



## Division 27 Communications

### 27 00 00 Communications

#### *27 05 00 Common Work Results for Communications*

##### **27 05 05 General Requirements for Communications**

1. The communications system design for all UW Madison facilities shall comply with all of the provisions of the latest version of the Division of Facilities Development & Management (DFDM) Communications Structured Cabling System Standards & Design Guidelines, which is available from the DFDM website.
2. References within the DFDM Guidelines regarding the DFD Project Manager shall apply to the UW Project Manager on UW Managed Projects.
3. Project Specifications shall use as their basis all appropriate sections of the latest edition of the DFD Master Specifications.
4. Deviations from DFDM's Minimum Design Guidelines or the DFD Master Specification sections shall be made only upon approval from the UW Project Manager.
5. The UW Guidelines take precedence over DFDM Guidelines, but the A/E shall discuss all conflicts within the guidelines and specifications with the UW Project Manager.
6. The UW is primarily all VOIP service; in rare cases where analog service is needed, consult with the UW-Madison Division of Information Technology (DoIT).
7. The following color scheme for cable jackets shall be followed:
  - 7.1. Blue – data non plenum
  - 7.2. Pink – data, plenum
8. The following color schemes for inside plant (ISP) fiber cable jackets shall be followed:
  - 8.1. Yellow – single mode
  - 8.2. Orange – multi-mode 62.5 micron data (not typically installed. Consult DoIT for recommendations) (No longer used on Campus)
  - 8.3. Aqua – multi-mode 50 micron (not typically installed. Consult DoIT for recommendations) (No longer used on Campus)
9. Flush mounted data jacks shall be specified for wall installation in lieu of angle mounted data jacks.
10. Data jacks shall have removable dust covers installed during construction.



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**27 05 29 Area of Rescue Assistance Communications**

1. Two-way communication systems shall provide communication between each required location and the fire command center or a central control point location approved by the fire department. Where the central control point is not a constantly attended location, a two-way communication system shall have a timed automatic telephone dial-out capability to a monitoring location or 9-1-1. The two-way communication system shall include both audible and visible signals. The devices are tied to the fire command center and reported via Metasys. Review the campus ADA coordinator's policy on ARA communication devices.
2. Emergency phones are different than the communication devices for ARA's. These phones dial 911. Review with UW Safety and UW Police and Security as to where these may be required. Each phone needs to have a unique phone line and likely needs a power supply. Currently the standard product for this type of phone is Code Blue. Exterior phones (post mounted outdoors or those in parking structures) need to be capable of withstanding severe cold.
3. The selected system must be UL Listed and shall be comprised of an Internal Call System and an External Call System. The internal call system shall be utilized to inform an emergency responder of an occupied area of rescue location. It is located at the fire command center and each lighted signal shall be clearly labeled to indicate the location from which the signal is being sent. Contact the UW FP&M Facilities Access Specialist for proper labeling details. The external call system shall be utilized by building occupants to call for assistance (per IBC). The ARA communication device shall be programmed to simultaneously connect with the fire panel and UW Police Department (UWPD) via the building automation system (BAS). Design coordination for this system shall be with both UW Electric Shop and UWPD.
4. The communication device shall be provided with an automatic voice location identifier in case the person calling is incapable of speaking.
5. All equipment choices must be thoroughly reviewed and approved by FP&M staff prior to finalizing the system selection.

**27 05 53 Identification for Communications**

6. Please refer to the UW Division of Information Technology (DoIT) Infrastructure Labeling Standards for voice/data jack labeling: [UW Division of Information Technology \(DoIT\) Infrastructure Labelling Standards.](#)

**27 10 00 Structured Cabling**

***27 11 00 Communications Equipment Room Fittings***

**27 11 05 UW Network Telecommunications Room Standards**

1. For new UW-Madison buildings, major remodeling, and renovation projects, please refer to the UW standard telecommunication room specifications, i.e. 27.11.05.04.
2. For existing buildings, upgrade existing telecommunications rooms to conform as closely as possible to the standards established for new buildings.
3. Background:



