary data, and developing reliable coverage maps would be a time consuming process that could consume much time and money, without connecting any additional Virginians.

The Commonwealth will obtain a dramatically improved understanding of where coverage exists and where it doesn't by working directly with local planners and administrators. Local broadband plans can be combined into a statewide coverage map.

D. What "Functionally Universal" Coverage Means

It isn't necessary to have a complete survey of all homes and businesses in Virginia to begin solving the problem of broadband access, when hundreds of thousands of Virginians lack access to broadband, Virginia should have a bias toward action and focus on connecting people. In the short and medium terms, state and local broadband funders will not have difficulty locating groups of people who need access. Over the longer term, local broadband planning efforts will help refine our assessment of who now has, and who still lacks broadband coverage.

This is at the heart of the definition of "functionally universal," broadband coverage. It is unnecessary to track down every single structure – the Commonwealth simply needs to ensure that all Virginians who want access can get it.

[5] State factsheets from USDA-ERS can be generated at https://data.ers.usda.gov/reports.aspx?ID=17854
[6] FCC Report on Rural Broadband Availability accessed at https://www.fcc.gov/document/report-broadband-availability-america

When local governments and citizens are no longer approaching the Commonwealth describing serious deficiencies in broadband availability, then we can credibly call the problem "functionally solved."

E. Broadband Affordability

Every expenditure of taxpayer resources must be prioritized to achieve maximum impact. To that end, this effort will focus on supporting the expansion of high-speed broadband to areas currently unserved as we have defined them (10/1 Mbps or less).

There are many communities in Virginia where service is technically available – that is to say, the infrastructure exists – but services are not available at rates that the average citizen can afford. The FCC recognized this issue and in 2015 voted to add broadband internet service as an option to Lifeline – a government program that provides subsidies for low-income families who need phone service. Many Internet Service Providers (ISPs) (including Xfinity, Cox, AT&T and Century Link) also offer their own assistance programs designed to assist households that might not otherwise be able to afford internet access.

V. Non-State and Local Actors

A. Private-sector providers in VA

Virginia is home to private-sector broadband companies both large and small, from Fortune 500 companies like Comcast or Verizon, each serving hundreds of thousands of Virginians, to small operators serving only a handful of customers.

Similarly, Virginia telecommunications companies employ a variety of technologies, including dial-up or digital subscriber line (DSL) networks, improved coaxial line networks, and the two technologies likely to be supported by state deployment efforts: fixed wireless broadband and fiber optic networks.

Private-sector broadband providers currently act as ISPs for the majority of Virginians currently served and are critical parts of any plan for universal coverage moving forward. These highly adept and well-resourced private-sector partners already spend millions of dollars annually enhancing current service and expanding coverage to those on the periphery of their existing networks.

We anticipate that there will be many public/private partnerships for infrastructure construction in the coming years, fueled by increased incentive payments from the state as well as increased allocations of capital from large, multi-state corporations.

According to filings with the FCC, there are 171 wireline and fixed-wireless internet service providers in Virginia currently serving customers.

B. Public sector providers in VA

Municipal providers:

Municipal broadband networks are permitted in Virginia; however, they must adhere to legislative requirements that limit their ability to compete with incumbent providers.[7]

Significant requirements include:

- Service prices shall not be set lower than the prices charged by any incumbent provider for a functionally equivalent service.
- The service shall not be subsidized.
- In order to provide cable or "triple play" services a feasibility study must be completed that shows that the network will be profitable within one year of installation (this is exceedingly difficult for any cable operator, public or private).

There are a number of municipal broadband networks in Virginia; however, there is no authoritative list of current networks.[8]

1. Charles City County
2. Eastern Shore of Virginia Broadband Authority (ESVBA)
3. Martinsville Information Network (MINet)
4. nDanville
5. Nelson County Broadband Authority
6. Roanoke Valley Broadband Authority
7. Rockbridge Area Network Authority
8. Wired Road Authority

Regional authorities:

Regional broadband authorities are permitted under Virginia law and are engaged in a variety of activities including: acting as an ISP, providing dark fiber leases to ISPs, operating municipal-use or education networks, or some combination of all three. Currently, the Virginia State Corporation Commission (SCC) lists 27 active authorities in the Commonwealth:

1. Albemarle Broadband Authority
2. Amherst County Broadband Authority
3. Appomattox County Broadband Authority
4. Bedford County Broadband Authority
5. Bland County Wireless Service Authority, Inc.
6. Charlotte County Broadband Authority
7. Cumberland County Wireless Authority
8. Eastern Shore of Virginia Broadband Authority
9. Fauquier County Broadband Authority

[7] Those legislative requirements can be found here and in associated code sections: VA Code § 56-265.4:4, VA Code § 56-484.7:1, VA Code § 15.2-2108.6

[8] Broadband Communities Magazine keeps a database of providers as well as a number of other valuable tools at its website, available here: http://www.bbpmag.com

10. Franklin County Broadband Authority
11. King and Queen County Wireless Authority
12. King George County Wireless Authority
13. Lancaster County Broadband Authority
14. Louisa County Broadband Authority
15. Middle Peninsula Broadband Authority
16. Middlesex Broadband Authority
17. Nelson County Broadband Authority
18. New River Valley Network Wireless Authority
19. Northern Neck Broadband Authority
20. Orange County Broadband Authority
21. Page County Broadband Authority
22. Pulaski County Wireless Integrated Network Authority
23. Roanoke Valley Broadband Authority
24. Shenandoah Wireless Broadband Authority
25. Spotsylvania County Wireless Authority
26. Surry County Broadband Authority
27. Tazewell County Wireless Service Authority

C. Cooperatives and Mid-Atlantic Broadband

Virginia's electric & telephone cooperatives:

Cooperatives - both telephone and electric - have a long history of delivering essential infrastructure to rural America and play an important role in Virginia broadband deployment. With assets in some of the most rural parts of Virginia, telephone cooperatives are in a unique position to help close the digital divide. Many telephone co-ops have provided broadband services for years and some are transitioning from DSL to fiber-to-the-home.

Applications like electric meters and household energy management systems have made broadband critical to the operations of electric companies and cooperatives. Recognizing the need for broadband for improved business operations and the needs of its members, some electric co-ops have begun deploying last mile broadband services to their members and many in Virginia anticipate providing service in the coming years, either themselves or in partnership with another co-op or a traditional private-sector provider.

The Virginia Telecommunications Industry Association (VTIA) and the Virginia, Maryland, & Delaware Association of Electric Cooperatives (VMDAEC) supplied highlights of their members' services for this report:

1. VTIA membership and highlights:

Members:

- Buggs Island Telephone Cooperative

- Burke's Garden Telephone Company, Inc.
- Citizens Telephone Cooperative, Inc.
- Highland Telephone Cooperative
- MGW Telephone Company
- New Hope Telephone Cooperative
- Pembroke Telephone Cooperative
- Peoples Mutual Telephone dba RiverStreet Networks
- Scott County Telephone Cooperative
- TDS Telecom

Highlights:

Citizens Telephone Cooperative, Inc.

Citizens has been providing telecommunications services in rural Virginia since 1914. With grant funding in the mid-2000's, Citizens started building a 440-mile, regional, open access fiber network that now spans 10 counties, 10 towns, and 3 cities. The last 200 miles of this network was built in partnership with the New River Valley Network Wireless Authority (NRVNWA), and with grant funding from NTIA and the Virginia Tobacco Commission.

The total network investment in the 440-mile network was over $22.5 million with $6.5 million from Citizens, $9.2 million from NTIA, $6 million from the Virginia Tobacco Commission, and $830,000 from the NRVNWA.

