Introduction: For all planned building projects on the U of A campus, Facilities Management, the PMO, architects and engineers design physical pathways for the telecommunications cables by following very specific guidelines.

As such, all new cabling installations and also wiring retrofits to existing cable plant at the University of Alberta campus should follow the current EIA/TIA and CSA cabling standards. The following points are to be strictly adhered to for all campus wiring jobs and are to be considered integral part of the University cabling standard.

Any inquiries about this document should be directed to University of Alberta Information Services & Technology department. Please call 780-492-9400 or email ist@ualberta.ca

Specific Requirements for the Design of Telecommunications Infrastructure at University of Alberta

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1. General Specification Guidelines

The information in this document should be useful in making design-related decisions that will not only satisfy U of A Information Services and Technology (IST) requirements but also meet the needs of the building and its future occupants with respect to voice, video and data communications. The intention of this document is to provide the architect, at very early stage of the project, sufficient information relevant to the design of telecommunications pathways and spaces.

IST bases its requirements on CAN/CSA standards and ANSI/EIA/TIA standards such as: 568-B-- Commercial Building Telecommunications Cabling Standard
ANSI/TIA/EIA-568-C.3 Optical Fiber Cabling Components Standard
569-- Commercial Building Standards for Telecommunications Pathways and Spaces
606-Administration Standard for the Telecommunications Infrastructure of Commercial Buildings
607-Commercial Building Grounding and Bonding Requirements for Telecommunications
BICSI Telecommunications Distribution Methods Manual (TDMM)
Part 1, C22.1 Canadian Electric Code (CEC)
(NFPA 70).

Requirements dictated by CEC shall be adhered to completely. Adjustments to any of the requirements stated in this document that are not CEC based must be addressed on a case by case basis and must be coordinated with IST and Facilities Management Electrical Projects Office.

2. Entrance Conduits

New buildings must be connected to the U of A telecommunications Service Corridors and cabling tray or conduit system within. IST will give design advice as to where the point of connection should be, and recommend a pathway for the new conduit or tray.

In some circumstances, new conduit may need to be placed to reinforce an existing conduit run which is full. As a general standard, at least four-4" and three-2" conduits will be installed to a new building. The 2" conduits are to be routed to the fire alarm panel, RCMS panel etc. and not to the telecommunications equipment room (T-E-R). 3/8" pullrope, not pull string, with 200 lbs minimum tensile strength must be provided in each conduit. All conduits must be mandrilled after installation. The minimum in ground bending radius for the conduit sweeps is 22 feet.

Note that it is important that the general contractor obtains substructure locations for all existing utilities prior to starting excavation work. The contractor should use both Facilities Management and campus sources.
3. Requirements for Telecommunications Spaces

The requirements below apply to all telecommunications spaces.

A. Location

There must be at least one telecommunications equipment room (T-E-R) in a single-story building. For multi-story buildings, one T-E-R on the first floor (or basement) is required. Telecommunication room (TR) placement should be discussed with IST and IST must approve the final design drawings. Quantity of TRs in a building should be kept to a minimum. T-E-Rs and TRs must be designed so that they are within 295 "cable feet" (90 meters) of every telecommunications outlet (TO) on that floor. If this is not possible then more than one TR per floor is required. (295 cable feet includes cable lengths through vertical walls, conduits, cable trays and other pathways between the patch panels in the TR and the TO.)

The best location for T-E-Rs or TRs is the building core. The rooms should be vertically aligned or stacked. They must be accessible either from the building exterior, public hallway or other common areas. They must not be located inside office spaces, classrooms or auditoria.

T-E-Rs and TRs must be dedicated to telecommunications. They may not contain electrical and mechanical equipment; fire alarm panels (permissible on a case by case basis), slop sinks for janitors, etc. Equipment not related to the T-E-R and TR such as piping, duct work, building column and distribution of building power must not be located in or pass through the T-E-R or TRs.

B. Size

The size of the telecommunications spaces depends on the function and total area served. (Please refer to the sizing method for each specific type of telecommunications space in items K and L.)

