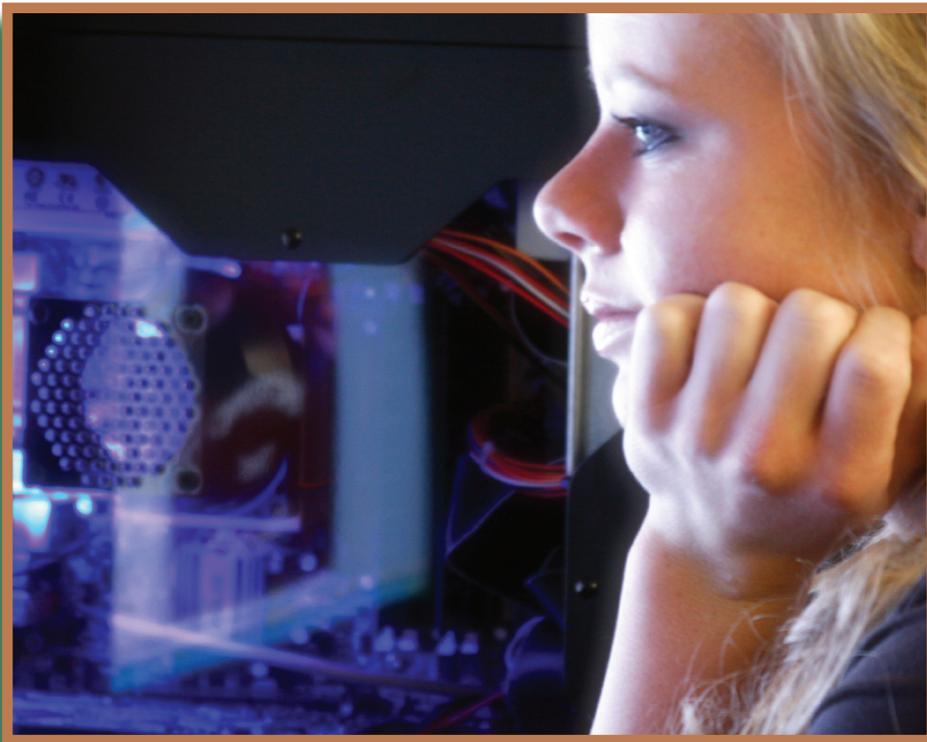


S **STANDARD 5 - LIBRARY AND INFORMATION
TECHNOLOGY - INFORMATION TECHNOLOGY**



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STANDARD 5.A - PURPOSE AND SCOPE

The primary purpose of the library and information resources is to support teaching, learning, and, if applicable, research in ways consistent with, and supportive of, the institution's mission and goals. Adequate library and information resources and services, at the appropriate level for degrees offered, are available to support the intellectual, cultural, and technical development of students enrolled in courses and programs wherever located and however delivered.

5.A.1 The institution's information resources and services include sufficient holdings, equipment, and personnel in all of its libraries, instructional media and production centers, computer centers, networks, telecommunication facilities, and other repositories of information to accomplish the institution's mission and goals.

Montana Tech's Information Technology Department is a critical component of Information Resources. The Montana Tech Library and the Information Technology Department are two separate entities. Therefore, Standard 5 is addressed in two separate self studies: 1) Standard 5 – Library; and 2) Standard 5 – Information Technology. What follows is the Information Technology section.

STANDARD 5.A.1 – INFORMATION TECHNOLOGY

Montana Tech provides a multitude of campus computing resources in support of the campus mission, which is to meet the changing needs of society by supplying knowledge and education through a strong undergraduate curriculum augmented by research, graduate education, and service. The base campus desktop runs a Microsoft Operating System. This homogeneity is purposeful to afford campus faculty and students seamless use of campus desktops and the software that they contain. In addition to this base platform, specialty campus resources are available which include a new production Mac lab and Linux facilities. Additionally, many campus departments run specialized hardware and software resources for the certification needs of their respective areas. Details can be found by referring to Required Exhibit 5.A.I – IT, [Campus Computer Lab Inventory](#).

Campus desktop computing is composed of more than 1000 desktops and is supported by 55 physical servers and 52 virtual servers which supply the following campus services: Active Directory and Radius Authentication, Printing, File, Email, On-Line Course Management (Blackboard), Campus Portal (MyMtech), Campus Web Site (www.mtech.edu), Thin Clients, Blackberry Enterprise Server, Student Records, Document Workflow (Nolij), DNS, WINS, and DHCP services.

All campus core computing services are environmentally, physically, and electrically protected to assure 24x7x365 availability in order to meet for the timely information needs of the entire Tech community. This delivery was made possible by renovating the data center in the summer of 2008. The core data center and cooling system is

backed with an automatic transfer switch coupled to a 125 KVA diesel powered backup generator.

Electrically, the data center is protected with a UPS system that protects electronic equipment from utility power blackouts, brownouts, sags and from surges. The UPS filters small utility line fluctuations and isolates electronic equipment from large disturbances by internally disconnecting from the utility line power. For a complete analysis of this system, see Required Exhibit 5.A.II – IT, [Montana Tech Data Center Upgrade](#).

Three service areas comprise Campus Technology Services (CTS) and are now in place: Network Services, Information Services, and Online Services (each with well-defined work paths). The Directors/Managers from these three areas make up the Campus Technology Council which advises the administration on technical issues, developments, and direction. Campus Technology Services has a staff of nine people to cover the core services and two well trained students to operate the Help Desk. Additionally, three Computer Support Specialists (Coordinators) provide desktop support. The dedication of the 12 IT members is reflected in the longevity of key members, with a collective total number of years of service to Montana Tech IT at 193 campus years and 288 years overall. See Table 5.A.I – IT, IT Experience in Years.

TABLE 5.A.I - IT, IT EXPERIENCE IN YEARS

IT EXPERIENCE IN YEARS			
STAFF	CTS	CAMPUS	OVERALL
3	Information Services	69	79
2	Online Services	41	54
4	Network Services	78	135
SUB-TOTAL		188	268
	SUPPORT		
3	Computer Specialists	5	20
TOTAL		193	288

5.A.2 The institution’s core collection and related information resources are sufficient to support the curriculum.

