October 29, 2010

Ms. Kelley Goes
Secretary, WV Department of Commerce
Chair, West Virginia Broadband Deployment Council
Bldg. 6, Room 525
State Capitol Complex
Charleston, WV 25305-0311

Dear Secretary Goes,

It is our pleasure to provide to the Broadband Deployment Council a report that details:

- the existing broadband infrastructure owned, leased, used, operated, or purchased;
- all programs or initiatives designed to increase the usage of broadband and broadband based educational applications;
- and all training provided to instructors in the use of broadband and broadband based educational applications

for our state's public post-secondary system, as required by House Bill 4637 (2008).

Additionally, this report provides a basic analysis of the data collected in a recent survey of our institutions as requested in HB 4637.

We hope this information is helpful to the Council, and we are encouraged by the continued growth and emphasis on broadband deployment and utilization across the state.

Sincerely,

Brian Noland, Ph.D.
Chancellor
West Virginia Higher Education Policy Commission
1018 Kanawha Boulevard, East
Suite 700
Charleston, WV 25301

James L. Skidmore
Chancellor
Community and Technical College System of West Virginia
1018 Kanawha Boulevard, East
Suite 700
Charleston, WV 25301

Broadband Infrastructure, Usage, and Training in the Public Baccalaureate and Graduate College System

Bluefield State College

Broadband Infrastructure

Campus LAN: Gigabit network utilizing Cisco 3750G POE switches. Fiber connects all buildings and links floors within buildings. The LAN infrastructure has Gigabit to the desktop.

WAN: Cisco 3825 Router connecting Bluefield State College (BSC) to WVNET via a DS3 using 25Mb of bandwidth. There is a current threshold of 16Mb for Internet traffic. Multiple T1s are used to connect campuses located in Beckley, Lewisburg, and Summersville, which route to Bluefield and are behind a firewall.

WIFI: Cisco wireless Internet across campus for staff and students that ties back into the Active Directory for usernames and passwords.

Broadband Usage

1. High use of Blackboard 9.1/ WebCT Campus Edition 4 Course Management System (CMS) and Moodle (called CART) on campus at three different locations. Systems are hosted both on campus and at managed hosted locations increasing the activity on the broadband system for the 2010 year.
2. Intensive use of broadband in delivery of lab courses in business, education, health sciences, and engineering technology utilizing streaming video, live video classroom, upload/download files, PowerPoint, and live chat.
3. Intensive use of interactive video technology to teach BSC classes in Lewisburg, Beckley, Logan, and Saulsville.
4. Intensive use of online tutorials across some disciplines.

Online Course Enrollment Summary – Academic Year '09-'10		
Semester	**Online Courses Offered**	**Enrollment**
Fall '09	182	2,649
Spring '10	197	3,062
*** Total**	**379**	**5,711**

Source: WV Virtual Learning Network, Course Enrollment 09-10

* Total is not a unique student count, so likely includes head count duplication.

Broadband Training

Training is made available via WebCT. Faculty training in Blackboard and PowerPoint use also continues to grow, with student training given at the beginning of each semester for new and review of system use. Training is given in Beckley and Bluefield for faculty and staff that use the IVN system, and training for faculty and staff for the electronic classrooms on Beckley and Bluefield Campus.

Concord University

Broadband Infrastructure

Concord University has fiber optic cabling to every building on campus terminating in the Rahall Technology building. CAT5 and CAT6 copper network cable is wired to every classroom, office, and residence hall room. Cisco 3750(G) routed switches are deployed throughout the campus. 80Mb of bandwidth to the internet is provided via the local phone company—Frontier—for the campus. The entire network is gigabit capable.

Concord currently has bids to place wireless access into each residence hall, the athletic stadium, and the commuter parking areas. This initiative will give complete wireless coverage to the campus.

Broadband Usage

Concord utilizes the Blackboard CE 6 learning system as its main resource for hosting online courses. Using this technology, instructors can easily place their syllabi, lecture notes, announcements and other resources online, as well as use Blackboard instruments such as live chat, whiteboard, email, discussion boards, and online assessments. Blackboard can be accessed by both instructor and student from any computer with internet connectivity. At present, Concord only facilitates courses that use Blackboard as a supplement to face-to-face courses. There are no online courses that are entirely online with no face-to-face meeting requirements.

Concord provides courses via videoconferencing to students who would otherwise be too far from campus to take classes. Videoconferencing is also used by a variety of individuals at Concord to conduct business meetings, budget meetings, and other conferencing with distant sites. The Center for Academic Technologies currently uses the H.323 (IP) and H.320 (ISDN) standards for transmission and has available three types of CODECs for faculty/student use: Vtel, Tandberg, and Polycom.

Broadband Training

The Center for Academic Technologies (CAT) provides monthly training on various classroom support technologies including Blackboard course development, use of video conferencing, Mediasite software and web development services, as well as the use of supplemental technologies into the classroom that provide instructional strategy support.

One web-based resource developed by the CAT is the website "Teaching & Learning: Educational Technology Resources for Faculty, Staff, & Students." This website serves as an online resource for instructional strategies, productivity tools, and reference materials. It fosters more effective teaching practices using technology to create an effective learning experience, enhances the quality of teaching and learning in Concord University courses, and supports teaching and learning at all levels and in all contexts in which instruction occurs at the university.

Fairmont State University

Broadband Infrastructure

Fairmont State University (FSU) has in place a sophisticated layered network that is supported by multimode and single mode fiber providing a minimum of 1GB Ethernet to every building. Buildings with high network demand have multiple trunked connections providing the necessary bandwidth.