- 3.1. At UW-Madison, buildings are designed using the structured cabling method. Telecommunication rooms are used as cross-connect facilities to:
  - 3.1.1. Cross-connect outside plant cable pairs/strands to building riser pairs/strands.
  - 3.1.2. Cross-connect inside plant riser cable pairs to horizontal cable pairs.
  - 3.1.3. Terminate communication cables (fiber, copper, coaxial and special purpose).
  - 3.1.4. House active electronic equipment such as campus network switches and routers which are mounted in data racks, and alarms and security related equipment. These rooms are typically secured via high security keyway (Primus) and preferably a card reader (campus standard Andover.)
  - 3.1.5. Environmental sensor controls or building automation systems may be co-located in the telecom rooms or may be located elsewhere at the direction of the UW Physical Plant. If both network and building automation system equipment is co-located, both DoIT and Physical Plant must be consulted in the design and the size of the room must be adequate to support both functions.
  - 3.1.6. Audio system controls and campus clock synchronization electronics also need space, but are to be located outside of the above referenced equipment rooms.

4. Standards:

- 4.1. Size of Rooms: [UW Division of Information Technology \(DoIT\) Equipment Room and Telecommunications Room Minimal Configurations.](#) A formula that is used to compute telecommunication room size is: Nationally, a standard work area is defined as 10 square meters. The formula to calculate the telecommunications room size is: 0.07 square meters times the number of 10 square meter work areas. For a floor with 200 work areas the room size would be 14 square meters. On campus we specify room sizes of 180 square feet for a new or renovated building. For the main telecommunications room, the minimum size would be 180 square feet, but the size may be larger depending on the size of the building and the role the building assumes in the campus network topology. For instance, if a main telecommunication room serves as a supernode or node, then more space will be required for additional network equipment racks. (See Division 27 Detail 1 at the end of this section for UW Division of Information Technology (DoIT) Equipment Room and Telecommunications Room Minimal Configurations.)
- 4.2. Geographic: Locations within a building should be:
  - 4.2.1. Vertically stacked with access directly from corridor, not accessible via another room.
  - 4.2.2. Have sufficient telecommunication rooms to meet the horizontal cable distance limitations.
  - 4.2.3. Easily accessible to cable pathways (internal and external to Telecom Room)



- 4.2.4. Conveniently located for the delivery and/or removal of equipment
- 4.2.5. Avoid areas of electromagnetic interference
- 4.2.6. Not be located near or under areas subject to water or steam infiltration or excessive heat such as mechanical, kitchens, shower, or toilet rooms.
- 4.2.7. Not be located in a corrosive atmosphere
- 4.3. Locating Storage in Telecommunication Rooms:
  - 4.3.1. For new buildings and/or significant renovations, the telecommunication rooms shall be designed for this single purpose. There is to be no sharing with other facilities such as server rooms, building maintenance/custodial, and electrical rooms.
  - 4.3.2. For existing telecommunication rooms that are to be upgraded to this standard, every effort will be made to eliminate sharing. If this is not physically possible, the telecommunications portion of the room should be segregated by means of a secured physical barrier such as a wire cage or partition. All requirements as stated shall be applied.
- 4.4. The following items shall never be stored in telecommunication rooms:
  - 4.4.1. Cleaning chemicals and cleaning equipment
  - 4.4.2. Office and computer supplies, especially toner and printer paper
  - 4.4.3. Grounds keeping chemicals and equipment
  - 4.4.4. Petroleum or other fuels
  - 4.4.5. Hazardous materials such as asbestos
- 4.5. Telecommunications Room Arrangements:
  - 4.5.1. A telecommunications room must include sufficient space for wall mounted blocks and racks with a minimum of 42" clearance in front and 72" clearance from front of rack to back wall or nearest obstruction and 36" side clearance on one side of the rack for rear access by maintenance technicians.
- 4.6. Electrical Power:
  - 4.6.1. The telecom rooms shall be fed by dedicated power. The equipment shall be on a feeder separate from the feeder for the room's lights, HVAC, and other utilities.
  - 4.6.2. Individual branch circuits to large telecommunication electronics equipment shall be provided.
  - 4.6.3. Power conditioning and backup power shall be provided only where required. The building occupants can request to place the network equipment on uninterruptible power supplies or at the discretion of DoIT, place these racks on the building's emergency generator. In this case,



commercial power must be provided in addition to the emergency power connections.

4.6.4. A building grounding and bonding system tying together all of the telecommunication rooms to the building ground shall be installed.

