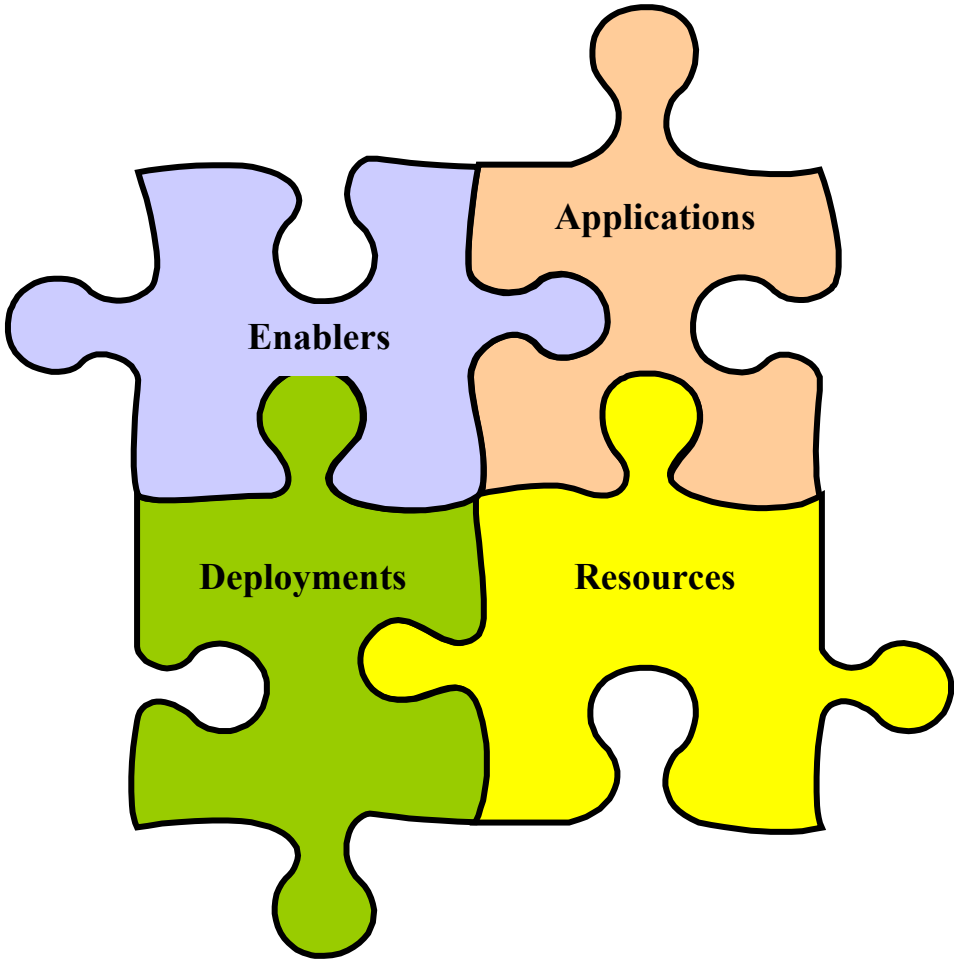
Status Report

Advancing affordable, high-bandwidth electronic networks in Rural Virginia



Submitted to the Governor and General Assembly of Virginia

December 1, 2005

Acknowledgements

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Acknowledgements:

The report staff would like to extend their gratitude to the following individuals and organizations for their invaluable contributions:

Jeff Crowder, NetworkVirginia; Glen "Skip" Skinner, LENOWISCO RAN; Paul Elswick, LENOWISCO RAN; Elizabeth Knight, James Madison University; Mark Cvetnich, Dickenson County Wireless Integrated Network; Sheila Smith, New River Valley Planning District Commission; Robin Sullenberger, Highland County;
Sandy Crusenberry, BVUOptinet, Juanita Roudabush, Town of Shenandoah; James Ervin, City of Bedford; Jeffrey Merriman, Verizon; Noel Munson, Ntelos; Shane Muchmore, Sprint; Steve Bradley, Virginia State Corporation Commission;
Andy Wells, Southside Planning District.

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Introduction

Advanced telecommunications infrastructure – otherwise known as broadband networks – is the first enabling technology since electricity to fundamentally impact society to such a great extent that it is now viewed in economic development circles as "critical infrastructure'' that is essential to the minimum operations of the economy and government.[1] This is why the deployment of affordable, last-mile, broadband services across the Commonwealth has been a priority for Governor Mark R. Warner and Secretaries of Technology George Newstrom and Eugene J. Huang.

Virginia's research priorities–nanotechnology, SmartBio, homeland defense, modeling and simulation–and indeed its overall economic competitiveness are dependent upon having affordable ubiquitous, high-speed Internet access available to governments, educational institutions, universities, entrepreneurial ventures, corporations (large and small), students and the entire Virginia workforce.

The need for high-speed networks is particularly important in rural areas of Virginia that are economically distressed, since municipalities cannot retain existing businesses or attract new ones without having broadband services available. Generally, these same areas have low population density rates that deter private sector investment. It is in these depressed areas that government intervention is necessary to spark private-sector interest and investment in broadband services, in order to level the playing field for competition with urban and suburban metropolitan areas.

For the future of Virginia's workforce, broadband access is no longer optional. In order to develop, nurture and retain the best and brightest workers for Virginia companies, it is imperative that workers (present and future) have access to broadband technologies so that educational and career development activities can be pursued.

Finally, for the citizens of the Commonwealth, broadband access affords a quality of life that has never before existed. For the young and old alike, access to broadband connectivity offers opportunities such as:

- Increased availability of learning, research and cultural opportunities.
- Access to world-class medical treatment through telemedicine.
- Flexibility of lifestyle via telecommuting.
- New opportunities for community interaction and involvement.

With these across-the-board benefits, the availability (or lack thereof) of affordable broadband services in Virginia will be a determining factor in the competitiveness of the Commonwealth in the 21st century and beyond. Foreseeing the importance that e-commerce and broadband would play in the future of the Commonwealth, CIT took the lead and began offering e-commerce and broadband related services in the mid 1990s.

[1] Definition of critical infrastructure from the Alliance for Telecommunications Industry Solutions (www.atis.org)

This role was formally added to CIT's mission through budget language[2] passed by the General Assembly in 2003. In accordance with this budget language, CIT continues to develop resources and programs to facilitate the deployment of affordable broadband telecommunication services into underserved areas of the Commonwealth. In keeping with the requirements of the amendment, CIT presents this report that continues the documentation[3] of Virginia's progress toward ubiquitous availability of affordable broadband services.

Leadership and tenacity continue to drive the deployment of broadband services throughout the Commonwealth. Despite budget constraints private companies, municipalities and legislators continue to find creative ways to facilitate the deployment of broadband services across the Commonwealth.

Broadband remains an enabler, an accelerator, and a catalyst. With it, social and economic development opportunities are expanded, worker productivity increases and lives are enhanced. Without it, communities find themselves on the wrong side of the Digital Divide, left to struggle while others move farther into the knowledge age.

While the need for broadband is ubiquitous, technologies are not. No single technology can meet all the challenges (population density, geography, etc.) of deploying affordable broadband solutions into non-metropolitan areas. Hybrid networks remain the best solution because they offer combinations of technologies and services rather than a one-size-fits-all solution. Therefore, each locality (neighborhood, city, town, county, state or country) needs to devise broadband strategies and deployment plans that define a technological solution that best meets current needs while remaining adaptable enough to accommodate the integration of future technical advancements, physical expansion and increasing capacity demands. The publication *Broadband Bringing Home the Bits* stated it best: "Broadband deployment is an ongoing process, not a one-time transition."[4]

One broadband deployment "reality" that often gets lost in the process of selecting and deploying the "right" technology is that the true benefits to be reaped from a broadband network result from the social and economic interactions that traverse its capacity – not the existence of the infrastructure itself.

The bottom-line is that the introduction of broadband technologies (regardless of type) has the potential to create significant economic benefits. Noted benefits include:

- Increased worker productivity
- Job creation

[2] "The Center for Innovative Technology shall continue to support efforts of public and quasi-public bodies within the Commonwealth to enhance or facilitate the prompt availability of and access to advanced electronic communication services, commonly known as broadband, throughout the Commonwealth, monitoring trends and advances in advanced electronic communications technology to plan and forecast future needs for such technology, and identify funding options."

[3] The documentation process began with HJ163 – *Advancing Affordable, High-bandwidth Electronic Networks in Rural Virginia*, a report published in 2002 by The Secretary of Technology and Virginia's Center for Innovative Technology.

[4] Washington, D.C.: National Academy Press, 2002.p.163

- Increased wages
- Efficiencies (time and money)

Additionally, second-tier benefits also include:

- Reduced commuting time
- Increased entertainment consumption
- Internet telephony (IP)
- Savings in healthcare costs (telemedicine)
- Increased demand for broadband related equipment (computers, home networking equipment, wireless handheld devices)

The remainder of this report highlights applications, enablers, and deployments that are advancing the Commonwealth toward the "One Virginia" goal of providing "every household and business in Virginia with the opportunity to purchase high-speed, high-quality, affordable broadband."

Virginia Rankings

Broadband Deployment in Virginia – Rankings and Data

In the most recently published (2003) state broadband deployment rankings, Virginia placed favorably in the categories of policy and infrastructure deployment.

In *The State Broadband Index*, a study conducted by Technet[5], Virginia ranked 8th for "showing leadership in clearing roadblocks to broadband deployment and adopting innovative policies that foster demand for the benefit of their citizens and industry."[6]

In this report, TechNet examined the key role states can play in the availability of broadband telecommunication services. The report ranks the top 25 states based on the extent to which the public policies spur (or impede) broadband deployment and demand. The index calls on states to consider a range of deployment policy areas including:

- Legislation that standardizes and expedites rights-of way permitting.
- Adoption of a statewide broadband strategy and creation of a lead broadband agency.
- Comprehensive infrastructure mapping.
- Policies to enable wholesale municipal networks.
- Innovative initiatives that increase private-sector deployment.
- Financial incentives to reach underserved communities.
- Demand-promotion efforts including enhanced e-government.

States joining Virginia in the *Broadband Index* "Top 10" are:

1. Michigan
2. Florida
3. Missouri
4. Texas
5. Ohio
6. Washington
7. Kansas
8. **Virginia**
9. Colorado
10. Iowa

[5] TechNet is a national network of more than 200 CEOs and senior executives in the high technology and biotechnology industries.
[6] Quote from TechNet's President and CEO Rick White, referring to the states at the top of the Broadband Index.

A second report, *Broadband in the States 2003* by the American Electronics Association (AEA), is based on broadband deployment data collected by the Federal Communications Commission.[7] Based on their analysis of the FCC data, AEA ranked Virginia as follows:

- 14th in Broadband Subscribers.
- 39th in Broadband Growth Rate (12-2001 through 6-2002).
- 25th in Broadband Subscribers per 1,000 households.
- 11th in Home Internet Access (all types).

Compared to other Eastern states, Virginia's broadband statistics are as follows:

State	State Population	Total Broadband Subscribers	Cable	DSL	Other	Dec. 2001 to June 2002 Subscriber Growth Rate
Massachusetts	6,379,304	583,627	391,391	147,139	43,097	15%
Virginia	***7,187,734***	***360,722***	***238,300***	***75,524***	***46,898***	***23%***
Maryland	5,375,156	316,666	181,864	95,439	39,363	21%
North Carolina	8,186,268	431,736	313,884	89,680	58,172	29%

Data collected by the Federal Communications Commission (FCC) offers another measure for gauging the progress Virginia has made in broadband communications deployment. In March 2000, the FCC adopted the local competition and broadband data-gathering program to assist the FCC in its efforts to monitor and further implement the pro-competitive, deregulatory provisions of the 1996 Telecommunications Act.

FCC data (collected through this process) remains the standard by which progress toward ubiquitous broadband is measured. Data reported by the FCC reflects the extent to which facilities-based providers[8] have provisioned high-speed connections as collected on FCC Form 477[9].

[7] The data collected by the FCC represents only those services with over 200 kilobits per second in at least one direction.

[8] Reporting of state level data is required for providers with at least 250 high-speed connections in service in a state.

[9] The report is available for reference in the FCC's Reference Information Center, Courtyard Level, 445 12th Street SW, Washington, DC. Copies may be purchased by calling 800-378-3160 or downloaded from the FCC-State Link Internet site at www.fcc.gov/wcb/stats

For reporting purposes, the FCC segregates broadband into two distinct categories:

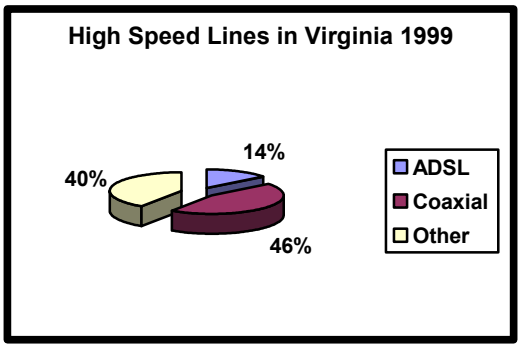
> **High-speed lines** – lines that deliver services at speeds exceeding 200 kilobits per second (kbps) in *at least one direction.*
> **Advanced service lines** – lines that provide services at speeds exceeding 200 kbps in *both directions.*

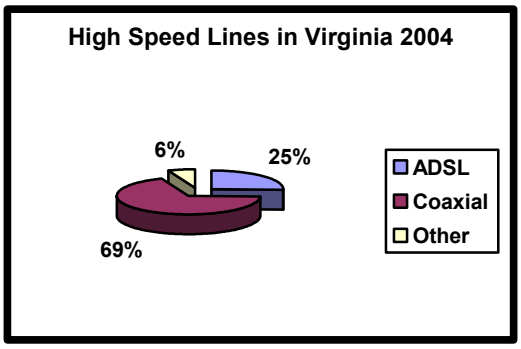
Lines that are not high speed are not reported.