Commodity Internet service is supported by two different providers, Time Warner (30MB) and WVNET (80MB). The two connections are multihomed using Border Gateway Protocol (BGP) routing providing physical and logical redundancy –if one fails, service is automatically maintained through the other so that the campus is able to function until the failed connection is reestablished.

Four remote locations, the Center for Workforce Education, the Gaston Caperton Center, the Robert C. Byrd National Aerospace Education Center, and FSU GearUp, connect back to the FSU main campus using a 20MB Metro WAN service provided by Time Warner.

Two other remote locations—Braxton Co. High School and Weston High School—connect back to the FSU campus using "point-to-point" T1s provided by Frontier (formerly Verizon).

Bandwidth is managed using a packet shaping device to ensure no one device or network segment can utilize all available capacity. Bandwidth is continuously monitored and added, when necessary and fiscally possible, to support the growing demand for online based instruction, services and research of the campus community.

802.11 b/g wireless networking covers most areas of the campus allowing the use of laptops and other mobile devices as one crosses the campus.

The security and integrity of the network is maintained by various methods, all of which are facilitated by having a common vendor for most network equipment.

Current educational applications are clustered around server farms to provide high availability and access to the user community. These systems utilize a hardware load balancer, along with redundant gigabit network connections.

A separate Research and Development Network is deployed for Science and Technology faculty. This R&D network was created so that research faculty can install servers, conduct "destructive testing" and perform other academic research in an environment that they can fully control, but which cannot impact the security and operations of the main campus network.

Broadband Usage

FSU is one of three institutions in West Virginia that provides hosting services for Blackboard/Vista as well as handling all online course delivery. Hosted partners include WV Northern Community College, Mountwest Community & Technical College, Eastern WV Community & Technical College, and Pierpont Community & Technical College. FSU is the largest participant in the Global Grid Exchange (G2EX) project managed by the West Virginia High Tech Consortium with 923 active nodes, and an approximate value of $10 million per year provided to the West Virginia and regional research economy that is serviced by the G2EX project.

Online Course Enrollment Summary – Academic Year '09-'10		
Semester	**Online Courses Offered**	**Enrollment**
Fall '09	129	3,230
Spring '10	127	3,234
Total	**256**	**6,464**

Source: FSU

* Total is not a unique student count, so likely includes head count duplication.

Broadband Training

FSU currently provides training via the Teaching and Learning Commons (TLC) for full-time faculty and adjuncts both at Fairmont State University and Pierpont Community & Technical College in the use of Blackboard/Vista and other learning technologies. The TLC also provides training on demand for hosted partners and other institutions in the state of WV on occasion.

Glenville State College

Broadband Infrastructure

Glenville State College (GSC) has a fiber optic delivered 100Mb Carrier Ethernet link from FiberNet connecting to WVNET for WAN connectivity. 45Mb/s of this available bandwidth is currently purchased for the use of faculty, staff and students at GSC. The core router and 95 percent of all of switches on campus are Cisco products. Other minority network equipment vendors are Cabletron/Entrasys, 3Com and Trendnet.

All major buildings on campus have fiber optic cable between them that was installed in the late 1980's. The fiber is 62.5 micron ATT multimode cable utilized in a star configuration bringing all buildings back to the Harry B. Hefflin Administration building. Recently remodeled buildings now have multiple strands of both multimode and single mode fiber available within the buildings. Wiring closets between floors are connected via fiber at 1Gb/s speeds. Most are running at 1Gb/s with two running at 100Mb/s via single mode fiber back to the core.

Most buildings have limited wireless (WiFi) connectivity in place with the Robert F. Kidd Library being the only building having total coverage. Faculty, staff, and students living in GSC Corp. units are connected to the main campus via Motorola canopy broadband wireless equipment at 100Mb/s.

Broadband Usage

GSC continues to be an innovative and driving force behind the use of broadband in North Central WV. The number of partners continues to grow, and initiatives that depend upon sustainable, stable computing resources brought online. Agreements with West Virginia Regional Jail System, Juvenile Justice System, Department of Corrections training centers, local entities (police, newspaper) are expanding GSC's environment of learning.

Grant funding from NCC, US Department of Education, US Department of Justice, NASA, PDS, and HEPC has helped to expand the network, security, support, training and utilization of broadband services. This allows GSC to build and support student success by offering additional bandwidth for tutoring, WebCT instruction, research, training, and video conferencing. The amount of hardware resources and broadband required continues to grow very quickly.

Online Course Enrollment Summary – Academic Year '09-'10		
Semester	**Online Courses Offered**	**Enrollment**
Fall '09	26	530
Spring '10	N/A	N/A
Total	**26**	**530**

Source: WV Virtual Learning Network, Course Enrollment '09-'10 (Spring '10 not yet reported to WVVLN)

* Total is not a unique student count, so likely includes head count duplication.

Broadband Training

Depending upon the topic area, training is provided by IT staff and/or contracted out to vendors. Training for faculty is provided in the following: Microsoft Windows XP, Microsoft Windows Vista, Microsoft Office Suite products, SunGard HE Banner SIS, Smarthinking, TeacherEase, WebCT Vista, and use of Video Conferencing equipment.