Montana Tech is enrolled in the Microsoft Campus Agreement for all of its Microsoft software needs. Most desktop operating systems and core software are licensed through this Campus Agreement. As part of other core software, Montana Tech is licensed to operate 28 Adobe Concurrent Master Suite sessions which are managed under a license server listed with 300 clients. Essentially, any Montana Tech computer can be setup with the Adobe Master Suite and includes instructional labs. The license server enables prioritizing client usage by time and/or station. Montana Tech addresses pc desktop

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security by licensing all desktops with the McAfee Total Protection Advanced Suite of antivirus and malware protection software.

In the Spring of 2001, the Blackboard Course Management system was implemented to support the online curriculum and online components. Originally this system was purchased with Blackboard's Community System, but the only piece that was used from the Blackboard Community System was the portal. In 2006, the Community System was discontinued, and uPortal, an open source portal system, was implemented. In the Spring of 2009, Tech implemented the latest release of uPortal, making it easier for users to access important information. Please see exhibit 5.A.III – IT, [MyMtech](#). While Blackboard is a very good system for delivering content, assessments, and assignments, its synchronous technologies are not quite mature enough and cause frustration for some users. Because of this gap in online materials, Tech purchased Wimba, the web-conferencing virtual classroom application. Wimba integrates with Blackboard, allowing the user to access the following tools without requiring special software or separate authentication credentials:

- » Video;
- » Chat;
- » Whiteboard;
- » Application Sharing; and
- » Session Archiving.

As an example of this technology, an instructor on maternity leave is using Wimba in order to teach the following courses from home:

- » Math for Bus and Social Science I 70038 (44 enrolled);
- » Calculus I Honors 72440 (11 enrolled);
- » Calculus I 73731 (27 enrolled); and
- » Calculus II 70045 (58 enrolled).

In the above courses, lectures recorded with Wimba are available to students via Blackboard and can be viewed as many times as needed. Students have given positive feedback on this process, particularly from those in which English is a second language. The whiteboard function within Wimba is used to write formulas for the students. Finally, evening online office hours are conducted from the instructor's home.

Other examples of Wimba in use are graduate level courses. Students from all over the globe participate in the Masters in Project Engineering Management (MPEM) program. Dr. Kumar Ganesan meets these students weekly, via Wimba, by using Power Point slides and having students take turns delivering lectures with their own materials from wherever they live.

5.A.3 Information resources and services are determined by the nature of the institution's educational programs and the locations where programs are offered.

Information resources and services accommodate the needs of the institution's educational programs. To this end, the Network Services Department designed, built, and integrated an audiovisual (AV) and Access Grid Node (AGN) Communications

System into a new 24-seat computer lab for the Health Care Informatics Program, making it “a classroom of the future.”

This Lab became a reality early in 2005. Health Care Informatics is an emerging specialization in the health care industry that joins the disciplines of information technology, communications, and health care. The new system enhances instruction for Health Care Informatics students and truly is a premium conferencing and presentation system. It can be used to link Montana Tech Health Care Informatics and remote students.

These innovations are possible because Montana Tech understands that learning can be enhanced and facilitated by a laboratory-classroom which is integrated with networked computers, AV conferencing, and information and communications technologies.



On another front, with the completion of the new Natural Resources Building in late 2009, Montana Tech will have another 24 seat computerized classroom equipped with expanded audio/visual presentation and video conferencing capability. Montana Tech is increasingly mindful of how video conferencing enhances classroom instruction by using experts in the field from across the country.

While AV classrooms are instrumental in bringing information to the classroom, Tech has also purchased Wimba Classroom which is a virtual classroom environment that allows students to log on from anywhere. With the use of a microphone and camera, the student can also be seen and heard. These items add to the experience, but are not required. At a minimum, the student only needs a telephone; a phone number is provided to also join the class.

The number of students in online learning is increasing at a steady pace. This increase is recognized in students that take classes with an online supplement of a face to face class and in those courses that are delivered purely online. The following Figure 5.A.1 – IT, Increasing Online Access, demonstrates year by year access is increasing. The number of course views indicates the frequency of course access. A course view is simply a web page related to a course, so the more access the more online participation. The downward trend noted in the graph is attributed to completion of courses and finals approaching. Also, the Fall semester ends in mid-December.

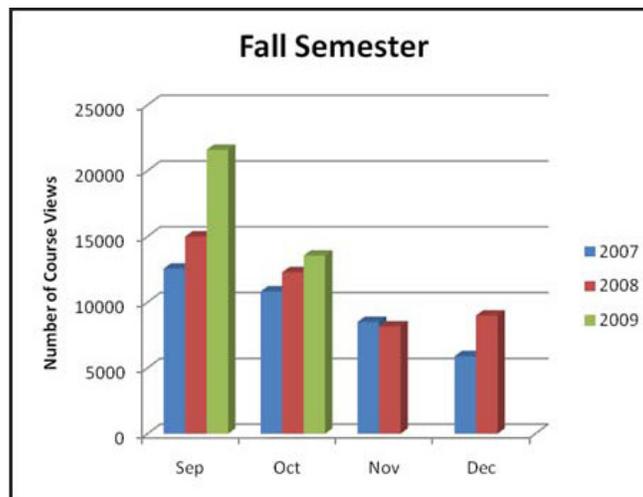


FIGURE 5.A.1 - IT, INCREASING ONLINE ACCESS

CLOSING THE LOOP

Based upon the increase, a Distance Learning Coordinator was hired. The Distance Learning Coordinator gives Tech faculty a resource person who understands all of the available technologies and pedagogical principles necessary to create high quality online courses.

Coupled with a clear plan and policies, a single point of contact reduces overall expenses to the University by providing support for a clearly defined distance learning “toolkit” (i.e., a set of common software applications) so that isolated faculty members and Departments do not purchase different software applications for web-conferencing, streaming video, and Podcast production, etc. Adopting and supporting a limited and unified set of software applications to maintain a distance learning program at the institutional level will enable Tech to take advantage of the cost savings associated with volume licensing.

Using technologies already available at Montana Tech, instructors are now able to cost-effectively encourage collaborative learning and to instill a sense of community among both distance and traditional students.

STANDARD 5.B – INFORMATION RESOURCES AND SERVICES

Information resources and services are sufficient in quality, depth, diversity, and currency to support the institution's curricular offerings.

5.B.1 Equipment and materials are selected, acquired, organized, and maintained to support the educational program.

The Campus Technology Services (CTS) Directors Council is the focus of integrating IT related systems into academic programs. Faculty, students, or deans introduce a need by first bringing it to the Computer and Telecommunications Advisory Committee whereby direction and funding are discussed. Once a plan of action is developed, a sub-committee presents to the Associated Student of Montana Tech (ASMT) where a vote is taken. Final approval comes from the Board of Regents.