C. Doors

The doors to the telecommunications rooms must open 180 degrees outward unless restricted by building code. They must be a minimum of 36" wide and 80" high with no door sills. For security reasons, doors must be equipped with locks. Locks must be keyed to U of A standard. This key assignment must be included in the keying schedule. Telecommunications room doors must not have windows.
D. Floors

Carpet is not permitted in any telecommunications spaces. Floors-- also walls and ceilings-- should be treated and sealed to eliminate dust. Static-controlled vinyl tiles are the preferred floor cover.

The rating for distributed floor loading for telecommunications room must be greater than 100 lbs/sq. ft. Concentrated loading must be greater than 907 kilogram (2000 lbs) in areas that will support telecommunications equipment.

E. Walls

All walls must be lined with ¾” void free A-C grade (or better) plywood. The plywood must be fire retardant or treated with at least two coats of fire retardant paint on all sides. Use light colored paint to aid with lighting in the rooms. The bottom of the plywood should be mounted 6” above finished floor (AFF). No electrical conduits, junction boxes or any other equipment may be mounted on or across any backboard. All wall anchors must be lead or metal or approved drywall anchors and NO plastic or fiber to be used. All wall penetrations must be fire stopped with proper rating. Telecommunications rooms must not have windows.

F. Ceiling

Drop ceiling or suspended ceiling is not permitted in all telecommunications spaces. The minimum acceptable ceiling height is 8.5’. It should be unobstructed to provide space over the equipment racks for suspended cable trays or horizontal ladder racks. Sprinkler heads must be provided with cages to prevent accidental operations. Drainage troughs must be provided under the sprinkler pipes to prevent leakage onto the equipment. They must be as high as possible to avoid accidental operation from cable pulling activities.

G. Electrical Power

A minimum of two dedicated non-switched 3-wire 120 volt AC quad outlets are required for equipment power; each one on a separate branch circuit. Branch circuits for equipment power shall be protected and wired for 20A capacity. VoIP equipment requires a 220V/20A emergency power outlet the connector must have the ability to mate with a HBL2321 power connector. See section 9; (Additional U of A Requirements) for information regarding VoIP installations. The outlets should be mounted 12 inches above finished floor (AFF). Separate duplex convenience outlets shall be installed at 6-foot interval around the room. Emergency power should be utilized whenever possible. If there is a UPS and/or a generator in the building then the TRs should be connected to it.
H. Lighting

Lighting must have uniform intensity of 50 foot candles when measured 3 feet from the finished floor. Indirect lighting is not permitted. Lighting fixtures must be on separate electrical circuits separate from the circuit the feeds the electrical outlets in the room. Do not place light fixture above equipment racks, cabinets, frames or other freestanding equipment to avoid blocking of light.

I. Environmental Control

The temperature inside telecommunications rooms must be maintained between 17.7°C (64 °F)-23.8°C (75 °F) and relative humidity between 30%-55%. There must be at least one air exchange per hour in the rooms to maintain positive pressure inside the rooms.

J. Grounding

Per CEC and ANSI/EIA/TIA- 607 requirements, the telecommunications grounding and bonding infrastructure shall be designed and routed through each telecommunications space. Each telecommunications room shall be equipped with a Telecommunications Grounding Busbar (TGB) bonded directly to the Telecommunications Bonding Backbone (TBB). The busbars shall be a minimum of 6" in length, 2" in width and 1/4 thick. They shall be drilled and tapped to accommodate standard NEMA compliant grounding hardware. The TBB shall be a minimum of #6 AWG stranded copper grounding conductor and should be in conduits. All TBBs must be tied to the telecommunications main grounding busbar (TMGB) located in the equipment room (or main telecommunications room). The TMGB must be bonded to the building system ground with a minimum of 3/0 AWG stranded copper bonding conductor (BC). The ohmic resistance to ground from any point in the telecommunications grounding system must not be more than 3 ohms.