5. HVAC/Plumbing:

- 5.1. The room temperature should be in the range of 64 to 75 degrees Fahrenheit. If this range can be maintained by the incorporation of adequate ventilation means, then mechanical cooling is not required. If this temperature range cannot be maintained by ventilation alone, then mechanical cooling will be required. A 20% growth factor for cooling/ventilation shall be included in the design.
- 5.2. The relative humidity shall range from 15% to 55% adjusted to the outside temperature.
- 5.3. The heat dissipation per rack shall range from 750 to 5000 BTU. The heat dissipation of the uninterruptible power supply(s) shall also be calculated.
- 5.4. If mechanical cooling equipment is installed, it is desired they be located remotely. If they must be installed within the room, they shall be installed on the wall at 4'-0" AFF or less, with adequate distance from the voice wall field to remove the chance for condensation.
- 5.5. All piping and ductwork that do not serve the telecommunications room shall be routed such that they do not pass through or over the room. Likewise, fittings and/or valves shall not be located over or adjacent to racks.

6. Room Infrastructure Characteristics:

6.1. Walls:

- 6.1.1. Paint with two coats of light colored paint.
- 6.1.2. Include  $\frac{3}{4}$ " plywood installed onto which hardware shall be mounted. The plywood can either be fire retardant or painted with two coats of fire retardant paint.

6.2. Floor:

- 6.2.1. Has a smooth surface that does not raise dust or produce static electricity. Sealed concrete or VCT are acceptable.
- 6.2.2. No floor drains are permitted in telecommunication rooms. If the space is below grade, other accommodations shall be made to ensure the room is not subject to moisture or water.
- 6.2.3. Has distributed floor load rating of 4.8 kPa (100 lbf/ft<sup>2</sup>).
- 6.2.4. Has a concentrated load rating up to 12.0 kPa (250 lbf/ft<sup>2</sup>).

6.3. Ceiling:

- 6.3.1. Height – at least 8' - 6".



6.3.2. No protrusions that will preclude a minimum clear height of 8' – 0".

6.3.3. Painted in a light color with non-dust producing paint.

6.3.4. No ceilings of any type shall be installed. Leave the area exposed to structure.

6.4. Doors/Security:

6.4.1. At least 3' wide x 6'-8" high with sweeps to keep dust out.

6.4.2. A double door is recommended for large equipment rooms 6' wide x 7'- 6" high.

6.4.3. Doors shall be secured by the access control system and a high security keyway (Primus.)

6.4.4. Access is limited to DoIT certified authorized agents and a restricted set of Physical Plant personnel (e.g. electricians).

6.4.5. Video surveillance cameras may also be installed to cover key telecommunication rooms.

6.5. Fire Protection:

6.5.1. If dry sprinklers are required by code, protect the sprinkler head to reduce the possibility that the head could accidentally discharge.

6.5.2. Fire stop all room penetrations (e.g. cables pathways, trays, conduits, slots) as required by code and DFD specifications.

6.6. Lighting:

6.6.1. Adequate and uniform lighting measuring 50 foot candles at 3' above finished floor (AFF), especially at the front and back of racks.

6.6.2. Emergency lighting is required within the room.

6.7. Equipment Racks:

6.7.1. For main telecommunication room, provide at least three which are 7'-0" high by 19" racks. More may be required if the room is also a supernode or node.

6.7.2. All racks shall include 6" wide, double sided wire managers on both sides of the rack.

6.7.3. Two double duplex receptacles (1 on bus A and 1 on bus B) shall be installed on the rear of each rack, at the bottom. DoIT shall provide a mounting bracket.

6.7.4. Unless a raised flooring is installed, all jumpers and cabling will be fed to the racks from overhead installed cable trays/pathways.



6.8. Telecommunication Blocks:

- 6.8.1. Telecommunication blocks compatible with the type of telecommunications cable to be installed, shall be securely mounted on the plywood backboard.

**27 16 00 Communications Connecting Cords, Devices and Adapters**

1. Cross-connect outside plant cable pairs/strands to building riser pairs/strands.
2. Cross-connect inside plant riser cable pairs to horizontal cable pairs.
3. To house active electronic equipment such as campus network and local area network (LAN) hubs/servers/routers, alarms and security equipment, environmental sensor controls, audio system controls and campus clock synchronization electronics.
4. To terminate telecommunication cables (fiber, copper, coaxial and special purpose)

BICSI Telecommunications Distribution Methods Manual (Latest revision) shall be used as a reference in addition to the UW-Madison guidelines noted within.