In 2005, Citizens started providing fiber connections to all public schools in Floyd County (one of the first fiber connected rural schools systems in the Commonwealth) and since then has provided fiber services to schools in Montgomery, Pulaski, and Wythe Counties as well as New River Community College, Radford University, and Virginia Tech. Currently there are nine ISPs are using this open access fiber network to provide services to their customers. In addition, this network is part of LIT Networks,[9] which provides service to carriers and Citizens Telephone Cooperative, Inc. was one of the original, founding members.[10]

RiverStreet Networks

Wilkes Telephone Membership Corporation, doing business as RiverStreet Networks, is investing significant funds in the Virginia Broadband market. On August 1, 2018, Peoples Mutual Telephone Company in Gretna, VA was purchased. Likewise, RiverStreet closed on the purchase of Gamewood Technology Group in Danville, VA, November 1, 2018. Earlier this year RiverStreet was awarded $32 Million through the Connect America Fund Phase II to build broadband service in rural parts of Bedford, Campbell, Charlotte, Halifax,

[9] Lit Networks is an organization comprised of many providers. More can be learned at their website: https://www.litnetworks.com

[10] A map of Citizens' Coop Network can be found here: https://citizens.coop/wp-content/uploads/2013/10/fiber-map-web-1.jpg

King and Queen, Lunenburg, Mecklenburg and Pittsylvania Counties, passing 13,518 locations.

With this as the first step in a plan to grow their Virginia market, RiverStreet intends to establish viable partner relationships to continue build out in the communities contiguous to service areas mentioned. There have already been connections made with Mecklenburg EMC, Buggs Island TMC, and several counties to develop partnering opportunities.

2. VMDAEC membership and highlights:

Members (not all are providing broadband services):

- A&N Electric Cooperative
- B-A-R-C Electric Cooperative
- Central Virginia Electric Cooperative
- Community Electric Cooperative
- Craig-Botetourt Electric Cooperative
- Mecklenburg Electric Cooperative
- Northern Neck Electric Cooperative
- Northern Virginia Electric Cooperative
- Prince George Electric Cooperative
- Rappahannock Electric Cooperative
- Shenandoah Valley Electric Cooperative
- Southside Electric Cooperative
- Powell Valley Electric Cooperative

Highlights:

Central Virginia Electric Cooperative

CVEC began construction of a fiber network this year, and will complete its first substation in December or January 2019. CVEC also announced its intention to build out to every member account (37,000 homes and businesses) over a five-year period; this plan is contingent on receiving external funding, likely from federal and state grant programs, necessary to make the project financially feasible. As part of its outside funding pursuit, CVEC was successful in winning some Connect America Fund support that will require building a little outside of CVEC's system footprint, increasing the total homes and business passed to over 40,000 and the total project budget to over $125 million.

Craig-Botetourt Electric Cooperative

Craig-Botetourt is currently working on offering fiber-based broadband to a portion of its members in Botetourt County. The Cooperative has established a public private partnership with Botetourt County. Its plans are to build on a successful phase 1 in Botetourt to meet the need in other unserved/underserved surrounding areas.

Shenandoah Valley Electric Cooperative

Shenandoah Valley Electric Cooperative (SVEC), headquartered in Rockingham, Virginia, is in the early stages of considering how broadband fits into its strategic objectives. SVEC will be putting together a comprehensive communications plan in 2019. A few of the initial objectives to include building fiber to substations as well as considering what the next automated metering infrastructure will need.

Mecklenburg Electric Cooperative

Mecklenburg Electric Cooperative (MEC) has responded to the request of its membership and is building fiber to the homes of its members. MEC has planned a fiber build for its entire service area for some time and to date has deployed 10 miles of the first phase in constructing a 135 mile stretch of fiber backbone. This optical backbone will connect MEC's 3 offices and 14 distribution substations.

MEC's board has approved moving forward with the overall connectivity plan, which will pass within 1,000 feet of 2,910 homes and businesses across the total of 135 miles of backbone. The estimated cost of deploying this 135-mile fiber backbone and fiber to the home is $5.2M.

Prince George Electric Cooperative

Prince George Electric Cooperative formed a subsidiary and is now delivering up to a Gigabit speed internet solution to underserved rural communities Prince George, Sussex and Surry Counties.

Prince George Electric Cooperative's wholly-owned and operated subsidiary PGEC Enterprises, LLC, doing business as RURALBAND, developed a broadband pilot program and began connecting homes in February 2017. This pilot connected 75 premises and experienced a 65% take rate of homes and businesses subscribing.

RURALBAND plans to expand, having received $3.2 million in funding from Prince George and Surry Counties as well as the Tobacco Commission, through a phased 3-5 year build out to its entire membership.

Rappahannock Electric Cooperative

Rappahannock Electric Cooperative ("REC") staff has recently proposed to its Board of Directors to construct a fiber utility network. This proposed fiber utility network, which will connect over 130 endpoints (substations, towers, offices) through a 6-year construction plan beginning third quarter 2019, will require installation of approximately 800 miles of fiber through portions of the 22 counties served by REC. Currently, REC relies upon a microwave backbone for communications, which is also supplemented by radio, cellular and power line carrier technology. The existing communications network has many

limitations, and is insufficient to manage business and operational systems needed for the future.

REC's construction plan will utilize its existing infrastructure to develop a smart grid network capable of detecting outages faster, thus reducing restoration times and improving reliability. While REC currently has no plans to provide end-use retail broadband service to its members, the Cooperative expects to have excess fiber capacity, which can be made available for open access leasing arrangements with local governments, schools, and other third party providers. Through this approach, REC believes it can assist with opportunities to expand broadband to unserved areas of the Cooperative's service territory.

Mid-Atlantic Broadband:

In January of 2001, Old Dominion Electric Cooperative, Virginia Tech, and prominent business and political leaders in Southern Virginia were working on solutions to solve substantial economic declines in tobacco farming, textile and furniture manufacturing, as well as shrinking state budgets. As the region started to shift its economic development priorities to target technology industries, a massive problem was identified with the existing telecommunications infrastructure and lack of broadband competition in the region.

The Tobacco Commission provided matching funds for a $6M grant to Mid-Atlantic Broadband Corporation (MBC), a tax-exempt 501(c)(4) organization, received from the Federal Economic Development Administration. MBC formally launched in the spring of 2004, with the mission to build an open-access fiber infrastructure in southern Virginia, connecting all 60 industrial parks with an advanced fiber optic backbone network.

To date, MBC has successfully implemented over $100 million in state and federal grants and now owns and operates over 1,800 route miles of open-access middle mile wholesale fiber in Southern Virginia.

MBC was able to build an advanced fiber optic network in rural Virginia where it was financially infeasible for a private sector operator to build the network infrastructure. MBC then created a "wholesale-only" business model, whereby MBC does not serve residential or business customers directly. MBC developed internal capabilities and expertise to operate the network to "carrier-class levels". This allows private sector telecom providers to purchase lit fiber (10 megabits to 100 Gigabits per second), or dark fiber, or colocation services from MBC to reduce their costs, expand access to their customers and provide a level playing field in the region to benefit economic growth and development.

Today, MBC serves over 45 carrier customers, from large global telecom providers to small locally owned Internet Service Providers. Conservative estimates show that over 100,000 residential and business customers in southern Virginia benefit directly from the MBC network. There is a multiplier effect when MBC sells a transport circuit to an ISP or provides a dark fiber lease to a telecom provider. Cellular and mobile voice/data services

are enhanced with an MBC fiber that connects a cell tower and provides large bandwidth to that site.

MBC and the Tobacco Commission partnered on a 50/50 matching grant program, one of the first of its kind in the Commonwealth, allowing MBC to provide a 50% direct grant to private sector telecom providers to reduce capital costs of extending last mile broadband services to unserved residential and business customers in Southern Virginia. This program invested almost $3 million of grant funds, leveraged $6.2 million in private sector funding, and allowed an estimated 15,000 residential and business customers to access broadband services.

Today, MBC's enterprise value is above $100 Million. MBC is working with industry experts to determine how to tap into some of that value while retaining ownership and restrictions on assets, which are held in trust.

D. Virginia's Investor-owned electric utilities

Recent reports produced by Virginia's two investor-owned electric utilities, AEP and Dominion, indicate that they could also be significant contributors to solving the problem of rural broadband availability. This is discussed in more detail in the policy section on page 35.

VI. How Other States are Increasing Broadband Availability

While states and regions vary significantly in the challenges they face, broadband expansion and access has been addressed in nearly every state in the union. State lawmakers seem focused on measures aimed at bringing broadband access to those who lack service by funding connectivity programs, directing more support to projects in unserved areas, and streamlining policies and procedures to speed broadband infrastructure deployment. These efforts reflect a broadly-shared recognition of the importance of digital inclusion and connectivity in improving community and economic development.