CLOSING THE LOOP

As an example, most classes require multi-media to be integrated into the classroom. However, scheduling was becoming difficult because of availability problems. To alleviate this condition, Montana Tech furnished most classrooms with multi-media capability, an effort that continues as funding becomes available. Of the classrooms/computer labs that seat 24 or more student computers, 80% are now equipped with multi-media presentation equipment. Please reference Exhibit 5.B.I – IT, [*Campus Classroom Information*](#), for a detailed breakdown. Classrooms and conference rooms range from full audio/visual resources with guest computer interfaces and full conferencing capability all the way down to visual only.

5.B.2 Library and information resources and services contribute to developing the ability of students, faculty, and staff to use the resources independently and effectively.

Montana Tech prides itself on using resources independently and effectively by providing access to the following services and personnel:

- » CTS Helpdesk;
- » Computer Support Coordinators;
- » Distance Learning Coordinator; and
- » Online Services workshops.

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In August, 2007, Network Services and the Library staff implemented a new Thin Client lab in the Library building to facilitate an instructional platform. The lab is used by Library personnel to conduct training classes on Library resource access. Also, the lab served as an experiment to validate the following assumptions normally associated with Thin Client computing: 1) Lower long-term hardware maintenance costs; and 2) Lower long-term software support costs. Thin clients are computers without hard drives and operate on client-server architecture with the central server performing processing activities. The idea is to ease hardware cost beyond the initial investment and to reduce computer configuration prototyping, computer setup, and maintenance. The initial investment is broken down in Required Exhibit 5.B.II – IT, [*Thin Client Lab Costs*](#). As expected, hardware costs have been low after the initial investment.

CLOSING THE LOOP

Another example of using technology independently and effectively is illustrated by the Video Remote Interpreting (VRI) Services now provided to Montana Tech's hearing-impaired students. Via an internet video link, a video interpreting service provider (SignOn) is accessed in Seattle. This eliminates the need for an in-person interpreter on site. A wireless microphone is attached to Montana Tech's instructor whose audio is received by the remote interpreter. Then the signed interpretation video is sent back to the hearing impaired student's notebook computer. Interaction with the instructor and student is through a webcam attached to the student's notebook computer. To communicate with the instructor, the student signs via video-communication to the remote interpreter. The interpreter then voices the translation back to the instructor and class.

Network Services worked to lighten the weight of the equipment by eliminating active devices and provisioning wireless connectivity through a privately secured band. This allows the hearing impaired students freedom to locate as desired in the classroom without having to plug into a wired network port.

At the beginning of each fall semester, Online Services provides a half day workshop for all faculty interested in using the online course management system (Blackboard). This workshop is reinforced by several one hour sessions throughout the academic year which are given by CTS Helpdesk staff. These sessions cover more detail and the more complex features of Blackboard. Upon request, one-on-one sessions are also available for instructors.

IT also understands that educating and assisting the faculty is only part of the process. It is also important to assist the students. Fortunately the CTS Helpdesk works with students as needed via email, phone, and in person and is particularly valuable for students who require more assistance.

5.B.3 Policies, regulations, and procedures for systematic development and management of information resources, in all formats, are documented, updated, and made available to the institution's constituents.

Montana Tech is covered with a three tiered policy structure. At the highest level are The Board of Regents IT policies covering The University of Montana (UM) and Montana State University and their affiliates. At the next level are The University of Montana IT policies governing not only the Missoula campus, but also the UM affiliates,

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i.e. Montana Tech of The University of Montana, The University of Montana Western, and The University of Montana – Helena College of Technology. Finally, each respective campus has developed its own IT policies.

Please refer to the following links for full versions of these policies. Also, full versions can be found in Required Exhibit 5.B.III – [*IT, IT Policies*](#):

- » [*Montana Board of Regents Policies*](#);
- » [*The University of Montana*](#); and
- » [*MT Tech Network Policies*](#).

Computers, the internet, and our campus network are major components of learning at Montana Tech. Each of these components has policies which govern use and are beneficial to all.

5.B.4 Opportunities are provided for faculty, staff, and students to participate in the planning and development of the library and information resources and services.

Membership in both the Computer and Telecommunications Advisory Committee and the Web Guidance Committee is open to anyone interested in serving. These committees are directly involved in an advisory capacity with the planning and recommendations of IT development. The roster can be found in Exhibit 5.B.IV - IT, [*Committee Roster*](#). Please refer to section 5.B.1 for a related discussion.

5.B.5 Computing and communications services are used to extend the boundaries in obtaining information and data from other sources, including regional, national, and international networks.

University/Montana Tech Network Traffic travels regionally, nationally, and internationally via:

- » Commodity internet to non-university endpoints;
- » Subsidized/restricted Internet2 network to member university endpoints; and
- » Subsidized/restricted extreme National Lambda Rail Network between selected NLR member endpoints.

Northern Tier Network Consortium

Through the Northern Tier Network Consortium, the University of Montana is working to build an extreme network (10 Gbps) connecting the Pacific Northwest [*Gigapop*](#) in Seattle and Chicago with drop-points at the two major Montana universities and with eventual links to the other Montana campuses. Montana Tech's local area network logically is an extension of The University of Montana's enterprise network. Because of this arrangement in network architecture, benefits of network connectivity derived at The University of Montana ultimately extend to Montana Tech's campus.

The Montana implementation of the Northern Tier extreme network was completed in January 2010, and is now carrying both campuses and residence life traffic. This venture involves other State Universities, State Government, and the Gigapops working together. Please refer to exhibit 5.B.V – IT, [*Northern Tier Map*](#).

With the final implementation of the Northern Tier across the other states, The University of Montana currently provisions 1.5 of the 10 Gbps transport at UM-Missoula and allocates 500 Mbps of commodity internet service to UM-Missoula and all other affiliated campuses (200 Mbps allocated for campus traffic and 200 Mbps allocated for dormitory traffic, with 100 left in reserve). The remaining 1 Gbps is allocated to I2, the National R&E Network, and the National Lambda Rail. The Northwest Gigapop now serves both I2 and commodity internet to the University of Montana campuses. As the Northern Tier-based backup (a planned component of the transition) becomes live, the old setup and services will be decommissioned.