Marshall University

Broadband Infrastructure

Marshall University's Campus Network (MUnet) is a state-of-the-art 10-Gb/s Ethernet backbone based network linking all buildings on the Huntington Campus with WAN links to our regional campus, centers, and medical clinics. MUnet supports over 11,000 switched gigabit Ethernet ports and nearly 350 WiFi 802.11n wireless access points. The Huntington Campus is connected to the South Charleston Campus by a 100-Mb/s Transparent LAN Service (TLS) circuit provided by Frontier Communications (formally Verizon) and a 100-Mb/s diverse path NTelos MPLS circuit. The Mid Ohio Valley Center campus in Point Pleasant is linked to the Huntington Campus by a 100-Mb/s Frontier Communications TLS circuit. The Medical Education Building and VA Hospital in Spring Valley and the Marshall University Research Corporation in downtown Huntington are connected by a 100-Mb/s Frontier Communications TLS circuits. Various smaller learning centers like the Larry Joe Harless Center in Gilbert and clinical facilities are connected via 10-Mb/s Frontier Communications TLS or NTelos MPLS circuits.

The Huntington Campus network is linked by a university owned metro fiber point to point service to the Robert C. Byrd Center for Flexible Manufacturing and the Marshall University Joan C. Edwards School of Medicine (JCESOM) Campus adjacent to Cabell Huntington Hospital. The School of Medical metro fiber also extends to the JCESOM Fairfield Campus linking the Erma Ora Byrd Clinical Center and the Forensic Science Center to the MUnet.

Completion of an FCC grant funded project to extend the current Huntington metro fiber network to St. Mary's Medical Center, St. Mary's Medical Center Education Center, Cabell Huntington Hospital, the JCESOM, the JCESOM Fairfield campus, and the Marshall University Robert C. Byrd Biotechnology Science Center, and MUnet with two redundant 10-Gb/s Ethernet rings should be complete in early 2011. These metro Ethernet rings will provide the bandwidth and redundancy necessary to enable the next generation medical and collaboration technologies.

The MUnet campus networks are connected to 600-Mb/s of commodity Internet Service provided by dual diverse path Internet Service Providers (ISP). Marshall University is also a member of Internet2 and is connected to Internet2 with 1-Gb/s of service via the Ohio Academic and Research Network (OARnet). Plans are underway to extend the total commodity Internet Service of MUnet to 1.5-Gb/s provided by a third ISP with a third diverse path before the end of 2010. This bandwidth and redundancy will provide the reliability and services needed to support current campus initiatives.

All MUnet service provides full Quality of Service (QoS) on all network ports and multicasting in support of voice, data, and video services and other real time applications. All services are switched and operate at full wire speeds. MUnet supports full Voice over IP, VoIP, telephony services with unified communications and voice mail to nearly 3,500 extensions and a limited number of FAX and other analog lines via analog gateways.

MUnet central video conferencing services support full High Definition (HD) conferencing at 720p or 1080p. All HD endpoints are capable of a four way video call. Support for video calls with more than four concurrent endpoints is provided by a 20 port Multi Point Control units supporting full HD.

Web Conferencing for virtual classrooms is provided by the Wimba Collaboration Suite, now Blackboard Collaborate. This service provides a full virtual classroom experiences with student breakout rooms, lecture recording/archiving, and poll/question/quizzing during on-demand archived sessions. Rooms are also available for campus meetings and other event functions.

Broadband Usage

Marshall University makes extensive use of broadband services. The university has over 200 totally online courses that have more than 5,000 enrollments each semester. In addition to the totally online courses, E-courses, most traditional classroom courses at Marshall University use the learning management system, MUOnline. MUOnline is powered by Blackboard Learning Systems software and has as many as 1,500 concurrent users accessing course content, assignments, video and other multimedia, and/or interacting in discussions, chats, or video conferences. Over 90 percent of the student population uses the learning management system for at least one course every semester.

Online Course Enrollment Summary – Academic Year '09-'10

Semester	Online Courses Offered	Enrollment
Fall '09	290	5,678
Spring '10	199	6,448
Summer '10	166	3,541
Total	**655**	**15,667**

Source: Marshall University / WV Virtual Learning Network, Course Enrollment '09-'10

* Total is not a unique student count, so likely includes head count duplication.

Total Use of Learning Management System – All Courses Using Broadband

Semester	Distinct Students Enrolled	Total Enrollments	Sections	Max # Concurrent Users
Spring '10	11,397	24,568	1,123	1,489
Summer '10	5,535	7,298	338	N/A
Fall '10	11,431	28,846	1,282	1,520

Source: Marshall University

Marshall University also hosts learning management system services for Glenville State College and Southern West Virginia Community & Technical College. Each hosted institution has had student enrollments in the Learning Management System of between 200 and 250 students during fall and spring terms.

Marshall University has partnered with the WV Telehealth Alliance in support of advanced networking to link researchers and clinical medicine facilities together at high speeds and to the networked world via commodity Internet and Internet2 services. Marshall will support improved health care coordination in rural areas through telehealth applications, applied research and health education.

Marshall University has made a major commitment to the research community with a recent NSF EPSCoR Cyberinfrastructure Grant that will support connections to Internet2 for qualifying state agencies, non-profits, non-profit and for profit K12, higher education institutions, museums, libraries, art galleries, hospitals, and research groups or projects. This Sponsored Education Group Participants program is intended to allow expanded access to the Internet2 national research network and will add to the economic development portfolio of the State.

Broadband Training

The MUOnline Design Center, a unit within Information Technology with three professional instructional designers and six FTE student design assistants, provides technical support to faculty for the development and deployment of online courses. Many of these utilize video, audio, and other bandwidth intensive resources and collaboration technologies.

A new initiative began last year, supported in part by an NSF EPSCoR CI-TRAIN Cyberinfrastructure Grant, to make faculty aware and train them on the resources available on Internet2. These resources include but are not limited to NSF supported resources such as TeraGrid. On-going faculty training presents topics related to High Performance Computing Clusters, Science Gateways, and other resources and services available via the Internet and Internet2.