According to the latest FCC data, the total (reported) number of high-speed lines (of all technology types) connecting homes and businesses to the Internet increased from 26.0 million to 37.9 million (34%) during 2004. Of the 37.9 million lines, 28.9 million provided advanced services, which represents an increase of 42% over 2003 year-end numbers. During this period, the technology showing the greatest high-speed line increase was asymmetric digital subscriber line (ADSL), which increased 45% to 13.8million lines; second was coaxial cable (cable modem) with an increase of 30%. The remaining 2.7 million high-speed connections are accounted for by wireline technologies other than ADSL, wireless, satellite and fiber or powerline high-speed connections. During 2004, satellite (or terrestrial wireless) connections increased by 50% to .5 million and fiber or powerline connections showed a 16% increase reaching .7 million.

Since December 1999, the number of high-speed lines in Virginia has risen from 51,305 to 998,261.

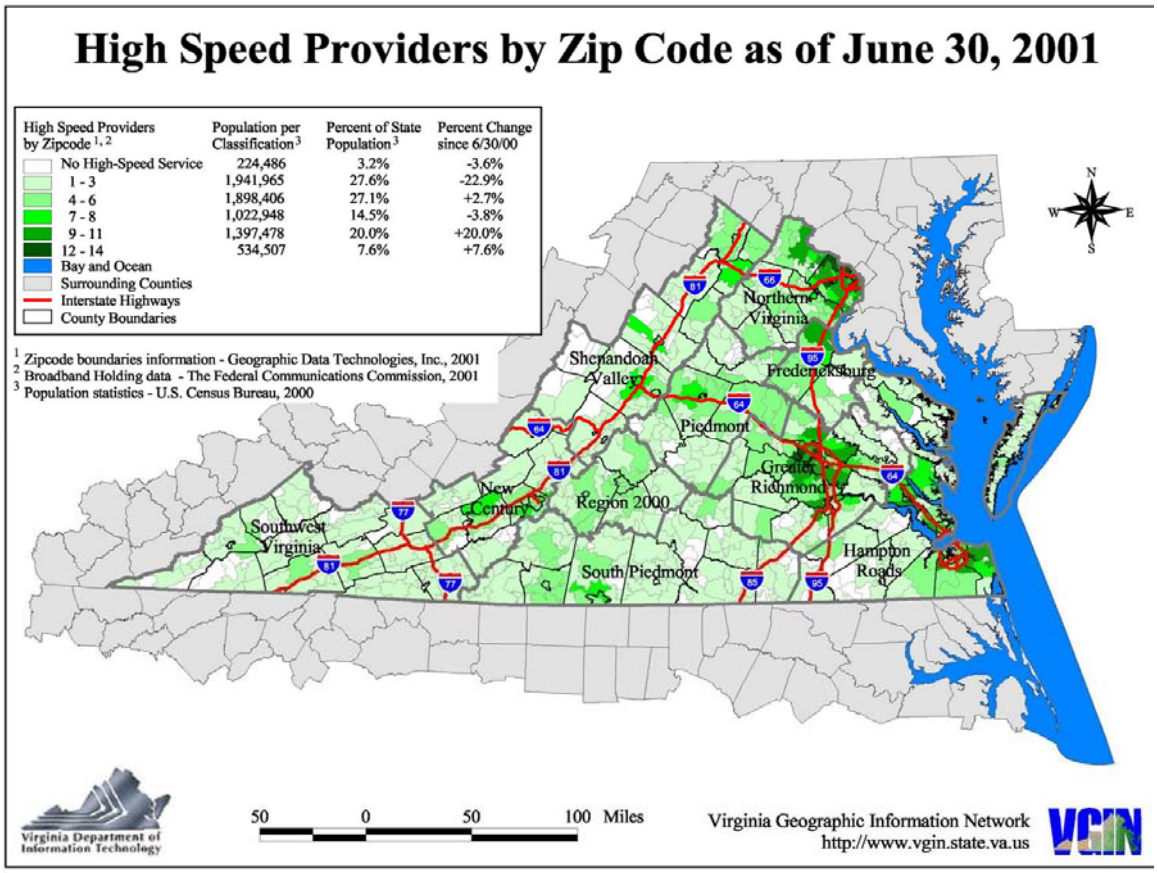
The charts to the left show a breakdown of Virginia's high-speed lines by technology for 1999 and 2004, respectively.



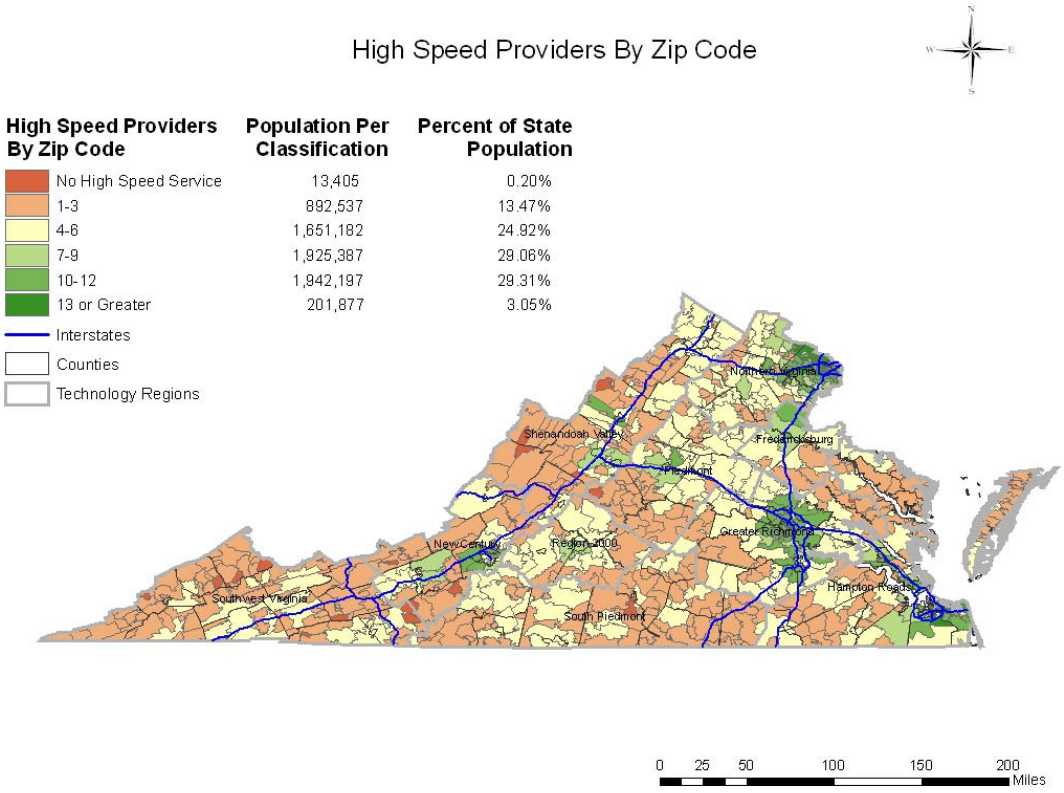


To highlight the importance being placed on the deployment of broadband services, consider what three major carriers in Virginia are doing. Since the release of the Commonwealth's 2002 broadband report, Verizon has almost tripled the number of DSL-equipped central office sites deployed in Virginia. In 2004, Verizon had 317 sites; in 2002 it had only 108. Verizon has also equipped more than 500 remote sites, bringing the number of DSL-equipped Verizon sites to 861. During that same time frame, Ntelos[10] of Waynesboro and Sprint have both expanded their broadband offerings. Ntelos has equipped more than 25 sites for DSL and has launched a portable broadband solution while Sprint has enabled more than 80 of its Central Offices with a High Speed Internet (HSI) offering.

The following maps reflect the number of high-speed providers by zip code according to FCC data for 2001 and 2004, respectively.



[10] Information about Ntelos' service areas can be found at: www.ntelos.com/wireline/maps/map_dsl.html for DSL and www.ntelos.com/wireline/!_d_busint3b.html for Portable Broadband services.



While these developments have placed Virginia in a positive position with regard to the number of high-speed lines that have been deployed, it is important to continue to measure the competition at local, national and global levels. Using the FCC data as the benchmark, Virginia compares to its neighbors as follows:

High-Speed Lines by State (over 200 kbps in one direction)						
State	**Dec-99**	**Dec-00**	**Dec-01**	**Dec-02**	**Dec-03**	**Dec-04**
North Carolina	57,881	136,703	357,906	594,039	842,130	1,120,611
Virginia	***51,305***	***139,915***	***292,772***	***463,455***	***716,839***	***998,261***
Maryland	52,749	124,465	260,634	391,397	578,004	796,110
Tennessee	66,307	122,391	237,401	369,370	471,341	630,308

Measuring infrastructure deployments is a widely accepted methodology for benchmarking progress toward bridging the Digital Divide. While this method does provide a measure of the physical aspect of broadband deployment, it focuses attention on the construction of the network rather than the development of applications and transactions that create the real economic and social benefits that result from online user engagement and interaction. It is important to note that sometime in the near term; Virginia will have to lessen its fixation with having the greatest number of lines and

follow the European Community's lead toward a strategy focused more on being a leader in the development of high-end, high-quality applications (www.bologna-berlin2003.de/pdf/PRESIDENCY_CONCLUSIONS_Lissabon.pdf).

Regardless of where the Commonwealth ranks today, it must continue its commitment to provide individuals, businesses and governments with affordable access to cost-effective broadband technologies. As part of this commitment, the Commonwealth must focus not only on promoting the deployment of infrastructure but also on initiating and supporting the development and use of applications that push the limits of technology and create a need for broadband capacity. Maintaining the "status quo" is not an option.

Applications

Localities planning to upgrade/install telecommunications infrastructure must take a holistic approach to assessing and determining the existing and future bandwidth needs of their citizens.

Delivering applications across the Internet is similar to hitting a moving target. As soon as an application is developed, the technology advances and the application must be retooled to keep pace. The deployment of broadband into areas beyond the metro markets has opened doors for users to evolve from "users" to "contributors" and has started to establish a "value add" proposition for those who have not bought in to the need for advanced telecommunications. Until a single "killer" application is developed to drive users to broadband en mass, there are applications that are emerging and drawing users to experience the benefits that advanced telecommunications has to offer. Some of the predominant broadband applications[11] deployed today include:

- Telemedicine
- Telework
- eGovernment
- Agriculture
- Security/Safety
- eCommerce
- Distance Learning
- Entertainment
- Small business/entrepreneur development
- Research

The remainder of this section provides an overview of the most prevalent applications currently in use in Virginia.

Telemedicine

Telemedicine has become one of the primary applications enabled by broadband technologies. In the Commonwealth, the University of Virginia's Office of Telemedicine is a key catalyst for the deployment of telemedicine programs.

Consultations, educational programming and administrative conferences offered through the telemedicine program provide vital, cost-effective, and confidential medical services to virtually any location, rural or urban, national or international.

As of July 2005, University of Virginia Telemedicine Network Partners included:

- Alleghany Regional Hospital, Low Moor, VA
- Augusta Correctional Facility, Craigsville, VA
- Augusta Medical Center, Fishersville, VA

[11] For an in-depth discussion of all the listed applications, consult *The Economic and Social Benefits of Broadband Deployment* published by the Telecommunications Industry Association (October 2003).

- Bath County Community Hospital, Hot Springs, VA
- Bland County Medical Center, Bastian, VA
- Buchanan General Hospital, Grundy, VA
- Buckingham Correctional Center, Dillwyn, VA
- Carilion-Giles Memorial Hospital, Pearisburg, VA
- Clinch River Health Services, Dungannon, VA
- Coffeewood Correctional Center, Culpeper, VA
- Community Health Center of Martinsville, Martinsville, VA
- Craig County School System, New Castle, VA
- Danville Health Department, Danville, VA
- Dickenson County Hospital, Clintwood, VA
- Dillwyn Correctional Center, Dillwyn, VA
- Fluvanna Correctional Center, Troy, VA
- Healthcare on the Square, Boydton, VA
- Highland Medical Center, Monterey, VA
- Johnston Memorial Hospital, Abingdon, VA
- Konnarock Family Health Center, Damascus, VA
- Lunenburg Medical Center, Victoria, VA
- Middlesex County Health Department, Saluda, VA
- Norton Community Hospital, Norton, VA
- Page Memorial Hospital, Luray, VA
- Red Onion Correctional Center, Clintwood, VA
- Rockingham Memorial Hospital, Harrisonburg, VA
- Russell County Medical Center, Lebanon, VA
- Saltville Medical Center, Saltville, VA
- Scott County Health Department, Gate City, VA
- Southwest Virginia Care Connection, Bristol, VA
- St. Charles Community Health Center, St.Charles, VA
- St. Mary's Health Wagon, Clinchco, VA
- Stone Wall Jackson Memorial Hospital, Lexington, VA
- Tazewell Community Hospital, Tazewell, VA
- Three Rivers Health Department, Lancaster, VA
- Tri-Area Health Clinic, Laurel Fork, VA
- Thompson Family Health Center, Vansant, VA
- Troutdale Medical Center, Troutdale, VA
- Twin County Regional Hospital, Galax, VA
- Veterans Administration Medical Center, Salem, VA
- Virginia Baptist Hospital, Lynchburg, VA
- Wallens Ridge Correctional Center, Big Stone Gap, VA
- William A. Davis Clinic, St. Paul, VA
- Winchester Medical Center, Winchester, VA
- Wise County Health Department, Wise, VA
- Wythe County Community Hospital, Wytheville, VA

Through the use of advanced computer applications and broadband telecommunications technologies, patients can now benefit from the latest knowledge, technology and treatment while remaining under the care of their hometown health care provider.

Additional information about current initiatives and the full scope of the program can be found at http://www.healthsystem.virginia.edu/internet/telemedicine/.

e-Learning

Education remains a priority in the Commonwealth. It is no surprise then, that one of the key online applications in use is e-learning. While there is no central repository for information on distance learning initiatives and programs, universities, colleges and K-12 institutions across the state are offering online educational opportunities[12] and students are capitalizing on the wealth of research materials available through online resources. While many of the resources on the web are capable of being "run" over a traditional dial-up, there are a growing number of online educational/research tools (streaming video, audio, remote monitoring of scientific experiments) that require a broadband level connection to be fully functional. The Commonwealth has placed such a high value on making these "new" tools available to **every** student, that the Virginia Department of Education made broadband availability one of the priority items in their Educational Technology Plan for Virginia 2003-2009[13]

The Educational Technology Plan for Virginia (the "Plan") provides strategic direction for the use of educational technology in schools and classrooms and serves as a blueprint for school divisions as local technology plans are created. This plan capitalizes on major advances resulting from two previous plans and through its implementation ensures that students are technologically literate and able to use technology tools to expand and improve learning. The plan is designed to provide a framework that allows for local direction, scope, and timing of implementation activities, and the emergence of new technologies.