Rocky Mountain Super Computer

Plans are underway to execute an agreement whereby UM will provision a dedicated research and education network link available to the Rocky Mountain Super Computer (RMSC). This will allow RMSC to serve all eight Montana University System campuses and the national research and education community. Although RMSC would have access to the national research and education community, only those endeavors associated with the Montana University System would be allowed.

Both the availability of the on-campus computing cluster and its link to the supercomputing facilities of RMSC make it possible for undergraduate engineering, geosciences programs, graduate education, and faculty research programs to flourish at Montana Tech.

STANDARD 5.C – FACILITIES AND ACCESS

The institution provides adequate facilities for library and information resources, equipment, and personnel. These resources, including collections, are readily available for use by the institution’s students, faculty, and staff on the primary campus and where required off-campus.

5.C.1 Library and information resources are readily accessible to all students and faculty. These resources and services are sufficient in quality, level, breadth, quantity, and currency to meet the requirements of the educational program.

Students, faculty, and staff are given sufficient network access to the following systems they will use:

- » Student Information Services;
- » Resource Sharing;
- » Wireless Hotspots;
- » Computer Labs;
- » Multimedia Presentation;
- » Video Conferencing; and
- » Internet.

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All of these resources and services are readily accessible. Campus Technology Services and the desktop computer support professionals support and maintain all of the computer resources and services. See Required Exhibit 5.C.I – IT, [CTS Organizational Chart](#). A related discussion can also be found in section 5.D.1.

Each building on the North Campus interconnects via fiber backbone to the newly renovated Data Center located in the MG Building; the infrastructure follows a dual-star topology. One star centers at the Montana Tech data center located in the Mining Geology Building, and the alternate star centers at the Engineering Building. The interconnection between the two is via a 1 Gbps link. Currently, one leg of the Engineering Building star connecting to the Chemistry Biology Building is 1 Gbps. Moreover, Network Services plans to implement 1 Gbps connections to all campus buildings. All internal links on the South Campus have been upgraded to run at 1 Gbps.

Both the South Campus and Apartment Housing interconnect to the LAN via two separate 45 Mbps licensed wireless microwave links. Additionally, there is a 54 Mbps wireless link to the Butte Airport supporting a Montana Tech Research Project. Also, we connect the Montana Bureau of Mines Pole Plant with an 11 Mbps wireless link.

Montana Tech's North Campus supports four instructional computer labs and 12 departmental or student use computer labs. The North Campus has four multi-media conference rooms located in the Student Union Building (SUB). Other conference rooms on campus have multimedia capability, such as the CBB conference room, the Dave Hill conference room (MUS 206), and ELCB 329. With two mobile video conferencing devices, video conferencing can now occur in any SUB conference room. Work is in progress to equip all classrooms of 24 seats or more with audio/video presentation capabilities, and the same is planned for several lower capacity classrooms. The South Campus supports four instructional labs with 25 computers each, a Learning Center with 22 computers, a Cad Lab, and one student access lab, (room 113) with 11 computers. Additionally, all faculty and staff are provided with a computer.



Network Services strives to maximize uptime utilization by planning upgrades, change-outs, and backups during low utilization periods such as summer, breaks, and weekends. See Exhibit 5.C.II – IT, [Systems Uptime](#), for an analysis of system downtime.

5.C.2 In cases of cooperative arrangements with other library and information resources, formal documented agreements are established. These cooperative relationships and externally provided information sources complement rather than substitute for the institution's own adequate and accessible core collection and services.

This substandard is appropriately answered in the Library's response to this standard.

STANDARD 5.D – PERSONNEL AND MANAGEMENT

Personnel are adequate in number and in areas of expertise to provide services in the development and use of library and information resources.

5.D.1 The institution employs a sufficient number of library and information resources staff to provide assistance to users of the library and to students at other learning resource sites.

Campus Technology Services (CTS) is structured to facilitate support. CTS is under the direction of the Vice Chancellor for Administration & Finance. The directors and managers from Network Services, Information Services, and Online Services comprise the Directors Council. The Directors Council advises the administration on technical issues, developments, and direction. The Directors Council can receive input from the Deans, Desktop Support Specialists, Faculty, Students, the Computer and Telecommunications Advisory Committee, or from the Web Guidance Committee. The desktop support is distributed to facilitate customized support to the College of Engineering and School of Mines, to the College of Letters, Sciences, and Professional Studies, and to the College of Technology. The Desktop Support Specialists are linked to CTS for technical direction and are managed by the Deans of each respective college.

The Campus Technology Services Helpdesk is staffed by two well trained students year round. These students take care of most problems, help the faculty and staff as necessary, and provide training workshops throughout the academic year. When an issue surpasses their knowledge, it is brought to the attention of the appropriate person. Please refer to Figure 5.D.1 – IT, [*CTS Organizational Chart*](#).