K. Telecommunications Equipment Room (T-E-R)

A telecommunications equipment room (T-E-R) is where the entrance conduits terminate. It is usually located on the ground floor but may also be located in the basement. A T-E-R typically functions as the main cross-connect (MCC). It is the main telecommunications serving point for the building. It will contain telecommunications equipment, much of it mounted on 19" racks. Cables will be spliced and terminated on the walls. It is important that the entrance conduits stub up in the T-E-R as close to a corner as possible.

Typical T-E-R dimensions are 12’ x 12-1/2’ (minimum) for a building serving fewer than 200 work areas—a typical work area (WA) is 10’x10’ or 100 sq. ft. A larger building will require a larger T-E-R.
In certain buildings, the T-E-R will be further designated as a Node Room. A Node Room is used as a cabling hub not just for that building but for other buildings in that neighborhood of the campus. A Node Room requires additional space, air conditioning, and additional entrance conduits. It may require 30 amp outlets. In some cases, where a Node Rooms is designated in a building, a separate TR on the same floor as the Node Room may be required.

IST will advise PMO and the architect in the initial planning stage if a Node Room has been designated. No water sprinklers may be installed in a Node Room. A separate fire suppression system, based on one of the approved replacements for Halon, must be installed in coordination with the campus Fire Marshall and Alberta Building Code.

A Node Room will house PBX telephone switching equipment, large wet- or dry-cell batteries, routers for campus wide area network (WAN), related local area network (LAN) switches, optical fiber cross connects and optical communications gear. Hence, it should be located so that it is accessible for the delivery of large equipment throughout its useful life. It must be at least 10' from a potential source of EMI (motors, transformers, photocopying equipment and the like).

### L. Telecommunications Rooms (TRs)

TRs are smaller than T-E-Rs. They are the cabling hubs for floors within a building. They also contain network electronics, typically mounted in 19" racks with appropriate cable management.

- A TR serving 50 WAs or 5000 sq. ft. must be at least 10'x 8' in size. (A typical WA is 10'X10' or 100 sq. ft.)
- A TR serving an area larger than 5000 sq. ft. and less than or equal to 8000 sq. ft. must be at least 10'x 9'.
- A TR serving an area larger than 8000 sq. ft. and less than or equal to 10,000 sq. ft. must be at least 10'x 11'.
- A minimum of four 4-inch vertical riser conduits or sleeves are required between TRs. They must be installed as close to a corner in the TR as much as possible.
- A minimum of a 6' service loop will be run by the cable installer.

### M. Service Corridors

The University of Alberta’s Service Corridor are not considered as an outdoor environment therefore a minimum flame test rating of FT6 (CSA) or CMG (NEC) for communications cabling is required. All new installations must be reviewed by Utilities and IST in order to follow the University of Alberta’s standard on no splice canisters installed into or mounted on to the tray system. Indoor/outdoor fiber cables are preferred when running cables through the service corridor.
4. Horizontal Pathways

The Horizontal Pathway System is the pathway through which cables are pulled from the T-E-R or TR to the outlets on that floor. Outlets must be connected to a TR on the same floor.

A. Tie Wraps

Tie wraps are not acceptable. Velcro shall be used to support Cat 6 cabling.

The cable jacket shall not be deformed when dressing cables.

B. Riser Conduits

In new buildings, a minimum of four 4-inch vertical riser conduits are required between TRs.

In renovations of existing buildings or addition of TRs, will be allowed as required or physically able to fit.

C. Raceway Systems

Perimeter Raceways

In a perimeter raceway, power and telecommunications cables must be in separate compartments and must comply with applicable electric codes. When metallic barrier is provided, it must be bonded to ground. The barrier must run continuously throughout the length of the raceway. Radius bend fittings must be used in “LB” fittings, or any other raceways. Junction boxes to have a 7” radius bend.

A pull box must be installed every 30 metres / 100 feet or every 180 degree bend radius.

Open ceiling and mechanical rooms must have conduit or approved cable tray. No free air or supported by existing conduit.

Raceways Inside Rooms

1. Wiremold 700 or equivalent can only be used on single vertical surface installs down a wall with maximum of two (2) Cat6 cables and minimum box of Wiremold 5748 or equivalent.