The plan emphasizes the importance of integrating technology into instruction. Use of technological tools by teachers in classrooms will motivate and engage students, enliven instruction, **extend learning beyond the school,** and assist by increasing students' achievement. The Plan provides the structure for the development of other components of an effective technology program: professional development, connectivity, educational applications, and accountability.

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[12] During 2004-2005, 57,872 students participated in distance learning courses offered by the Virginia Community College System.

[13] The *Educational Technology Plan for Virginia 2003-2009* is the culmination of research, planning, and collaboration with Virginia educational technology stakeholders. The plan in its entirety can be found on the Department of Education website at http://www.pen.k12.va.us/VDOE/Technology/OET/

Goal 1: Ensure that all public schools have access to integrated instructional and administrative services across interoperable high-speed networks.

Targets:

1. Every instructional and administrative area in every school has a sufficient number of network connections to support the high bandwidth requirements of current and future instructional and administrative applications.
2. Each school division connects all school facilities through a wide area network with sufficient bandwidth to accommodate instructional and administrative needs.
3. Each school local area network has reliable high-speed access to the Internet capable of supporting instructional and administrative applications and initiatives.
4. An integrated suite of instructional and administrative applications supported by standards-based enterprise architecture for K-12 schools is in place.

Goal 2: Ensure sufficient support for ongoing, reliable network operations.

Goal 3: Provide leadership and resources to promote efficient procurement of infrastructure, including the identification and procurement of emerging technologies.

Goal 4: Ensure that school divisions have in place network security, filtering, and disaster recovery plans.

According to the US Department of Commerce (2002), by making Internet access available, schools have dramatically reduced the "digital divide" – the inequities of access among groups of race, gender, and age. In this study, children and young adults of all age groups reported using the Internet "outside home" nearly as often as "at home," with the most prevalent use "outside home" being at school. What does the next decade hold in store? What priorities are emerging for current and future generations of students? One immediate answer is **broadband access**.

The dramatic rise in Internet use and the increasing complexity of Web-based data and applications demand more capacity to transmit voice, video, and data quickly and reliably across the globe.

For educational institutions, access to reliable broadband access will:

- Support the potential of networked technologies to provide rich content and educational resources, such as digital libraries with HDTV-quality video, CD-quality audio available on demand, and virtual libraries that promote remote access to scientific instruments.

- Improve the transmission of voice and video data such that all participants (students, teachers, content experts) will be allowed to have more natural interactions.

- Deliver more sophisticated information and resources such as real-time transmissions from remote instruments located deep in the ocean.

- Support the creation of new learning environments that use simulation and virtual reality-technologies that hold the potential to create complex, stimulating environments heretofore inaccessible or even impossible.

- Allow users to capitalize more effectively on diverse learning styles and preferences and become more engaged in learning and less encumbered by technology.

- Center learning on the student, focusing on the strengths and needs of individual learners and making lifelong learning a practical reality.

- Provide a means for e-learning. E-learning is scalable at less cost than traditional education. It is more accessible – every Internet connection is a classroom. It is timely – information and knowledge can be updated more cost effectively than more traditional forms of instruction. May be one strategy for handling growing student enrollments, overcrowded schools and teacher shortages. A by-product may also be teacher retention and renewed enthusiasm.

By including broadband connectivity in their strategic plan, the Virginia Department of Education is making a bold commitment to insuring that the students across the Commonwealth have equitable access to the online technologies and applications that are rapidly emerging and evolving.

Transitioning from “plan” into “practice” isn’t always easy, but there are educational institutions across the Commonwealth currently offering online opportunities to students in the Commonwealth and beyond.

Virginia Community College System – Online Resources

Throughout Virginia, Community Colleges are offering numerous ways to learn, and earn academic credit. Some distance learning options do not require on-campus classes, while others combine online learning and traditional classroom meetings. Distance learning technologies such as the Internet, e-mail, videotapes, "compressed" video, tele-courses, and/or audio conferencing allow students to connect to courses and programs at Virginia's community colleges from home, work, local library, community computer center, or vacation destination. While distance-learning courses are academically rigorous and are best suited for students that are self-motivated, comfortable with

independent learning, and have solid time management and study skills, more than 231,565[14] students (unduplicated) have taken advantage of the program since 1996.

Additional information about specific course offerings may be obtained on: www.so.cc.va.us/vccsonline/about.html

Electronic Campus - Southern Regional Education Board (SREB)
http://www.electroniccampus.org/

Options for Virginians wanting to balance a busy schedule with opportunities to learn are available through the Southern Regional Education Board's *Electronic Campus*. Through the *Electronic Campus,* students can select from hundreds of courses and degree programs from accredited colleges and universities in the 16 SREB states. The *Electronic Campus* offers information on both traditional and e-learning opportunities, educational resources, and links designed to help students (adult, e-learners, and traditional) plan their education and complete college/university applications online. The *Electronic Campus* also provides resources for educators including information on certification requirements and competencies.

Regional Mentor™ System
www.virginiamentor.org/

A mentor system is an online resource to help students and their families select a college, apply for admission, and plan to finance higher education.

In Virginia, *VirginiaMentor* offers access to information and admissions applications for public and private colleges and universities within Virginia. Mentor systems are provided free of charge but students submitting applications for admission ARE responsible for the standard fee charged by a college or university.

In short, *VirginiaMentor* brings college courses from across Virginia as close as your computer. Through www.virginiamentor.org, prospective students can:

- Obtain information on the Commonwealth College Course Collaborative
- Prepare for college
- Select a school
- Apply for admission and/or financial aid.
- Search by college or university, subject, or data format for more detailed information including course descriptions and how the courses are delivered.
- Plan a career

[14] Distance Learning Reports - Distance Learning Historical Summary 6-15-05
www.vccs.edu/vccsit/DLreports.htm

Sixty-three Virginia Colleges and Universities participate in the *VirginiaMentor* including:

Appalachian School of Law
Central Virginia Community College
Eastern Mennonite University
Germanna Community College
J. Sargeant Reynolds Community College
John Tyler Community College
Longwood University
Lord Fairfax Community College
Mountain Empire Community College
New River Community College
Norfolk State University
Northern Virginia Community College
Old Dominion University
Patrick Henry Community College
Piedmont Virginia Community College
Radford University
Rappahannock Community College
Southside Community College
Southwest Virginia Community College
University of Virginia - Wise
Virginia Commonwealth University
Virginia State
Virginia Tech.
Virginia Western Community College
Wytheville Community College

Virginia Department of Education
www.pen.k12.va.us

The Virginia Department of Education has a robust website that offers a host of information about education happenings and resources in the Commonwealth. Designed for both consumers and providers of educational services, the Department's website, www.pen.k12.va.us offers links to online resources including:

- VA School Report Card (SOL accreditation status and scores)
- Project Graduation (portal for graduation requirements)
- Reading First (national initiative to help every young child in every state become a successful reader)
- Federal Resources for Educational Excellence
- Virginia Commission on Youth
- VirtualAP (Advanced Placement School)

Additionally, the site contains robust resources (individual sections) dedicated to the individualized needs of students, parents, teachers, administrators, and superintendents.

Research

More and more, students and businesses in the Commonwealth are relying on the Internet for strategic business intelligence and research.

The Virtual Library of Virginia (VIVA)
www.vivalib.org

One of the most robust resources available in the Commonwealth today is The Virtual Library of Virginia (VIVA). A consortium of the nonprofit academic libraries within the Commonwealth of Virginia, VIVA members include all of the 39 state-assisted colleges and universities (54 campuses), as well as 30 of the independent (private non-profit) colleges and universities (participating as full members where possible), and the Library of Virginia.

VIVA's mission is to provide, in an equitable, cooperative and cost-effective manner, enhanced access to library and information resources for the Commonwealth of Virginia's non-profit academic libraries serving the higher education community.

The Virtual Library of Virginia is comprised of two major components:

- Enhanced resource sharing of Virginia's exceptional print and microform collections.
- Shared access to online library resources and improved coordination of collection development throughout VIVA.

Through VIVA, Virginia's students and faculty can access:

- Academic Press (IDEAL)
- ACM Digital Library (Association for Computing Machinery)
- America: History and Life
- American Chemical Society
- BioOne
- Business & Company Resource Center
- Cambridge Scientific Abstracts [mirror site]
- Cambridge University Press
- Cumulative Index to Nursing and Allied Health Literature (CINAHL)
- Computer Database (telnet)
- Factiva
- ERIC (Ovid)
- Expanded Academic Index ASAP (telnet)
- Gale Database of Publications and Broadcast Media
- Health & Wellness Resource Center
- Historical Abstracts
- LexisNexis Congressional & Statistical
- MathSciNet [mirror site]

- Modern Language Association (MLA) International Bibliography
- Nature Publishing Group
- OVID Nursing Journals
- Oxford English Dictionary
- Oxford University Press
- Project MUSE
- PsycArticles
- PsycINFO
- Sociological Abstracts
- STAT-USA
- Ulrich's Periodical Directory

For more information, visit VIVA's website at http://www.vivalib.org

VECTEC[15]/PenSoft Online E-Business Resource Center

The PenSoft E-Business Resource Center at VECTEC is a multi-disciplinary resource for businesses venturing online, as well as those with an established e-commerce presence. The center includes more than 1,000 articles and statistics for small to medium-size businesses contained within 14 e-business topic areas. Research topics include: Internet marketing, security, law, web design, search engine optimization and other subjects. Special features of this free resource include a fully searchable and dynamic database, e-business glossaries, helpful state and federal business resource links, and guidelines for creating a "model web site". To learn more about this resource, call 757-594-7092 or visit **www.vectec.org/researchcenter**.

Center for Technical Data & Information (CTDI)

The Center for Technical Data & Information (CTDI) at VECTEC offers a broad range of business, technical and scientific document search and retrieval support for Virginia businesses. Since opening in fall 2003, the Center has assisted businesses with research requests for financial data, product and service supplier lists, market research reports, trademark and patent research, technology overviews, and scientific research. The Center's resources include leading business electronic and print resources such as Dialog, Hoovers, Dun & Bradstreet and the Virginia Manufacturer's Directory. To learn more about CTDI's research capabilities, please visit **www.vectec.org/ctdi**

[15] VECTEC is the Virginia Electronic Commerce Technology Center located at Christopher Newport University.

e-Government

Citizens are consumers of governmental services, and not unlike the phenomena that is occurring in the commercial arena, demands are being placed on governments at the local, state, and federal levels to provide an enhanced list of services and 24/7 availability.

Through e-government applications, constituents can solve problems, obtain information on basic governmental services, and complete forms (obtain a business license)/conduct transactions (pay taxes) directly with the desired agency. For those who work long hours, shift work, or have mobility constraints, broadband enabled e-government applications provide equitable availability to information and transactions once available only through an office visit.

While constituent convenience is a key driver for developing e-government applications, the benefits of e-government are far from one-sided. Agencies that are able to transition mundane and/or frequently performed tasks into web-enabled applications generally report improved task management, cost savings (reduced postage/printing costs), and improved staff efficiency.

e-Government models are springing up at the local, state and federal levels. Virginia has been recognized on numerous occasions for pushing the envelope to make state-level resources and services more accessible. Services for citizens and businesses are available on Virginia's e-government portal at: http://www.virginia.gov/cmsportal/. In addition to online services, the site also provides links to other e-government applications including tourism, tax reform policies, and the Department of Game and Inland Fisheries. It also offers citizens the opportunity to access information on local community services (through "Virginia Communities") and build a customized "My Virginia" page containing only the links that are of use/interest.

Examples of locality level online e-government services include:

Fairfax County - www.fairfaxcounty.gov/
Town of Abingdon – www.abingdon.com
Wise County – City of Norton Circuit Court www.courtbar.org
City of Danville – www.danville-va.gov/home.asp
City of Richmond www.RichmondGov.com
Dickenson County www.dickensonctyva.com/

At the national level, federal e-government services can be accessed at: www.firstgov.gov

Enablers

Legislation

As evidenced by the Commonwealth's top ten ranking in the Technet study, Virginia's legislators continue to be forward thinking in their approach to facilitating broadband deployments in the Commonwealth. From establishing processes by which qualifying localities can obtain municipal local exchange carrier (MLEC) status to enabling the development of wireless authorities, the General Assembly continues to enact legislation to promote competition and foster broadband deployment into underserved areas. Legislation related to broadband deployment includes:

SB 959 Telecommunication and cable television; release of information (2005)
Patron – William C. Wampler, Jr.

Summary as passed Senate:
Telecommunication and cable television service by localities; release of information. Exempts from the mandatory disclosure requirements of the Freedom of Information Act any public record of a local government that contains confidential proprietary information or trade secrets pertaining to its provision of telecommunication services and cable television service. Public bodies may discuss such records in closed meetings.

HB 2386 Conveyance of easements; eliminates public hearing requirement for localities. (2005)
Patron – William K. Barlow

Summary as passed:
Conveyance of easements. Eliminates the public hearing requirement for localities that convey certain site development easements across public property.

HB 2404 FoIA; exempts certain local wireless service authorities (2005)
Patron Clarence E. Phillips

Summary as passed House:
Virginia Freedom of Information Act; exemptions; local wireless service authorities. Excludes from the mandatory disclosure requirements of the Virginia Freedom of Information Act (FOIA) confidential proprietary records and trade secrets developed by or for a local authority created in accordance with the Virginia Wireless Service Authorities Act (§ 15.2-5431.1 et seq.) that provides qualifying communications services as authorized by Article 5.1 (§ 56-484.7:1 et seq.) of Chapter 15 of Title 56 where disclosure of such information would be harmful to the competitive position of the authority. The bill also grants an open meeting exemption for discussions of such records by a local wireless service authority. The bill contains technical amendments.