A. State Funding

Minnesota established the Office of Broadband Development to support the state's goal to achieve coverage to all businesses and homes in the state, with minimum download speeds of 25 megabits per second and minimum upload speeds of at least 3 megabits per second, no later than the year 2022.[11] Minnesota has allocated $85 million over the past four years for broadband support programs.

In 2017, the state legislature directed $20 million in broadband funds for the Border-to-Border Broadband grant program. These grants focus on providing state resources to help make the financial case for new and existing providers to invest in building infrastructure

[11] More on Minnesota's program can be found here: https://mn.gov/deed/programs-services/broadband/

into unserved and underserved areas of the state. The grants provide that any area unserved or underserved is eligible based on availability of a wireline service; service provided by mobile – and even fixed – wireless carriers are not considered in determining areas eligible for grant programs. The grants provide up to 50 percent of project development costs with an established maximum grant of $5 million per project. The grants require matching funds and eligible applicants include businesses, political subdivisions, Indian tribes, and non-profits.

Minnesota has also funded statewide mapping efforts to compliment, and often times supplement, federal mapping tools. The state contracts with a third party to prepare maps, based on provider submitted data[12], to represent areas of broadband service availability. Similarly, in Utah, the Broadband Outreach Center[13] has worked with over 50 providers in the state to enhance the FCC's map of existing broadband and allow users to identify broadband service by speed and technology type throughout the state. Utah maintains this map and uses the information to market their infrastructure.

Earlier this year, on the heels of a Purdue University study[14] estimating the return of four dollars to the local economy for every dollar spent rural broadband deployment, Indiana unveiled a $1 billion "Next Level Connections"[15] infrastructure plan. It also includes a $100 million investment to help bring affordable, high-speed, fiber optic broadband access to unserved and underserved communities in the state. The program is expected to require local match and call for download speeds of at least 100 megabits per second and upload speeds of at least 10 megabits per second.

In 2018, Wyoming[16] allocated $10 million to establish a new grant program for broadband deployment. Also in 2018, Alabama established the Broadband Accessibility Fund[17] with $7.4 million available to non-government entities that provide broadband service to communities with 25,000 residents or fewer. Earlier this year the state of Iowa[18] approved tax cuts for internet service providers to encourage build out in communities with limited or no access to broadband. These credits primarily consist of a reduction in local property taxes as well as a state sales tax break.

Officials in Colorado have called for 100 percent of rural Colorado to have broadband available by 2020. The state has taken a different approach: in 2018, Colorado committed $100 million over five years by redirecting money for rural telephone service to support

[12] The use of a third party allows the providers to carefully curate what information they will and won't release, permitting more-accurate maps while protecting their proprietary data.
[13] More on Utah's mapping program can be found here: https://broadband.utah.gov/
[14] That study is available here: https://www.pcrd.purdue.edu/files/media/006-RPINsights-Indiana-Broadband-Study.pdf
[15] Indiana's program details can be found here: https://www.in.gov/gov/files/NextLevel%20Connections%20facts%20sheet.pdf
[16] Wyoming's grant program legislation can be read here: https://www.wyoleg.gov/2018/Introduced/SF0100.pdf
[17] A release regarding Alabama's broadband access fund is here: https://governor.alabama.gov/press-releases/governor-ivey-signs-alabama-broadband-accessibility-act/
[18] Details on Iowa's tax cut program can be read here: https://www.legis.iowa.gov/docs/publications/LGE/87/Attachments/SF2388_GovLetter.pdf

broadband deployment and award grants for projects aimed at deploying broadband service in unserved areas of the state.[19] Funding comes from a 2.6 percent "high-cost support" fee on Colorado phone bills that historically has been used to offset costs of providing landline phone service in sparsely populated parts of the state.

In 2014, officials in Washington created a targeted and temporary universal service program[20], set to expire in 2020, to support legacy and small incumbent local exchange carriers (ILECs) during the transition to broadband.

Officials in Arkansas established the High Cost Fund (ARHCF)[21] to promote and assure the availability of universal broadband service at rates that are reasonable and affordable, and to provide for reasonably comparable service and rates between rural and urban areas. The customer in a high-cost region recovers ARHCR fees paid by qualifying telecommunications providers.

B. Regulatory Activity

Though implementation varies, "dig once" policies, which seek to lower the cost of broadband deployment by providing internet companies access to public rights of way and minimizing the number of excavations required to install telecommunications infrastructure, are supported in states including Arizona, Utah, Minnesota, Maine, and West Virginia. The 2018 General Assembly in Virginia directed the Center for Innovative Technology (CIT) to conduct a feasibility study of a statewide dig once policy, including the installation of conduits with bridge and tunnel construction projects. Federal legislation passed in 2018 that directs states to lay the groundwork for potential "Dig Once" policies.

C. Neighboring States

Closer to home, Virginia's neighboring states vary in their efforts to address the digital divide, and Virginia can swiftly take the lead regionally by implementing the Governor's Connected Commonwealth initiative.

North Carolina's Broadband Infrastructure Office (BIO)[22] aligns NC Broadband, the statewide effort to expand high-speed internet access, with the FirstNet public safety initiative for improved resource sharing across state agencies. In 2017, Governor Cooper proposed the establishment of the Growing Rural Economics with Access to Technologies (GREAT) Grant Program[23] with $20 million in funding to provide grants to deploy broadband infrastructure; the program ultimately received $10 million in funding, largely

[19] Colorado's program details are here: https://leg.colorado.gov/sites/default/files/documents/2018A/bills/2018a_002_signed.pdf
[20] Washington's temporary universal service program is described here: http://app.leg.wa.gov/RCW/default.aspx?cite=80.36.650
[21] Learn more about the Arkansas program here: https://bit.ly/2DPzqoT
[22] North Carolina's program website is: https://www.ncbroadband.gov/
[23] Details on North Carolina's grant program can be found here: https://www.ncleg.net/EnactedLegislation/SessionLaws/HTML/2017-2018/SL2018-5.html

described as a "first step" by legislators. North Carolina's efforts also include "The Playbook," a guide for local communities to create incentives and favorable policies that enable them to build new partnerships with broadband providers and increase broadband access. The BIO has divided the state into three regions and provides a single point-of-contact for technical assistance.

The Tennessee Broadband Accessibility Act[24] (TNBAA) was passed in 2017 and launched the state's efforts to incentivize and support deployment and adoption of broadband in unserved areas across the state. The legislation focused on three main areas- investment, deregulation, and education. The Broadband Accessibility Grant Program was established within the Department of Economic and Community Development (TNECD) and allocated $30 million over a three-year period ($10 million per year) to encourage deployment to unserved homes and businesses. In addition, tax credits to private sector providers totaling $15 million over three years ($5 million per year) will be available based on the purchase of broadband equipment used to provide broadband access in the state's most economically challenged counties. The TNBAA permits the state's electric cooperatives, previously restricted from providing retail broadband services, to provide broadband services within their territories while strengthening protections that prevent cooperatives from using electric system assets to subsidize broadband services.

West Virginia passed legislation in 2018 calling for a "uniform and efficient system of broadband conduit installation coinciding with the construction, maintenance, or improvement of highways and rights-of-way."[25] The West Virginia Division of Highways (WVDOH) has since issued guidance [26] to assist district offices in the submission, processing and enforcement of permit applications from companies seeking to install, extend, expand or upgrade telecommunications facilities within the WVDOH rights-of-way.

In November, West Virginia entered a partnership with the Zayo Group and the announcement of the company's plan to build a 200-mile fiber route across the state[27]. The state credits their broadband-friendly policies- including providing access to the state's rights-of-way in attracting Zayo's investment. The project will connect major internet exchanges in Ashburn, Virginia and Columbus, Ohio, creating opportunities for network expansion along the route as well as potentially attracting data centers to locate in West Virginia.