2. Suggested minimum raceways or equivalent: Non-metallic uniduct 2900 1½” (38mm) x ¾” (19mm) with radiused elbows.
Existing hollow wall with low voltage bracket can be used as raceway. Cat 6 cable must be protected entering through metal studs or metal plates.

3. Hubbell PL1 non-metallic Raceway - single channel with radius elbow fittings or equivalent

4. Hubbell PW2 - two channel raceway with radius elbow fittings or equivalent

5. Wiremold 5400 series - two channel raceway with radius elbow fittings or equivalent. Suggested for larger installations.

D. Cable Trays

TOs can also be connected to the TR via a combination of cable tray and conduit. U of A has standardized on using basket or ventilated solid type cable trays, ladder tray is not recommended. TOs should be connected to the cable tray with home run 1-1/4" conduits.

Cable trays to be installed according to electrical code.

It is important that the path for the cable tray is clear of obstructions, such as HVAC ducts, large pipes and structural beams within the building. Where fire or smoke barriers are penetrated by the cable tray, they shall be fire stopped to maintain the rating of the barrier. Alternatively, conduit sleeves may be used through the penetrations. They must be fire stopped as well. The number of sleeves required depends on the number of cables and size of tray. Use 40% fill ratio to determine the number of sleeves. Two additional spare sleeves should be installed to accommodate future cable placement with fire seal or capped off.

Place cable trays above drop ceilings in corridors. Do not place them above offices or inaccessible spaces. There must be at least 4 inches of vertical space between the suspended ceiling tile and the bottom of the cable tray; 12 inches of vertical clearance from the top of the cable tray to the true ceiling; and 2' total side clearance (meaning, if the cable tray is wall mounted and there is no clearance on one side, then minimum clearance on the other side should be 2').

It is desirable that the cable tray originates from the TR. If it does not originate from the TR then 4" conduits may be used to connect the TR to the cable tray. The number of 4" conduits required depends on the number of cables and size of tray. Use 40% fill ratio to determine the number of 4" conduits. Two additional spare conduits should be installed to accommodate future cable placement.
Access ceiling panels must be installed at 5-foot interval if cable tray is passing through a hard-lid ceiling. The panels should be within 2 feet from the cable tray. They shall not be mounted directly underneath the cable tray.

All metallic cable trays must be bonded but should not be used as grounding conductor for equipment.

It is recommended for installations over 25 lines that a cable tray be used. The cables must be properly radiused or waterfalled when leaving the cable tray in the TR with a physical radius part, no tie wraps or Velcro substitutes.

E. Homerun Conduits

Telecommunications outlets (TOs) should be connected to the TR with a home run. ¾" conduit sleeve/stub required in wall space, with a maximum of four Cat 6 cables. Longer runs of ¾" conduit shall have a maximum of three (3) Cat 6 cables. “LB” fittings to be used only with radius bend of 7”. Junction boxes to be 4”x4” deep straight through -3- conductor ¾” conduit. For 4”/16 straight through 1” conduit, there shall be a maximum of six (6) Cat 6 cables. A 7” radius bend on Cat 6 cable must be kept even when using larger junction boxes for 90 degree turns.

Power over Ethernet (PoE) devices such as wireless access points (APs) must have a home run to the telecommunication room (TR) that contains the PoE network switch. Patching between floors or between different TRs is not acceptable.

A 2-inch conduit is required to each wall-mounted box that supports a multiuser telecommunications outlet assembly (MUTOA). A MUTOA is a special type of telecommunications outlets that can support up to 12 voice/data jacks. It is suitable for use in locations where there is a cluster of machines where each one is within 15 feet from the MUTOA.

Two 2-inch conduits are required from the TR to each 2'X2' enclosure designated as a consolidation point (CP). Consolidation points are usually mounted in the ceiling. CPs are effective in serving floor areas consisting of modular furniture where furniture reconfiguration occurs. It allows permanent cabling between TR and CP. Short replaceable cable runs are placed from the CP to the TOs in the cubicles. When the furniture configuration is changed, then it is only necessary to re-pull the cables from the CP to the cubicles, thus avoiding cable replacement back to the TR.