HB 2397 Public utilities; communications services (2003)
Patron - Joe T. May

Summary as passed:
Public utilities; communications services. Gives the State Corporation Commission the authority to enforce the provisions of law that permit a locality to offer communications services, including local telephone service, to customers. Localities that have obtained a certificate to offer local telephone service are required to file an annual report demonstrating that they have complied with the requirements of law regarding certain accounting practices. Localities offering qualifying communications services, including high-speed data and Internet services, are required to provide nondiscriminatory access to for-profit providers of communications services on a first-come, first-served basis, are prohibited from cross-subsidizing such services, and are prohibited from acquiring facilities for such services by eminent domain. The Commission may deem telephone services competitive on the basis of a category of customers, and the Commission may also determine bundles of competitive and noncompetitive services if the noncompetitive services are available separately.

SB 875 Telecommunications services; certificate (2003)
Patron - William C. Wampler, Jr.

Summary as passed:
Telecommunications services; certificate. Creates a statutory procedure for cities and towns that operate a municipal electric utility and obtain a certificate to operate as a telephone utility to offer cable television services. Before offering cable television services, a locality is required to (i) hold a preliminary public hearing, (ii) hire a consultant to perform a feasibility study, (iii) hold public hearings on the feasibility study, (iv) determine whether such study finds that certain revenue requirements can be met, and (v) hold a referendum. The municipality shall establish a separate department for operation of cable television services, and establish an enterprise fund to account for the provision of such services, and cross-subsidization is prohibited. The requirements of clauses (i) through (v) will not apply to a locality that had obtained a certificate to operate as a telephone utility and installed a cable television headend prior to December 31, 2002.

HB 2164 Virginia Wireless Service Authorities Act (2003)
Patron - Clarence E. Phillips

Summary as passed:
Virginia Wireless Service Authorities Act. Authorizes any locality to create a wireless service authority, which may provide qualifying communications services as authorized by Article 5.1 (§ 56-484.7:1 et seq.) of Chapter 15 of Title 56. The authority shall have many of the powers typically granted to authorities, including the issuance of revenue bonds.

SB 245 Telecommunications services; local exchange (2002)
Patron - William C. Wampler, Jr.

Summary as passed:
Local telecommunications services. Provides that any certificate for local exchange service or interexchange service granted by the SCC after July 1, 2002, shall be for service throughout the Commonwealth. Each local exchange carrier that was certificated before July 1, 2002, to provide service in part of the Commonwealth shall be certificated to provide local exchange service throughout the Commonwealth beginning September 1, 2002. The bill authorizes any county, city or town that operates an electric distribution system to provide telephone services within any locality in which it has electric distribution system facilities as of March 1, 2002, if the locality obtains a certificate for such service from the SCC and complies with all applicable laws and regulations for the provision of competitive telecommunications services. A county, city or town that does not obtain a certificate to provide telephone services may offer qualifying telecommunications services, including high-speed data service and Internet access service, upon application to the SCC. The SCC shall approve such a petition if it is in the public interest, and if the proposed services are not available in quantity, quality, and price from three or more providers in the proposed geographic area. This bill is identical to HB 1021.

As of July 2005, the Cities of Franklin, Danville (d/b/a Danville Department of Utilities), Bristol (d/b/a Bristol Utilities), Manassas, Salem, Martinsville, and the Town of Front Royal have been granted MLEC (Municipal Local Exchange Carrier) status. The City of Radford's application is pending.

Other related legislation:

SB 942 Wireless enhanced 9-1-1 surcharge (2003)
Patron - Charles J. Colgan

Summary as passed:
Wireless enhanced 9-1-1 surcharge. Specifies how CMRS providers can collect the wireless E-911 surcharge. Under the current statute, the surcharge is defined as a monthly charge billed monthly. Because prepaid wireless is not billed monthly, the bill provides that the surcharge may be collected either through monthly billing, adding the surcharge at the point of sale, or deducting an equivalent number of minutes.

SB 148 Enhanced Public Safety Telephone Services (E-911) (2000)
Patron - Kenneth W. Stolle

Summary as passed:
Enhanced Public Safety Telephone Services (E-911). Establishes the Wireless E-911 Services Board and the Public Safety Communications Division of the Department of Technology Planning, and continues the Wireless E-911 special fund. The Board shall be responsible for promoting and assisting the development, deployment and maintenance of a statewide enhanced emergency telecommunications system and enhanced wireline emergency telecommunication services in specific local jurisdictions not currently wireline E-911 capable. The Board shall also be responsible for overseeing and allocating the wireless E-911 special funds and managing moneys appropriated for enhanced wireline emergency telecommunication services in local jurisdictions not wireline E-911 capable as of July 1, 2000. Each mobile service provider shall collect a surcharge in the amount of 75 cents per month per customer, to be paid into the Wireless E-911 Fund. The Board shall use the moneys in the fund to pay the operators of the systems for their costs of operation pursuant to a budget proposal submitted to and reviewed by the Board. The Board shall have enforcement authority to ensure that funds are spent for their intended purposes and shall review each operator's actual expenditures at the end of each year. Local jurisdictions which have or will establish enhanced E-911 services are authorized to impose a special tax in an amount not to exceed $3.00 per month per customer to be accounted for in a separate special revenue fund or in a cost center and revenue accounting system acceptable to the Auditor of Public Accounts. Funds collected from the tax shall be used to pay for reasonable and direct capital costs and operating expenses incurred by the E-911 service facility. All local jurisdictions are required to be operating a wireline E-911 system by July 1, 2003. Certain documents submitted to the Wireless Carrier E-911 Cost Recovery Subcommittee created by the bill are exempt from disclosure under the Freedom of Information Act and the Subcommittee is granted an exemption to convene in a closed meeting when discussing or considering such documents.

Funding

Funding for broadband projects (infrastructure and last-mile) remains the Achilles heel for Virginia's rural communities. As in the past, funding programs remain tied to an application (tele-med, distance learning), a geographic region, or demographic factor such as income or population.

Organizations such as the Virginia Tobacco Indemnification and Community Revitalization Commission **(Appendix One)** and the Appalachian Regional Commission **(Appendix Two)** offer funding opportunities, but only to selected geographic areas of the Commonwealth. Not surprisingly, the large-scale deployments in Virginia continue to occur in areas aligned with either or both of these organizations.

Unfortunately areas outside the reach of the Tobacco and Appalachian Regional Commissions are left to seek out funding in the highly competitive federal funding arena. In the past, Virginia's Center for Innovative Technology has provided seed funding to communities for initial planning and development activities. Unfortunately CIT's broadband funding has been cut so severely that the planning and development funding portion of the program has been eliminated. In the absence of funding, CIT has developed/produced a broadband funding resource guide outlining agencies that typically offer broadband related funding. The report can be found at:
www.cit.org/pdf/CIT_Broadband_Funding_Handbook_2004.pdf

Two of the most notable programs referenced in the handbook flow through the Federal Communications Commission (FCC). While not directed to general infrastructure (backbone) construction or last mile deployment, the e-Rate and Rural Health Care programs offered through the FCC and funded through the Universal Service Support Mechanism offers qualifying entities throughout the Commonwealth the opportunity to reduce the cost of their broadband level services.

Schools and Libraries Universal Service Support Mechanism (E-Rate)
www.sl.universalservice.org

The most widely used Federal assistance program in Virginia today is the Schools and Libraries Universal Service Support Mechanism (Universal Service) more commonly known as "E-Rate." The E-Rate program was established to address a growing public concern regarding the quality of today's schools and an intense public interest in technology. To address these concerns, policy makers expanded universal service to include the E-rate within the Telecommunications Act of 1996 with the intent of improving schools by getting them ready for the digital age, and to extend service to rural health providers. With the sliding scale of discounts that give advantage to poor districts, these incentives are literally "jump-starting" many schools into connecting to the Internet and expanding broadband access to every community. In all cases, this requires a commitment of local funds to support and sustain base telecommunications costs which the discounts don't fully cover and a significant effort to use the application process.

The Federal Communications Commission oversees the E-Rate, which provides affordable access to advanced telecommunications services for all eligible schools and libraries in the United States. Based on a rule of urban parity, the e-rate discounts are intended to bring urban connection prices to qualifying rural entities. Program discounts of 20% to 90% are offered on the cost of telecommunications services and on Internet access and internal connections for non-profit K-12 schools and libraries. Under a separate program discounts are made available to Rural Health Care providers to bring rural rates to the same level as their urban counterparts.

In Virginia, both NET.WORK.VIRGINIA and COVANET offer services on e-rate approved contracts. Currently, schools and libraries throughout the Commonwealth are served by e-rate subsidized infrastructure. Bandwidth provisioned pursuant to an e-rate contract can be subdivided amongst qualified parties[16] (such as a T-1 shared by a school and a municipality) so long as adequate "auditable" records are kept documenting the rationale for the allocation of e-rate and non-rate usage – but only that part of the "pipe" utilized by the school (or library) will be subsidized under the e-rate program.

Interesting models incorporating e-rate funded connections are starting to emerge. In some cases an e-rate ineligible party such as a municipality will serve as the host (co-location/staffing) for the eligible entity and use the e-rate bandwidth as a redundant path in the event of an emergency…conversely, by virtue of the shared location, the eligible party will also have a redundancy on the host's connection. However, the stringent rules of the program have not encouraged partnerships among rural health providers, schools and libraries.

Virginia's 2005 e-rate funding commitments (cumulative state total) $22,327,307.53

Rural Health Care
www.rhc.universalservice.org

The Rural Health Care Program remains a cornerstone program of the FCC's Federal Universal Service Fund. This program, mandated by Congress in 1996, provides a mechanism through which qualifying health care providers (HCP) serving rural localities pay no more than their urban counterparts for the telecommunications services necessary for the provision of health care.

Although the program has provided more than $14 million in discounts (nationwide), demand for reimbursements has fallen well below the $400 million (capped) annual budget. For 2004, the RHC funding commitments to Virginia providers totaled $348,848.63.

[16] "Qualified parties" in this context refers to any entity served by a COVANET or NET.WORK.VA contract.

Not all healthcare providers are eligible to participate in the program. Applicants must be rural (see Determining Rural Status below) and public or non-profit health care providers of the types listed below.

1. Post-secondary educational institutions offering health care instruction, teaching hospitals or medical schools
2. Community health centers or health centers providing health care to migrants
3. Local health departments or agencies including dedicated emergency departments of rural for-profit hospitals
4. Community mental health centers
5. Not-for-profit hospitals
6. Rural health clinics including mobile clinics
7. Consortia of HCPs consisting of one or more of the above entities
8. Part-time eligible entities located in otherwise ineligible facilities.

Eligible Services

Qualifying HCPs are permitted to apply to receive reduced rates for a variety of telecommunication services under the RHCD program. HCPs may seek support for multiple telecommunications services of any bandwidth and for monthly Internet service charges. Eligible telecommunication service charges include:

- Mileage related charges
- T3 or DS3
- T1/Fractional T1
- Frame Relay
- ATM
- ISDN (BRI and PRI)
- Off-premise extension
- Satellite service
- Centrex
- Dedicated private line
- Foreign exchange line
- Network reconfiguration service
- Direct inward dialing
- Onetime (installation) charges
- Wireless or microwave access
- DSL

Special Eligibility for Internet Access via Toll Charges

Not-for-profit HCPs located in a rural or an urban area may qualify for toll charge (long distance) support, if that is required to reach the nearest Internet Service Provider.

In this case, the HCP may receive the lesser of 30 hours or $180.00 per month for the toll charge support.

Note that this provision is distinct from the provision to pay 25% of the monthly cost of Internet access for all eligible rural HCPs.

Rural Status Determiniation

Beginning July 1, 2005, (according to the new FCC rural definition) a Health Care Provider is designated as rural or urban by its US census tract. If all census tracts in a county are rural or urban, it is unnecessary to know the tract because the entire county is designated as rural or urban. If this is not the case, the census tract can be determined tract by calling the regional census bureau office or visiting the Federal Financial Institutions Examination Council's (FFIEC) website www.ffiec.gov HCPs which have been receiving support, but become ineligible under this new definition, will have grandfathered eligibility for three years, to ease the transition. A list of rural census tracts in zipped (.txt) file format can be accessed through the Rural Health website at http://www.rhc.universalservice.org/whatsnew/122004.asp#122104

Statewide Networks

COVANET

http://covanet.state.va.us/

In an effort to lower telecommunication costs for the state and other governmental users, of scale by consolidating telecommunications (voice, data, video) purchases by agencies and qualifying users[17] into a unified system. Virginia's version of this model, COVANET (Commonwealth of Virginia Network), was launched in September 2000 in partnership with WorldCom.

In 2003, the contract was re-bid and a new contract was signed with MCI. Under this contract, eligible entities will be able to access a wide array of telecommunications services including long distance voice services and comprehensive data network and Internet service that will provide the Commonwealth with the latest technology available. While providing state of the art telecommunications solutions that will meet Virginia's needs for the next several years, the new agreement is expected to save the Commonwealth $3 Million dollars per year compared to the prior contract.

Features of the new COVANET contract provide:

- New private IP intranet network services that will assist VITA[18] in achieving a simpler more cost effective Commonwealth enterprise network design
- A path for transitioning to new technologies such as:
    - MPLS-based networks – allowing private networks to be defined using IP
    - Access to Internet II through MCI's VBNS+ network
    - Converged data and voice networking
    - IP version 6
    - Multicast services
- Improved Richmond-based network monitoring and management services
- Improved installation intervals for most services
- Improved service level agreements with credits for not achieving objectives
- Reduced rates for Frame Relay and ATM data network services (core data network services)
- Reduced rates for outbound long distance calling within the Commonwealth, as well as domestic and international dialing

[17] Libraries, local and county governments, universities/colleges and school systems, and other quasi-governmental agencies

[18] Virginia Information Technology Agency (VITA) was established during the 2003 General Assembly session to reform state government information technology and serve as the consolidation point of a majority of 94 state agencies' IT departments. In creating VITA, the legislation also eliminated, as of July 1, 2003, three existing state agencies, the Department of Technology Planning, the Department of Information Technology, and the Virginia Information Providers Network (VIPNet) Authority; and two boards, the Board of the Virginia Information Providers Network (VIPNet) Authority and the Chief Information Officer Advisory Board.

- Reduced rates for inbound 800 services, automatic call routing, and interactive voice response services
- Free dedicated access T1's for Centrex's and PBX's
- No installation costs for all data and voice services that remain in place for at least 12 months.