In 2013, Maryland completed the build out of the One Maryland Broadband Network: a 1,324-mile fiber optic broadband network that linked 1,068 government facilities and

[24] Tennessee's rural broadband program details are here: https://www.tn.gov/ecd/rural-development/tennessee-broadband-grant-initiative/tennessee-broadband-accessibility-act-article.html
[25] West Virginia's conduit program legislation is here: http://www.wvlegislature.gov/Bill_Text_HTML/2018_SESSIONS/RS/bills/HB4447%20SUB%20ENR.pdf
[26] And specific dig once policy guidelines from West Virginia can be found here: https://broadband.wv.gov/assets/files/pdfs/news/Dig-Once-Policy-Guide-October-2018.pdf
[27] The announcement regarding West Virginia's backbone/middle mile project can be read at https://broadband.wv.gov/index.php?p=resources/news/the-wv-broadband-enhancement-council-welcomes-exciting-news-from-the-zayo-group

"community anchor institutions" in every county of the state. The state received a federal grant under the Broadband Technology Opportunities Program (BTOP) for over $115 million and provided over $43 million dollars in matching funds. This backbone supplies core infrastructure and connects thee separate systems: the state-run "networkMaryland," established for public sector use, the nine-jurisdiction Inter-County Broadband Network, which connects government buildings and other anchors across Central Maryland, and the non-profit Maryland Broadband Cooperative made up of a consortium of rural carriers.

The Kentucky Wired broadband initiative offers a cautionary tale. In 2015, Kentucky began construction on a 3,000-mile build out of fiber optic cable in an effort to bring high-speed internet access to all 120 counties in the state. The project, originally budgeted for $324 million and financed with bonds backed by the state's credit, is currently four years behind schedule because of persistent delays and is about $100 million dollars over budget with projected costs many times that amount. The use of state-backed bonds, unrealistic revenue projections, and a misunderstanding of which federal funding programs would support the project are a few of the program's many errors.

Pennsylvania launched its broadband initiative in 2018: a dedicated effort to provide high-speed internet access to every household and business in the state. The Pennsylvania Broadband Investment Incentive Program[28] made available $35 million in financial assistance to private providers bidding on service areas within the state in the Federal Communications Commission (FCC) Connect American Fund II (CAF-II) Auction. The new office is currently developing longer-term approaches to incentivize service to those areas not included in the FCC CAF-II auction.

VII. Virginia Broadband Programs

Virginia has only recently begun investing in the deployment of broadband infrastructure using state dollars. Between the work done by the DHCD to develop robust program guidelines for its programs and the data collected from other states and the Tobacco Commission, the current structure should yield high leverage and efficiently reach unserved Virginians.

These programs will continue to be refined and improved through the application of information gained through local planning efforts (discussed below on page 38) and leverage gained through utility middle-mile deployment (discussed below on page 35).

A. The Virginia Telecommunications Initiative (VATI)

History:

The VATI program was established in 2016 as a state-funded program administered by DHCD. The goal of VATI is to create strong, competitive communities throughout the

[28] Pennsylvania's program to support CAF Auction applicants is detailed here: https://www.governor.pa.gov/broadband/

Commonwealth by preparing those communities to build, utilize, and capitalize on telecommunications infrastructure. In partnership with localities and private service providers, VATI provides financial assistance to supplement the construction costs for extending service to areas that presently are unserved.

Localities receive VATI funding through a competitive grant process in which each project is evaluated based upon a demonstrated need and benefit for the community, applicant readiness and capacity, and the efficiency of the planned use of taxpayer dollars. For both of the first two funding years (2017 and 2018) $1 million dollars was budgeted for the program. In 2017, VATI received 17 applications totaling more than $3.7 million in funding requests of which five localities received nearly $945,000 for last-mile broadband construction projects. In 2018, 12 applications were received totaling more than $2.8 million in funding requests of which four localities received $978,000. As these numbers show, demand for VATI funding from Virginia localities has been much greater than the funding available.

Because of the strong demand for the program, the 2019 VATI budget was increased to $4 million dollars per year with a December 2018 deadline. The program received 31 applications, requesting approximately $11 million in funding and leveraging $13 million in matching dollars. Awards will be announced in February 2019.[29]

VATI moving forward:

VATI should be the primary vehicle by which the Commonwealth incentivizes broadband infrastructure deployment. VATI is designed to be a program focused on deploying one-time capital for the purposes of building broadband infrastructure in a public/private partnership model. This makes VATI an ideal use of funds, since coverage can be increased without creating a new program.

Moreover, stakeholders from across the telecommunications industry, local governments, and technical advisors all support the model of the VATI program. While the program guidelines will be improved upon annually, the basic program structure is unlikely to change during the coming years given the efficient manner in which it is able to deploy capital and engage with stakeholders with low administrative costs. Thus, the primary determinant of project awards will be the efficiency with which connections are made on a per-public-dollar basis. Additional considerations such as offered speeds, difficulty of a given population to be reached, and affordability may also be considered as modifying a project's score beyond solely efficiency, but at no point will inefficient projects be supported.

[29] More information about the VATI program, as well as application guidelines and agency contact information can be found here: http://www.dhcd.virginia.gov/index.php/business-va-assistance/telecommunications/254-virginia-telecommunication-planning-initiative-vatpi.html

To date, VATI grants all needed to be spent within a year of the award date. However, once the VATI fund is made non-reverting, larger projects can be undertaken. These projects will bring greater efficiencies but will have build times of 1 to 3 years.

B. Tobacco Commission's Broadband Programs

History:

Created by the Virginia General Assembly to revitalize and diversify the economies of 40 southern and southwest Virginia localities, the Tobacco Region Revitalization Commission is a political subdivision of the Commonwealth. The Commission has long recognized that broadband access is vital to attracting companies and their employees to rural Virginia. It has directed significant funding to address the "digital divide" in its footprint. In excess of $130 million has been granted to construct robust broadband infrastructure in every Tobacco Region locality. The Commission's investments have also leveraged tens of millions of matching investments from other sources, primarily federal broadband funding programs. While the Commission and its funding partners have contributed significantly to the fiber backbone and middle-mile broadband infrastructure, there remains a lack of "last-mile" connections for individual home and businesses to the backbone fiber network that the Commission has helped create.

In 2017, the Commission created a last-mile broadband grant program and set aside $10 million to assist in the construction of these projects. Last-mile projects include fiber-to the-premise, fixed wireless, or some combination of both technologies, assuming greater than 10 Mbps download and 1 Mbps upload speeds. Applications are reviewed for feasibility and the potential to positively influence the regional economic base. They are accepted from localities that wish to expand broadband access in unserved areas within the Commission's footprint. Funding preference is given to localities applying in conjunction with private-sector partners, and eligible applicants must meet specific program guidelines. In March 2018, the Commission approved an initial round of funding to nine projects for $11 million, leveraging an additional $16 million in matching project funds to serve 31,500 homes and businesses across 13 localities within the Commission's footprint. [30]

The Commission's broadband program moving forward:

The Commission has recently announced a second round of last-mile broadband funding with a pre-application period that closed in mid-December 2018. The second round of funding is for up to $5 million in Commission funding for grants and loans to localities and qualified private sector broadband providers to provide new or expanded service to unserved Tobacco Region households and businesses. It is anticipated that the Commission will approve grants at its May 2019 meeting. The Commission anticipates a similar level of last-mile broadband funding for future grant rounds, with program guidelines remaining similar to those of the VATI program.

[30] More information about the Commission's last-mile program, as well as contact information and application deadlines, is available at: https://www.revitalizeva.org/grant-loan-program/grant-programs/research-development-grant-program/

C. Office of Broadband Promotion

History:

Virginia's Office of Broadband Assistance supports the acceleration of broadband telecommunications in rural Virginia. This state-sponsored program provides broadband technical assistance to unserved localities across the Commonwealth.

The technical assistance provided by the Office of Broadband Assistance allows localities unserved by broadband to develop strategic plans for broadband deployment. The Office of Broadband Assistance emphasizes that the most efficient way of expanding broadband in Virginia is through public-private partnerships, and utilizes a three-step process to help facilitate public-private partnerships that address unique local broadband needs. Staff at the Office of Broadband Assistance perform a comprehensive broadband assessment, help the locality determine its needs and goals, and help facilitate a public-private partnership through a Request for Proposal. This process is unique because it produces tangible, goal-driven, fiscally achievable broadband solutions at no cost to the locality.

