

The University of Montana Western

Information Technology Services Network Communications Design Guidelines

The University of Montana Western, Information Technology Services has specific standards for communications design on campus. All new building construction, renovations and cable add-ons must comply with the elements of this document.

A successful “voice and data” systems infrastructure design involves knowledge of all of the latest communication standards and engineering principals. Communications design and planning has developed to the point where communication engineering specialists now provide the highest quality required on the Western campus.

The first step to a high-quality, reliable, secure and structured cabling installation starts with the design and planning. The concept of using a single wiring scheme to handle all voice, data, and other services like video and alert systems is called structured cabling. It is important to make sure that Western’s goals of quality, reliability, scalability and security are clearly understood and that the plans to reach them are accurate and will succeed. This can be achieved by working with Montana Western, Information Technology Services.

It is important to understand how projects can grow or shrink over their lifetime; this is scalability and is a necessary design consideration. Cabling will be in place for decades. Montana Western understands it is more economical to make sure the job is done correctly, conforms to standards, and is scalable. A network that cuts corners by using:

- lower grade cabling
- inexperienced installers
- non-conforming standards

will cost more in the end when users complain about slow speed or connection problems. It is estimated that approximately 70% of all network problems are attributed to poor wiring.

Simply put, a standards-compliant structured cabling system increases the reliability and usability of a network or telephone system.

Network Communications Design Guidelines

The communications design shall be based on the latest standards of ANSI/TIA/EIA/BICSI/NEC and shall be designed with the following elements in mind:

A. Backbone Design

The design shall illustrate system backbone diagrams showing cable dimensions, conduit dimensions, fill calculations, and routing. Specifications shall include conduit installation, pull box requirements, maximum run distances, and minimum bend radii, etc. These shall be shown on the drawings and in the specifications and shall be coordinated with the design team to assure satisfactory completion.

B. Cable Routing/Cable Support

The design shall show cable routing and cable support requirements such as cable trays, j-hooks, and ladder racks. This shall include dimensions, sizes, and locations. These shall be shown on the drawings and in the specifications and shall be coordinated with the design team to assure satisfactory completion.

C. Telecommunications Room Design

The design shall illustrate telecommunications room layouts showing room size, equipment locations, elevations, cores, sleeves, racks, cable management, ladder racks, backboard layouts, grounding requirements, labeling, and power requirements. These shall be shown on the drawings and in the specifications and shall be coordinated with the design team to assure satisfactory completion.

D. Structured Cabling System Details

The design shall illustrate every copper and fiber cable included in the structured cabling system including both horizontal (intra-building, Category 6 UTP) and backbone (inter-building, fiber optic cable for data; multi-pair copper for voice) cables. The design shall also show rack elevations, patch panels, work area outlets, jacks, faceplates, protectors, termination blocks, cable management, patch cord and cross connect cable routing, sleeve sizes and locations, and grounding connection points. These shall be shown on the drawings and in the specifications and shall be coordinated with the design team to assure satisfactory completion.

E. Active Electronics

The design shall illustrate all necessary active electronics and their associated peripheries that are part of a project. The baseline design of the information technology systems consists of the distribution layers containing active and passive interconnection equipment, backbone cabling connecting to the campus networks, horizontal cabling connecting each work area outlet to the distribution

rooms, and end user equipment such as telephones, computers and assorted peripherals.

Network Communications System Description

The system will be designed such that as technology changes the system will be able to adapt to those changes. This is accomplished by designing the Pathways and Spaces (cable tray, conduit, and Telecommunications Room) with future expansion as the foremost consideration. This will allow the greatest flexibility for the building for both today and in the years to come. Pathways and Spaces are often referred to as “Fixed Infrastructure”. As new technologies emerge (as they always do) the “fixed infrastructure” will easily handle changes to the existing technologies because it provides easy access for future installations and changes.

At the core of the information systems is the campus Data Center. From the Data Center originates the central point of distribution or campus distribution (CD). The CD houses the routers and active electronics for interconnecting all campus buildings. Presently, from the CD the network extends via multi mode fiber to the Building Distribution (BD) layers. However, we must retrofit all layers to be connected via single mode fiber. The function of the BD and Floor Distribution (FD) is to house the active electronics and the interconnections between the campus data and legacy voice networks. They also house the equipment racks, patch panels, Ethernet switches, 66 blocks (all 66 blocks to be upgraded to 110 blocks) cable management and other devices.

The networks within the building will be designed to fully comply with the following standards:

- ANSI/TIA-568-C.0, Generic Telecommunications Cabling for Customer Premises, and its published addenda.
- ANSI/TIA-568-C.1, Commercial Building Telecommunications Cabling Standard, and its published addenda.
- ANSI/TIA-568-C.2, Copper Cabling Components Standard, and its published addenda.
- ANSI/TIA-568-C.3, Optical Fiber Cabling Components Standard, and its published addenda.
- ANSI/TIA-569-B, Commercial Building Standard for Telecommunications Pathways and Spaces, and its published addenda
- ANSI/TIA-606-B, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings, and its published addenda
- J-STD-607-B, Commercial Building Grounding (Earthing) and Bonding Requirements for Telecommunications, and its published addenda.
- ANSI/TIA-758-A Customer Owned Outside-Plant Telecommunications Infrastructure Standard, and its published addenda.

The infrastructure will utilize a star topology originating from the Campus Distribution terminating at each work area outlet. Each jack in a work area outlet will be connected by a Category 5e cable to a patch panel in the floor distribution layer. Plenum rated cable will be utilized in buildings utilizing either partial or full plenum mechanical systems. These cables can be used for either voice, IP video, or data services -- depending on what each cable connects. This allows for one cable to be used for voice services one day and then data services the next day. This design approach allows for the greatest flexibility with regard to infrastructure use.

Network Communications System Installers

Further, the Construction Specifications Institute's (CSI) Division 27 Sub-contractor shall be certified as a Siemon Certified Installer (CI) Contractor (no exceptions will be made) and will be required to provide a Siemon 20-year premium warranty on parts and labor for all Category 6 cabling and systems. CI's are the only contractors eligible to offer the Siemon Cabling System twenty (20) year warranty. Siemon certification alone does not constitute authorization to provide a Siemon 20-year performance warranty. Proof of the Sub-Contractor's ability to provide such a warranty shall be submitted to the General Contractor at the time of bidding and to the Owner prior to the Notice-To-Proceed. This warranty shall cover the patch panels, horizontal cabling, backbone cabling, work area outlets, equipment, cords and circuit certifications. Performance warranty will include all current and future Category 6 compliant applications.

Original Issue Date:

July 15, 2015

Revision Date:

September 30, 2016