The EPSCoR CI-TRAIN Cyberinfrastructure Grant also supports an experimental HPC Cluster at Marshall University to train faculty and other researchers in the use of high performance computing.

Shepherd University

Broadband Infrastructure

Shepherd University's commodity Internet connection remains at 40 Mb/s. Equipment is being replaced this year which will enable us to expand that connection in future years while maintaining our current levels of network management. Shepherd does not subscribe to Internet2. The campus network is a gigabit fiber-optic network core with a mixture of mostly Cat-5e and Cat-6 connections to end points. An 804.11(g) wireless network is available in selected locations (e.g., library, student center, and a few other buildings). The wireless network, administrative network, and student residential network are segmented into virtual LANs with access control lists between each of the VLANs. Shepherd has partnered with Frontier Communications to extend wireless network access to almost all academic buildings on campus beginning with the fall 2009 semester. NAT is used for all internal addressing.

Broadband Usage

In 2008 the University replaced the WebCT learning management system with Sakai—an open-source system. An instructional technologist in the Center for Teaching and Learning has created Sakai instances for all courses. All instructors are invited to seminars and sessions for using Sakai as part of their classroom instruction; approximately 20 percent of the faculty use CTL resources at some point during the academic year. Expansion of the wireless network into classroom spaces proceeds as funding permits. Alternatives to the campus-owned and managed wireless network are being explored (i.e., outsourcing the wireless LAN to a local Internet provider).

The Office of Admissions is developing downloadable video clips ("vodcasts") for prospective students. These clips help introduce Shepherd's unique educational opportunities to high school and transfer students. While Shepherd University's World Wide Web presence is entirely accessible to dial-up users, vodcasts target the increasing percentage of incoming students with broadband connections. It is hoped that increased usage of these technologies by the administration will encourage their use among the faculty for teaching.

On-campus usage of the infrastructure continues to increase. Our Internet connection is routinely at 100% utilization during peak academic times (weekdays, 10 am to 6 pm). Approximately 1/3 of the course sections at Shepherd now use the Sakai learning management system (up from about 20% in 2008). Beginning in fall 2009, two programs (nursing and music) are using Apple iPod Touches as mobile computers for instructional purposes, taking advantage of the wireless networks available in their primary teaching locations.

Broadband Training

As described above the Center for Teaching and Learning assists instructors in the use of Sakai. No other formal programs are in place, although the IT Services User Support area assists instructors having problems with information technology. Implemented in Fall 2009, a new leave management system now requires all employees to submit sick and vacation time electronically. Therefore we have employees who are not traditional computer users (e.g., dining service workers or custodians) using computers and computer accounts as part of their work routine. As a result, additional technology training is being offered on campus to employees.

West Liberty University

Broadband Infrastructure

West Liberty University has in place two physically and logically segregated networks. Our administrative network is an internal network that is comprised of a Cisco Infrastructure utilizing Cisco 3750G switches, Cisco Catalyst 4507 switches, Cisco ASA 5550, Cisco ACS, and a Cisco WLSE. The residential network consisting of seven dorms and numerous residential units are currently being serviced by a Comcast High Speed Broadband connection. Users are guaranteed 6Mb/s download and 768Kb/s upload speeds and the network as a whole can burst to 7Gb/s as needed. 802.11a/b/g wireless access has been deployed for our students in the academic buildings.

West Liberty University's WAN network utilizes a Cisco 3825 router connecting to CityNet via a DS3 using 45Mb/s of bandwidth.

The campus is supported by multimode fiber connected to every administrative and academic building on campus.

West Liberty University also has in place a satellite location at the Highlands in Triadelphia, WV. This location consists of a Cisco 2921 router utilizing 5Mb/s of bandwidth from Stratuswave.

Broadband Usage

The majority of West Liberty University's major applications are housed at off-campus locations, so these services are made available to the campus via existing broadband connections. Sakai, an open source product, replaces Blackboard / Vista, hosted by Fairmont State University, for 2009-2010. Our instance of Sakai is hosted by rSmart. The switch reflects a choice to move to a platform with features better aligned with our needs rather than a dissatisfaction with the hosting services provided. Email continues to be provided via Google Apps for Education and Banner is provided through WVNET. There is a marked increase in the use of Web 2.0 tools to support instruction.

Online Course Enrollment Summary – Academic Year '09-'10		
Semester	**Online Courses Offered**	**Enrollment**
Fall '09	14	282
Spring '10	16	338
Total	**30**	**620**

Source: West Liberty University

* Total is not a unique student count, so likely includes head count duplication.

Broadband Training

To better support student learning and faculty productivity West Liberty University created a new 11-month faculty position, the Online Learning Specialist, and established a formal compensation plan to provide faculty a monetary incentive for online course development and teaching. The Online Learning Specialist's responsibilities, working with both IT and faculty, include training and support for the use of Sakai, iTunesU, Turnitin, online Web2.0 tools, Google Apps for Education, instructional technologies such as interactive whiteboards, student response systems, and streaming video such as Discovery Education. Each of these tools depends heavily upon broadband availability. During May 2009, 47 faculty members completed the training for use of Sakai to support online learning. Additional trainings, June-August 2009, were completed by 26 freshmen experience instructors and/or faculty members.

West Virginia School of Osteopathic Medicine

Broadband Infrastructure

The West Virginia School of Osteopathic Medicine (WVSOM) leases a 22Mb metro Ethernet connection from the Lewisburg Campus to the State Capitol Complex, Building 6, in Charleston via FiberNet. A 10Mb internet connection is managed by WVNET. This provides connectivity for the faculty/staff network supporting Banner, Web site and other institutional applications, including Microsoft exchange. WVSOM leases a second 10Mb internet connection provided by Suddenlink Communications. This second connection provides for an independent, internet-based student network accessible via Cisco wireless access points located throughout the campus. Students access all web-based applications and printers found throughout campus via this network.

