Broadband

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Broadband

- What is it and what is it used for?
- The Digital Divide – Rural vs. Urban
- Bridging the Digital Divide – Federal Programs
- Citizen Access and Bridging the Digital Divide – Other States
- Citizen Access and Bridging the Digital Divide in Virginia
- Barriers to Broadband Access in Virginia
- Recommendations

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Broadband – What is it?

In the 1990's the Internet was hailed as the "Information Superhighway," that everyone **must be connected** to in order to be an active participant in the new **Information Age**

- Back then dial-up services, AOL and "surfing the Internet" were signs of being hip, as this tool served to grant access to information to individuals at an unprecedented level becoming the single, most-empowering activity a citizen could engage in since democracy granted one person, one vote

- However, as with other technologies, the Internet expanded at a rate that exceed most people's expectations, as did its utilization by citizens for purposes that reflected our diverse society

- Information could be identified and accessed at incredible speeds, and as demand for knowledge and commercial activity increased, so did the amount of traffic flowing on these limited pipelines of connectivity

- Files of information (megabytes and now gigabytes) came in increasingly larger packages that required more bandwidth to flow through. Moreover, we needed larger funnels to pour the information into our personal devices, such as desktops, laptops and now smart phones

- E-Commerce websites and commercial applications became more complex and citizens became more reliant upon the Internet to conduct business and interact with government

- Broadband became the next logical step in the evolution of connectivity to the Internet, as it provided a larger pipe for information to flow through at a higher rate of speed

- Currently, one cannot effectively participate in this new Information Technology Age without it

Broadband – What is it?

- There is no formal statutory or codified definition of Broadband

- Recently, the FCC has defined Broadband as telecommunications having minimum download speeds of 25/3Mbps, up from 10/1Mbps

- Commonwealth of Virginia utilizes a 10/3Mbps speed in its determination of minimum standards

- But Broadband is much more than a technical definition

Broadband – What is it?

Speed

- The speed of your connection determines the kinds of applications you can utilize
- Speed = Megabits per second, Gigabits per second, etc. (Mbps, Gbps, etc.)
- Speeds are rarely as advertised. A 10Mbps line means that under the best circumstances (you don't share your line with anyone), you will get 10Mbps
- If your connection speed is 'up to 10Mbps', it's practically impossible to actually get your full 10Mbps

Bandwidth Vs. Speed

- Bandwidth refers to the size of the conduit in which the data is traveling within
- For example, if you are on a 3-lane interstate and the only 2 cars on the road are driving the legal speed limit of 70mph, while you could fit more cars on the road, you could go faster, but the speed is set at 70mph

Activity	Minimum Required Speed (Mbps)	Dial-Up	3G	Satellite	DSL	4G / LTE	WiMax	Cable Modem	Fiber
Download Speed Range		up to 56 Kbps	50 Kbps - 1.5 Mbps	400 Kbps - 2 Mbps	768 Kbps - 6 Mbps	up to 12 Mbps	up to 128 Mbps	1 Mbps - 1 Gbps	up to 1 Gbps
Connection		Phone Line	Wireless	Wireless Satellite	Phone Line	Mobile Wireless	Wireless	Coaxial Cable	Fiber Optics
General Usage									
General Browsing and Email	1		?	?	X	X	X	X	X
Streaming Online Radio	Less than 0.5		?	?	X	X	X	X	X
VoIP Calls	Less than 0.5		?	?	X	X	X	X	X
Students									
Telecommuting	5 - 25				?	X	X	X	X
File Downloading	10					X	X	X	X
Social Media	1		?	?	?	X	X	X	X
Watching Video									
Streaming Standard Definition Video	3 - 4				X	X	X	X	X
Stream High Definition (HD) Video	5 - 8				?	X	X	X	X
Streaming Ultra HD 4K Video	25						X	X	X
Video Conferencing									
Standard Personal Video Call (eg., Skype)	1		?	?	?	X	X	X	X
HD Personal Video Call (eg.,Skype)	2			?	?	X	X	X	X
HD Video Teleconferencing	6				?	X	X	X	X
Gaming									
Game Console Connecting to the Internet	3				?	X	X	X	X
Online Multiplayer	4				?	X	X	X	X

