THE UNIVERSITY OF TENNESSEE
HEALTH SCIENCE CENTER

UT Health Science Center: IT1318-HSC-B Network Cabling Requirements	
Version 1	**Effective Date: September 18, 2024**

Purpose

To define the criteria for the installation of fiber optic and copper cable at all locations affiliated with UT Health Science Center (UTHSC). This includes providing guidance regarding underground conduits, ducts, cables, building entrances, pull boxes, and maintenance holes. This policy determines the standards for all projects.

Scope

The standard applies to any UTHSC-affiliated location that is maintained and operated by UTHSC. The sections below provide guidance for all indoor cabling standards, as well as regarding outside plant for underground conduits, ducts, cables, building entrances, pull boxes, and maintenance holes. The UTHSC ITS Networking and Unified Communications (NUC) Team must approve all inside and outside plant design.

Standard

General Contractor Requirements to be Responsive

Commscope/Systimax Requirements: All contractors shall be certified through Commscope/Systimax Technologies in the Systimax structured cabling program. All cabling and associated components shall be provided as part of the Systimax product line. The contractor shall provide the Commscope Systimax extended 25-year warranty for the system. As such, the contractor shall supply Systimax Technologies with all the necessary paperwork in a timely manner and arrange for final inspection by Systimax Technologies, pursuant to the terms of the warranty. The base bid shall use Systimax cabling and all associated components. All work shall be done in a professional manner in accordance with NFP, BICSI, and NEC codes and standards.

All work completed shall be performed under the guidance and standards of the University's low-voltage project managers listed below:

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Section 1 – Unit Pricing

The contractor must provide their cost of all materials, labor, and the markup applied to these items. The contractor must also grant the University access to the contractor's invoices from suppliers or wholesalers and grant the University the option to conduct an audit of the contractor's invoices. Substitute material shall not be accepted. All required materials are listed in the itemized list in the addendum to this document.

Section 2 – Staffing Requirements

Contractors must provide the number of qualified persons on staff. To be qualified, a person must have both training and experience in that area. It is legitimate to count the same person in more than one skill. Inflation of these numbers by counting an individual in a skill for which they are not fully qualified would lead to rejection of the contract or, if an award has been made, invalidation of the contract. Please include documents for employees who hold RCDD and Systimax credentials. All work on the UTHSC campus must be performed by a UTHSC contractor and approved by the UTHSC ITS Networking and Unified Communications (NUC) Team, including shared spaces and tenant spaces.

Minimum Requirements:

Classification	Required FTE
Project Manager	5
System Designer / RCDD (Company Employees, Not Sub-contractor)	1
Quality Control and System Acceptance	5
As-built Documentation	5
Certified SYSTIMAX Design and Engineer (or Master Class), include documentation	2
Certified SYSTIMAX Installation and Maintenance	8
Certified SYSTIMAX iPatch Programmer	1
Twisted pair/copper installation and termination (include documentation for any BICSI technicians or installers)	15
Fiber optic installation and termination (include documentation for any BICSI technicians or installers)	10

Section 3 – Outside Plant

All outside plant designs shall be approved by the UTHSC Network and Unified Communications (NUC) Team.

Conduits

- Standard size interbuilding conduit shall be four inches. For small buildings, the quantity shall be two. For large buildings, the quantity shall be a minimum of four.
- All newly constructed buildings greater than 100,000 square feet shall have dual entrance facilities – two means of access to the campus network. An exception may be taken due to the function of the building.
- No LBs (electrical elbows) are allowed in any conduit system.
- Only schedule 40 PVC pipe may be used underground. No rigid steel, gas pipe, or water pipe shall be used for underground runs.

Entrance Facility

- Outside plant contractors shall include one Armorcast or Quazite 30x48x36 two-lid pull box ground rod and gravel bottom adjacent to the building for the electrical contractor to tie into for all new construction. OSP Conduits supplied by the boring contractor shall terminate here, and the building electrical contractor shall begin tie-in here.
- Unused conduits shall be capped. Others shall be sealed or waterproofed around the cable. Seal type shall be a link-belt seal around the conduits, not foam.
- No more than two 90-degree bends at the OSP entrance point.