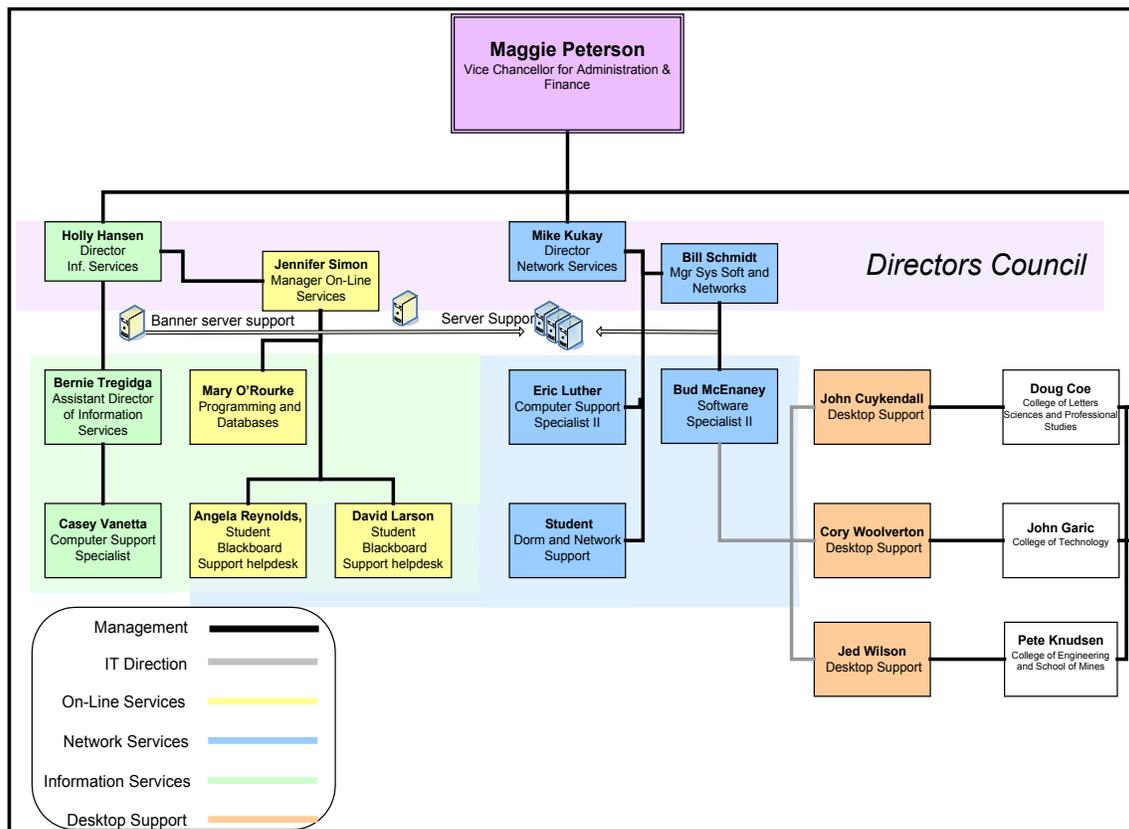


FIGURE 5.D.1 – IT, CTS ORGANIZATIONAL CHART

5.D.2 Library and information resources staff include qualified professional and technical support staff, with required specific competencies, whose responsibilities are clearly defined.

Network Services supports and delivers information technologies to the Montana Tech campus. Information technology includes World Wide Web, e-mail, student information systems, human resources, distance learning, video conferencing, and collaborative information and resource sharing. The network delivers all media and computer communication, facilitating both instructional and administrative needs. Network Services develops, monitors, secures, and maintains the entire network infrastructure. Network Services has four full-time employees with a total of over 78 years of networking and computer experience at Montana Tech.

Information Services is a unit within Campus Technology Services and is responsible for the campus administrative computing functions. Included in those functions are management/coordination/maintenance of the student information

system (Banner), reporting from the centralized human resource database, designing/reporting/developing the various college supported data warehouses, and managing Nolij (the system used to store/retrieve scanned documents). Information Services has three full-time employees with a total of 69 years of administrative computing experience specializing in higher education.

Online Services creates and maintains enterprise-level web applications, some of which include Blackboard, MyMtech (uPortal), and Online Course Evaluations. This unit is also responsible for maintaining a web server, a media server, and for managing the CTS Helpdesk. Online Services has two full-time staff employees with a total of 41 years of experience developing enterprise level applications.

The Directors/Managers from these three areas comprise the Campus Technology Council which advises the administration on technical issues, developments, and direction. The minutes of the meetings are included in Exhibit 5.D.I - IT, [*CTS Minutes*](#), and primary duties can be found in Required Exhibit 5.D.II - IT, [*CTS Principal Responsibilities*](#).

5.D.3 The institution provides opportunities for professional growth for library and information resources professional staff.

To keep up with new developments, CTS staff attends yearly conferences, especially those that pertain to projects at hand. For example, Blackboard is undergoing several major changes with the corporate merger between Blackboard and WebCT. Therefore BBWorld, 2008, was well attended by Tech staff to determine how emerging changes would affect the campus. Another example are the ongoing upgrades to Banner, which attracted a number of staff to the annual SCT Summit. Also, local yearly conferences are attended, such as the Montana State University Security Conference and the Montana Telecommunications Conference.

5.D.4 Library and information resources and services are organized to support the accomplishment of institutional mission and goals. Organizational arrangements recognize the need for service linkage among complementary resources bases (e.g., libraries, computing facilities, instructional media and telecommunication centers).

Tech's computer services have re-organized with an emphasis on both distributing computer support and on focusing on mission critical support service areas. The re-organization has brought computer service closer to the end user and, at the same time, developed and focused core networking and administrative services. (Please refer to sections 5.D.I and 5.D.II for discussions of Campus Technology Services and the linkages to complementary resources.)

Montana Tech encourages the use of computers and the network as educational and problem solving research tools. A fully integrated local area network connects more than 1000 computers and peripherals with over 500 workstations dedicated to student use. Microcomputer labs are located in most buildings on campus to support student word processing, business applications, engineering data acquisition/analysis, e-mail, and access to the World Wide Web.

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5.D.5 The institution consults library and information resources staff in curriculum development.

Where appropriate, Campus Technology Services (CTS) is consulted in areas directly related to IT services. Such areas are podcasting and distance learning, with Blackboard as the primary application used for distance learning. Supporting tools, such as Wimba and iTunes U, have building blocks associated with them that allow a seamless integration from Blackboard to these supporting tools.

CTS personnel are typically consulted on technical aspects of, for example, integrating podcasting into a given curriculum; this approach involves production, publication, and delivery. Montana Tech subscribes to iTunes U from Apple and is currently working on setting up a podcasting server.

5.D.6 The institution provides sufficient financial support for library and information resources and services, and for their maintenance and security.

Designated Fee Accounts

Several designated fee accounts are dedicated to laboratory and computing equipment. The most important fee account is the Computer Use Fee which fee is used to purchase equipment, software, maintenance, or related items that will benefit the instructional program. The use of this fee is determined through annual meetings of the Computer and Telecommunications Advisory Committee. This committee meets on and approves a computer use plan that is projected out for the next five years. This plan looks at replacing all workstations in the campus computer lab at least once every four years. This plan contains allocations for workstations, network/departmental servers, for software, paper and toner, and for lab printers. There is a separate fee for the North Campus and for the South Campus. See Required Exhibits 5.D.III –IT, [Computer Fee](#), and 5.D.IV -- IT, [COT Computer Fee](#).

The college coordinators are often in the best position to recognize the educational and administrative requirements of the constituencies that they serve; therefore, they often bring recommendations to the committee for consideration. These recommendations include which workstations and servers to replace, recommendations for software and support, and any individual departmental needs to be addressed by planning. The coordinators also work closely with department heads and deans to make recommendations on workstation specifications and requirements based on the educational needs of the department.