? = Maybe   X = Yes

Broadband – Benefits for All

- **Education & Workforce**
  - Most – but not all – Virginia schools have fiber optic connections to the Internet
  - Students will engage in use of digital resources, including devices and content, that were previously unavailable
  - Connection at home enables homework assignments to be completed & permit access to increased online resources
  - Access to online and computing skills training & certifications to increase available workforce & address shortages
  - For secondary education, access to distance learning and online credentialing is increased and choices are expanded

- **Healthcare**
  - Improve access to health records, as well as timely diagnosis and treatment (tele-health) for improved quality of care
  - Utilization of newer technologies that require Broadband in order to function

- **Economy**
  - Attract companies to previously unserved areas
  - Retain pre-existing businesses with increased speeds in marginal areas
  - Expansion of pre-existing businesses that require increased speeds due to nature of business in already served areas
  - Job seekers will be able to reach out beyond their immediate area in their searches
  - Some businesses utilize a remote workforce and require faster speeds as part of their connectivity requirements
  - Facilitate start-ups of small businesses for those who have been shut out of new economy & unable to access markets
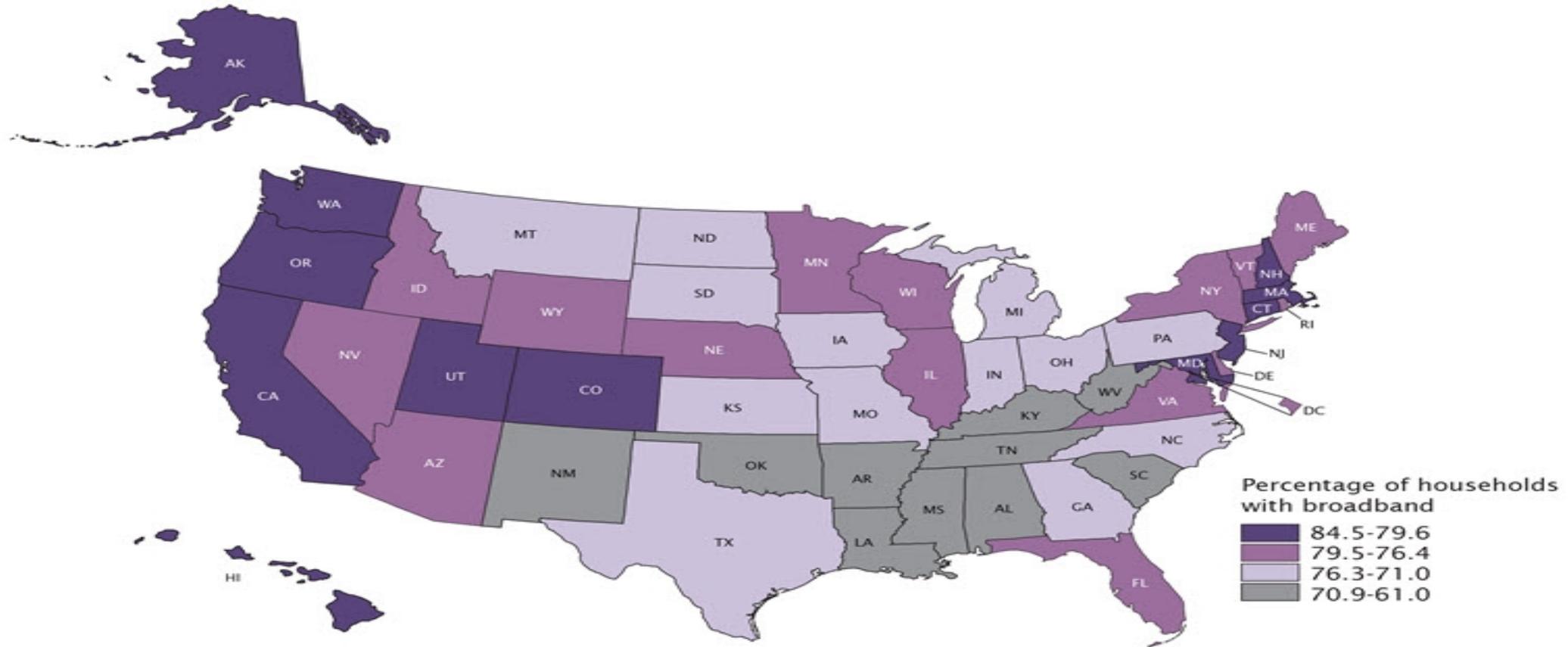
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Broadband – The Digital Divide (Rural vs. Urban)