These connections are managed by firewall and Packeteer/Packetshaper filtering appliances. These allow WVSOM to manage network traffic thereby providing priority to academic applications.

Broadband connectivity is used to link WVSOM with campuses and Mountain State Osteopathic Training Institution sites throughout WV. These include over 20 hospitals and clinics that provide clinical training for graduate students and postgraduate internship and residency training. Additional connectivity used for video conferencing is provided via MDTV.

Bandwidth utilization is monitored and can be increased based on demand.

Broadband Usage

WVSOM utilizes web-based resources in support of all four years of graduate student medical education. WVSOM utilizes a WAN to deliver video and other applications to statewide campuses and postgraduate training sites. There are no on-line courses as such. Graduate student pre-clinical and clinical training utilizes the Secure On-line Learning Environment (SOLE), developed at the WVU School of Medicine. All curricular material is made available via this application (which is similar to Blackboard/WebCT). Testing is conducted online using SOLE or LXR. The statewide campuses utilize these applications extensively. The management of rotations, evaluations, grading, et cetera, is done using web-based applications.

WVSOM is a partner in the WV Telehealth Alliance, formed to manage the FCC rural telehealth grant program, and the WV Health information network initiative, which is developing linked health-related databases. WVSOM will be providing training and will also participate in evaluation and data analysis.

Broadband Training

Instructors receive training in the use of the web-based course management system and the web site content management system. Training in the use of videoconferencing equipment is also available. Computer labs are maintained for demonstrating the use of web-based applications, and web-based seminars (webinars) are being developed to train staff at remote sites.

West Virginia State University

Broadband Infrastructure

West Virginia State University (WVSU) has in place a campus LAN utilizing Gigabit fiber connections in a combination of star and ring topologies to each of 26 buildings on the Institute campus via a multimode fiber backbone with 1Gb routers in most buildings and providing 1Gb – 10Mb connections in buildings.

Off campus facilities include Valley Fork (Clay County), WVSU Economic Development Center (Kanawha Blvd, Charleston), WVSU Capital Center (Summers Street, Charleston), Shawnee Regional Park (Dunbar), Fayette County Courthouse (Fayette County), Summers County Courthouse (Hinton), Wyoming (Pineville), Roosevelt Center (Charleston), Carroll Terrace (Charleston), and Nicholas County (Summersville) and are served via multiple methods including shared facilities, DSL, cable and dedicated T1 (Verizon, FrontierNet, WV FiberNet).

Internet service providers include WVNET (16Mb) and FiberNet (100Mb to the Governor's Office of Technology/WVNET).

Wireless LAN is supported in the Library and Student Union for visitors and students with portable computing devices. It is also supported in other locations on campus where portable computer labs may be deployed. The wireless connections are used when needed and simplify connection to internet services to facilitate quick setup of the portable computing labs.

The main campus network is composed of 3 networks sharing a common public network:

1. An administrative network protected by a Cisco PIX firewall and includes separate fiber connections to five buildings.
2. A student residential network that incorporates a registration system and is segregated from the other networks. Bandwidth to the residential network is managed using a Packeteer appliance.
3. A third network exists using VPNs on the public network for the WVSU Research and Development Corporation.

Network service is provided for the WV State Community and Technical College on the public network through 3 routers.

The separate private networks are deployed in each building or logical building segment using smoothwall routers. Public network service is provided via on-campus DSL or fiber to WV Clearing House, College Summit, Upward Bound, Kanawha County Adult Basic Education, and Kanawha County Collaborative Programs.

Campus network operation is insured by continuously monitoring segment and critical servers via TCP connect, ping, and resource availability.

Campus infrastructure is built according to published campus standards (http://standards.wvstateu.edu).

Broadband Usage

The campus continues to expand its use of WebCT, a product that supports using the web for delivering course content. While the primary use of WebCT at WVSU is for web assisted or web enriched classes, WVSU also offers online courses using WebCT.

Online Course Enrollment Summary – Academic Year '09-'10		
Semester	**Online Courses Offered**	**Enrollment**
Fall '09	22	549
Spring '10	38	914
Total	**60**	**1,463**

Source: WV Virtual Learning Network, Course Enrollment '09-'10

* Total is not a unique student count, so likely includes head count duplication.

Broadband Training

WVSU currently provides training on WebCT/ Blackboard/Vista and other learning technologies for full-time faculty and adjuncts through the Center for Instructional Technology (CIT).

West Virginia University

Broadband Infrastructure

West Virginia University (WVU) supports three core network locations; one in downtown Morgantown, one in the Evansdale Campus, and one in the Health Sciences Center; each is connected by redundant single-mode (SM) fiber. Campus buildings are connected to the core locations via redundant SM fiber. The fiber is owned by WVU.

Wireless networking (WLAN) is handled by Cisco LWAPPs controlled by five WiSM blades, four located at the core sites and one at the Evansdale Residential Complex. One WLC44 located at Potomac State College in Academy Hall. Currently B- and G- signals are deployed with no plans to go to N-signal at this time.