NET.WORK.VIRGINIA
www.networkvirginia.net/

NET.WORK.VIRGINA (NWV) is an advanced, digital communication service based on the latest, evolving Internet technology, delivering Internet and intranet services statewide. It is the result of a project led by Virginia Tech in association with Old Dominion University and the Virginia Community College System to develop universal access to advanced digital communications services with level pricing for all of Virginia. Virginia Tech is responsible for contract administration, vendor coordination, and support to customers for end-to-end performance and advanced applications.

With 1.5 million users at over one thousand sites, NWV offers access to a rich array of educational and information resources. Participants include four-year colleges and universities, the Virginia Community College System, private schools, and K-12 school systems. Also, many state agencies are taking advantage of NWV including the Department of Health, the Virginia Employment Commission, the Department of General Services, the Virginia State Library, the State Police, the Institute of Marine Science and others. The same infrastructure instigated by NWV is now open to everyone including commercial customers at low cost. NWV is a public-private hybrid network providing access to the Internet and to Internet2 for 1.4 million people.

The contracts that make up NWV were established on June 12, 1996. Since these contracts were established prior to July 10, 1997 and they are intended for a large number of schools and libraries, they are considered "master contracts" by the Schools and Libraries Corporation. K-12 schools and libraries may utilize these contracts for discounted services under the terms of the USF program without the need to compete or re-compete.

The network has very high capacity and can deliver simultaneous transmission of fully interactive voice, data, and video services. An Internet gateway, open to all participants, is included. A single connection to Net.Work.Virginia can be used to support different types of multimedia connections simultaneously. The bandwidth can be flexibly allocated and reallocated as needed. Virtually any type of application or communication service can be transported across Net.Work.Virginia. Possible applications include:

- Internet Access
- Limited local area computer network interconnection
- Limited videoconferencing
- Audio connectivity
- High performance local area computer network interconnection

- High quality videoconferencing
- High volume Internet users
- Multimedia server connection
- Very high performance network computing and research applications
- High volume multimedia applications/users

The Vision Alliance, a consortium of local exchange companies in Virginia led by Verizon/Bell Atlantic-Virginia, provides local access and intraLATA switching services. Verizon/Bell Atlantic-Virginia is the prime contractor for these services and coordinates all network management and order processing within the consortium. This contract was updated by addendum in 2003 to include Transparent LAN Services (TLS). TLS offers a suite of affordable new ethernet access alternatives including 10 Mbps, 100 Mbps, and 1 Gbps alternatives[19].

An interLATA backbone is provided by Sprint. The legacy NWV backbone is still operating with three ATM switches strategically located around the state, providing interconnection points for Vision Alliance switches. During the first half of 2001, Sprint is implementing the NWVng (next generation) backbone comprised of Cisco 12016 GigaSwitch Routers interconnected with a diverse mesh of OC12c packet over SONET (PoS) links. NWVng will offer support for next generation Internet-based applications.

Sprint is also providing Internet backbone gateways in Washington, Roanoke and Richmond each at OC12c capacity for a combined aggregate Internet access capacity of nearly 2 gigabits per second. This Internet service is open to all participants.
With the implementation of NWVng (next generation) during the first half of 2001, Net.Work.Virginia offers greatly increased capacity and enhanced support for new Internet-based applications like IP videoconferencing, high definition video, and greatly improved reliability and performance for Internet access. NWVng also supports upgraded access to Internet2's Abilene network and other regional and national research and education networks. Also, NWVng offers the capability to support demanding new applications such as Virginia's Standards of Learning online testing.

Net.Work.Virginia Next Generation (NWVng) Overview

- New multi-service backbone network leveraging NWV affordable, ubiquitous access
- Advanced IP services including IP-based Quality of Service, native multicast, and next-generation IP protocols
- High performance switching and routing architecture overlaying scalable, optical infrastructure
- Highly engineered Internet access, better fault tolerance, increased capacity, and cutting-edge features
- Access to Internet2 and other research networks and education resources

[19] Several school divisions are using TLS to create county area, high-speed networks seamlessly interconnecting local area networks serving individual schools.

- Low-cost, statewide access open to everyone, continued competitive advantage for all Virginians

Gateways currently deployed to the Internet, to the Department of Energy's ESnet network, and to the Internet2 Abilene network extend the reach of this powerful information resource beyond the bounds of the Commonwealth. Sample Costs:

Type	Capacity	Applications (from list)	Installation Cost	Annual Cost *[20]
DS1	1.5 Mbps	1 - 4	$500	$10,320
DS3	45 Mbps	1 - 8	$1,000	$53,124
OC3	155 Mbps	1 - 10	$2,000	$133,716

[20] Costs shown are based on prices for representative services applicable to educational sites and state agencies. Other services are available and different prices may apply

University Led Initiatives

In order to remain competitive, Virginia's universities must be equipped to participate in national research activities. To achieve this goal the Warner Administration has sought to establish partnerships that increase both statewide broadband deployment and federal research and development funding.

Governor Warner, during his term as chairman of the Southern Governor's Association, helped to strengthen the region's broadband infrastructure through participation in National Lambda Rail. This initiative will benefit the entire Southeast by spreading access to nation wide research endeavors, improving economic development opportunities, and helping to spread commercial broadband access. By pooling the region's collective resources, states are able to flourish despite diminishing federal dollars for research and development and prove that states too can participate in "big science" through collaboration.

The National Lambda Rail (NLR)

http://www.nlr.net/

When the original proposed architecture for NLR was unveiled, not a single network access point was located in the southeastern United States. Fearing that research institutions of higher education would fall further behind in efforts to bolster cutting edge research in science and engineering disciplines, Governor Warner proposed that the Southern Governors' Association (SGA) pursue the Southern eCorridors project to extend NLR throughout the Southeast.

In his role as chairman, Governor Warner proposed at the SGA Annual Meeting in New Orleans in August 2002 that the SGA partner with the Southeastern Universities Research Association (SURA) to support the establishment of high-capacity, fiber-optic computer networks throughout the southeastern United States.

Mid-Atlantic Terascale Partnership and VORTEX

The Mid-Atlantic Terascale Partnership (MATP) and the Virginia Optical Research Technology Exchange (VORTEX) represent a unique public-private partnership that brought the National Lambda Rail (NLR) network to Virginia and neighboring states in the mid-Atlantic and southeastern United States. This partnership, bringing together state governments, institutions of higher education, and private sector communications providers, has helped to develop a next generation data communications network using individual light waves within an optical fiber to communicate at the speed of light (at speeds significantly faster than Internet 2). An example of NLR's potential in Virginia is

the ability to provide distributed access to the System X supercomputer located at Virginia Tech to researchers at other schools on the NLR backbone.

MATP was able to establish a regional NLR node through a $5 million initial investment provided by the Virginia Tech Foundation (VTF) on behalf of MATP. VTF licenses network access rights to MATP, and each MATP member contributes a cost share amount of $500,000 spread over five years ($100,000 per year) towards the $5 million NLR investment. The network began operations on May 12, 2004. In Virginia, Governor Warner included $2.4 million in the 2004 state budget to assist with the costs of connecting the state's institutions of higher education to MATP.

VORTEX is a multi-faceted approach featuring a strategic alliance with Verizon and other communications providers to foster development of a new statewide fiber infrastructure coupled with customer-owned last mile fiber and dark fiber leasing.
Rather than building a single purpose, state-owned fiber optic network solely for research, Virginia is leveraging Network Virginia to collaborate with other communications providers to build a new, statewide Dense Wave Division Multiplexing based (DWDM) system to support both research and economic development interests. DWDM is the fiber technology used by NLR.

The costs of VORTEX are divided among participating institutions, state government, and private investment. Verizon and other providers are making a significant, multi-million dollar investment in excess of the amounts contributed by MATP members and the state for construction and operation of the network.

The efforts undertaken by Virginia to develop MATP and VORTEX have resulted in a number of benefits and opportunities. These include:

- Increased Broadband Access. Working in partnership Verizon and building upon existing state initiatives, Virginia has been able to increase broadband access to rural communities and provide new IP-based and Ethernet services to existing academic institutions and private sector entities.

- Low-cost Research Facilities for Higher Education. MATP members are able to connect to NLR using 10 Gbps fiber optic channels purchased at cost.

- Economic Development. Access to NLR was critical to Lockheed Martin investing $30 million in a new Center for Innovation in Suffolk that will create 50 jobs.

The investment in MATP and VORTEX is already benefiting Virginia's economic development initiatives. Governor Warner announced in April 2005 the Virginia Modeling and Simulation Initiative (VIMSIM), an aggressive plan to promote the high-tech modeling and simulation industry in the Hampton Roads region, centered on Old Dominion University in Norfolk. VIMSIM was announced concurrently with the opening of Lockheed Martin's Center for Innovation in Suffolk, a $30 million investment that will create 50 modeling and simulation jobs.

The collaboration between VIMSIM and VORTEX is just one of a number of efforts underway in the Commonwealth of Virginia to leverage NLR for the benefit of Virginia's economic development initiatives and the competitiveness of research initiatives at Virginia's institutions of higher education.

Resources

Virginia's Center for Innovative Technology (CIT)

In 1999, Virginia's Center for Innovative Technology launched a formal program to promote the awareness and use of electronic commerce techniques and technologies. Known as e-Business Outreach, the program focused primarily on assisting small and medium-sized traditional businesses and local governments in rural areas who needed additional "coaching" in order to capitalize on the power of the Internet. In 2002, the Outreach program was expanded to also provide assistance to those companies and localities interested in obtaining broadband services.

During the 2002 General Assembly Session, CIT was assigned the responsibility for delivering a study on **Advancing affordable, high-bandwidth electronic networks in rural Virginia study (HJ163).** The study was delivered to the General Assembly in 2003, and as a result, CIT's mission was expanded (by budget amendment) to include "supporting efforts of public and quasi-public bodies within the Commonwealth to enhance or facilitate the prompt availability of and access to advanced electronic communication services, commonly known as broadband, throughout the Commonwealth, monitoring trends and advances in advanced electronic communications technology to plan and forecast future needs for such technology, and identify funding options."

As a result, **CIT is the only resource in the Commonwealth that offers a "holistic" supply and demand approach to solving the broadband equation**. By facilitating developments on both sides of the equation, CIT is working to ensure that there is not only infrastructure but also users to take advantage of, and sustain, the networks that are built. This holistic approach to solving the Digital Divide sets Virginia apart from most state assistance programs that concentrate solely on the deployment of infrastructure.

CIT's philosophy is the result of a hard work and the reality that the Commonwealth has not funded its broadband program to support large-scale investments in infrastructure. CIT also is committed to the idea that it is best not to overbuild networks wherever possible.

For FY2004, CIT's Broadband Program had $250,000 in funding to provide assistance to communities across the Commonwealth with both supply and demand oriented activities. Through strategic partnering and leveraging federal investments being made in the Commonwealth for broadband planning and development, CIT was able to participate in more than 15 broadband related initiatives throughout the Commonwealth. Additionally, the same $250,000 returned $2.8 million in leveraged funding to the Commonwealth.

The current mission of CIT's Broadband Program is to "accelerate the socio-economic growth of Virginia's rural and underserved areas through the application and use of broadband telecommunications." This bold mission statement emphasizes the idea that

the true value of broadband telecommunications infrastructure is derived from the applications that traverse its capacity, not the mere existence of the infrastructure. In keeping with its mission, CIT is assisting communities across Virginia planning network deployments. From Northern Neck to far Southwest Virginia, CIT is bringing expertise and resources to broadband projects in all stages of development. In Southside, CIT is coordinating with Southside and West Piedmont Planning District Commissions and Mid-Atlantic Broadband Cooperative to provide demand aggregation and e-commerce training services to communities along the Route 58 corridor. These activities are the result of a $140,000 grant awarded to CIT by the Economic Development Administration to complement the infrastructure project that is underway.

Two cornerstone activities currently offered through the CIT Broadband Program include Broadband Infrastructure Attainment and Broadband Education. CIT's program activities in each area include:

Broadband Infrastructure Attainment

Broadband telecommunications infrastructure planning offers an unprecedented opportunity for elected officials, educators, healthcare providers, economic developers and citizens to define the future for their community. CIT staff serves as a coalescing force to bring unrelated groups together to forge partnerships for infrastructure attainment. Process elements include: leader and stakeholder identification, demand assessment and aggregation, resource identification, request for information (RFI) development, and funding identification.

Broadband Education

One of the most overlooked, but imperative, elements of broadband deployment is the training and preparation of the user base. Effective utilization of broadband technologies can bring unparalleled efficiencies and opportunities to organizations of all sizes, orientation (public and private sector), and function. Not since the industrial revolution has technology adoption made such a fundamental change in the conduct of business.

Broadband adoption is a double-edged sword. Not only is adopting the technology imperative to the continued survival and growth of rural communities, but it is also imperative that communities have an adequate number of users (subscribers) on the network to sustain and maintain the infrastructure. Therefore, it is in the best interest of both the users and the network "owners" to ensure that the user base has access to the training and information necessary to make intelligent broadband integration decisions.

Unfortunately, many small companies and rural municipalities do not have the resources necessary to support dedicated IT staff to handle broadband integration and application development. Consequently, there are many companies and organizations that opt NOT to adopt broadband technologies because of a lack of understanding of the technology options and/or the inability to create a compelling business case for adoption due to a lack of understanding of potential applications.

Recognizing the important role that "informed consumers" play in the ultimate success of broadband deployments, CIT initiated the development and delivery of an introductory broadband workshop entitled "Broadband 101 – Untangling the Wires." The workshop is designed to help broadband "novices":

- Understand terminology and acronyms
- Attain an unbiased understanding of the technologies commonly referred to as "broadband"
- Gain an awareness of applications, efficiencies, and opportunities that are enabled by broadband
- Safeguard their operations through the implementation of adequate security and networking controls

To date, CIT has conducted workshops in South Boston, South Hill, Blackstone, Clarksville, Bristol, Abingdon, Richlands, Lebanon, Marion, Gate City, Rocky Mount, Stuart, and Harrisonburg. More than 300 representatives from a wide variety of organizations (companies, non-profits, educational institutions, government entities, first responders, citizens) have participated, and communities throughout Virginia are already scheduling workshops for CY2006. **Appendix Three** contains a detailed description of the Broadband 101 workshop content and schedule of events beginning Jan. 1, 2006.

e-Commerce Education

Economic development remains the number one reason for communities to embark on broadband infrastructure attainment projects. As noted in the previous section, it is imperative that communities seeking infrastructure also cultivate the usage of the network to ensure long-term network viability. Most economic developers concentrate on the attraction of new companies into the area and many programs exist to assist with the endeavor. Fewer developers recognize the need to cultivate existing industries and companies to provide network sustenance until critical mass is attained.