- Share of US population without access is **10%** but those in rural areas without access is **38%**

- Communities without access to broadband Internet face serious challenges such as lower access to quality health care, education, and training for workers and children and reduced access to markets for area businesses

- Some of these distressed areas face similar barriers :
  - Economic distress
  - Low population density and declining population
  - A lack of high-speed Internet availability

- Access, adoption, and utilization of broadband the Region's citizens and businesses is a catalytic factor for business growth and workforce development

- This is exacerbated by broadband Internet service providers being less likely to provide services in sparsely populated areas because it initially has a lower return on investment and is less cost-effective

The Digital Divide

Percentage of Households With Broadband Internet[1] Subscription by State

Percentage of households with broadband
- 84.5-79.6
- 79.5-76.4
- 76.3-71.0
- 70.9-61.0

[1] Broadband internet refers to households who said "Yes" to one or more of the following types of subscriptions: DSL, cable, fiber optic, mobile broadband, satellite or fixed wireless.

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Broadband – The Last Mile

- The last mile connection may be defined as tapping into the broadband "backbone" that is already in place down most interstates and many state highways, and is more than likely a wireline network

- Private-sector providers will not invest in the capital expenditures necessary to make this connection in order to expand broadband into areas where there is a low density of population or business opportunities

- Providers need a minimum level of subscribers to get an ROI to offset their costly investment for infrastructure necessary for basic broadband or upgrades in speed and bandwidth

- Moreover, in many places there is a broadband connection but the service is provided by only one private-sector company and rates may be cost-prohibitive and service may be limited for the 21st century

- The federal, state and local governments have stepped in – across the country – to fulfill the need of the unserved and underserved regions

- These regions are primarily rural and represent the majority areas that suffer from the digital divide

- *It should be noted that the FCC has recognized that continuing advances in wireless technologies, such as 4G/5G and whitespace, may have the greatest promise to close the digital divide in a more cost-effective manner than traditional wireline solutions*

Broadband – Bridging the Digital Divide

There are numerous federal agencies that have stepped in to bridge the digital divide:

- Federal Communications Division (E-Rate and CAF)
- Appalachia Regional Commission
- Housing and Urban Development (CDBG)
- Department of Agriculture
- National Telecommunications Information Agency (NTIA)
- American Recovery and Reinvestment Act (ARRA)

These competitive grant funds are used for surveying, planning, development, implementation and rate subsidy purposes

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Broadband – Bridging the Divide in Other States

Many states, including Virginia, have adopted laws and regulations that permit local and regional publicly-financed networks (municipal, utility or authority) to be built, managed and operated by localities in order to meet the needs of their citizens in unserved and underserved areas

- After a long series of nationwide failures due to financial mismanagement, operational mismanagement or both, many states have gotten serious about managing broadband deployment and are looking for alternatives

- North Carolina: Currently has 20% of its rural population without access
  - Recently established and a state broadband office and adopted a statewide plan
  - NC permits independent municipal networks but is leaning towards a different model
  - It has committed some state funding behind deploying more broadband access and has received over $230m from NTIA and $10m from CAF towards this effort

- Maryland: Currently has 13% of its rural population without access
  - Has no state office or plan
  - Has received over $227m from NTIA towards increasing broadband

- Georgia: Currently has 25% of its rural population without access
  - Recently passed a "co-location act" to facilitate private-sector deployment of broadband technologies
  - Has received over $180m from NTIA and $270k from CAF