The Office of Broadband Assistance has assisted many Virginia localities in developing strategic broadband deployment plans, which has helped to drive significant broadband expansion and promote local broadband awareness. Unfortunately, the office is constrained by a lack of available staff and has been unable to assist localities needing assistance.

In addition to helping localities develop strategic broadband deployment plans, the Office of Broadband Assistance also serves as a repository of broadband information (ex: broadband funding, best practices, and statistics), a conduit for elected officials, providers, localities and citizens, and a helper for locality-led broadband initiatives.

The Office of Broadband Assistance moving forward:

In the coming years, the Office of Broadband Assistance support for local broadband planning efforts will increase dramatically. With additional funding, the Office of Broadband Assistance could provide technical assistance to many more localities, increasing the depth and breadth of planning and data collection across the Commonwealth, adding leverage to state deployment efforts, and assisting in the creation of public/private partnerships and drawing down of federal funds. This funding could be supplied directly by VATI, provided it is in the context of a local planning grant and if the General Assembly includes language authorizing such in the budget.

VIII. Fund Deployment, Methodology, and Timeline for Project Awards

A. VATI as the Primary Mechanism for Deployment of Funds

The FCC believes that the U.S. rural broadband problem could be solved with a national deployment of approximately $40 billion in public funds.[31] Given Virginia's relatively high population density, the cost of functionally universal coverage is achievable.

The state will need to make a significantly larger investment in the VATI program to ensure every Virginian has access to broadband.

The primary vehicle by which funds are to be distributed is the VATI program. This program works by focusing exclusively on unserved Virginians.

Applications must be submitted by a unit of government (Towns, Cities, Counties, Economic Development Authorities/Industrial Development Authorities, Broadband/Wireless Authorities, Planning District Commissions, School Divisions, etc.) with a private sector provider(s) as a co-applicant. Eligible projects will be owned and operated by the private sector co-applicant. Grantees will be selected through a competitive application process.

Applicants are encouraged to provide a co-investment, as the efficiency in the use of public dollars is the primary metric by which applicants are scored. DHCD will award funding to applicants to provide last-mile services, middle-mile networks, equipment, or other investments. Unserved serviceable units are defined as having broadband speeds of 10 Mbps download and 1 Mbps upload or less.

B. Assumptions and Timeline

While this timeline is based on assumptions and statistical derivations, they are well-founded and can be tightened in future years as better data is acquired and more projects are funded. Further assumptions included in this budget estimate are:

1. A connection is "made" when it is contracted for.
2. The VATI and Tobacco Commission programs remain in substantially the same form.
3. Virginia remains at least as competitive for federal grants as it has been in prior years.
4. Private-sector and coop investment in broadband deployment continues as currently projected.
5. State cost for remaining connections will be around $500 per connection, averaged between wireless and wireline connections, with future deployments benefitting from escalating leverage.[32]

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[31] Transition paper by Paul de Sa, Chief, FCC Office of Strategic Planning and Policy Analysis: http://transition.fcc.gov/Daily_Releases/Daily_Business/2017/db0119/DOC-343135A1.pdf

[32] This estimate is based on the data currently available, and will need to be refined over time as new data is available through future grant funding rounds. It's also important to note that this is in the aggregate – some projects will be less expensive on a per-connection basis, while others will be more expensive. This current estimate is supported by broadband deployment efforts by the Tobacco Commission, which has run the only round of well-funded large-scale broadband infrastructure projects, details of which can be found here:

6. Broadband deployment will be around 5% more efficient when done in the context of a robust local plan.
7. While the population of Virginians in-need of broadband access at home will be reduced given that many occupy the same household, there are also an uncounted number of business premises that are currently unserved and not captured in population-based scoping. These unknowns are deemed to offset each other.[33]
8. As costs escalate in harder-to-reach areas of the Commonwealth, "smart grid" telecommunications networks will have been constructed by utilities that will reduce the costs of accessing these areas.

We assume an aggregate project leverage of approximately 25% state dollars, 25% federal dollars, and local and private sector dollars covering the remaining 50% of project costs.

The VATI program is currently funded at $4 million per year. This program requires a public/private partnership and, as a result, no project funded through it can have any ongoing state budget impact – this program injects capital into projects that are then managed and maintained by the private sector.

Success in this effort requires that this funding be increased to at least $50 million per year. This $50 million per year, with the continued investment of at least $5 million per year by the Tobacco Commission within its footprint, over the coming nine-year period, would allow the drawing down of at least $305 million in federal funds since there would be available match. The combined $305 million in state funds and $305 million in federal funds can then be matched by $600+ million in local and private-sector dollars. These funding sources wouldn't all apply to every project – though a project with all four funding sources would score very well within the VATI process

This new funding, in excess of $1 billion, over the remaining nine-year period, should be sufficient to accomplish the Governor's goals. It will be matched with continued planned investment by the private sector and electric coops, leveraging of the "smart grid" communications networks being constructed by the electric cooperatives, investor-owned utilities, and municipal utilities, and continued technological improvement.[34]

C. Year by year infrastructure spending estimates

Because of the above budget recommendations, the following expenditures would be made on a year-by-year basis, with the cumulative totals exceeding our necessary costs ahead of the 10th year of the effort, FY28:

https://www.revitalizeva.org/2018/03/12/31218-tobacco-commission-approves-funding-requests-for-broadband-expansion/

[33] This is a safe assumption because while families occupy housing all over the Commonwealth, businesses tend to cluster in business districts more likely to already be served. As a result, it is likely that grouping the unserved population in households will drive down the number of new connections to a greater extent than connection needs are driven up by unserved business locations

[34] It should be noted that the leveraging of the electric utilities' "smart grid" telecom network is very likely to do far more than merely offset the increased cost of harder-to-reach places, but for the time being that likelihood is being kept out of these calculations as a safety margin backstopping these estimates.

Virginia State Infrastructure Expenditures by Fiscal Year			
Fiscal Year	VATI	TRRC	Cumulative Total
FY19	$4m	$11m	$15m
FY20	$50m	$5m	$70m
FY21	$50m	$5m	$125m
FY22	$50m	$5m	$180m
FY23	$50m	$5m	$235m
FY24	$50m	$5m	$290m
FY25	$10m	$5m	$305m
FY26	$5m	$0m	$310m
FY27	$5m	$0m	$315m
FY28	$5m	$0m	$320m

Following from those budgetary assumptions, Virginia should be able to fund, through its grant programs, infrastructure leading to approximately 110,000 connections each in the coming two years, rising once local plans are in place to 115,500 connections per year.[35] In the out years, with most of the work completed, we anticipate funding decreasing dramatically. At that point, the utility leverage opportunities are better understood, and gaps are identified and filled.

Virginia Premises Connected by Fiscal Year			
Fiscal Year	Cumulative State Expenditures	Number of Connections Made	Cumulative Connections Total
FY19	$15m	32,000 (actual)	32,000
FY20	$70m	110,000	142,000
FY21	$125m	110,000	252,000
FY22	$180m	115,500	367,500
FY23	$235m	115,500	483,000
FY24	$290m	115,500	598,500
FY25	$305m	31,500	630,000
FY26	$310m	10,500	640,500
FY27	$315m	10,500	651,000
FY28	$320m	10,500	>660,000

[35] This assumes that connections can be made at a cost of approximately $500 each in state-level costs, matched by federal, local, and private sector expenditures. Our assumptions are that 55,000,000 ÷ 500 = 110,000, which are the connection totals for the next two years. After local plans are completed, we are assuming a 5% increase in efficiency as a result of local planning efforts, 110,000 × 1.05 = 115,500.

IX. Complementary and Related Issue and Policy Areas

There are a number of different areas of government with opportunities for additional leverage or complementary efforts to this broadband initiative.