Boring and Trenching

- All boring and trenching shall be performed by the University contractor.
- All subsurface facilities shall be located by the contractor via an 811 call before performing any work.
- Shared manholes are not permitted.

- No 90-degree bends between OSP pull points.
- All conduits shall be reamed, shear-free, and at a minimum below the frost line. In special considerations, depth may be coordinated with campus facilities.
- Contractor shall provide one Armorcast or Quazite 30x48x36 pull box with ground rod and gravel bottom at every 400 feet or 90-degree turn.
- Boring contractor shall restore all grass or sidewalk.
- Boring contractor shall coordinate all permits with the ITS and UT Facilities office or General Contractor.
- Contractor shall provide one 6 AWG wire for locating in one conduit.
- Manholes are generally avoided but may be needed in areas such as parking lots or roads. Each case shall be coordinated with ITS Network Services and Facilities.

Fiber Cables

- Cables shall be determined by the bill of materials list in this standard.
- Splicing and splicing accessories shall be determined by the scope of each project, the standard's bill of materials, and approved by the network services department. Fusion splices only. "Unicam" or mechanical splices are not permitted. Contractor shall use an approved fusion splicer and OTDR for loss testing.
- Service Loop – Service loops in pull boxes shall be 100 feet of service loop per 1000 feet of cable; a 100-foot service loop at each street crossing; no more than 200 feet of service loop per 1000 feet of cable.
- There shall be 50 feet of service loop at the building entrance – even if using indoor/outdoor cable.
- There shall be another service loop at the MDF where the cable terminates.

Section 4 – Inside Plant

Telecommunications Room Requirements – Campus, Floor Serving (IDF)

- A minimum of a 12x16 room is required for each floor. No drop ceiling shall be installed in the telecommunications room.
- Walls are to be lined with fire-rated plywood with fireproof paint in white.
- A 120V L5-30R receptacle is to be mounted on the wall next to the last rack.
- Multiple 120V 20A quad receptacles are to be mounted on each wall for convenience and auxiliary equipment.
- All final outlet locations to be coordinated with UTHSC.
- Acceptable flooring to be installed is VCT, LVP, or sealed/painted concrete. Bare concrete is not acceptable due to excessive dust.
- Door shall have a door sweep installed. The door shall swing outward to the hallway, not inward to the room.
- Each room shall have a grounding bus bar installed on the backboard with all racks and ladder tray directly bonded to the bus bar according to NEC specification. Bus bar must be installed to the building grounding system, installed by an electrician, and not to the building's steel. Bus bars are to be interconnected between telecommunications rooms via endothermic welding.
- Installer must supply 6AWG stranded green grounding wire to the bus bar.
- Each room shall have qty. 3 19”x84” two-post rack with qty. 4 vertical organizers with doors.
- Each room shall have qty. 2 18” ladder racks, parallel above rack, with splices, runway radius drops, elevation kits, and ground straps from wall to wall above rack system for cable management.
- Riser fiber shall be installed in the center rack at the top of the rack in a 1U LIU as specified in the parts list.
- Riser fiber to be a minimum of 24 strands of single-mode fiber optic cable from IDF to MDF, terminated on both ends with LC connectors using epoxy termination with manual polishing.

- Copper patch panels shall be installed in the two outer racks, starting on the left-hand side and ending on the right-hand side, balanced between racks as appropriate, with room for growth on the right side. Patch panels are to have 2U horizontal cable managers installed between each patch panel. All parts to be installed as specified in the parts list.
- Electrical panels, access controls, building automation, fire panels, booster equipment, and other non-IT equipment are not allowed to be co-located in the telecommunications room.
- General contractor shall provide shop-style wrap-around LED lights.
- General contractor shall provide mini-split HVAC equipment mounted above the door with a minimum requirement of 15K BTU rating with remote control.
- General contractor shall provide qty. 4 4" sleeves between telecommunications rooms in the location coordinated with UTHSC.
- All telecommunications rooms shall be stacked throughout the entirety of the building.
- No storage is permitted of any kind in telecommunications rooms.