- Tennessee: Currently has 34% of its rural population without access
  - Permits municipalities to construct and operate broadband networks
  - Established a broadband deployment fund with state resources
  - Has received $1.6m in CAF funds and over $128m from NTIA

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Broadband – Citizen Access in Virginia

Commonwealth of Virginia

- Currently, Virginia has over 730k citizens of its rural population without access to broadband, or 38%

- Virginia has no "official" broadband plan or office for planning, engineering, coordinating or implementing broadband

- However, the Q1 2017 Akamai State of the Internet report ranks Virginia among the top ten in numerous categories:
  - Virginia is ranked #8 nationwide in average connection speed
  - Virginia is ranked #7 nationwide in average peak connection speed
  - Virginia is ranked #8 nationwide in broadband adoption of 10mbps, 15mbps and 25mbps

- Prior to 2010, approximately $5 million of state funding was utilized to leverage several sources of federal funding on numerous , isolated projects of varied use, including $3m leveraged for federal funds for Eastern Shore

- Currently, Virginia permits localities to fund, build and manage networks, but there has been mixed results (e.g. Bristol, Danville, etc.)

- CIT estimates that as of November 2016 over $1b has been invested by the private sector in the previous 3-5 years to expand broadband in the Commonwealth
  - Over $14m by fixed wireless providers
  - Over $191m by incumbent wireline providers
  - Over $800m by the cable industry

Broadband – Unserved (10/1 or less) in Brown; Minimum Speed per the FCC (25/3) in Yellow
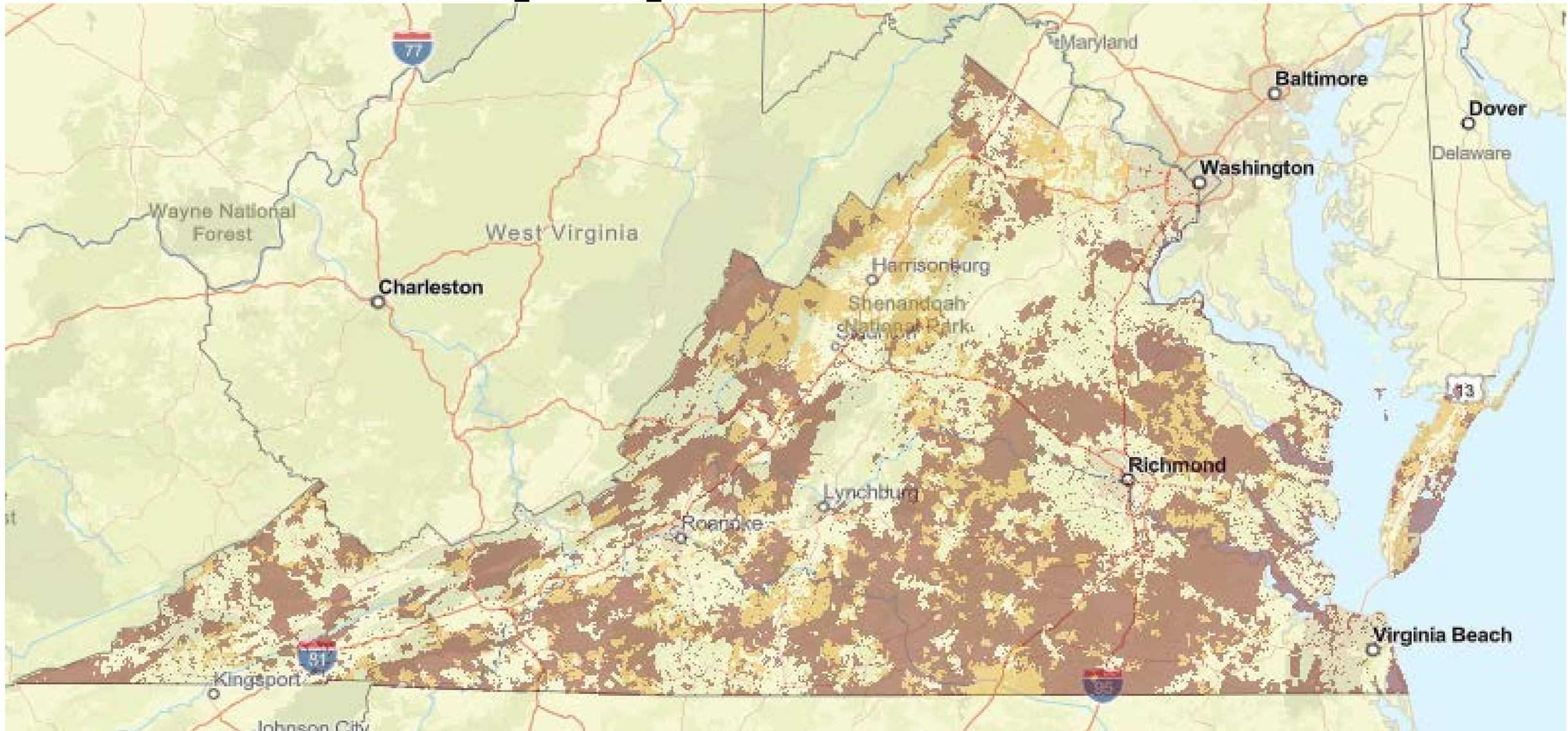
Broadband – Bridging the Digital Divide in Virginia

