

Broadband

Marshall University 2013 Update

Broadband Infrastructure

Marshall University's Campus Network, MUnet, is a state-of-the-art 10 Gb Switched Ethernet based backbone network linking all buildings on the Huntington Campus with WAN links to our regional campus, centers, and medical clinics. MUnet supports over 15,000 switched gigabit Ethernet ports and over 600 WiFi 802.11n dual band wireless access points that are upgradable to the new 802.11ac emerging standard.

The Huntington Campus is connected to the South Charleston Campus by a 100Mb Transparent LAN Service (TLS) circuit provided by Frontier Communications (formally Verizon) and a 100Mb diverse path LUMOS MPLS circuit. The Mid-Ohio Valley Center in Point Pleasant is linked to the Huntington Campus by a 100Mb Frontier Communications TLS circuit. The Medical Education Building (now housing our new School of Pharmacy) adjacent to the VA Hospital in Spring Valley and the Marshall University Research Corporation in downtown Huntington are both also connected by a 100Mb Frontier Communications TLS circuits. Various smaller learning centers like the Larry Joe Harless Center in Gilbert and clinical facilities are connected via T1 or 10Mb Frontier Communications TLS or LUMOS 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 in downtown Huntington. Fiber pathway has been extended to the new Visual Arts Center being across across from Pullman Square in downtown Huntington. This facility is due to open in summer 2014.

The Marshall University Joan C. Edwards School of Medicine (JCESOM) Campus adjacent to Cabell Huntington Hospital and the JCESOM Fairfield Campus, including the Erma Ora Byrd Clinical Center as well as the Forensic Science Center, are connected by a JCESOM & WV Telehealth owned metro fiber optic ring operating at 10Gb. An additional JCESOM and WV Telehealth owned metro fiber optic ring links St. Mary's Medical Center and the St. Mary's Medical Education Center, also the location of the new Marshall University Physical Therapy Doctoral Program, at 10Gb and integrates to MUnet on the Huntington Campus. The WV Telehealth intra-carrier hub for Huntington is located in the Drinko library and connected to each of the JCESOM/WV Telehealth rings. These rings are planned and operated by Marshall University Information Technology in coordination with St. Mary's Medical Center, Cabell Huntington Hospital, the Joan C. Edward School of Medicine, and the WV Telehealth Alliance.

The MUnet campus networks are connected to 1.4Gbs of commodity Internet Service provided by three diverse Internet Service Providers (LUMOS, OARnet/3ROX/WVNET, and GTT). Marshall University is also a member of Internet2 and is connected to Internet2 with 500Mb of service provided via the WVNET 10Gb West Virginia state-wide ring linking Huntington, Charleston, Morgantown, Columbus, and

Pittsburg to primary Internet and Internet2 providers. This bandwidth and redundancy provides the reliability and services needed to support current campus initiatives and activities.

Marshall University had established a SEGP agreement with Internet2 to offer Internet2 services to other West Virginia higher education institutions, K12, State Government Agencies, Libraries, Hospitals, and other eligible not for profit research and education entities in West Virginia. This was partially funded in FY2012 by an EPSCoR grant that was initiated in FY2011. An agreement was reached at the beginning of FY2013 to turn over services for provisioning Internet2 to other agencies to WVNET. WVNET had obtained BTOP funding for provisioning a state-wide 10Gb ring that should sustain this connectivity into the near future.

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.

Marshall University participated in the Internet Society's World IPv6 Day 2011 on June 8, 2011. During this worldwide test Marshall University certified MUnet to be fully IPv6 enabled. Internet Protocol version 6 is the future of Internet addressing and protocols and will gradually replace IPv4, Internet Protocol version 4. IPv6 offers many enhancements to the basic protocol of the Internet in addition to adequate address space to accommodate the growing number of Internet connected devices.

MUnet supports full Voice over IP, VoIP, telephony services with unified communications and voice mail to nearly 4,000 extensions as well as a limited number of legacy FAX and other analog lines via analog gateways.

MUnet central video conferencing services support High Definition (HD) conferencing at 720p or 1080p. All HD endpoints are capable of a four way video call on their own. A 20-port Multi Point Control unit supporting full HD Video Teleconferencing over IP enables video calls requiring more than four concurrent endpoints.

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

Marshall University faculty, staff, and students are given the ability to record video, audio, and screen/presentation capture of lectures and meetings with Marshall University Camtasia Relay services. These recording can be distributed automatically to YouTube directly or managed and protected with an Ensemble Video Management System and made available from within the Learning/Course Management System, MUOnline (powered by Bb Learn 9.1), or via specific credentials for streaming or download.