**27 50 00 Distributed Communications and Monitoring Systems**

**27 53 00 Distributed Systems**

**27 53 13 Clock Systems**

1. A central building clock system, with very few exceptions, should be included in all building projects. Use synchronizing GPS broadcast signals for new buildings not currently on the campus clock system.
2. All buildings shall have stand-alone GPS 120 volt clock systems.
3. All instructional areas shall have a soft tone classroom bell system.
4. Provide digitally operated clocks in appropriate public spaces, classrooms, lecture halls, student spaces, conference rooms, and laboratories and other areas at user's request. Number size should be selected based on the distance and view angle. Clocks in corridors should be double faced and mounted on a stem perpendicular to the wall. The style of clocks can be determined by designers as long as they are part of a stand-alone GPS system that utilizes 120 volt clocks.



# Division 27 Detail 1

## UW Madison Voice & Data Jacks

Several different types of voice and data jacks with different types of labeling schemes are installed on the UW-Madison campus. The intent of this document is to provide standards for the installation and labeling of these jacks to promote consistency and avoid confusion.

### New construction or large remodeling projects:

Voice jacks – Terminate and label as diagrammed on page 2

Data jacks – Terminate and label as diagrammed on page 3

### Small remodeling projects where an existing ER (MDF) or TR (IDF) will be used:

Follow the wire termination and labeling schemes currently being used in that MDF or IDF (see appropriate figure), **EXCEPT:** If there are currently both voice and data USOC jacks in an ER or TR **AND** more than half of the current jacks will be replaced, then use:

Voice jacks – Terminate on new Cat 6 110 blocks and label as diagrammed on page 2

Data jacks – Terminate on a new Cat 6 patch panel and label as diagrammed on page 3

### Standard jack label (example):

Example = B150E - TA102 or B150E - DA012

B150E: represents the Telecommunication Room

T: represents Voice jack, D: represents a Data jack

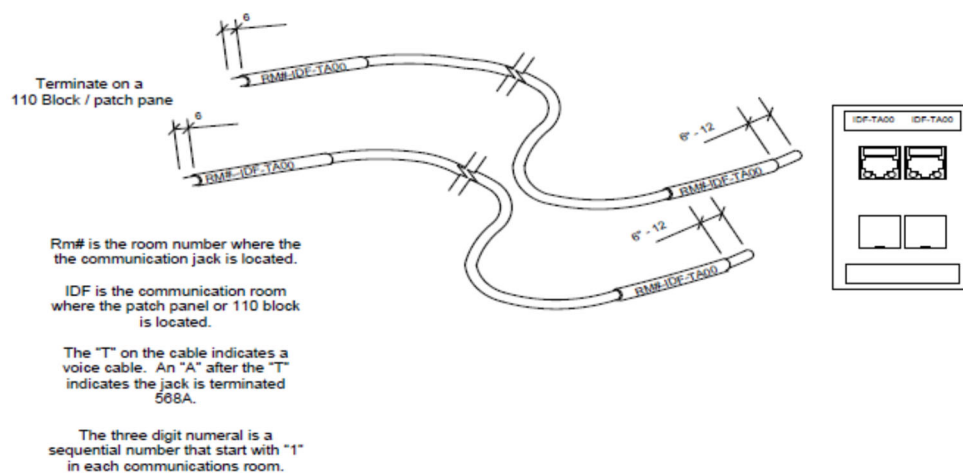
A: represents 568A termination on the jack

012: represents a sequential number for the jack. The voice and data jacks in each telecom room shall start with 001.

**NOTE:** If there are questions regarding the type of termination or labeling that should be used, dial 608.262.7474 to request a consultation. A technician or engineer will meet with the telecom consultant or installer. Any re-work required by the installer, because they failed to get clarification, will be the responsibility of the installing vendor.