CIT & Local Broadband Planning

- **RU Online Survey** – conducted by CIT in 2016 to determine access and speed availability map (needs to be updated)

- Developed *The Broadband Path*, which is a nationally-recognized methodology that includes a three-step process:
    1. Assessment
    2. Needs and goals
    3. Facilitate partnerships for implementation

- Funding Levels for CIT's broadband activity: FY13-FY14 = $1m; FY15-FY16 = $1m; FY17-FY18 = $1m; FY19-FY20 = $1.6m

Department of Housing & Community Development

- The Virginia Telecommunications Initiative (VATI) works with rural communities and private sector partners on issues surrounding the necessity of high-speed, affordable telecommunications for their community's economic vitality and sustainability and to develop solutions to bring broader access to unserved

- VATI awards funds to eligible applicants to provide Last-Mile services to unserved areas of the state defined as having 10Mbps/1 or less broadband speed; will fund installation of minimum 10Mbps/3
    - Funding – FY14-FY16 = $500k for planning; FY17-FY18 = $2m; FY19-FY20 requests total $14m

Appalachian Regional Commission (ARC)

- Telecommunications and Technology Grants
    - During the period between FY 2004 and FY 2010, ARC granted nearly $41 million to telecommunications and technology programs, but Virginia received only $700k during this time

Broadband – Bridging the Digital Divide in Virginia

Tobacco Commission

- Prior to 2017, the Commission committed $140m in grants to leverage an additional $130m for broadband development

- Last Mile Broadband Program (est. 2017)
  - Set aside $10m from Research & Development Committee budget to assist in the construction of "last mile" connections

USDA

- Virginia received $7m in funds from 2013-16

Community Development Block Grant (CDBG)

- DHCD has invested $555,000 grants funds in planning and $4.5m in implementation efforts since 2007

Federal Communications Commission (FCC): NTIA, E-Rate in Virginia and Connect America Fund (CAF)

- NTIA has given Virginia approximately $183m in grant funds to assist in expanding broadband access

- Virginia Department of Education operates the K-12 Fixed Infrastructure Program that is a self-provisioning program that is funded by E-Rate dollars
  - Since 2014 that permitted funds to be directed toward broadband adoption, Virginia received approximately $181m out of national total of approximately $10b (1.8% average annually)

- CenturyLink is Virginia's approved carrier to participate in the CAF and in Phase I of this program, it accepted $15.7m per year for six years to bring 10/1 speed to about 50,000 "eligible" locations under the federal Connect America Fund program

Broadband – Bridging the Digital Divide in Virginia

Eastern Shore of Virginia = Success

- In 2007, DHCD funded a regional broadband study covering the Eastern Shore using state resources

- Concern was rising that broadband availability in Maryland was becoming a reality and economic development experts thought that much of the growth expected at the newly proposed space commercial launch facility would located outside of Virginia.