The campus also uses a Technology Fee account to support the technology infrastructure for academic and administrative systems. On an annual basis, the



workstation needs of the faculty and staff are assessed, and replacement workstations are made from the technology fee account. Montana Tech strives to replace faculty and staff workstations at least once every four years. The Technology Fee account is also used to purchase academic software, personal electronic devices for campus use, repair and maintain network services, and utilized to support campus online services. See Required Exhibit 5.D.V – IT, [Technology Fee](#).

Major laboratory and educational equipment purchases are funded through the Equipment Fee. Both the North and the South campuses have separate equipment fees. On an annual basis, the deans contact department heads on their equipment needs for the upcoming fiscal year. The Deans Council reviews the compiled list of requests and allocates funding for the upcoming year based on projected fee revenues. The Vice Chancellor of Academic Affairs and Research oversees the process and regularly reviews the spending throughout the year. Should the requirements of the departments change through the year, the Vice Chancellor may reallocate funding in collaboration with the deans. Again, funding is based both on the merit of the request and on the educational requirements of the academic programs. See Required Exhibits 5.D.VI – IT, [Equipment Fee](#), and 5.D.VII – IT, [COT Equipment Fee](#).

An Academic Facility Fee is also assessed to students and is used primarily as a classroom improvement account. Faculty or staff members who recognize a need for classroom improvements submit a request to the Vice Chancellor of Academic Affairs and Research. Typically these requests include classroom furniture, such as tables, desks, chairs, and podiums as well as classroom fixtures, such as white boards, overhead projectors, and computer data projectors. See Required Exhibit 5.D.VIII – IT, [Academic Facility Fee](#).

Table 5.D.I – IT below summarizes funds utilized from FY 2005 through FY 2009.

TABLE 5.D.I - IT, DESIGNATED FEE ACCOUNT EQUIPMENT FUNDING

Montana Tech					
Designated Fee Account Equipment Funding					
Fee Account	FY05	FY06	FY07	FY08	FY09
Equipment Fee (BEQMTF)	\$ 207,288	\$ 238,874	\$ 294,073	\$ 264,819	\$ 272,014
Computer Fee (BCOMPU)	183,556	383,912	275,984	216,827	215,402
Academic Facilities Fee (BAFMGB)	42,590	19,908	33,029	45,196	102,981
Technology Fee (BTECFE)	184,161	161,655	157,882	227,763	307,596
COT Equipment Fee	48,251	66,554	57,485	72,160	67,664
COT Computer Fee	42,809	56,648	68,650	47,715	50,810
Total	\$ 708,655	\$ 927,551	\$ 887,103	\$ 874,480	\$ 1,016,467

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STANDARD 5.E – PLANNING AND EVALUATION

Library and information resources planning activities support teaching and learning functions by facilitating the research and scholarship of students and faculty. Related evaluation processes regularly assess the quality, accessibility, and use of libraries and other information resource repositories and their services to determine the level of effectiveness in support of the educational program.

5.E.1 The institution has a planning process that involves users, library and information resource staff, faculty, and administrators.

The planning process is via the Computer and Telecommunications Advisory Committee which is made up of representatives from faculty, staff, and students. This Committee is advisory to the Administration. Decisions on computer replacement schedules, software purchases, network expansion to wireless, multi-media expansion to classrooms, and on OS platform are typically made by this committee. The Committee is the oversight for the Computer Use Fee assessed to all students each semester.

Guests are always welcomed to voice an area of concern or expertise pertinent to a particular subject or academic area/department - not directly represented by committee membership. The membership of all committees can be found in Exhibit 5.B.IV – IT, [Committee Roster](#).

Another committee involved with planning is the Web Guidance Committee which is composed of both faculty and staff. Created in 1998 with the original intent to guide the entire web site (look and feel as well as updating of content, policies, and the use of templates), the committee quickly realized that developing a web site by committee was not a good idea. Everyone has a different opinion on the way the site should look, how strict the use of templates should be, and so forth. For this reason, the Web Committee became more of a policy committee. To date, only one policy has been created, one requiring that all departments use a uniform template, or work with Tech's webmaster to create one that will still provide a similar look and feel as the standard, which was adopted in May 2006. The membership can be found in Exhibit 5.B.IV – IT, [Committee Roster](#).

5.E.2 The institution , in its planning, recognizes the need for management and technical linkages among information resource bases (e.g., libraries, instructional computing, media production and distribution centers, and telecommunication networks).

In order to foster communication among informational resources, the Campus Technology Services (CTS) Council was formed in 2005. Members of the Council include the Director of Information Services, Director of Network Services, Manager of System Software and Networks, and the Manager of Online Learning and Extended Projects. Monthly meetings are held, with notes taken and forwarded to the Vice Chancellor of Administration and Finance.

Because easy access from one software system to another is important, Montana Tech's portal (MyMtech) has been designed with portlets that provide intuitive, easy linkages to the various software systems. Thus, with one click of the mouse, users can access their Blackboard courses, view campus announcements, and manage their campus email. In 2010 and 2011, Tech plans to add several new portlets that will allow students easy access to their grades, to any holds placed on their account, and to posted jobs available on campus.

5.E.3 The institution regularly and systematically evaluates the quality, adequacy, and utilization of its library and information resources and services, including those provided through cooperative arrangements, and at all locations where courses, programs, or degrees are offered. The institution uses the results of the evaluations to improve the effectiveness of these resources.

Network Services regularly and systematically evaluates both the quality and the adequacy of its campus information technology resources. Montana Tech is more than willing to accommodate network access for those who require remote service to the campus LAN. Several examples follow with expanded discussions found in Exhibit 5.E.I - IT, *Expanded Discussions* for each.

Data Center

The data center had no substantial upgrades for at least 20 years prior to its recent renovation. The data center is always the heart of an enterprise, and this is true for Montana Tech as well. The student information system, course management system, web server, e-mail, print services, and network services are centrally supported at this core.

Renovation of Montana Tech's Data Center or computer room was completed August 18, 2008. This need was pushed by the integration of the New Media Group (currently called Online Services) into Campus Technology Services (CTS). This integration required at least 12 additional servers to be installed in the data center; as a result, a 50% added load of heat and power over (at the time) current loads was realized. The New Media server pool was housed in the Library. Short-term planning required Network Services to install additional servers and a new monitoring system in the data center. For details and a complete analysis, please see Required Exhibit 5.A.II – IT, *Montana Tech Data Center Upgrade*.