A. Education

The E-rate program:

The FCC's E-rate program makes telecommunications and information services more affordable for schools and libraries. With funding from the Universal Service Fund[36], E-rate provides discounts for telecommunications, internet access and internal connections to eligible schools and libraries. Eligible schools and libraries receive discounts on telecommunications and internet access, as well as internal connections, managed internal broadband services and basic maintenance of internal connections. Discounts range from 20 to 90 percent, with higher discounts for higher poverty and rural schools and libraries. Recipients must pay some portion of the service costs.

Virginia has received between $20 million and $54 million every year from 1998 through 2018 through the E-rate program. While this has led to nearly universal connectivity for Virginia's K-12 schools, many libraries remain disconnected or inadequately served.[37]

Broadband only at school is inadequate:

While nearly all Virginia's schools are connected, research is clear that students without access to a reliable, high-speed, internet connection at home suffer both during and after their time in secondary school. The Federal Reserve found that there were significant negative impacts on test scores as well as applications to college and other training programs.[38] Children who don't have access to the internet at home are less-able to access educational opportunities than those who have broadband at their homes. This is a fundamental inequity, and we have the duty to provide a level playing field to all children in the Commonwealth.

Further, libraries are important civic spaces necessary for free access to the internet for Virginians without broadband at home. Connecting all of Virginia's libraries to high-quality broadband should be a priority. Fortunately, the E-rate program makes these disconnected libraries an opportunity. By leveraging future E-rate library connections in unserved areas to support broader projects, these libraries can be connected affordably

[36] More information about the Universal Service Fund can be found here: https://www.fcc.gov/general/universal-service-fund

[37] More information about Virginia's E-rate program, eligibility, and application instructions can be found here: http://www.doe.virginia.gov/support/technology/edtech_plan/infrastructure_program/erate/index.shtml

[38] The full Fed. Study can be found here: https://www.federalreserve.gov/econresdata/feds/2015/files/2015108pap.pdf

while the federal funds supporting that connection can reduce the cost of broadband deployment across the area.

B. Healthcare

Many Virginians outside of major metropolitan areas often lack locally-available medical care options, particularly in specialty areas like oncology or psychiatry. While options to engage telehealth services exist, they are reliant on access to broadband at the patient's residence or a nearby clinic.

Non-emergency medical transportation:

As of 2015, the General Assembly's Joint Legislative Audit and Review Commission found that Virginia's Medicaid program was paying approximately $77 million/year transporting a relatively small number of Virginians from their homes to medical visits for non-emergency treatment.[39]

If a percentage of these trips could be replaced with a one-time telecommunications infrastructure build, the program could see savings over a short window. Virginia should seek a waiver for a pilot premised on finding opportunities for one-time infrastructure investments using Medicaid dollars that would be a cost-savings over a 3-5 year period.

C. Public Safety

There are gaps in data services for our first responders, as well as concerns about the reliability of voice-over-IP emergency services. Our state's communications network must allow citizens the ability to reliably contact first responders, and allow all public safety officials to communicate seamlessly with each and the public

Leveraging coverage gaps:

In areas where first responders have spotty voice communications or inadequate access to digital or data services, the Commonwealth is obliged to construct infrastructure to solve that problem. That infrastructure will include towers and the backhaul to serve them, and networks can be built from that backhaul or they can be projected from the towers in the form of fixed wireless broadband services.

The First Net program:

While the Commonwealth's localities are served well by a variety of public safety communications providers, AT&T won a large federal contract to fill gaps in service and construct a nationwide, interoperable public safety network.[40] The resources of the First

[39] The full report can be found here: http://jlarc.virginia.gov/pdfs/reports/Rpt477.pdf
[40] You can learn more about the First Net Program here: https://about.att.com/story/firstnet_selects_att_to_build_network_supporting_first_responders.html

Net program will be included in both local broadband planning and in dialogue with applicants for broadband infrastructure grant programs.

D. Transportation

Virginia's transportation network is among the most robust transportation systems in the nation. As a result, there are transportation needs for improved communications technology[41] and infrastructure as well as opportunities to leverage existing transportation-related assets for customer-facing broadband applications.

Leveraging existing assets:

According to the Virginia Department of Transportation (VDOT), approximately 1,000 of the 3,708 miles of "resource sharing routes" across the Commonwealth have potential use for broadband. In February 2018, the VDOT Office of Public-Private Partnerships made a presentation to the Commonwealth Transportation Board about the Fiber Optic Opportunities Initiative. Their six-step process: 1) reviews the existing legal framework and identifies opportunities; 2) assesses needs in the Commonwealth; 3) compiles data sets to evaluate VDOT right-of-way asset capabilities; 4) develops an initial framework to maximize capabilities; 5) establishes a framework for commercial opportunities based on market findings; and, 6) develops potential procurement options. Their report later in the year outlined that there were significant opportunities for partnerships in existing rights of way as well as for the location of telecommunications assets in VDOT rights of way and properties.[42]

Gaps in complete understanding of assets:

VDOT continues to work toward a full and detailed accounting of all potential assets it can leverage for the purposes of shared smart-transportation and consumer broadband provision projects. Signage and vertical assets to which communications equipment could be affixed, VDOT-controlled land appropriate for tower location, and improved access for the telecommunications industry to a more-comprehensive conduit network in VDOT rights of way would all lead to better leveraging of VDOT assets. Upon its completion of it's inventory, there will be a much greater understanding of the ways in which VDOT can both improve its network and make assets available for citizen-serving broadband expansion.

VDOT expertise:

In addition to VDOT's physical assets, the office of public private partnerships is the most-experienced office in state government in making large-scale agreements with

[41] For more about VDOT's smart transportation operations, their site can be accessed here: http://www.virginiadot.org/business/operations_program.asp

[42] That report is available here: http://www.ctb.virginia.gov/resources/2018/june/it/fiber_optics_opportunities_initiative_phase_1_findings_june_19,_2018.pdf

infrastructure companies.[43] It is anticipated that there may be certain times during the Governor's broadband initiative when provision of service for specific, difficult to serve, areas will need to be contracted for. The public private partnership office is the ideal office to handle the negotiating and contracting.

X. Policy Recommendations

Meeting the Governor's goals of deploying broadband universally will require a number of different initiatives, improvements, and allocations of resources. Some of these will take place solely within the executive branch of government, and others will require legislation. Not all changes can or should be made at once, so some recommendations will need to be met in future years. Further, some challenges do not currently have clear solutions.

A. Policy Improvements within the Executive Branch

Agency actions:

1. **Create Index of Vertical Assets:** The Chief Broadband Advisor, along with VDOT and the Office of Broadband Assistance, will build and maintain an index of publicly controlled, state and local vertical assets sufficient to blanket VA in wireless signals. It need only be adequate, not comprehensive. Where there are gaps, the team work with all available stakeholders to see if these can be filled to meet as many existing needs as possible.

2. **Require Local Broadband Plans for State Investment:** VATI and Tobacco Commission grants should require that applicant localities adopt a tactical plan for universal broadband coverage within 10 years as a part or addendum to its comprehensive plan. This plan could be for an individual locality, or as a part of a multi-locality authority, planning district or other grouping of localities. Failure to have, or be working on, such a plan would preclude access to state broadband support programs or state support for pursuit of federal funding programs.

   This would also require that state funding for the Office of Broadband Assistance be increased to improve its planning support capacity, as well as making available financial support for planning efforts through other DHCD resources such as Community Development Block Grants.

3. **Ensure VDOT continues to improve its conduit policy:** VDOT has done a remarkable job of employing a "dig once" policy, but they have opportunities to improve in two areas. First, they do not always install conduit when engaged in trenching activities, and second, they rarely affix conduit to bridges, overpasses,

[43] More detail regarding the public private partnership office is available here: http://www.p3virginia.org

and tunnels. Obviously, networks that stop and start when they reach such obstacles are ineffective.

4. **Enable attachment of wireless equipment to state property:** Require all new rural state-owned buildings be designed to allow for towers or other vertical assets to be attached or located. These should be offered at free or reduced cost to providers planning to expand service to unserved Virginians. Some exception should be made for view-shed concerns where applicable.

Coordination:

In addition to specific policy and regulatory changes, a critical improvement in the state's approach to broadband deployment is the coordination of all broadband-related efforts by the Chief Broadband Advisor.