Flexible conduits such as metallic flexible conduit are not desirable pathways for telecommunications cables because they tend to "creep" and "shift" and cause sheath damage to the cables. Therefore, the use of flexible conduits as pathway for telecommunications cables must be avoided as much as possible. Conduits should be grommeted.
F. J-Hooks

J-Hooks are to be used only in existing ceilings or small renovations where cable tray or conduit cannot be installed. J-hooks on T-bar wire support a maximum of five (5) Cat 6 cables on single wire. There shall be one (1) J-hook maximum per T-bar wire, and be at every 4 feet. J-Hooks with six (6) or more Cat 6 cables shall be supported by independent rods every metre or every 3 feet. J-hooks shall be installed to nearest tray or conduit.

New constructions or renovations shall be cable tray and conduit. No J-hooks are allowed.

5. Telecommunications Outlets

A. Standard Wall Outlets

Hubbell universal keystone standard U of A telecommunications outlet (TO) is used for voice, data and sometimes video communications. It requires a double gang box, 4 11/16" x 4 11/16" x 2 1/8" deep, with a single gang mud ring. It is mounted flush in the wall at same height as the convenience electrical outlet-- 12" AFF. The 110 standard electrical outlet boxes will not be acceptable. Wall outlets shall have a maximum of four (4) Cat 6 per gang box according to electrical code. If a box is less than 2” deep a sloped type faceplate must be used to terminate cable. Sloped style faceplates should be used for all fiber connections.

Consider furniture designs when determining outlet placement. Wall ports must remain accessible for terminations, testing, and future troubleshooting.

Indicate TO locations on the prints with half-shaded triangles. Use appropriate symbols to differentiate TOs that have additional interface such as video or that support special devices like a wireless access point.

A TO for a wireless access point should be no more than 3 feet away from the specified wireless access point location. IST is responsible for wireless design and wireless access point placement. The TO must be designated with appropriate subscript on the drawings. IST installs the wireless access points after the building construction is complete.

B. Floor-mounted Outlets

Enclosures for floor mounted TOs must have 1-1/4" knock-outs to accept the station conduits and must accommodate Hubbell universal keystone standard TO faceplates.
C. Pack Poles
The pack pole must have a physical divider between the power and data as per CSA standard. This pack pole must have grommets on entry and exit points.

D. Service Loops
The cable installer contractor will leave a 3’ minimum of extra Cat 6 cable on the room end, and should have a 3’ service loop in the ceiling space before being installed down the wall. The cable installer contractor will create a minimum 6’ service loop in the TR space leaving no more than 10’ of extra cable past the service loop. Moreover, a 6’ service loop should be installed in the ceiling space before entering a TR.

E. Modular Furniture
Modular furniture must accommodate Hubbell universal keystone standard TO faceplates and can be provided by IST Cabling Services for an added cost.

Wall ports must remain accessible for terminations, testing, and future troubleshooting.

6. Miscellaneous

A. Audio-visual, Intercom and Paging Systems
Audio-visual (AV) systems, intercoms and similar in-house paging devices are the responsibility of the architect. They may not be located in any TR. Contact IST Repair and Deployment for further information in designing, supporting or maintaining these systems.

B. Analogue Phone Line
Special cabling requirements may be needed in case of Analogue or non PBX services. Please contact IST for review and advice.

C. Elevator Phones
Elevator phones are covered under the Elevator Specification Guideline. U of A Planning & Infrastructure, Electrical Maintenance is responsible for service to these phones. There must be at least one TO in the elevator equipment room that is cabled to the elevator controllers to allow
for the actual connection of the phone in the elevator cab. There must be an adequate number of jacks on the TO to accommodate all elevators in the building.

7. Reroutes

For many new buildings, the site work means that existing telecommunications cables in the area need to be rerouted. The architect is responsible for designing the conduit, cable tray etc. necessary for the reroute. IST will provide design advice and information. The general contractor will install the new underground conduit and Service Corridor conduit.