Consequently, companies throughout Virginia are still grappling with the role that the Internet can/should play in day-to-day operations. Some are "late adopters" in need of a "safe" place to experiment with, and develop e-commerce applications; others have taken an initial foray into the online world and are ready to develop new applications to capitalize on available broadband infrastructure. Both situations can be fraught with pitfalls, and oftentimes business and community leaders prefer to "maintain the status quo" rather than venture into unknown territory. Unfortunately this mentality can lead to stagnation, or even worse economic demise.

In an effort to mitigate the uncertainties surrounding e-commerce application development and deployment and spur the development of broadband demand, CIT has partnered with the Virginia Electronic Commerce Technology Center to provide e-commerce assistance and training to small and medium sized businesses throughout the Commonwealth and oversee the electronic business villages (eBV) in Southwest Virginia.

Through the eBV program, small businesses, local governments, and regional economic development agencies are availed a low cost entry platform for experimenting with electronic commerce[21]. While regionally oriented, the "village" itself is "virtual," but serves as a coalescing and networking point for e-Commerce activities. The Virginia Electronic Commerce Technology Center (VECTEC) in Newport News, VA and VECTEC-West in Lebanon, VA[22] provide the technical support for this program. In short, the eBV's serve as e-commerce incubators for companies interested in experimenting with e-commerce in a non-threatening, (relatively) low cost environment.

The participation cycle for an organization is generally one to two years, after which the eBV participants are encouraged to transition to the private sector for the continuation of e-Commerce services. The CIT/VECTEC e-Business Village program is working to ensure the future survival and prosperity of Virginia's small and medium-sized businesses and underserved communities.

Virginia Electronic Commerce Technology Center (VECTEC)
www.vectec.org

The Virginia Electronic Commerce Technology Center (VECTEC) was launched in 1997 by Christopher Newport University, Virginia's Center for Innovative Technology, Verizon, and Newport News Shipbuilding (now Northrup Grumman, Newport News), VECTEC is the organization primarily responsible for handling the technical assistance aspects of the e-Business Villages[23]. Based in Newport News (Christopher Newport University) and Lebanon Virginia, VECTEC and VECTEC-West respectively, are the cornerstones of the EBV initiative.

VECTEC's mission is to promote economic competitiveness and development throughout the Commonwealth by sponsoring, developing, and implementing electronic commerce activities and programs. VECTEC places special emphasis on delivering electronic commerce technologies and services to Virginia's small and medium-sized businesses.

To accomplish their mission VECTEC provides a wide range of services to their clients, including: search engine positioning, Website strategy and development, back office automation and integrated databases, database design and development, and architecture design.

[21] Services include (but are not limited to) web site design and development, back-office automation, graphic design, search engine optimization, catalog and shopping cart design and implementation.
[22] In Southwest Virginia, VECTEC-West has partnered with Southwest Virginia Community College and Mountain Empire Community College to serve as the local service points for the two EBV's in the region.
[23] Electronic Business Villages (sponsored by Virginia's Center for Innovative Technology) provide hands-on electronic commerce planning and implementation assistance to companies and communities interested in implementing and experimenting with electronic commerce techniques and technologies in a vendor-neutral environment.

Virginia Tech eCorridors Program

Access to advanced communications and network infrastructure has become critical for ensuring economic competitiveness in today's global economy. Beyond standard telephone systems and basic Internet access, communities are suddenly finding that businesses and other stakeholders are making specific demands for access to fiber optic infrastructure with very explicit route diversity and fiber specification requirements. Communities with advanced fiber, wireless, and "next generation" Internet infrastructure will have a distinct competitive advantage. Those without such infrastructure will fall behind in ways that may not be recoverable over a period of decades (such as difficulty attracting and retaining sustainable job creation opportunities).

The objective of Virginia Tech's eCorridors Program is to work with communities, private-sector, and municipal partners to facilitate rapid development of advanced, fiber optic, wireless, and "next generation" Internet infrastructure across the Southern region of Virginia, and expanding into the eastern and northern regions. Through multiple community and regional based initiatives, this program proposes to put the world's most advanced communications infrastructure within reach of every community in Virginia within 10 years. See http://www.ecorridors.vt.edu/ for the latest update on the eCorridors Program.

The overriding goal of the program is to serve as a catalyst for the deployment of affordable access to fiber optic network infrastructure that is needed to create economic and educational opportunities for citizens and businesses. Fiber optic network infrastructure is needed to support current high-speed (10/100/1000 Mbps) data access for a range of business and community applications and for future higher speed applications. Fiber may also be needed to support both analog and digital applications. The infrastructure should be open to all service providers and private sector based. It can enable the emergence of a new economy and network industry in Virginia. This new industry, in its infancy, combines high capacity optical and wireless technologies with the Internet protocol and Ethernet to enable an extraordinary advantage in cost and communications power.

The eCorridors Program also serves educational communities. It enables research and development of network technologies and solutions for business, education, and other programs on a 'real world,' large-scale network. For the past 15 years, Virginia Tech has developed network infrastructure strategies aimed at dramatically lowering the cost of broadband network access (see http://www.networkvirginia.net/). The proposed large-scale community oriented network combines the resources and expertise of education, private sector partners, municipalities, and non-profit entities to provide a unique opportunity for all involved. The program has created significant and widespread interest from municipal leaders and legislators. This level of visibility helps build long-term relationships. Another benefit is the provision of a statewide, truly high-speed network over a diverse route infrastructure that otherwise would not be affordable. A network infrastructure is needed for the economic opportunity and the viability of communities as they develop networked economies.

Community Broadband Deployments

Cumberland Plateau Planning District (CPPDC)

Cumberland Plateau Planning District represents the Counties of Russell, Tazewell, Buchanan and Dickenson. Nestled in the heart of Southwest Virginia, this Planning District recognized early on that if it was to have economic development parity with its more urban counterparts it would require bold steps. Amongst other issues, local leadership recognized the need for affordable, ubiquitous, broadband connectivity to the businesses (existing and potential) and residences. To this end, the Planning District secured $1.6 million from the U.S. Department of Commerce's Economic Development Administration and more than $1,000,000 in grants from the Virginia Tobacco Commission to provide broadband services from Abingdon to Lebanon to Claypool Hill and on to Tazewell County and the Towns of Bluefield and Grundy.

With a connection to the backbone, businesses will have access to high-speed Internet service which was previously unavailable in many areas and digital cable television service offered by Bristol Virginia Utilities. More than 17 offices and a number of government offices in Russell County have already been connected to the backbone.

Bristol Virginia Utilities is operating and maintaining the telecommunication network.

LENOWISCO Planning District

Lee, Norton, Wise & Scott

The LENOWISCO Planning District is leading the charge for extending world-class broadband level services to residents in rural Southwest Virginia. Through the LENOWISCO Rural Area Network (RAN) project, the Planning District proposes to put the world's most advanced communications infrastructure within reach of every business and citizen in the LENOWISCO area within 10 years. The overriding goal of the program is to provide extremely high speed, reliable broadband network infrastructure at a fraction of currently available prices to act as a catalyst to create substantial economic, educational, and health care enhancements for citizens and to create a distinct competitive advantage for its businesses (current and future). This infrastructure will be private sector based as a means of ensuring its sustainability and economic viability, and will assist in enabling the newly emerging communications and network industry in southwest Virginia. This new industry, still in its infancy, combines leading edge optical technologies and advanced features of the Internet protocol to enable an extraordinary advantage in cost and communications power.

Using grant funds, including those from the Virginia Tobacco Commission, the Virginia Center for Innovative Technology, and the Appalachian Regional Commission, the project was to develop a model that will help reinvent the economies of the Tobacco counties of Southwest Virginia. As a result LENOWISCO has done what the public Telcos could not--invest in a redundant communications infrastructure in rural tobacco

counties. Because of the approach, everything was a challenge. The network is a regional "Computer Network", NOT a Telecommunications Infrastructure. This is an important distinction – the LENOWISCO network DOES NOT duplicate what the major Telcos provide-- telecommunications. The network provides computer Ethernet transport that can in many instances provide the same services and more than a telecommunications network. Several challenges have arisen including: building a regional Ethernet network, obtaining rights-of-way where possible and designing alternatives to expensive rights-of-way, building partnerships to leverage funds, complying with regulatory issues and developing a sustainable business model. The infrastructure is physically owned by a subsidiary of the LENOWISCO Planning District Commission, LENOWISCO, Inc. I, a 501©3 corporation.

As a multi-phase project, the first phase of the LENOWISCO Rural Area Network (Duffield to Big Stone Gap) incorporated the installation of fiber optic conduit alongside a public water system. In this phase, it was proven that a fiber-optic backbone/distribution network could be successfully deployed along-side a public water project. Opportunities are still being sought to maximize the advantages of this practice.

The second phase included installation of the same conduit with related fiber and electronics to allow our initial customer, Tuck Engineering to totally re-vamp their business practices. A local aerial mapping and aerial photography firm that owns several aircraft and aerial cameras and related optics sometimes valued more than the aircraft itself, Bobby Tuck was at a disadvantage when his firm communicated with clients. Some of the data that he collected on behalf of his clients had to be expressed mailed to clients on computer hard drives. Even though technology was utilized on a daily basis to maximize flight times and routes, Tuck was unable to afford broadband services at the capacity his firm required. Since the LENOWISCO RAN has been made available, Tuck Aerial Mapping has successfully competed against nationally known firms and enabled his world headquarters to remain in rural Big Stone Gap, Virginia.

The third phase of the project (nearly complete) includes 92 miles of fiber being installed with both underground conduit and conventional overhead construction techniques being utilized. Connectivity is now in place between Pocket, Jonesville, Pennington Gap and Woodway in Lee County to Duffield in Scott County to Big Stone Gap, Norton and Esserville in Wise County. Additional construction is also on-going for a downtown fiber project in Jonesville in Lee County Virginia.

As a result, approximately thirty small business and residential customers are being served by the network, connecting them to the commodity Internet via redundant DS3. The lowest level of service is 5MB down and 256KB up. This surpasses any service available in the area from the existing providers. Our network operator, Sunset Digital Communications, Inc is currently negotiating for cable TV feeds and affiliate licensing. VoIP is the last priority due to the large regulatory investment and minimal expected return.

Additionally, funds are currently being sought from the Virginia Tobacco Commission and the U.S. Department of Commerce, Economic Development Administration for an additional 75 miles of backbone and affiliated "last mile" connectivity. Communities included in this proposal include Wise, Pound, Clintwood and Rose Hill. As part of this initiative, funds are being sought to interconnect similar projects, including Cumberland Plateau Planning District, Bristol Virginia Utilities Board (BVU Optinet), and Mid-Atlantic Broadband Cooperative, via Citizens Telephone Cooperative.

In addition to pursuing infrastructure, LENOWISCO is also supporting the growth of new asset-based economic development projects in the region such as the Crooked Road Music Heritage Trail through widespread web casts and internet television feeds. Through these activities LENOWISCO hopes to bring national and international attention to the rich, diverse musical heritage of the area thereby expanding the tourism potential of the region.

BVU OptiNet

To encourage economic development in Bristol, Virginia and surrounding areas, while providing more bandwidth and a higher quality telecommunications infrastructure for its customers, Bristol Virginia Utilities (BVU) began building a state-of-the-art fiber-optic network in 1999. Initially, BVU offered voice, and high-speed data applications to local schools and governmental agencies. However, during a survey of its customers in 2001, BVU received a 97% satisfaction rating and overwhelming encouragement to begin providing these services to the general population in the city of Bristol, VA and Washington County, VA. After working with a lobbyist for over 2 years to change Virginia's legislation, BVU OptiNet (Bristol Virginia Utilities' telecom division) now provides local telephone service, cable television, dial-up and high-speed Internet, along with long distance packages in a highly competitive environment.

BVU is among the first municipal utilities in the country to implement a fiber-to-the-user infrastructure providing voice, video and data services; often referred to as the "triple play." Business and residential customers alike are now able to take advantage of the most advanced and affordable technology and services available anywhere in the country. For most BVU OptiNet customers, an equally important element in addition to technology is that they have access to customer service and technical support through a local company with local employees, who live, work and have a vested interest in the community.

After just 2 ½ years, BVU OptiNet boasts incredible market penetration rates.[24]

	Residential	**Business**
Telephone	4273 (55.47%)	458 (50%)
Cable	4365 (51.18%)	167 (18.3%)
High-Speed Data	2543 (29.82%)	378 (41.4%)

[24] Penetration rates are based on total residential and businesses passed and serviceable within BVU OptiNet's primary service areas in the city of Bristol, VA and Washington County, VA

One of the primary objectives for building this network was to increase broadband availability at an affordable price. According to recent studies by both Leichtman Research Group and Nielsen/NetRatings, the average U.S. residential broadband penetration rate is 21.3%[25]. As you can see, Bristol has successfully increased residential broadband penetration levels well over the national average. As further testament to the need for this venture, BVU OptiNet built fiber-optic lines to a small, very rural community known as Mendota last year. In this area, which is in BVU's electric service footprint, there had previously been no high-speed Internet provider or cable television provider. After less than one year, 64% of the residential homes passed in that area have subscribed to BVU OptiNet services. 62.5% have switched to our telephone service, 59% are taking cable television service and 33% have subscribed to high-speed data.

The success enjoyed by BVU OptiNet is based on several factors. First and foremost, we believe that the excellent service we have provided to our community for the past 45 years was the solid foundation necessary to compete in the telecommunications industry. Second, our customers appreciate that they have someone locally to sit down with to discuss their bill, to speak with about a technical issue, etc. The incumbent operators have slowly moved away from local offices to regional call centers and customers have noticed the change. And finally, we offer competitive pricing. Attached is a chart, which shows how BVU OptiNet prices compare with other local telecom service providers.

Bristol Virginia Utilities has invested $43.27 million in fiber-optic infrastructure and "last mile" deployment. As an added economic boost, 40 full-time positions have been created through BVU OptiNet. These jobs are primarily customer service, skilled technical, and management level and provide above average wages and benefits. The best news is that local residents now save money each and every month.