- Through the Eastern Shore Virginia Telecommunications planning grant coupled with the town planning grants, the region was able to leverage a total of $9.4 million in state, federal and local funds

Mid-Atlantic Broadband Communities Corporation (MBC) = Success

- Formed in 2004 and received a total of $12 million in capital grants from the Tobacco Commission and Economic Development Administration (EDA) to build the first phase of the fiber network; additional grants of $24 million were awarded by VTC in 2005 and 2006 to finish the first phase of the network along the **E-58 corridor** in Southside VA; total funding to date: $68m
    - Current initiatives – MBC has partnered with Microsoft to deliver broadband internet access at home to thousands of students in Charlotte and Halifax counties through the use of TV Whitespace technology

Transoceanic Cables (Atlantic Pipelines) = In Progress

- March 2016, Spanish telecom giant Telefonica announced plans to connect Rio de Janeiro & and Fortaleza, Brazil to Virginia Beach with BRUSA cable

- May 2016, Microsoft and Facebook announced plans to build MAREA, a new 4,000 mile-long cable that would run under the Atlantic Ocean and connect Bilbao, Spain to Virginia Beach

- This will be the only landing point on the mid-Atlantic coast and creates new demand for data centers in Virginia

- This has prompted GO Virginia Region #5 to create a broadband proposal that will link the region's municipal networks, while also expanding the current access to rural portions of the region to accommodate expected economic growth

Broadband – Two Municipal Networks Currently in Virginia

Bristol Virginia Utilities (BVU)

- This municipal network has been plagued with problems for several years since it was begun 2004

- Cost a total of $51m in federal and state grants to construct in more of a "build and they will subscribe" strategy

- APA report contained 57 findings of BVU's widespread failures within its business and financial practices

- After federal and local criminal investigations, jail time and fines for over one dozen people involved in illegal activity, including Board members and contractors

- However, the presence of the broadband network brought Northrup Grumman and CGI into the region

- Announced a deal (February 2016) to sell network to private provider that is expected to close by then end of 2017

Danville (nDanville network)

- nDanville is the broadband fiber network provided by Danville Utilities and it became operational in late 2005

- Since then, new customers have been connected steadily, utilizing an incremental growth strategy and a major expansion began in the summer of 2009

  - nDanville is an ***open access network*** that can be used by a number of different service providers that share the investments and maintenance cost

  - In contrast to traditional municipal networks where the municipality owns the network and there is only one service provider, the open access model allows multiple service providers to compete over the same network

  - It is tapped into Mid-Atlantic Broadband Communities Corporation Network (backbone)

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Broadband – Barriers to Broadband Access

- Low Population Density
- Geography & Topography
- Local Government
- Right-of-Way
- Co-Location
- No incentives to encourage deployment
- Pole Attachments
- Railroad Crossing Fees

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Broadband – Recommendations

Suggestions for consideration:

- Redo RU Online Survey (CIT) to update adoption and speeds deployment, while simultaneously conducting survey to gauge interest in region(s)

- Facilitate broadband deployment and speed upgrades through legislative and policy initiatives, such as streamline permitting process; dig once (new construction); new conduit in developments; poles/building hang once; facilitate rights-of-way, etc.

- Encourage or form Public-Private Partnerships, to include non-profits where applicable, to address the insufficient access to broadband its citizens have currently

- Broadband Workgroup to help develop statewide framework that could be led by VATI and CIT
  - Industry Representatives
  - Consultant with technical expertise
  - Statewide framework in 6 months, including recommendations on facilitation of deployment
    - Framework must include the following:
      - Technology Neutral policy
      - Leverage existing public resources
      - Competitive bid RFP to Lease Network; Lease-to-Own option = No publicly operated networks
      - Access for competitors
      - Most cost-effective broadband solution that incorporates all types of technology where applicable
      - Minimum speed of 10Mbps/3

- Financial incentives
  - Any further incentives considered should be driven by economic development concerns and priorities