1

## Voice Labels



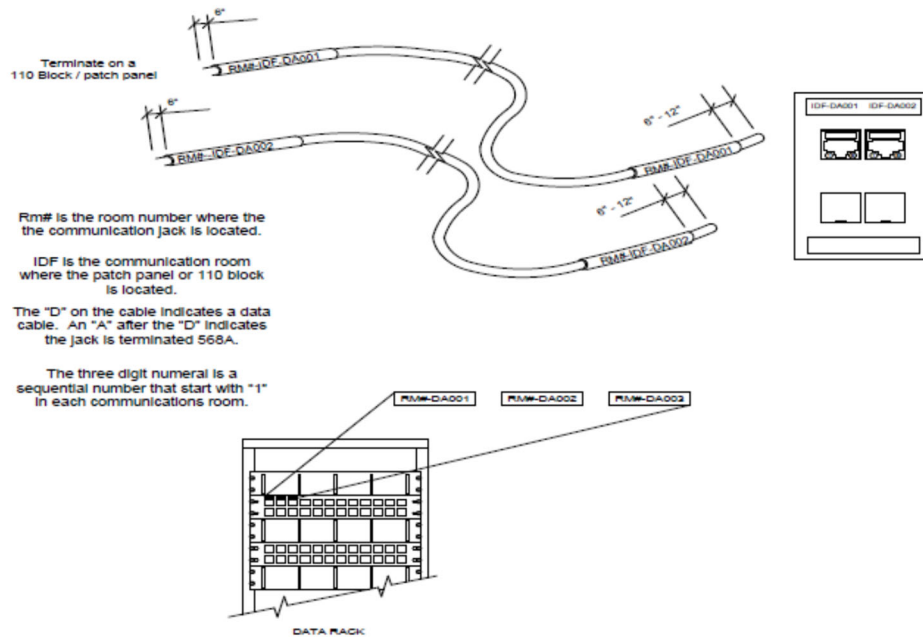
Rm#-TA00	Rm#-TA00	Rm#-TA00	Rm#-TA00	Rm#-TA00	Rm#-TA00
Rm#-TA00	Rm#-TA00	Rm#-TA00	Rm#-TA01	Rm#-TA01	Rm#-TA01

110 Blocks mounted on plywood  
back board painted with fire  
retardant pain

2

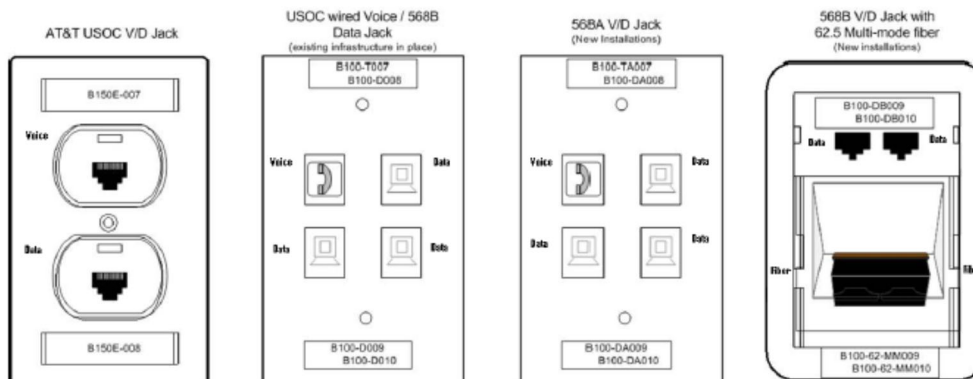


## Data Labels



3

## Voice and Data Jack Labels at Desktop



4

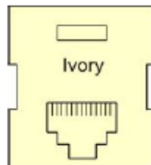


## UW Cable Color Code

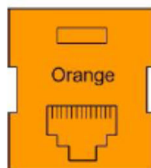
- Non-Plenum Cable
  - Voice . . . . . White
  - Data . . . . . Blue
- Plenum Cable
  - Voice . . . . . Purple
  - Data . . . . . Pink

5

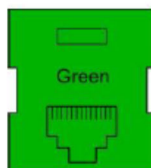
## UW Jack Color Code



Telephone



Data - Room to IDF/MDF



Data - Special applications  
Jacks not going back to an IDF/MDF

6



## Video Jack Labels

Coaxial Video Jack Labels

B100-V001	B100-V007
B100-V002	B100-V008
B100-V003	B100-V009
B100-V004	B100-V010
B100-V005	B100-V011
B100-V006	B100-V012

**NOTE:** The above shows an example of a twelve jack installation; an ER/TR can have any number of jacks.  
There shall be no duplicate jack labels in any building.

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## Fiber Jack Labels

Single Mode Fiber Jack Label

B100-SM001	B100-SM007
B100-SM002	B100-SM008
B100-SM003	B100-SM009
B100-SM004	B100-SM010
B100-SM005	B100-SM011
B100-SM006	B100-SM012

62.5 micron Multi Mode  
Fiber Jack Label

B100-62-MM001	B100-62-MM007
B100-62-MM002	B100-62-MM008
B100-62-MM003	B100-62-MM009
B100-62-MM004	B100-62-MM010
B100-62-MM005	B100-62-MM011
B100-62-MM006	B100-62-MM012

50 micron Multi Mode  
Fiber Jack Label

B100-50-MM001	B100-50-MM007
B100-50-MM002	B100-50-MM008
B100-50-MM003	B100-50-MM009
B100-50-MM004	B100-50-MM010
B100-50-MM005	B100-50-MM011
B100-50-MM006	B100-50-MM012

**NOTE:** Terminate outside plant fiber in a box separate from the inside plant fiber wherever possible. Single Mode and Multi Mode fiber should share sequential numbering. If 62.5 micron and 50 micron fibers are terminated in the same ER/TR, then these shall also share sequential numbering.