Combining staff-level grant application and review processes between DHCD and the Tobacco Commission will ensure that decision-making between the two primary, state-level, funding agencies of broadband infrastructure are consistent and complementary. Further, it will allow multiple iterations of grant-making each year, ensuring that lessons are learned more quickly and put into the field in a more timely fashion.

Ensuring that other agency efforts within the Education, Public Safety, Transportation, and Healthcare secretariats are tracked and, when opportunities for collaboration exist, that they are highlighted and taken advantage of will be a core function of the Chief Broadband Advisor.

B. Legislative Changes Recommended:

1. **Leverage Grid Transformation for middle-mile service:** Implementation of this idea will be complex, and may require additional development beyond what can be done in the 2019 legislative session. Virginia has many citizens who live in unserved areas and may not be able to attract providers because of a lack of available middle-mile infrastructure to which to connect. Neighboring operators are under no obligation to allow a new market entrant access these areas. Worse, some areas will never make economic sense for any sort of network construction absent significant incentive funding from government actors or other charitably-inclined funders.

   The Grid Transformation and Security Act of 2018 requires Virginia's electric utilities to modernize the energy grid to improve reliability and increase efficiency-in part through the utilization of broadband technologies to their electric distribution substations to provide real-time grid status and control. This smart grid communications network will be created among various substations and will be sufficiently close to each end-user's home or business to allow a direct fiber connection or wireless reading of a smart meter mesh network.

This will require that a great deal of fiber be strung along poles and through conduit throughout the service territories of Virginia's Investor Owned Utilities (IOUs) and Electric Cooperatives (Coops).

Grid transformation represents a unique opportunity for electric providers to improve the efficiency of their delivery, while simultaneously generating a new revenue stream and leveraging their smart grid build-out to provide critically-needed infrastructure to citizens of the Commonwealth currently without access to high speed broadband.

Given that the majority of the cost in the creation of a fiber network is in the stringing of fibers, not the marginal capacity of said fibers, this represents an opportunity for electric providers to generate a new revenue stream while simultaneously leveraging their smart grid build-out to unserved areas.

A failure to leverage this smart grid build-out will result in the citizens of the Commonwealth paying to build two comprehensive communications networks: one that only serves the electrical grid, paid for by ratepayers, and another through tax dollars and monthly subscriptions. Leveraging the grid transformation will save Virginia ratepayers an anticipated $150 million while simultaneously supporting the low-cost connection of at least 198,000 additional Virginians[44].

Legislation should be passed permitting investor-owned utilities to recover costs from their ratepayers to pull additional fiber beyond the minimum necessary for the purposes of building a smart electrical grid. The companies would then be permitted to lease additional capacity to ISPs for the purposes of serving currently unserved Virginians – and only unserved Virginians; there is no reason for the ratepayers to subsidize market entry for the purposes of creating additional service for those Virginians already connected.

Lease revenues should be then applied to rates, lowering the cost of electricity while providing broadband access for more Virginians. These networks should be managed, marketed, and leased to ISPs by a third party with direct incentives to get as much business and as many connections made as possible, while also maximizing value for the ratepayers who invested in this fiber capacity.

Crafting this legislation in a manner that accomplishes the Commonwealth's goals while remaining within the realistic confines of a utility regulated by the State

[44] Dominion Energy's Broadband Feasibility Report cites a savings of $75 million in building out their smart grid build out in unserved areas while creating a telecommunications network for partnership with third party internet service providers. We assume that AEP, whose territory is less dense but has a higher percentage of unserved customers, has a similar net savings bringing the total savings to rate payers of $150 million over three years. Based on an average leased cost per fiber mile from established middle-mile service providers, and a very conservative estimate of 3 homes per mile in unserved areas, we can extrapolate from that net revenue an additional 198,000 connections are estimated based on these projections.

Corporation Commission and federal regulators will require significant care and stakeholder outreach.

2. **Create a Freedom of Information Act (FOIA) exemption for the VATI program:** There is a strong disincentive for broadband companies to disclose many of the details necessary for VATI to evaluate projects properly. This exemption would mirror that of other agencies doing economic development: only proprietary corporate data would be excluded from public consumption, not the details of any uses of public funds.

3. **Give budgetary "rollover" permission to the VATI program:** By making VATI funding non-reverting, the program will be able to entertain multi-year grants with slower drawdowns of allocated funds, meaning that DHCD isn't required to expend project funds in a single fiscal year. Many larger projects will take longer to engineer and construct, and some projects will require flexibility in timeframes. Significant economies of scale can be gained by soliciting and funding larger projects which, necessarily, require longer construction times.

C. Policy Challenges not yet met but necessary for full-deployment

Even after adoption of the prior recommendations, there will still be obstacles to swift broadband deployment, related to continuation or increases in funding for infrastructure support programs, costs of equipment and engineering for broadband networks, proper implementation of funding programs and support for smart-grid leverage, as well as re-scoping that will be necessary once local planning efforts yield superior data.

Challenges remaining:

1. **Cost of equipment:** One of the primary costs associated with broadband deployment is the expense of the purchase of fiber, switching equipment, transmission equipment, etc. By pursuing policies that reduce the costs of these items the Commonwealth could potentially attract additional sale and manufacture of these items in-state while simultaneously increasing the number of citizens that could be reached per dollar expended.

2. **Cost of shared infrastructure for network deployment:** Another significant cost in the deployment of fiber networks is the cost of attaching communications infrastructure to utility poles owned by a third party. While the FCC sets a fixed rate for investor-owned utilities, municipalities and non-investor-owned utilities can charge a wide variety of rates. Additionally, varying rules and engineering requirements affect timing and compliance costs related with pole attachments. This issue has proven difficult to address in the past, but will likely need to be revisited at some point.

3. **Cost associated with easements during network deployment:** While the parties have begun to negotiate, there remain significant challenges related to the direct

costs, engineering costs, and time-of-approval uncertainty related to the crossing of third-party-owned real estate when deploying broadband networks. Negotiated master agreements among parties would be an ideal solution for this problem, but the state's ability to require such agreements or set terms and limitations related to these agreements is unclear and potentially inadequate.

4. **Filling gaps and identifying borders of coverage:** Local planning efforts will include identification of served and unserved areas in a more-granular and comprehensive fashion than has been previously available, but there will remain serious challenges associated with identifying specific borders and gaps in coverage areas. No state or locality has solved this problem satisfactorily.

D. How this all fits together

Each of the above is necessary for this plan to achieve its goals at the cost points and price levels identified. Moreover, it should be stated again that current projections are based on currently available data. It is likely that the number of necessary connections will fall dramatically as data becomes available regarding the number of disconnected Virginians sharing households, however, it's also likely that the cost per-connection will be higher.

A great deal more data will become available once local planning efforts have been undertaken. These local plans will provide the Commonwealth with the most accurate maps possible, as well as identify available local resources and funding gaps. Further, additional rounds of grant funding will allow better estimation of the likely cost the state can expect on a per-connection basis, either confirming, or pushing up or down our current $500 per connection estimate. These plans will also ensure that projects undertaken in a given locality are pushing in the direction of universal coverage rather than merely covering additional citizens without any overall plan.

Once those plans are in place, grant funding from VATI will be better-targeted and more efficient. These plans and state funding will also be able to take advantage of the utility middle mile networks in a significant way, driving the cost of connections down for unserved citizens while providing significant new benefits in the form of ratepayer cost savings.

The coordination efforts by the Governor's broadband team will yield significant savings for local governments, Virginia ISPs, and the Commonwealth, as projects will be able to take advantage of multiple funding sources and opportunities for leverage.

As a result, in the next year the Commonwealth can expect around 110,000 new connections funded through the VATI and Tobacco Commission grant rounds, the creation of a governance structure, model for a utility middle-mile network, construction of that network to begin, robust local planning efforts to occur (in potentially 1/3 of all Virginia localities), and a concerted effort by state actors to help secure federal funds by ISPs and local governments throughout Virginia. As more information about the costs and successes

of those efforts come in, future plans will reflect that new data and adjust as necessary to remain on track for universal coverage.