Cabling Infrastructure

Since 1999, Network Services has upgraded the cabling plant. Two network wiring projects (one in 1999 and the other in 2006) were undertaken to eliminate all shared media and both substandard unrated twisted pair cable and all non-plenum wire designated for such areas.

Early, in the spring of 1999, Network Services evaluated the campus wiring infrastructure. Please refer to Required Exhibit 5.E.II – IT, *Strategic Network Planning*. This self evaluation revealed that the campus building-wiring infrastructure ranged all the way from poor to excellent. Wiring was anything from thin-wire, to unrated twisted

pair, Category 3 or Category 5. These were typical legacy issues that still confront most businesses today. Consequently, Network Services planned an upgrade from the original shared 10-Mb backbone to a 100-Mb switched/routed facility with gigabit on designated backbone legs.

Microwave – Point to Point

In early 2003, Network Services was concerned with the wireless point-to-point circuits both to the College of Technology and to the campus Apartment Housing surviving the demise of Touchamerica. Touchamerica, a telecommunications enterprise, had provisioned both circuits. The equipment used was old, and support was expected to sunset for all units in service. To prevent this from happening, Network Services researched the feasibility of deploying a campus owned point-to-point, voice and data system.

In July, 2003, Montana Tech installed a licensed microwave (point-to-point) between the North Campus and both the College of Technology and the campus Apartment Housing. The COT is approximately 5.5 miles (line of site) to the south, and the Apartment Housing is approximately 1 mile to the north of the main campus.

The project extended Montana Tech's LAN and PBX connectivity by providing both voice and data services to these remote sites and also improved the extremely limited bandwidth (2 Mbps). This was accomplished with two, 18 GHz licensed microwaves, delivering 45 Mbps at both remote sites.

Airport

Network Services extended the campus LAN network to the Bert Mooney Airport via a 54 Mbps wireless point-to-point. A special engineering research project on airport security was being studied under the direction of Montana Tech General Engineering faculty. Bert Mooney Airport Authority (BMAA) wanted a Vehicular Identification Smart Sensor Web (VISSW) for detection, classification, and mitigation of events related to untended vehicles at the terminal curbside and public roadways adjacent to the air operations area of small regional airports. This site has since been decommissioned (spring 2009) with the end of the research project.

Pole Plant

The Montana Pole Treatment Plant Superfund site is the location of a former wood-treating facility that operated from 1946 to 1985. Contamination of soils, ground water, and Silver Bow Creek resulted from discharges of solutions used in the treating process. The Montana Bureau of Mines assisted the State of Montana in setting up an environmental monitoring network to prevent offsite migration or release of site contaminants. They currently operate the site water treatment plant and establish contaminant levels and provide all environmental sampling and monitoring during site cleanup and construction activities. Network Services extended a network to the Pole Plant via an 11 Mbps wireless point-to-point. The Pole Plant is located approximately 1 mile south of Tech's North Campus.

Montana Tech Mineral Research Center

The Mineral Research Center is a Montana Tech facility located in the Butte industrial park on South Parkmont Drive and is approximately 1 mile south of the College of Technology. This facility currently consists of five buildings located on 11.3 acres. Two of the buildings are high bay structures of 3200 sq. ft. each. In addition, there are two single story buildings (a shop and warehouse building of 3200 sq. ft.) and a Laboratory Building of 6400 sq. ft.

In the past, this facility supported campus research, but by the 1990's Montana Tech's use had ceased, and it became entirely a rental facility. In early 2000, however, three buildings were once again used by Montana Tech, two by the RAVE Technical Development Center and one by the student project clubs (human powered vehicle, bridge competition, etc.). General Engineering is currently proposing to relocate its machining capability and robotic welders to the North Campus. The student project shop would also be relocated to the North Campus. Proceeds of the MRC sale could be used to support both of these relocations.

Because Network Services accommodates any academic program requiring network access, at one time the LAN was extended to the Mineral Research Center. At that time, a 54 Mbps wireless point-to-point link was installed. However, this site has subsequently been decommissioned (spring 2009) with the end of the research project.

Wireless

Montana Tech now has a comprehensive enterprise wireless system. This system uses a central Aruba wireless controller and thin access points to provide dual band concurrent 802.11a and b/g access. The system delivers extensive integrated security and provides physical layer security, data encryption, VPNs, and a firewall to protect users on the network.

The current campus wireless system provides reliable wireless access to students, to employees, and for special events at Montana Tech. See Exhibit 5.E.III – IT, [*Wireless Interface*](#). Approximately 85 access points are currently deployed to provide wireless access in nearly every building on campus that includes the dorms, apartment housing, and the South Campus.



The 802.11a band also hosts various specialized networks for different campus uses. The computer lab in the Mill building runs completely on the private wireless network hosted by the access points in that building. This design provides a level of redundancy to all of the computers in that lab. If one of the access points fails, another access point close by will seamlessly take over the traffic management for the computers that the failed access point was handling.

The 802.11a band of the wireless network has also provided service to hearing-impaired students at Montana Tech. Before the wireless network was deployed for

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the specialized laptops, each laptop had to have a special configuration for each room the student had a class in. However, with the new wireless network, the laptops can now roam from room to room and give students the required hearing services without worrying about network access.

The wireless network at Montana Tech is very versatile and will allow wireless coverage to be expanded and upgraded for several years into the future. The modular design of the Aruba equipment allows integration of new technology without changing the entire network infrastructure.

CLOSING THE LOOP

Strengths

The IT staff is service-oriented and delivers information technology in all of its forms. All the projects mentioned in this document could only be accomplished with a dedicated IT staff. Montana Tech's IT professionals have a depth of knowledge reflected in the diverse IT infrastructure that they support. Through cooperation and teamwork with Montana Tech Faculty and Staff, IT Staff provides innovative solutions that support the Mission of Montana Tech. The dedication of the 12 IT members reflects the longevity of key members, with a collective total number of years of service to Montana Tech IT at 193 years.

Opportunities for Improvement

Enhance MyMTEch (portal) experience, allowing users to view information that is most important to each student, faculty, or staff member's unique needs.

The Wide Area Network (WAN) pipe which logically interconnects Montana Tech to the University of Montana currently shows signs of saturating. A typical upgrade will most likely advance the resource from 45 Mbps to 155 Mbps.

The Local Area Network (LAN) backbone links, which interconnect all campus buildings to the data center, must eventually be upgraded from 100 Mbps multi-mode fiber to 1 Gbps single mode fiber.