Telecommunications Room Requirements – Main Equipment Room (MDF)

- A minimum of a 16x20 room is required for each floor. No drop ceiling shall be installed in the telecommunications room.
- Walls are to be lined with fire-rated plywood with fireproof paint in white.
- Two 208V L6-30R receptacles are to be mounted on the wall next to the last rack.
- Multiple 120V 20A quad receptacles are to be mounted on each wall for convenience and auxiliary equipment.
- All final outlet locations to be coordinated with UTHSC.
- Acceptable flooring to be installed is VCT, LVP, or sealed/painted concrete. Bare concrete is not acceptable due to excessive dust.

- Door shall have a door sweep installed. The door shall swing outward to the hallway, not inward to the room.
- Each room shall have a grounding bus bar installed on the backboard with all racks and ladder tray directly bonded to the bus bar according to NEC specification. A bus bar must be installed to the building's grounding system, installed by an electrician, and not to the building's steel. Bus bars are to be interconnected between telecommunications rooms via endothermic welding.
- Installer must supply 6AWG stranded green grounding wire to the bus bar.
- Each room shall have qty. 4 19"x84" two-post rack with qty. 5 vertical organizers with doors.
- Each room shall have qty. 2 18" ladder racks, parallel above rack, with splices, runway radius drops, elevation kits, and ground straps from wall to wall above rack system for cable management.
- Plant fiber shall be installed in the center rack at the top of the rack in a 2U LIU as specified in the parts list. Floor-serving fiber shall be installed in the center rack in the second position below plant fiber as specified in the parts list.
- Plant fiber requirements shall be determined on a case-by-case basis, with a minimum of 48 strands of single-mode fiber optic cable, terminated on both ends with LC connectors using epoxy termination with manual polishing.
- A minimum of two separate service entrances shall be required on all new construction, as feasible.
- Copper patch panels shall be installed in the two outer racks, starting on the left-hand side and ending on the right-hand side, balanced between racks as appropriate, with room for growth on the right side. Patch panels to have 2U horizontal cable managers installed between each patch panel. All parts to be installed as specified in the parts list.
- Electrical panels, access controls, building automation, fire panels, booster equipment, and other non-IT equipment are not allowed to be co-located in the telecommunications room.
- General contractor shall provide shop-style wrap-around LED lights.

- General contractor shall provide mini-split HVAC equipment mounted above the door with a minimum requirement of 20K BTU rating with a remote control.
- General contractor shall provide qty. 4 4" sleeves between telecommunications rooms in the location coordinated with UTHSC. See the outside plant section for building entrance requirements.
- All telecommunications rooms shall be stacked throughout the entirety of the building.
- No storage is permitted of any kind in telecommunications rooms.

Telecommunications Room Requirements – Remote Branch Offices

- A dedicated telecommunications room is preferred but not required. A minimum 6'x9' is preferred for room sizing.
    - Walls are to be lined with fire-rated plywood with fireproof paint in white.
    - One 120V L5-30R receptacle is to be mounted on the wall next to the last rack.
    - Multiple 120V 20A quad receptacles are to be mounted on each wall for convenience and auxiliary equipment.
    - All final outlet locations to be coordinated with UTHSC.
    - Acceptable flooring to be installed is VCT, LVP, or sealed/painted concrete. Bare concrete is not acceptable due to excessive dust.
    - Door shall have a door sweep installed. The door shall swing outward to the hallway, not inward to the room.
    - Each room shall have a grounding bus bar installed on the backboard with all racks and ladder tray directly bonded to the bus bar according to NEC specification. A bus bar must be installed to the building's grounding system, installed by an electrician, and not to the building's steel. Bus bars are to be interconnected between telecommunications rooms via endothermic welding.