The wide-area network (WAN) consists of several different types of circuits. The main MPLS WAN consists of a 1 Gb connection (100 Mb access) in Morgantown with remote connections to WVUP (25Mb), WVUIT (30Mb), City Hospital (45Mb), Jefferson Hospital (45Mb), Princeton (1.5 Mb Frame), Elkins (1.5Mb) and WVU/Health Sciences - Charleston (20Mb). Additional sites—Center for Rural Emergency Medicine, Fire Training Center, Jackson's Mill, and the Center for Excellence in Disabilities—each have 1.5Mb Frame Relay circuits that land on the WVU ATM backbone via an ATM OC3. WVU has a total internet bandwidth of 773 Mb with 60 Mb of that connection dedicated to WVU Hospital. There are various other locations, both residential, and college oriented, that have DSL connections to the WVU backbone via ATM. There are additional broadband connections via Telemedicine (MDTV), and IVIN interactive academic classrooms are multiple sites across West Virginia.

Finally there is a full T1 connection to WVU Jackson's Mill.

Broadband Usage

West Virginia University Extended Learning — eLearn.wvu.edu —takes courses around the state and around the globe through off-campus programming and distance learning technology via broadband. WVU provides access to graduate programs as well as many undergraduate online classes. Most students tend to be adult learners, but courses are also offered to many high school students through online and hybrid classes offered in high schools. WVU offers more than 21 graduate degrees and certificates in online and/or blended formats and 3 undergraduate degree completion options. WVU Extended Learning has also expanded into the non-credit field to address the needs of all life-long learners.

The Instructional Technology Resource Center (ITRC) increases the extent to which technology enhances the quality of teaching and learning at WVU. The

ITRC's mission is to support, promote, and enhance teaching effectiveness at the University through instructional strategies and faculty development. The ITRC promotes methods that enable the University to achieve its goals of providing a student-centered technology enhanced educational experience for all students. With 6 Instructional Designers and 3 Multi-Media Designers, the ITRC developed approximately 40 online courses in 2008, bringing WVU's total to over 300 totally online courses.

WVU operates an enterprise Course Management System using Blackboard Vista that hosts the WVU main campus including Health Sciences, WVUIT, Bridgemont Community and Technical College, Potomac State College and WVU-Parkersburg. Representatives from units and hosted institutions meet monthly for updates and training on eCampus Course Management System. This group, or eCampus Points of Contact, provides information and support within units on aspects related to eCampus including plug-ins and auxiliary tools (see https://ecampus.wvu.edu/faculty).

WVU eCampus Statistics

Semester	Distinct Students Enrolled	Total Enrollments	Sections	Max # of Concurrent Users
Fall '09	32,389	171,400	4,705	3,444
Spring '10	30,268	154,761	5,044	4,231
Summer '10	11,697	27,227	1,404	1,341
Fall '10	32,669	178,572	4,974	3,619

* Statistics are for WVU campuses only. Hosted institutions courses are not included in these numbers.

Additionally, the Health Sciences Center offers faculty assistance through the Information Technology Services. This department provides networking and telecommunication services; telemedicine, teleconferencing, and distance education; web and database support; user training, consultation, and public computing facilities; and Help Desk support to Health Sciences Center students, faculty, and staff in support of the teaching, learning, and research mission of the Robert C. Byrd Health Sciences Center. Pedagogy and effective teaching strategies are enhanced through the Teaching Scholars program for Health Sciences faculty. In Health Sciences Center, SOLE (Secure OnLine Environment) portal is used as a single point of entry for all courses and secure resources. It is a web-based open-ended system for students to access courses and for instructors to build and maintain those courses. SOLE portal (https://sole.hsc.wvu.edu) is also used as a secure gateway to access and manage other applications and databases used in Health Sciences Center. SOLE delivered about 26 million pages in spring of 2009 and the volume of usage increases approximately 10 percent each year.

Some individual Colleges host local instructional technology support units, e.g., Human Resources and Education's Teaching Learning Center, Business and Economics' Technology Support Unit, and Eberly College's Center for Computing Literacy.

Online Course Enrollment Summary – Academic Year '09-'10		
Semester	**Online Courses Offered**	**Enrollment**
Fall '09	325	5,483
Spring '10	368	6,217
Summer '10	415	7,460
Total	**1,108**	**19,160**

Source: WVU enrollment data for sections 7D, 7W, OIA, OIB (Extended Learning online/web)

* Enrollment does not represent a unique student count, but represents the sum of enrollment per course.

Broadband Training

Training is provided by the Office of Information Technology and the ITRC to all new and current faculty on all campuses. Training includes effective online teaching and how to use the enterprise course management system and all associated eLearning tools. This provides faculty with the information needed to quickly and easily integrate into the classroom. Web-based tools are often used to provide these training opportunities.

The Computer Science/Electrical Engineering Department offers a periodic course in parallel and grid computing. Ad hoc and on-demand training is also available on-campus, conducted by the Pittsburgh Supercomputing Center in the use of High Performance Computing tools.

Discussion and recommendations regarding deployment of additional collaborative tools such as Wikis, blogs, document management, and other online tools to support teaching and learning as well as administrative efficiencies are also under consideration.

Broadband Infrastructure, Usage, and Training in the Community & Technical College System

Blue Ridge Community and Technical College

Broadband Infrastructure

Blue Ridge has two campus locations – downtown and tech center - networked together using two T1 links. This will be replaced with a 10Mb fiber connection. Each individual campus network backbone is interconnected via 1Gb links. Phone service at the tech center is achieved through VOIP connection to the downtown building. Wireless covers both academic and administrative areas at both buildings. A local cable company internet connection is used for the student portion of the wireless network and some computer labs.