Direct-attached storage is proving insufficient for some of the applications and system network services.

Multi-media capable classrooms and conference rooms are increasingly more in demand; with this growth comes the need for a dedicated support technician to inventory, maintain, and even to operate the equipment in these rooms.

CLOSING THE LOOP

Moving Forward

Enhance MyMTech (portal). Several portlets are scheduled to be added. An example is the Blackboard Community System which will be implemented in January of 2010. It allows users, or anyone, to add money to a campus DiggerCard account. This system will be integrated with MyMTech.

The Wide Area Network (WAN) pipe usually has a lesser bandwidth capacity than the LAN. To regulate this limited resource, packet shaping, firewalling, and anti-spamming devices are in place at the University of Montana. However, even with these regulators in place, at some future point Tech's WAN link will saturate.

The Local Area Network (LAN) backbone is being upgraded to single-mode fiber, where opportunity presents. For example, both the new Natural Resource Building and the ELCB now have single-mode fiber to interconnect to the data center. Moreover, where distance permits, Tech operates multimode fiber at 1 Gbps – for example, within the College of Technology. Upgrading of all building backbones to 1 Gbps is planned.

Direct-attached storage will be replaced with a Storage Array Network (SAN). A SAN will expand the following services: larger individual e-mail stores, automated enterprise backups, and alternate site availability.

Multi-media systems support and faculty expectations are eased by standardizing classroom and conference room setups. New projectors with double bulb length, consistent bulb modules, and automatic filter cleaning, will free up computer support staff and conserve monetary resources. Although Tech continues to operating smarter, the sheer size of demand points to an eventual staff increase or to a reallocation of efforts.

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REFERENCED EXHIBITS

- Required Exhibit 5.A.I - IT, *Campus Computer Lab Inventory*
Required Exhibit 5.A.II – IT, *Montana Tech Data Center Upgrade*
Exhibit 5.A.III – IT, *MyMtech*
Exhibit 5.B.I – IT, *Campus Classroom Information*
Required Exhibit 5.B.II – IT, *Thin Client Lab Costs*
Required Exhibit 5.B.III – IT, *IT Policies*
Exhibit 5.B.IV – IT, *Committee Roster*
Exhibit 5.B.V – IT, *Northern Tier Map*
Required Exhibit 5.C.I – IT, *CTS Organizational Chart*
Exhibit 5.C.II – IT, *Systems Uptime*
Exhibit 5.D.I – IT, *CTS Minutes*
Required Exhibit 5.D.II – IT, *Principal Responsibilities*
Required Exhibit 5.D.III – IT, *Computer Fee*
Required Exhibit 5.D.IV – IT, *COT Computer Fee*
Required Exhibit 5.D.V – IT, *Technology Fee*
Required Exhibit 5.D.VI -- IT, *Equipment Fee*
Required Exhibit 5.D.VII – IT, *COT Equipment Fee*
Required Exhibit 5.D.VIII – IT, *Academic Facility Fee*
Exhibit 5.E.I – IT, *Expanded Discussions*
Required Exhibit 5.E.II – IT, *Strategic Network Planning*
Exhibit 5.E.III – IT, *Wireless Interface*

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TABLE 5.D.I – IT, Designated Fee Account Equipment Funding

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Figure 5.A.2 – IT, Increasing Online Access
Figure 5.B.1 – IT, VRI Computer
Figure 5.D.1 – IT, CTS Organizational Chart

SUPPORTING DOCUMENTATION FOR STANDARD FIVE

REQUIRED EXHIBITS

1. Printed materials that describe for students the hours and services of learning resources facilities such as libraries, computer labs, and audio-visual facilities.
 - a. *Campus Computer Lab Inventory*
 - b. *Campus Classroom Information*
2. Policies, regulations, and procedures for the development and management of library and information resources, including collection development and weeding.

IT Policy Directory includes the following:

 - a. Montana Board of Regents Policies
 - b. The University of Montana
 - c. Montana Tech Network Policies
3. Statistics on use of library and other learning resources.
 - a. This required exhibit applies only to the library and is available in the library required exhibits.
4. Statistics on library collection and inventory of other learning resources.
 - a. This required exhibit applies only to the library and is available in the library required exhibits.
5. Assessment measures utilized to determine the adequacy of facilities for the goals of the library and information resources and services.
 - a. *Downtime*
 - b. *SRP*
 - c. *Wireless Monthly and Yearly Usage*
 - d. *Backbone Graphs*
 - e. *ipPulse*
 - f. *Real-time network status graph*
 - g. *Wireless Admin Interface*
 - h. *Wireless Usage Snapshots*

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6. **Assessment measures to determine the adequacy of holdings, information resources and services to support the educational programs both on and off campus.**
 - a. *BB Training Survey Results*
 - b. *Blackboard Stats*
 - c. *Faculty Blackboard User Survey Results*
7. **Data regarding number and assignments of library staff.**
 - a. This required exhibit applies only to the library and is available in the library required exhibits.
8. **Chart showing the organizational arrangements for managing libraries and other informational resources (e.g. computing facilities, instructional media, and telecommunication centers).**
 - a. *CTS Organizational Chart*
 - b. *Principal Responsibilities*
9. **Comprehensive budget(s) for library and information resources.**
 - a. *Computer Fee*
 - b. *COT Computer Fee*
 - c. *Technology Fee*
 - d. *Equipment Fee*
 - e. *COT Equipment Fee*
 - f. *Academic Facility Fee*
10. **Vitae of professional library staff.**
 - a. This required exhibit applies only to the library and is available in the library required exhibits.
11. **Formal, written agreements with other libraries.**
 - a. This required exhibit applies only to the library and is available in the library required exhibits.
12. **Computer usage statistics related to the retrieval of library resources.**
 - a. This required exhibit applies only to the library and is available in the library required exhibits.
13. **Printed information describing user services provided by the computing facility.**
 - a. *Blackboard Faculty Training Manual*
 - b. *Blackboard Student Training Manual*

14. Studies or documents describing the evaluation of library and information resources.
 - a. *Montana Tech Data Center Upgrade*
 - b. *Strategic Network Planning*

GENERAL EXHIBITS

1. Miscellaneous
 - a. *CTS Minutes*
 - b. *Northern Tier Map*
 - c. *Committee Roster*
 - d. *Jos Nigeria*
 - e. *IT Resources*
 - f. *MyMtech*