- Installer must supply 6AWG stranded green grounding wire to the bus bar.
- Each room shall have qty. 1 19"x84" two-post rack with qty. 2 vertical organizers with doors.
- Each room shall have all cables installed in metallic J-hooks or D-rings.
- Electrical panels, access controls, building automation, fire panels, booster equipment, and other non-IT equipment are not allowed to be co-located in the telecommunications room. *Exceptions may be made on a case-by-case basis with UTHSC Network and Telecommunications.
- General contractor shall provide shop-style wrap-around LED lights.
- General contractor shall provide mini-split HVAC equipment mounted above the door with a minimum requirement of 10K BTU rating with remote control.
- General contractor shall provide qty. 2 4" sleeves, if needed, between telecommunications rooms in the location coordinated with UTHSC. *Coordinate with UTHSC Network and Telecommunications.

- If a dedicated telecommunications room is not available due to space constraints, a minimum space of three-foot clearance in front of and on each side of a wall cabinet will be required. Minimum lockable wall cabinet size shall be 36"x24"x25" with fan and filter mounted to plywood backboard.
- If space is at a bare minimum and all other options exhausted, a 6U drop-in rack will be specified in accordance with space constraints, mounted to plywood. Mops, mop buckets, janitorial supplies, and chemicals are not to be stored on or near the rack.

Telecommunications Cabling Requirements – Work Area

- Contractor shall supply Nvent Caddy J-hook system, preferably mounted to the wall at 5' spaced apart for proper support.
- The main cable trunk shall be arranged in a tree fashion.

- All station cabling shall be attached to the wall in work areas and shall not "free-float" through the room via hooks to the grid wire. Bridle rings shall not be used. J-hooks shall not attach to the ceiling grid.
- General contractor shall provide a 1" stub-out above the nearest accessible ceiling for each station drop. Conduit shall not be derated unless otherwise approved. All conduit shall be reamed; no metallic flex conduit allowed.
- Station cabling shall have a minimum 5' service loop above the station drop.
- Standard jack colors to be used shall be orange. All jacks to be Systimax jacks and faceplates.
- Faceplate colors shall be coordinated with the architect/project managers to match modular furniture or electrical plate colors.
- Faceplate labeling shall match the UTHSC example as follows:
    - Top row, centered, contains: [TR number – office/work area room number – faceplate number]
    - Bottom row, centered above jacks: [Building number, floor letter, cable number]

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- Building numbers are assigned by UTHSC. Please coordinate with the project managers for the specific building number.
- Each work area shall have a minimum of qty. 2 cables installed, no exceptions.
- Each wireless access point location, to be determined by UTHSC according to building plans, shall have a minimum of qty. 2 cables installed, no exceptions.
- Each television/signage display shall have a minimum of qty. 2 cables installed, no exceptions.
- Electrical raceways shall be coordinated with the electricians.

Section 5 – Testing and Acceptance

Copper Cabling

- All testing shall be completed to conform to Systimax warranty with DSX series or approved Fluke tester, with results provided in PDF form using Fluke LinkWare Live software.
- Testing shall be Permanent Link testing and pass/fail per the tester.
- All testing results shall be provided to UTHSC upon completion of the job.
- Final acceptance shall be completed with the award of warranty by Systimax.

Fiber Optical Cabling

- Optical testing shall be completed to conform to Systimax warranty with Fluke Certifiber Pro or equivalent approved Fluke tester with results provided in PDF form using Fluke LinkWare Live software. Testing shall be Pass/Fail per the tester.
- All testing results shall be provided to UTHSC upon completion of the job.
- Final acceptance shall be completed with the award of warranty by Systimax.

As-Built Drawings

- The contractor shall supply a set of as-builts upon completion of all new construction in PDF format.

Policy History

Version #	Effective Date
1	08/01/2024
1.1	09/18/2024 – updated inside plan and outside plan fiber specifications

References

1. IT1318-Information Technology Network Monitoring and Defense and Penetration Testing