Broadband Usage

Blue Ridge CTC uses MyMathLab and SMARThinking online tutoring in the academic foundation courses. SMARThinking is available to the entire campus but is primarily used in the academic foundations writing courses. WebCT Version 4.1 hosted at WVNET is the primary learning management system. Digital library resources include EBSCO Host and LLW Premium Nursing database. Access is also provided to databases at the Martinsburg-Berkeley County Public Library.

Online Course Enrollment Summary – Academic Year '09-'10		
Semester	**Online Courses Offered**	**Enrollment**
Fall '09	64	1,252
Spring '10	103	1,965
Total	**167**	**3,217**

Source: Blue Ridge CTC

* Total is not a unique student count, so likely includes head count duplication.

Broadband Training

Academic departments train instructors in MyMathLab and SMARThinking.

Eastern West Virginia Community & Technical College

Broadband Infrastructure

Eastern West Virginia Community & Technical College broadband serves four Access Centers (Pendleton County High School, Tucker County High School, South Branch Career and Technical Center, Hampshire County High School) and the nursing lab. These locations are networked together using a T1 frame relay circuits with a DS3 circuit at the main campus. All network traffic routes back to the headquarters using Cisco hardware. All Access Centers and the nursing lab have a 100Mb/s backbone; the main campus has a Gigabit backbone. Firewall protection, antivirus, and spam filtering are provided by WVNET in Morgantown. QoS is installed on the Cisco routers at the Access Centers and the nursing lab to ensure priority of video packets when using Distance Learning equipment. This equipment includes a PolyCom VSX 7000 and VSX 8000. Multiple connections can be made using our PolyCom MGC-50. Plans are underway to expand broadband access to the technology center in Petersburg beginning Fall 2010.

Wireless network access has been deployed at all Access Centers and the nursing lab. The main campus has both secure and unsecure wireless VLANs. The secure VLAN is for use by college employees to access shared resources and printers on the LAN. The student VLAN allows access only to the internet and is restricted from access to the college LAN. Wireless at the Access Centers are secure networks using WEP with 128bit encryption.

Broadband Usage

The college currently uses the PolyCom videoconferencing systems and Blackboard WebCT as its primary delivery tools for distance education classes. The PolyCom MGC-50 makes it possible for the instructor to be located at the headquarters and to provide instruction to one or two other sites using interactive video over IP. The college has entered into an agreement with Fairmont University train, and support courses being delivered using Blackboard. Other modalities are also in use, using a combination of hardware and software.

Online Course Enrollment Summary – Academic Year '09-'10		
Semester	**Online Courses Offered**	**Enrollment**
Fall '09	18	276
Spring '10	25	360
Total	**43**	**636**

Source: Eastern WV CTC

* Total is not a unique student count, so likely includes head count duplication.

Broadband Training

Access Center advisors and faculty receive training at the start of each semester for both existing and new employees. The training covers the use of the PolyCom VSX 7000 & 8000 systems. An Information Technology guide that contains IP addresses, location, and layout of the classrooms is also provided. Two employees of the college have been trained on the use and support of Blackboard and are readily available to assist faculty and student with their use of the application.

New River Community and Technical College

Broadband Infrastructure

The New River CTC broadband network is an integrated voice, video and data network that connects six locations in Beckley, Ghent, Lewisburg, Princeton, and two sites in Summersville. Fiber connections (10Mbps) connect each campus location to the COLO in Charleston, which is provided by Alpha Technologies with Fibernet as the Internet Service Provider. The main campus in Beckley was recently upgraded to 20Mbps. Ghent is currently in transition from a cable modem connection to fiber. The College's Internet connection is currently a 30Mb circuit. New River does not currently have access to Internet2. The New River wireless network is available at each of our six locations using 802.11n. All switches, routers, gateways, firewalls, and wireless access points are Cisco equipment and gigabit speeds to the desktop are supported. A Cisco VoIP phone system is deployed at all six campus locations.

Broadband Usage

With six locations, New River relies heavily upon the broadband network for all academic and administrative services. The Beckley campus is currently the primary location for most server-based solutions (email, web, active directory, etc.) but SCT Banner is hosted in Morgantown by WVNET and New River staff members administer it. New River relies heavily on a number of cloud-based resources (nearly half of all online resources in use at the College are on the cloud). A combination of Windows Server 2003 and 2008 comprises the majority of New River hosted solutions, although some key services are hosted on Mac OS X Server.

To support a 9-county area of southern West Virginia, New River heavily utilizes video-based course delivery that we refer to as the Interactive Video Network (IVN). Currently, we have 14 IVN classrooms owned by New River with four in Lewisburg, three in Summersville, two in Beckley, two in Princeton, one in Ghent, one at the Valley Fork Education Center, and one at the Pocahontas County High School. Additionally, we have two IVN classrooms owned by Bluefield State College that are deployed on the New River campus in Lewisburg. New River is currently creating one additional classroom on the Beckley Campus that will be available by October 2010. All of the New River IVN classrooms support High Definition video with multipoint connectivity and duo video (instructor plus content using two simultaneous video streams). A 24-port Cisco MCU is currently being used to bridge, schedule and manage these video connections but it provides only 16 HD ports for video. A 5-port IPVCR records and streams the IVN content following the live delivery for students to review and to assist students who might miss an IVN class.

Currently the Fall 2010 schedule has 107 course sections being offered via IVN with some of those courses also being web-enhanced, meaning that they additionally use the ANGEL learning management system. Each IVN course is comprised of at least two course sections and some comprise as many as 3-4 sections, so 107 course sections on the schedule indicates a smaller number of actual courses. The Fall 2010 schedule currently has 82 ANGEL course sections on the schedule (completely online) and one section actually does equal one course. We have 27 course sections on the Fall 2010 schedule that are web-enhanced, meaning they utilize ANGEL for some portion of the course delivery. And every course section on the schedule (over 600 total) has access to the ANGEL learning management system so that it may be used as a supplement to traditional classes.