Appendix Four contains maps depicting the LENOWISCO, Cumberland Plateau Networks and their relationship to existing infrastructure and the Mid-Atlantic Broadband Initiative.

Manassas – Broadband over Power Line (BPL)

On October 5, 2005, Manassas Virginia, the 37,000-person Washington, D.C. suburb became home to the first citywide commercial deployment of broadband-over-powerline (BPL) technology anywhere in the United States. Communication Technologies, Inc. of Chantilly, Va. owns and operates the BPL network in Manassas. BPL technology uses the

[25] The Leichtman Research data cited is the penetration of residential and small business broadband subscribers (not including medium and large business, institutional and government) as defined by the FCC, divided by the total number of US Postal Service mailing addresses. Note that Nielsen//NetRatings reports the percentage of active Internet users that use broadband from home, not broadband households. NetRatings uses a panel of 40,000 to 50,000 people with software meters installed on their computers. These meters detect connection speeds. Each month they do an enumeration study to call a number of people to calibrate the panel by adjusting weightings to match the population at large.

electricity grid in a city and the wiring in individual homes to provide direct "plug in" broadband access through electricity sockets, rather than over phone or cable TV lines. As of the launch date, COMTek estimated that 12,500 households in Manassas were within the reach of the BPL network and commercial services available to 2,500 businesses on an on-demand basis. COMTek estimates list more than 700 customers served and an additional 500 requests for service in process. In addition to Manassas, COMTek is in negotiations to deliver similar services for nine other investor-owned utilities, municipal-owned utilities, and other entities.

In July 2004, the City of Manassas selected COMTek to provide BPL services over the city's electric system. COMTek owns and operates the BPL network and also serves as the ISP, providing email and Web hosting services for customers. COMTek signs up and services the needs of Manassas customers. The City of Manassas provides utility staff to install BPL couplers and repeaters and to maintain the fiber connections that link COMTek servers and routers to the power lines. The city receives a portion of subscriber revenues to offset the manpower and equipment resources that they contribute to the BPL services.

In addition to delivering broadband access to residential and commercial customers, COMTek has enabled the Manassas utility to save money and respond more quickly in identifying outages at both the transformer and customer level, central control for traffic signals, and operating video surveillance systems at substations. The City is exploring opportunities to use BPL for other advanced utility applications such as automatic distribution switching, which would restore power more quickly to the grid after outages, and automated meter reading, which already is available on the Manassas network.

How BPL Works

Broadband over power line is the transmission of high-speed communications services, including Internet access, over the existing electric infrastructure using adaptive technologies. The wires that carry electricity, either on poles above ground or through underground pipes, possess the capacity to also serve as a conduit for data signals. These power lines are known as medium voltage, carrying between 1,000 and 32,000 volts of electricity and travel the distances between power substations and the customer's household or building. The electric lines that connect to a household or other building from the utility pole are known as low voltage, transmitting 120/240/480 volts.

By bundling radio-frequency (RF) energy on the same line with the electric current that is already carried, data can be transmitted without the need for a separate line. Since the electric current, which is used to provide power to the end users, and RF energy signals carrying the data operate at different frequencies (with electric current traveling at lower frequencies and data at higher levels), the two don't interfere with each other.

Technological advances in the past several years have enabled electric companies to place devices along existing wires and poles to provide broadband services. Known as Access BPL, the systems require a connection from the Internet backbone at a power

substation, repeaters (in some cases) and couplers along the medium voltage power lines that transmit the data signals, and then a final converter that transfers the signal from the medium voltage to the low voltage lines that go into homes. Once inside the home, the signal can be accessed at any electrical outlet with a BPL modem.[26]

Shenandoah Valley Mapping Project

With assistance from Virginia's Center for Innovative Technology (CIT), a focus group which includes representatives of the Shenandoah Valley Technology Council, the Piedmont Virginia Technology Council, the Shenandoah Valley Partnership, the Thomas Jefferson Partnership, James Madison University, the University of Virginia, Piedmont Community College, Blue Ridge Community College, Virginia's Center for Innovative Technology, Central Shenandoah Valley Planning District Commission and the Northern Shenandoah Valley Regional Commission is working to determine the best method to ascertain current, accurate information on availability and affordability of internet access, whether and where there is broadband access, and where there are gaps. Our proposal, "Communication Infrastructure Pilot Project," which addresses the need for this information in relation to regional security, economic development, and overall quality of life for the region has received initial funding from CIT. The need for this information has been substantiated by an independent study conducted by consultants for the Shenandoah Valley Partnership, which stated that "a map of fiber connections (especially for industrial parks) needs to be developed and available so prospective tenants can determine the reliability and availability of high-speed connections."

Faculty, students, and other interested parties will collaborate to develop a prototype instrument to be used for a region-wide aggregate demand assessment study. This prototype will be developed so that it can be utilized by students from the universities and community colleges to actually perform the study giving the region vital information and the students an opportunity to use their skills in a real-world environment. The study will include information on providers, services available, types of services by region, internet access available (including broadband), cost of services, demographics of the regions based on the need for services, and gaps in service. The initial test areas of the instrument will be the City of Charlottesville and Rockingham County. Ultimately, the plan is to utilize this instrument to determine this information for the entire geographic region – Planning District 7, Planning District 6 plus Page County and Planning District 10 plus the counties of Orange, Madison and Culpeper. The prototype development phase of the project is underway, and testing of the instrument is scheduled for the latter part of the fall 2005 semester.

26 COMTek News Release "MAJOR U.S. TECHNOLOGY MILESTONE: COMTek, CITY OF MANASSAS DELIVER FIRST CITY-WIDE AVAILABILITY OF BROADBAND OVER POWERLINE (BPL) IN THE U.S. www.comtechnologies.com

City of Bedford

The City of Bedford created its Community Wireless project to extend mobile data into the community. The project will provide mobile data access at speeds of up to 1 megabit to all areas of the city and a substantial portion of the adjacent county. The network plan also includes a higher speed mesh network to cover the downtown area. At the time of publication, the City is in the latter stages of the RFP process and expects to have a vendor selected by the end of the 2005.

Bedford is an electric utility and plans to leverage its infrastructure to create a comprehensive wireless network covering the rolling hills of Bedford which are home to the National D-day Memorial as well as many new businesses. The network rollout will be conducted in three phases. The first phase features public safety access involving primarily law enforcement, fire and rescue vehicles. The second phase includes enabling governmental activities (meter reading, customer service, building inspections and permitting software, etc.) in the field. The final phase will feature private sector (businesses and citizens) access through a franchise type relationship wherein multiple parties are invited to provide services to citizens and businesses over the public wireless right-of-way.

Ultimately, the Bedford network will deliver last-mile connectivity to the (Mid-Atlantic Broadband Cooperative) Regional Backbone Initiative. Bedford covers a geographic area of 6.77 square miles. The City currently utilizes a complex fiber optic network to power the campus voice and data systems. This fiber optic network will be used to interconnect the wireless access infrastructure to the Regional Backbone Initiative's node site located in Bedford's Center for Business industrial park.

Construction is expected to begin in early 2006.

The Town of Shenandoah

The Town of Shenandoah, located in Page County, is a small, rural community in the heart of the Shenandoah Valley with a population of about 1,878. Over the last several years the Town has been very aggressively working to revitalize and bring economic vitality back into the depressed and blighted downtown commercial district, and to develop a 68-acre Brownfield area into a recreational/historical park to promote quality of life, all with the help of grants applied for and received. Plagued by the recent loss of over 900 jobs in Shenandoah and surrounding Page County, through factory relocation abroad, the Town has felt the need to pursue other types of businesses. One hindrance to this pursuit has been the lack of technology infrastructure. The Town had approached all of the traditional telecommunications providers to provide high-speed Internet service, all of which cited the Town’s rural location and distance from Interstate 81, as well as lack of demand to justify their investment, which was basically the chicken or the egg syndrome. The Town has been diligent in maintaining an economic development

department and creating partnerships with government agencies and local colleges and universities.

In 2003, the Town received a Community-Oriented Connectivity Broadband Grant in the amount of $643,493 from the United States Department of Agriculture Rural Utilities Service, which has allowed the Town to form a private partnership with Rural Broadband Network Services to build the infrastructure for a top-notch wireless broadband service. The Town owns the infrastructure, and the Shenandoah Wireless Broadband Authority was formed. This service is available to all residents and businesses within the approximate 857 acres of the corporate limits, and to any businesses within any other unincorporated areas. The project construction actually began August of 2004, with the Town Hall going on line in December 2004. Other businesses came on-line in January 2005, and residential customer started coming on line in March 2005. The project continues in the growth phase with new customers added weekly. Currently there are 56 residential customers and 20 business customers, as well as two critical care customers. By the close of the project in September 2006, the network will be self-supportive and continue taking on new customers and growing as needed. With the availability of this wireless, high-speed Internet service, the Town is now a viable location for small technology companies that can provide jobs for some of those who have been displaced.

The project also includes a Computer Center that houses 25 computers that are available for use by the public, free of charge and with extended hours, for a period of two years. Free computer classes are being provided to senior citizens and anyone else interested. Video conferencing equipment is to be installed and access will be provided to local businesses. Also, the Town will partner with James Madison University, Lord Fairfax Community College, and Blue Ridge Community College to make courses and training available at the Computer Center for the public. Access to high-speed Internet will make a huge impact on the economic development of the Town of Shenandoah.

Shenandoah first applied for funding from the USDA in November 2002, with the assistance of Virginia's Center for Innovative Technology (CIT). CIT provided Shenandoah with invaluable technical assistance and $1,500 to assist with the application process. Congressman Eric Cantor, Sheriff Danny Presgraves, Delegate Allen Louderback, Virginia's Center for Innovative Technology, and many others gave Shenandoah's application special attention, which helped make this service a reality for our Town and surrounding area.

Highland County

Highland is Virginia's least populated county, and describing it as remote would be an understatement. To put this in perspective, a drive from border to border, traveling east to west through the county on Route 250 (yes, it's the same road as Broad Street in Richmond!), would include crossing seven mountain ranges.

Yet, with the help of a CIT grant, Highland has DSL service available through about two thirds of the highest populated areas of the county. Local leaders tout that it has been their "distinct pleasure to announce this fact at several forums over the past two years, and the most frequent response has been "you must be kidding", often because those in attendance are from more urbanized localities that have been unable to establish broadband services.

The DSL service is a joint venture of the county, which received the CIT grant, and Highland Telephone Cooperative (HTC), which coordinated installation and provides the service to the public. The county was very fortunate to be able to work with a local cooperative that has a vested interest in local success stories, and to have the support of an organization like CIT that supports getting the job done, not micromanaging the process.

The service, which began in October 2003, covers approximately 250 – 275 square miles and currently serves more than 80 customers. Given that there are less than 1500 full time households in the entire county, the network is off to a great start. Only Allegheny Mountain in the far western part of the county does not currently have service available in the area covered by HTC, and it will be available on request.

The Highland County Comprehensive Plan encourages the establishment of local business enterprises and cottage industries, and with telecommuting becoming more commonplace, high speed Internet will be a critical component of future economic development in the county. The Highland Center, a local incubator, already boasts several tenants that are dependent on this availability.

This is an exciting local success story in a most unlikely location, and none of this would have been possible without the support of CIT and other technology savvy collaborators.

New River Valley Regional Telecommunications Plan

Background

Over the past two years the New River Valley Planning District Commission has continued to move forward in the development of the New River Valley Regional Telecommunications Plan. This plan will provide potential services to the residents of the Counties of Pulaski, Montgomery, Floyd, Giles and the City of Radford.

The purpose of the New River Valley Regional Telecommunications Plan was to understand the current status of services, the needs of the community, future goals and

visions, alternatives and strategies for attaining the goals. The NRV Regional Telecommunications Plan began in March 2003 and was completed and unveiled to the community in June 2004. This plan was like non other offered in the state, a true regional open access to a broadband network allowing such a way that various service providers can offer products throughout the region.

Activities

During the past year, attention has been given to the organizational structures, which can deliver on the openness concepts. With the action of the 2005 General Assembly allowing multiple jurisdictions to create a Wireless Authority, offering "qualifying communications services" and the 1996 Regional Industrial Facility Act authorizing the creation of public/private partnerships to deliver economic development facilities, the Telecommunications Committee has developed a workable organizational structure to allow the region to expand its economic futures by providing open network infrastructure to deploy and operate broadband infrastructure and last mile solutions, jointly. The two organizations as herein described will provide the regional to develop, house, own and manage a new community fiber network, featuring open access.

1. The **New River Valley Broadband Authority** – to own or control the infrastructure and 127 points of access to the network and

2. The **New River Valley Regional Broadband Network –** to operate and manage open access to the Network**.** The Network is a public/private partnership created under the provisions of the Virginia's First Regional Industrial Facility Authority. The Network will operate the facilities and assure openness to users and service providers.

Once these two organizations are in place, there will be regional entities to develop, house, own and manage a new community fiber network, featuring open access. Currently attorneys representing Virginia's First Regional Industrial Facility Authority are preparing the legal documents to implement each organization. It is anticipated that the organizations will be in place by early November.

During these next few months, efforts of the NRVPDC staff and E-Corridors staff will be concentrated in the area of modifications to the existing infrastructure plans. It is anticipated that by early 2006, plans will be prepared and negotiations underway with each local jurisdiction for participation in the open access network.

The NRVPDC shall continue to hold monthly meeting with all members of the Telecommunications Committee as the plans for the NRV Regional Telecommunications Plan are finalized.

Dickenson County

The concept of DCWIN began in November of 2001 while looking at ways of connecting the Courthouse and the new 911 center being constructed. We determined that the best way to connect the two was through a wireless network. Looking to save money we also decided to share the Internet connection with several different County Agencies. During this time the 911 office was working with a local engineering company and they expressed their frustration with the limited access to broadband in the area. After checking the alternatives for broadband access and speaking to several other business owners in the area we saw that there were very limited options and these options were very expensive. We then looked in to the possibility of having a very large pipe to the internet and providing service to these businesses that would benefit from a broadband service. We are able to provide high speed data transmission between County Agencies, provide high speed internet access to County agencies, high speed data transmission to mobile units, high speed internet access to mobile units, provide broadband to large, medium, and small businesses, provide high speed data transmission for business, and provide broadband internet to residential customers while providing much needed tower space for emergency services (police, fire, rescue and emergency management).