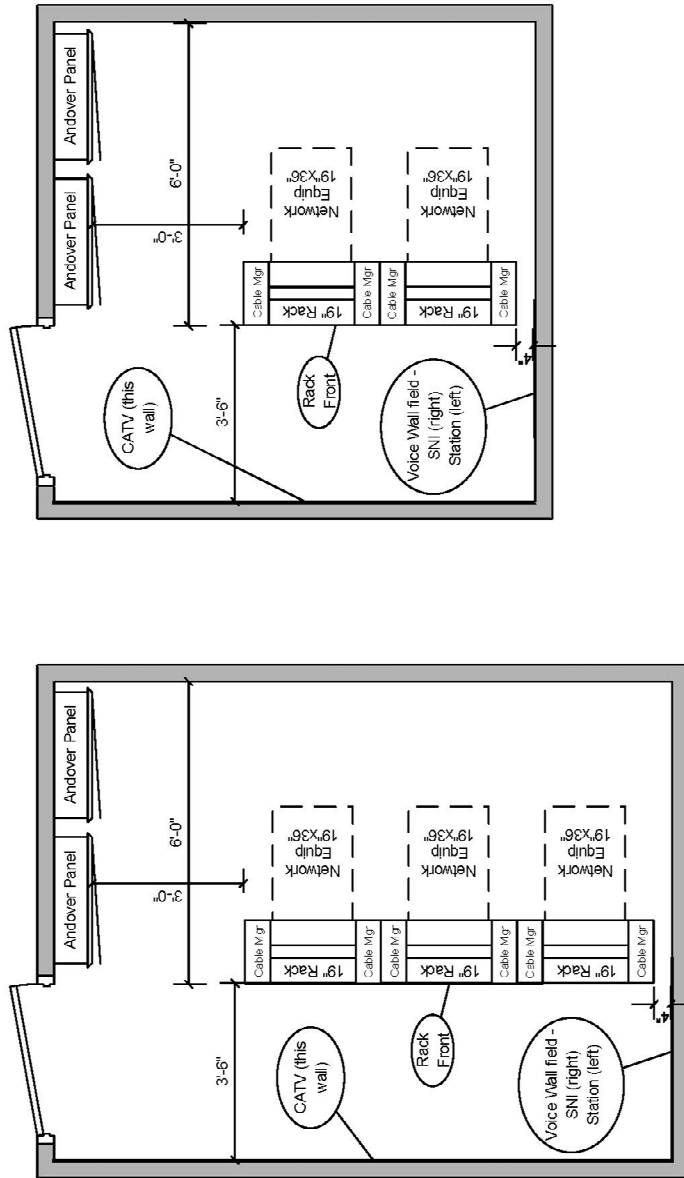
8





## Division 27 Detail 2

### UW-Madison, Division of Information Technology (DoIT) – ER & TR Minimum Configurations



- Rack = 19" EIA, 2-post, 3 racks (minimum) per ER, 2 racks (minimum) per TR
- Vertical Cable Manager = 6 inches (minimum) wide, double sided; two (2) per rack
- Rack w/2 Vertical Cable Managers = 33"w.
- Patch Panels = 48 port (2RU), 240 ports (maximum) per rack
- Voice Riser and Station 110Modular block adjacent to rack, in front
- Minimal Clearances = 42 inches (between rack front and wall field/nearest obstruction); 72 inches (rack front to nearest wall/obstruction behind); 4 inches (one side); 36 inches (one side)
- Secure top of rack row at both ends (minimally) for stability
- Field verify with DoIT Network Infrastructure before installing racks and overhead cable ladder rack
- 36 inch door with swing into the corridor
- Andover Panels = 30"w 40"h 8"q; 36" access/clearance required; panels not required to be located in room

ER & TR Configuration Revised 2013-11-14.vsd

Revised: June 5, 2017