IST will engineer the reroute of the cables through the new conduit. Cable reroutes are not done by the general contractor. IST will prepare a separate bid document for the cable reroute, select a contractor and be responsible for the reroute. No existing telecommunications cables can be damaged or demolished until the reroute is complete. This needs to be made clear in the general bid documents. IST will advise PMO during the design stage how much time must be allowed in the construction schedule for the cable reroute.

8. Additional U of A Cabling Specifications

- Installation permits for data and telecommunication cables
- Fiber Requirements - as per EIA/TIA and CSA standards
  - Singlemode to be SMF28e or equivalent
  - Multimode 50μm OM4 minimum
  - Indoor use FT-6 rated, tight buffered
  - Outdoor use moisture protected, tight buffered, may need UV protection
  - Can share conduit space with copper lines
  - Termination to be LC connectors
  - Multimode fiber to be directly terminated or fusion spliced (Preferably by IST)
  - Singlemode fiber to be fusion spliced (Preferably by IST)
  - Fiber patch panels to be used at all locations, IST to determine type/brand of enclosure to suit the location (i.e. Siemon depending on location and proper adapter strips depending on terminations)
  - Fiber optic cable should have a 25 foot loop at each end of installations.
- Copper Cable Supported - as per EIA/TIA and CSA standards
  - Minimum CAT6 certification
  - Current primary: minimum GenSpeed 6000
  - Secondary: Mohawk/CDT Advancenet or approved equivalent
  - Cable color preference is Yellow for Cat 6 (Data)
Cable color preference is White for Cat 6 (PBX Voice)

- Connectivity Hardware – minimum Cat 6 certified
  - Data Jacks: Hubbell (violet in color)
  - PBX Voice Jacks: Hubbell (white in color)
  - Unloaded patch panel ends - discrete jacks must be used for all lines
  - All above must conform to the Hubbell universal keystone standard

* All cable and/or connectivity hardware can be obtained directly from IST*

- Testing and labeling requirements
  - printed test, minimum link (90m) level 3 certification for Category 6
  - labeling as per ANSI/EIA/TIA 606 standard or minimum IST standard (i.e. TR245 C001)
  - Room End (i.e. RM231 C001) Telecommunication Room
  - Cable certification summary and wiring diagrams to be supplied on completion of all cabling installations
  - Copy to be sent to IST and to the PMO on capital projects

* IST reserves the right to check and verify all certification results performed by non-IST personnel. In case of failure to meet certification standards, reinstallation of any non-compliant cabling will be expected at installer’s expense.*

Note:
- Removal of legacy cabling - both in tunnels and hallways, whenever possible
- If horizontal voice interconnect trunk is needed between two electrical closets it can be cabled using a standard 25 pair or higher Category 3 UTP trunk cable
- All new voice lines shall be cabled to the nearest active telecommunications closet
- All wall penetrations must be fire stopped with proper rating.

9. Additional U of A Cabling Requirements

Primary supported cable, connectivity hardware or fiber can be obtained through IST on request. All other non-specified Cat 6 cable and hardware must be approved by IST prior to installation. For renovations and any cabling projects where IST is supplying the cable, the cable can be obtained only through the PMO or requesting university department. IST is not authorized to re-sell any cable to outside contractors or vendors.

** Important Note for Capital Renovations Projects:**

Minimum Category 6 as of July 2003. Discrete jacks on Telecommunications Room end and Hubbell universal keystone standard are expected and any changes to this standard must be
approved by IST. All other standards for hardware and electrical requirements as per this document.

Preferred “Premise Wiring Systems” are Hubbell. IST technicians must be certified for any such Premise Wiring System as part of the Renovation Project.

A. Voice over Internet Protocol (VoIP)

The following Voice over Internet Protocol (VoIP) items are required to be implemented for this type network infrastructure.

1. The power requirements are a minimum of one NEMA L6-20R locking female receptacle connected to a 220 volt 20 amp circuit on UPS power. The power should be mounted on the wall close enough to so that no extension cord is required.
2. Minimum of one 4 post relay rack.
3. This VoIP TR shall be considered an IST secured room.
4. In every instance only (1) Category 6 line to each WA / Phone unless otherwise specified.