DCWIN worked with Representative Clarence "Bud" Phillips to craft and enact the Wireless Authority legislation (HB 2164) in Virginia. DCWIN is a Wireless Authority and we have been operating since June of 2002 for the County agencies and June of 2004 providing service to business and residential customers.

DCWIN continues to grow and we expect to offer service in at least three other counties that are adjacent to our county and have enter in to talks with other localities about the possibility of installing there system and or operating their system. We can offer them 24/7 tech support for their systems through our existing staff.

As we continue to grow we have been contracted to manage and operate the Haysi Fiber Project. Through this contract we have extended the fiber an extra mile in length and we are installing WiPOPs (Wireless Access Points of Presents) along this fiber. We are able to extend the fiber to businesses that need the higher capabilities of the fiber and through the WiPOPs we can offer high-speed data transmission for small business and broadband to residential customers at a fraction of the cost of running the fiber. We are presently in talks with one Virginia locality that has installed fiber in a great majority of their city but wants to cover the downtown area with free WiFi, WiPOPs to cover the areas that small business and residents are located that they do not have fiber to, and to allow access for Mobile Data Terminals (MDT's) in Police, Fire, Rescue, and Emergency Management vehicles any where within the City.

Southside Planning District Broadband Initiative

The Southside Planning District Commission, working with local leaders, continues to work towards the goal of high-speed telecommunications services available to all citizens, businesses, and industries in Southside Virginia.

Funding was acquired from the Tobacco Indemnification and Community Revitalization Commission and the Economic Development Administration to build and deploy broadband services via a high-speed telecommunications backbone across Southside Virginia. The Regional Backbone Initiative will complete a link between Southside's rural areas and small communities, and larger areas such as Richmond and the Research Triangle Park in North Carolina, as well as universities and business centers throughout the world. These connections will help to create an economic advantage for the area, which already features an excellent quality-of-life.

The Mid-Atlantic Broadband Cooperative is overseeing the planning and construction of the new telecommunications lines. The backbone will connect four cities, twenty counties, and 56 industrial parks. It has the potential to connect nearly 700,000 citizens and 19,000 businesses as well. The backbone system, planned by Adesta and Dewberry, is expected to go live in 2006. A $15 million network operations center is being built in South Boston as well.

It is hoped that having the telecommunications backbone will spur economic development projects involving "last mile connectivity," that is, connections from the actual backbone infrastructure to groups of people and businesses, typically in towns and developments. Already, this activity is taking place.

The Southside Regional Broadband Telecommunications Planning Project aims to provide that link between the backbone telecommunications system being built by the Mid-Atlantic Broadband Cooperative, and end users in the Southside Planning District. The project targets users in the towns of Halifax and South Boston, in Halifax County, as well as the towns of Boydton, Chase City, Clarksville, and South Hill, in Mecklenburg County.

The Southside Planning District Commission is facilitating the success of this project in many ways: by applying for funding, surveying potential users, managing the bidding process for feasibility studies and engineering design, and promoting the project through various avenues of outreach including group meetings and individual consultation.

The plan, known as the Regional Community Telecommunications Plan, provides for the preparation of Halifax and Mecklenburg Counties for the installation and operation of a telecommunications network. This network will connect to the backbone fiber optic system and provide last-mile connectivity to the residents and businesses of the towns. The network itself will be an open system, allowing anyone access. Local governments will own the network, with maintenance and operations contracted out to private firms.

Private firms will also provide the end user services, including Internet access, VPN, and other technologies.

The Regional Community Telecommunications Plan identifies current service providers, the rates they charge, their customer base, capabilities, and relationships to a regional planning process. The plan also highlights users' needs in terms of current uses and costs, opportunities and needs, and technical support needs. The plan identifies potential service providers for the network, and their needs, marketing plans, and costs. Broadband uses and applications, training issues, and potential training providers are also discussed.

Network operations and management are addressed in the plan as well. Procurement of a design firm, creation of user agreements, and preliminary as well as final design with cost estimates are included in the plan. The Regional Community Telecommunications Plan also outlines funding strategies for the network's physical costs and operations as well as marketing issues, such as websites, education, and economic development recruiting.

The development of this plan will result in identifying the projected beneficiaries and costs associated with installing and operating a broadband telecommunications network. This network will provide businesses and individuals throughout the area with high-speed telecommunications services that will result in business expansion opportunities as well as encouragement of new economic growth in Southside Virginia.

Mid-Atlantic Broadband Cooperative, Inc.

The Mid-Atlantic Broadband Cooperative (MBC) is a non-profit 501 c (6) cooperative organized under the laws of the Commonwealth of Virginia.

With funding from the Virginia Tobacco Commission, and the federal Economic Development Agency, MBC is overseeing the construction and operation of an advanced fiber backbone project – the Regional Backbone Initiative (RBI) – to connect all 56 industrial parks in Southside Virginia, carrier central office locations, hospitals, higher educational facilities and other connectivity points. Once completed, the network will cover more than 700 miles across 20 counties and five cities. The project user base includes almost 700,000 citizens and 19,000 businesses.

MBC will offer wholesale dark-fiber pairs as well as wholesale-managed services to competitive carriers, existing carriers, cable companies, content service providers and research groups.

In February 2004, MBC signed a contract with the Adesta Group, a large telecommunications services company that plans, designs, constructs, and manages large fiber-optic projects. Adesta is managing the design and construction for more than 400 miles of fiber-optic network. As a part of the project, Adesta is building a new state-of-the-art Network Operations and Control Center (NOCC) in South Boston that will be used to manage the operational aspects of the MBC network as well as control other networks that Adesta manages in the region. As a true partner, Adesta is investing its own money in the establishment of the NOCC. The center will create at least 20 new jobs in this Virginia town.

The RBI will provide for connections outside the Southside region including Roanoke, Richmond, Norfolk, Tysons Corner and Raleigh, North Carolina. These connections will provide open access connectivity to major telecom hub locations and allow the Southside region to market itself as a home for technology related industries, connectivity, and job creation.

A project status map for this project can be found at www.mbc-rbi.org/status/

Summary

During the past five years, Virginia has taken bold steps to ensure that the backbone telecommunications infrastructure necessary to support the delivery of affordable last-mile services is deployed. Governor Warner's "One Virginia" set the tone for the initiatives at the onset of his administration, and rural communities continue to rally around its ideas and ideals.

We have made progress toward our goal of ubiquitous affordable broadband availability, but the journey is not complete. While metropolitan areas with high population densities such as Hampton Roads, Arlington, Richmond, Prince William and Fairfax are flush with broadband choices, areas with lesser concentrations such as Westmoreland, Giles, and Page Counties are for the most part, still operating on dial-up. Due to the rapidly changing broadband deployment landscape, it is impossible to estimate how many Virginians are still without affordable, accessible broadband access. But so long as a dichotomy exists, there is still work to be done.

In keeping with this sentiment, and in an effort to keep the momentum going, Governor Warner requested that the Office of the Secretary of Technology convene a broadband roundtable[27] to examine and identify broadband deployment barriers, determine areas of need, and develop a set of recommendations and action items. The group held its first meeting on October 11, 2005 and will reconvene for a daylong working session in Richmond on December 9, 2005 to develop an initial list of issues and action items.

If this meeting produces an outcome(s)with the potential to shape future broadband activities and policies in the Commonwealth, a report outlining the group's recommendations will be submitted as an addendum to this report.

[27] Roundtable participants include broadband providers, community representatives, federal, state, and local governmental agencies, advocacy organizations, and members of the Virginia Legislature.

Appendix One: Virginia Tobacco Indemnification and Community Revitalization Commission

Created in 1999 by the General Assembly of Virginia, the Virginia Tobacco Indemnification and Community Revitalization Commission is a 31-member body whose purpose is to make payments to farmers to compensate for the decline of tobacco quotas and to promote economic growth and development in tobacco-dependent communities. The Commission is also tasked with studying and determining the economic consequences of the reduction in quotas, the viability of alternative cash crops, and any other matters the Commission believes will affect Virginia tobacco farmers. Funding for these initiatives is provided through the National Tobacco Grower Settlement Trust.[28] Virginia Counties eligible to receive funding are as follows:

Southside:
Amelia, Appomattox, Bedford, Brunswick, Buckingham, Campbell, Charlotte, Cumberland, Dinwiddie, Franklin, Greensville, Halifax, Henry, Lunenburg, Mecklenburg, Nottoway, Patrick, Pittsylvania, Prince Edward, and Sussex.

Southwest:
Bland, Buchanan, Carroll, Dickenson, Floyd, Grayson, Lee, Russell, Scott, Smyth, Tazewell, Washington, Wise, and Wythe.

Proposals from qualifying localities are submitted to subcommittees of the Commission for consideration and approval. The Subcommittees are: Southside Economic Committee, Southwest Economic Committee, Agribusiness Committee (formerly Tobacco), Education Committee, Special Projects/Innovation Committee, Securitization/Finance, Personnel Committee, Technology Committee, Long Range Plan Task Force, and the Procurement Committee. Note: Guidelines for grant submissions are located on the Commission's website at www.vatobaccocommission.org

To date, more than $23 million in funding has been committed to broadband projects in Southside and Southwest Virginia. Grant funded telecommunications related initiatives include:

[28] The National Tobacco Grower Settlement Trust was created by separate agreements with the major tobacco manufacturers to fulfill an obligation to address concerns of tobacco farmers and tobacco-growing communities. The agreement applies to 14 tobacco-growing states and trust funds are NOT revenue to the Commonwealth of Virginia. Chase Manhattan Bank serves as Trustee for the private trust.

Locality	Purpose	Amount
Scott County Telephone Cooperative	FTTP – Gate City Virginia	$3,302,756
Mid-Atlantic Broadband, Inc.	Regional Broadband Initiative	$3,600,000
Southwest Virginia Education and Training Network	SVETN Broadband Utilization: Educational Telecommunications for Economic Development	$1,500,000
Virginia Coalfield Coalition	Southwest Virginia Fiber Optic Backbone	$3,000,000
Bristol Virginia Utilities	Commercial and Residential Telecom Infrastructure Expansion in Washington County	$4,676,912
City of Bristol	BVU High Speed Bandwidth in Rural Areas	$2,030,000
Lee County, Scott County, and Wise County	Lenowisco Rural Area Network	$1,879,877
Russell County	Cumberland Plateau Broadband Project	$850,000
Campbell County	Wireless Broadband Internet Access Infrastructure	$50,000
Piedmont Foundation, Dan River Region	High-bandwidth network infrastructure to serve Danville/Pittsylvania County to provide foundation for an e-business data center	$2,000,000
LENOWISCO PDC	Broadband Last mile demonstration project (preliminary engineering study). Project also received a $445,000 Loan from the Commission	$200,000
Russell County	Preliminary engineering study for high-bandwidth technology – Bristol to Gate City, Abingdon to Lebanon to Richlands, and within Abingdon.	$450,000

Appendix Two: Appalachian Regional Commission

The Appalachian Regional Commission (ARC) is a federal-state partnership that works with the people of Appalachia to create opportunities for self-sustaining economic development and improved quality of life. As defined in the legislation from which the Appalachian Regional Commission derives its authority, Appalachia is a 200,000-square-mile region that follows the spine of the Appalachian Mountains from southern New York to northern Mississippi. It includes all of West Virginia and parts of twelve other states: Alabama, Georgia, Kentucky, Maryland, Mississippi, New York, North Carolina, Ohio, Pennsylvania, South Carolina, Tennessee, and Virginia. The Appalachian Counties in Virginia are as follows: Alleghany, Bath, Bland, Botetourt, Buchanan, Carroll, Craig, Dickenson, Floyd, Giles, Grayson, Highland, Lee, Montgomery, Pulaski, Rockbridge, Russell, Scott, Smyth, Tazewell, Washington, Wise/Norton, and Wythe. Additionally, the following independent cities are included as part of the Appalachian Region: Bristol, Buena Vista, Covington, Galax, Lexington, Norton, and Radford.

Each year, ARC provides funding for several hundred projects throughout the 13 Appalachian states in support of economic and human development. Each year throughout the Region, ARC programs create thousands of new jobs, increase school readiness, improve local water and sewer systems, expand access to health care, assist local communities with strategic planning, and provide technical, managerial, and marketing assistance to emerging new businesses.

The ARC spreads their funding across nine project categories including telecommunications. In an effort to ensure that the information highway does not bypass the Appalachian region, the ARC established the Information Age Appalachia Telecommunications and Information Technology Program.

The Telecommunications and Information program was developed out of recognition that while much of the United States has been reaping the economic benefits of the Information Age, rural and small town areas in Appalachia were lacking access to robust telecommunication infrastructures. Intended to benefit any locality in Appalachia, the program places special emphasis on the Region's distressed counties[29].

Information Age Appalachia focuses not only on access to infrastructure, but also, and more importantly, on applications that use that access. Instead of simply promoting technology, this ARC program seeks to stimulate economic growth and improve the standard of living in the Region through technology-related activities. The four key areas of the program are: access and infrastructure, education and training, e-commerce, and technology-sector job creation.

[29] The six ARC Designated Distressed Counties in Virginia are: Buchanan, Lee, Scott, Wise, Russell and Dickenson.

Appendix Three: CIT's *Broadband 101 - Untangling the Wires*

Broadband 101 - "Untangling the Wires" Workshop

If you find the "alphabet soup" of broadband acronyms and jargon to be confusing, then this is the workshop for you. This interactive workshop provides participants with the opportunity to learn about broadband technologies and how they can improve an organization's bottom-line.

Topics to be covered include:

What is "Broadband"?

- Understand broadband technologies, acronyms and jargon
- Learn how broadband is changing the business and social landscape, and what it means to you

Broadband Benefits:

- Determine how implementing broadband can cut costs and improve productivity
- Understand where to look for potential cost savings that could be realized by implementing broadband
- Leave with the tools you need to assess your broadband readiness and make informed decisions.

Workshop Dates and Locations

March 22, 23 – Eastern Shore, Locations TBD
April 4 – Liberty University, Lynchburg

For more information on any of the sessions listed above, please contact Karen Jackson on 757-249-0884 x4 or Karen@cit.org

Appendix Four: LENOWISCO and Cumberland Plateau Networks