A five-year Title III grant has been instrumental to New River's development of a broadband network infrastructure and accompanying online services by funding a large portion of these startup initiatives. Year three of this initiative began in October 2010.

Online Course Enrollment Summary – Academic Year '09-'10		
Semester	**Online Courses Offered**	**Enrollment**
Fall '09	57	1,042
Spring '10	71	1,560
Total	**128**	**2,602**

Source: New River CTC

* Total is not a unique student count, so likely includes head count duplication.

Broadband Training

The Center for Teaching Excellence provides an instructional designer to support faculty for development and deployment of traditional, online, video-based and hybrid forms of instruction. A centralized college Help Desk works collaboratively with Information Technology staff deployed to each campus location to provide technical support for all New River students, faculty and staff.

West Virginia Northern Community College

Broadband Infrastructure

West Virginia Northern Community College has three campus locations—Wheeling, Weirton, and New Martinsville—networked together via T1 and D3 lines. Network traffic routes through Cisco routers and switches at all locations. Fixed firewall and traffic limiter/filtering are provided through a software/hardware solution. The connection among the three campuses is via VPN. The college is currently working with a regional internet security designer/engineer to restructure the flow of traffic for both intra- and internet usage at the college and campuses. This restructuring will increase bandwidth and the availability of services to support increased use of technology for distance education, and remote connections of classes via internet/intranet applications.

Broadband Usage

The college currently uses Blackboard Vista as its primary CMS for delivery of distance education classes, hybrid courses and programs. Other modalities are also in use, using a combination of hardware and software, to deliver classes via video web conferencing. Three classrooms are fully outfitted with IP Video instruction stations.

Online Course Enrollment Summary – Academic Year '09-'10		
Semester	**Online Courses Offered**	**Enrollment**
Fall '09	32	709
Spring '10	32	1,007
Total	**64**	**1,716**

Source: WV Virtual Learning Network, Course Enrollment '09-'10

* Total is not a unique student count, so likely includes head count duplication.

Broadband Training

Faculty and staff professional development sessions are offered throughout the year in the use of all technology initiatives. Some of these sessions include the use of CMS systems like Blackboard, video web conferencing between campuses and with area high schools, web page design and development, and a variety of user applications available for use.

Southern West Virginia Community and Technical College

Broadband Infrastructure

Southern West Virginia Community & Technical College currently has four campus locations, and one off-site location at Lincoln County High School. All campus locations and the Lincoln County site have their Internet access routed through the Logan campus site. So, all Internet traffic comes from Charleston to the Logan campus and is then routed to the appropriate satellite campus location. For traffic that is dependant on the state wide infrastructure, such as ICR classrooms, the traffic is routed from each campus's ICR facility to the facility that is either hosting the event, or watching the conference via ICR. Southern also utilizes a 10 megabyte connection between the Williamson campus and the Logan campus that is provided by Suddenlink Communications at a monthly subscription cost. The rest of the College's connectivity is provided by Verizon. The connection to the state network and the Internet is through WVNET, the statewide ISP for higher education institutions.

Broadband Usage

Wireless network access is deployed at each campus location. There is a secure and unsecured VLAN defined for this. The secure link is for use by college employees and allows access to applications that are not available for student use. The student VLAN allows access only to the internet and is routed to a separate connection to remove the traffic from the campus network. This is accomplished by purchasing a low cost connection from the local cable company at each campus.

Online Course Enrollment Summary – Academic Year '09-'10		
Semester	**Online Courses Offered**	**Enrollment**
Fall '09	58	1,330
Spring '10	56	1,437
Total	**114**	**2,767**

Source: WV Virtual Learning Network, Course Enrollment '09-'10

* Total is not a unique student count, so likely includes head count duplication.

Broadband Training

None.

CTC Outsourced Broadband Services

The following CTCs are either hosted on four-year campuses or broadband services are managed by another institution. Broadband data related to these institutions are reported as part of the host institution. Where possible, online course enrollment figures are reported.

- Bridgemont CTC – Broadband services provided by WVU

Online Course Enrollment Summary – Academic Year '09-'10		
Semester	**Online Courses Offered**	**Enrollment**
Fall '09	40	690
Spring '10	18	322
Total	**58**	**1,012**

Source: WV Virtual Learning Network, Course Enrollment '09-'10

* Total is not a unique student count, so likely includes head count duplication.

- Mountwest CTC – Broadband services provided by Marshall University
  - Course enrollment is included in the host institution data.

- Pierpont CTC – Broadband services provided by Fairmont State University

Online Course Enrollment Summary – Academic Year '09-'10		
Semester	**Online Courses Offered**	**Enrollment**
Fall '09	N/A	N/A
Spring '10	50	1,282
Total	**50**	**1,282**

Source: WV Virtual Learning Network, Course Enrollment '09-'10 (Fall '09 not yet reported to WVVLN)

* Total is not a unique student count, so likely includes head count duplication.

- Kanawha Valley CTC – Broadband services provided by WV State University
  - Course enrollment is included in the host institution data.

- WVU at Parkersburg – Broadband services provided by WVU

Online Course Enrollment Summary – Academic Year '09-'10		
Semester	**Online Courses Offered**	**Enrollment**
Fall '09	145	2,627
Spring '10	183	3,158
Total	**328**	**5,785**

Source: WV Virtual Learning Network, Course Enrollment '09-'10

* Total is not a unique student count, so likely includes head count duplication.