For further assistance in the requirements for a VoIP telecommunications room contact IST.

For all UTP installations data and voice the minimum requirement will be Category 6.

10. References

Appendix A: Requirements for copper and fiber installations

Racks

Depending on the services that we are designing either one or two racks are used. If the service requires a UPS then both a four post rack and a two post rack is required with a vertical manager separating the two racks. The two post rack will contain all the cabling infrastructure and the four post rack will contain all the electronics. If no UPS is required then only a two post rack is required with vertical managers on both sides. If space is constrained, one vertical manager can be used.

Terminations and cable management

All fiber will be terminated in a 1U rack-mounted fiber panel installed on the second U of the two post rack. Leave a 1U below it as well. All splicing will be done using a fusion splicer. The splices will be managed in a splice tray.

There will be a 10 meter service loop at each termination location using a snowshoe to create the service loop.

All copper terminations will be code T-568B using Hubbell jacks, installed in a 24 port Hubbell patch block. Lacing bars will be used to manage the cables. There will be a 1U space between each patch panel. The jack color will depend on purpose of the connection. Purple Jacks are for Data/Voice and Yellow Jacks are for University Wireless Service (UWS). The data connections should be installed on the first available patch panels and the UWS should be on the very last patch panel on the end to leave room for expansion. Lacing bars should be used for sides of the Hubbell patch block. The following images (front and back of patch panel) are examples of what we expect for cable management.
Labeling

First cable will be started from C001, then 2nd cable C002 and so on. If there are existing cables on the patch panel, then the number will be continued from the last existing number. Labeling in the Telecommunication room (TR) for data/voice connections will be as follows:

C001  C002  C003  C004  C005
Rm #  Rm#  Rm#  Rm#  Rm#

Labeling in TR for wireless access point (AP) locations will be as follows:

UWS1  UWS2  UWS3  UWS4
Rm 201  Rm 202  Rm 203  Rm 204

If AP is outside a room then use the closest room number to the AP. All labels will be computer generated no hand written labels will be acceptable. IST can provide an editable spreadsheet for easily making the required labels for the Communications rooms.

Labeling for users end will be as follows:

C###
TR Rm#

for example

C001
Rm 220

Labeling for the AP locations will be as follows

UWS#
TR Rm#

For Example
AP installation

Power over Ethernet (PoE) devices such as wireless access points (APs) must have a home run to the telecommunication room (TR) that contains the PoE network switch. Patching between floors or between different TRs is not acceptable.

A map will be provided as to the location where the access points will be installed. A 10 meter service coil will be provided at each of the locations to give flexibility to move the access point. A yellow jack will be used for terminations and a short patch cable (3 ft) will be used to connect to access point.

Access point will either be mounted to a T-Bar on drop down ceilings or a gang box. A T-Bar is illustrated below and an access point installed on a T-Bar.
Each access point’s MAC address will be recorded indicating the location it is being installed.

This information needs to be provided to IST so the access points can be added to the correct controllers and put on monitoring.

The 3 ft patch cable needs to be plugged into the port labeled Ethernet and the other end to the jack. The cable needs to be routed so not to be seen.

After each floor is complete the installer needs to insure that the LED is Blue while attempting to connect their device to each access point.

The following illustration will indicate the installation process.
Testing

Copper media:

All tests are to be Certified Cat 6 by Manufacturer. Testing will include attenuation, PS Next, ELFEXT, ACR, Return Loss, PP Next, PS ELFEXT, PSACR
All test results need to be signed off by IST before the job is complete.

**Fiber Optic media:**

All fiber strands need to be tested for dB loss using a loss kit certified for SM fiber, OTDR readings would be in addition and are optional.

**Wireless Access Point testing:**

All wireless access points installed need to be verified by IST that they are working correctly in addition to the copper testing and the light indicators on the access point.
Appendix B: Typical Telecommunications Room Layout

4 post and 2 post Racks setup

Conceptual drawing is not to scale. IST will assist with telecommunication room design layout.

Electrical code must be adhered to for all finalized designs.