XI. Appendix A: Overview of State and Federal Government Programs funding Broadband

A wide variety of state and federal funding programs, from different agencies, address broadband. Below is a table, divided by Virginia, federal, and tribal sources, that provides brief funding program details:

Source	Opportunity	Brief Description	Application Timeline
Virginia Funding Opportunities			
Department of Housing and Community Development (DHCD)	Community Development Block Grant Planning Grant http://www.dhcd.virginia.gov/index.php/community-partnerships-dhcd/79-community-development-block-grant-cdbg-planning-grant.html	Funds available for 3 areas: planning grants, local innovation grants, implementation and economic development, and large scale local level projects.	January – September
Department of Housing and Community Development (DHCD)	Virginia Telecommunication Initiative http://www.dhcd.virginia.gov/	Provides financial assistance to supplement construction costs by private sector providers to extend services to areas that are presently unserved by any broadband provider. Definition of unserved; speeds </= 10 Mbps/1 Mbps. Eligible applicants: towns, cities, counties, EDA/IDA, broadband/wireless authorities, PDC, etc.	Fall
Virginia Tobacco Region Revitalization Commission	TRRC Last-mile Grant and Loan Fund https://www.revitalizeva.org/grant-loan-program/grant-programs/research-development-grant-program/	Provides grants and loans to public/private partnerships between localities and ISPs to construct projects within its service area.	Announced annually
Virginia Resources Authority (VRA)	Virginia Pooled Financing Program http://www.virginiaresource	Provides financing to local governments for essential projects. All	Multiple windows annually

	s.org/page/virginia-pooled-financing-program/	VRA's authorized project areas are eligible for financing in the Virginia Pooled Financing Program (VPFP). Since inception in 2003, over 100 local governments in Virginia have utilized this program to finance or refinance over $2 billion in infrastructure projects.	
Federal Funding Opportunities			
United States Department of Agriculture Rural Development (USDA)	Community Connect Grant program https://www.rd.usda.gov/programs-services/community-connect-grants	This program helps fund broadband deployment into rural communities where it is not yet economically viable for private sector providers to deliver service.	Announced periodically
United States Department of Agriculture Rural Development (USDA)	Rural Broadband Access Loan and Loan Guarantee https://www.rd.usda.gov/programs-services/rural-broadband-access-loan-and-loan-guarantee	This program offers financial assistance to eligible applicants that will construct, improve, or acquire facilities and equipment needed to provide service at the broadband lending speed as defined in the most recent funding announcement in eligible rural areas.	Announced periodically
United States Department of Agriculture Rural Development (USDA)	Telecommunications Infrastructure Loans & Loan Guarantees https://www.rd.usda.gov/programs-services/telecommunications-infrastructure-loans-loan-guarantees	This program provides financing for the construction, maintenance, improvement and expansion of telephone service and broadband in rural areas.	Applications are accepted on a continuing basis
United States Department of Agriculture Rural Development (USDA)	Distance Learning and Telemedicine Program https://www.rd.usda.gov/programs-services/distance-learning-telemedicine-grants	This program helps rural communities use telecommunications to connect to each other and to the world for the purposes of distance learning and telemedicine.	Announced periodically
United States Department of	Community Facilities Direct Loan & Grant Program	This program provides affordable funding to develop	Applications are accepted

Agriculture Rural Development (USDA)	https://www.rd.usda.gov/programs-services/community-facilities-direct-loan-grant-program	essential community facilities in rural areas.	on a continuing basis
Federal Communications Commission (FCC)	Connect America Fund https://www.fcc.gov/general/connect-america-fund-caf	Provider funding for FCC eligible areas only. Eligible areas map: https://www.fcc.gov/reports-research/maps/connect-america-phase-ii-initial-eligible-areas-map/	N/A – program not currently renewed
Federal Communications Commission (FCC)	FCC Mobility Fund Phase II https://www.fcc.gov/mobility-fund-phase-2	The FCC plans to make up to $4.53 billion in funding available to mobile operators that are building out 4G LTE networks to underserved rural markets. The funding will be made available over a 10-year period. Operators that receive the support from the auction will build out 4G LTE mobile service that will deliver at least 10 Mbps to customers in markets that lack access to unsubsidized 4G LTE.	Not yet active
Federal Communications Commission (FCC)	E-Rate Funding http://www.fcc.gov/encyclopedia/e-rate-schools-libraries-usf-program	The schools and libraries universal service support program, commonly known as the E-Rate program, helps schools and libraries to obtain affordable broadband.	Winter-Spring
Universal Service Administration Co. (USAC)	Lifeline Support https://www.usac.org/li/	Lifeline is a federal program that lowers the monthly cost of phone and internet for eligible customers. Participating companies in Virginia: http://www.lifelinesupport.org/ls/companies/CompanyListing.aspx?state=VA&stateName=Virginia	Applications are accepted on a continuing basis
Universal Service Administration Co. (USAC)	Rural Health Care – Healthcare Connect Fund https://www.usac.org/rhc/he	This program provides a 65 percent discount on eligible expenses related to broadband connectivity to both individual rural health care	Winter - Summer

	althcare-connect/default.aspx	providers (HCPs) and consortia, which can include non-rural HCPs, if the consortium has a majority of rural sites.	
Universal Service Administration Co. (USAC)	Rural Health Care – Telecommunications Program https://www.usac.org/rhc/telecommunications/default.aspx	This program provides reduced rates to rural health care providers (HCPs) for telecommunications services related to the use of telemedicine and telehealth.	Winter - Summer
US Economic Development Administration (EDA)	Planning Program and Local Technical Assistance Program https://www.grants.gov/web/grants/view-opportunity.html?oppId=301936	This program assists eligible recipients in developing economic development plans and studies designed to build capacity and guide the economic prosperity and resiliency of an area or region.	Applications are accepted on a continuing basis
US Economic Development Administration (EDA)	Public Works and Economic Adjustment Assistance Programs https://www.grants.gov/web/grants/view-opportunity.html?oppId=294771	Grants made under this program will leverage regional assets to support the implementation of regional economic development strategies designed to create jobs, leverage private capital, encourage economic development, and strengthen America's ability to compete in the global marketplace.	Applications are accepted on a continuing basis
Department of Education (DOE)	Promise Neighborhoods Competition http://www2.ed.gov/programs/promiseneighborhoods/index.html	This program provides funding to support eligible entities to significantly improve the educational and developmental outcomes of children and youth in our most distressed communities.	Spring
Appalachian Regional Commission (ARC)	ARC Project Grants https://www.arc.gov/funding/arcprojectgrants.asp	ARC funds a number of telecommunications activities, including strategic community planning, equipment acquisition, and hardware and software for network building. ARC funds can be used for strategic telecommunications planning	Announced annually

		activities, telecommunication service inventory and assessment activities, aggregation of demand projects, among other activities.	
Federal Reserve	Community Reinvestment Act (CRA) https://www.dallasfed.org/cd/pubs/digitaldivide.aspx	The Federal Reserve has issued guidance on how to leverage a bank's CRA resources in digital equity initiatives.	Ongoing
Tribal Funding Opportunities			
U.S. Department of Housing and Urban Development (HUD)	Indian Community Development Block Grant http://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/ih/grants/icdbg	Provides funds to eligible grantees for housing rehabilitation, land acquisition, community facilities, infrastructure construction, and economic development activities. Eligible applicants for assistance include any Indian tribe, band, group, or nation.	Winter
U.S. Department of Housing and Urban Development (HUD)	Indian Housing Block Grant (IHBG) program http://portal.hud.gov/hudportal/HUD?src=/program_offices/public_indian_housing/ih/grants/ihbg	The provision of broadband is eligible under this program. Eligible IHBG recipients are Federally recognized Indian tribes or their tribally designated housing entity (TDHE), and a limited number of state recognized tribes who were funded under the Indian Housing Program authorized by the United States Housing Act of 1937 (USHA).	Winter
Institute of Museum and Library Services	Native American Library Services https://www.imls.gov/nofo/native-american-library-services-basic-grants-fy16-notice-funding-opportunity	Basic Grants are available to support existing library operations and to maintain core library services. Indian tribes, Alaska native villages, regional corporations, and village corporations are eligible to apply for funding under the Native American Library Services grant program.	Spring