Marshall University provides live event streaming and archiving via the commercial LiveStream service. Commencement Ceremonies, special campus event speakers, and other public events are streamed live from campus or other remote MUnet sites.

Broadband Usage

Marshall University makes extensive use of broadband services for the delivery of credit courses. The university offered 969 totally online asynchronous courses in FY13 that had 14,888 student enrollments. In addition to the totally online asynchronous courses, called *Ecourses* at Marshall University, most traditional classroom courses at Marshall University also use the learning management system, MUOnline, to provide content online to students. Many lectures are recorded and provided as online streaming video from campus servers for both on and off campus viewing.

MUOnline is powered by Blackboard Learning Systems Learn 9.1 software and has as many as 2,500 concurrent users accessing course content, assignments, video/multimedia, and/or interacting in discussions, chats, or web/video conferences. Over 90 percent of the student population uses the MUOnline learning management system for at least one course every semester.

Technology Enhanced, *Tcourses* or blended learning courses sometimes referred to as hybrid courses, at Marshall University are delivered primarily online with eighty percent or more online and asynchronous and up to twenty percent that may require synchronous class meetings totaled 265 course sections in FY13. Two-way or multi-way distance room video conferencing accounted for 49 sections while Virtual Classroom sections utilizing our Blackboard Collaborate Web Conferencing is growing rapidly many traditional synchronous offering this option to students for lecture and group meeting attendance.

Marshall University no longer hosts learning management system services for Southern West Virginia Community & Technical College. WVNET assumed these services in January 2013.

In 2010 and 2011 Marshall University partnered with the WV Tele-health 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 Tele-health applications, applied research and health education.

Marshall University made a major commitment to the research community with the implementation of an EPSCoR Cyber Infrastructure Grant that is supporting the offering of connections to qualifying state agencies, non-profits, non-profit and for profit K12, higher education institutions, museums, libraries, art galleries, hospitals, and research groups or projects to Internet2. This Sponsored Education Group Participants, SEGP, program is intended to allow expanded access to the Internet2 network and is a major addition to the State of WV economic development. In the summer of 2012 Marshall University agreed to turn the operation of this initiative over to the newly reorganized WVNET for operation and delivery.

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 in 2010 and completed in 2013, supported in part by an EPSCoR CI-Train Cyber Infrastructure Grant, to make faculty aware and train them on the resources available on Internet2. These resources include but are not limited to NSF support resources like the TeraGrid. Faculty training is on-going on topics like High Performance Computing Clusters, Science Gateways, and other resources and services available on the Internet and Internet2.

The EPSCoR CI-Train Cyber Infrastructure Grant will also supported an experimental HPC Cluster at Marshall University to train faculty and other researchers in the use of high performance computing.

In May 2011 Marshall University Information Technology established a subscription agreement with the Internet Streaming Services of Lynda.com, an online training site known for excellent training content on a wide variety of computer applications, software, and general professional development. In 2012 and 2013 Marshall University renewed the LyndaCampus subscription which continues to provide high quality and current training content to any Marshall University faculty, staff, or student anywhere they have a broadband connection. The LyndaCampus subscription provides over 1,200 up-to-date training topics on a variety of both technical and non-technical topics.

Traditional Room Based Video Conferencing Sites

Marshall University utilizes a number of room based video conferencing systems for meetings as well as for credit courses. Most of these are available to other state agencies on a cost recovery basis when not in use by Marshall University for credit courses or other events. Most Standard Definition calls are at 1-2 Mb whereas most High Definition calls are at 2-4 Mb. Polycom is our preferred room system vendor although we do have some systems from Lifesize and Cisco/Tandberg.

Increased Broadband Use

Marshall University is in its fifth year of providing university wide web conferencing (including voice, data, and video) for synchronous online courses, meetings, and other collaboration. The use of these services, particularly for online synchronous web conferencing classrooms, is growing rapidly. The introduction of mobile clients for both our Blackboard Collaborate Service (used primarily for classroom instruction and online faculty office hours) and our Microsoft Lync Service (used primarily for meetings and faculty/staff collaboration) will introduce new demand for both 4G public mobile broadband and WiFi networks linked to home and business ISPs.

We are seeing an increase in the use of cloud services for research computing with Internet2 along with cloud commodity Internet suppliers for many different applications within the university. Cloud services for compute, storage, and disaster services are being used extensively. These services provide new and exciting methods of efficiency and effectiveness in teaching, learning, research, and administration.