

# TELECOMMUNICATIONS

## DESIGN AND CONSTRUCTION GUIDELINES

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## **1.0 General**

The following minimum guidelines for telephone, data, video, and other general telecommunications distribution systems are of a general nature and may be modified by the Communication Technologies Office as necessary to accommodate special design or functional requirements. Wiring standards are dynamic and constantly changing due to continually evolving networking standards. Designers and Contractors need consult with the UNC-Chapel Hill – ITS - Communications Technologies – Engineering and Operations Office for clarification of current media types and standards before completing telecom designs, purchasing materials, and commencing work. Basic requirements for all new building structures will include underground service entrance ducts, Telecommunication Rooms (TR's), a conduit riser system between TR's, a horizontal cable distribution system, and building wiring as defined in the following document. Existing building renovations MAY or may not require the construction of new Telecommunications duct bank.

The contractor will be required to purchase, install, test, and document all communications wiring as specified by the UNC-Chapel Hill-Communication Technologies – Engineering and Operations Office. The contractor may be required to provide communications manholes/duct bank within the scope of selected projects.

The project communications contractor shall be required to attend at least one a pre-installation meeting prior to any work being performed. This meeting will be coordinated by the project UNC-CH Construction Manager. The contractor shall be required to submit all communications

materials for review and approval by the designer and UNC Communication Technologies prior to any procurement.

Telecommunications electronic equipment will normally be provided (purchased and installed) by the Communication Technologies Group but may, in rare instances, be specified for installation by a contractor in accordance with ITS-Communications Technologies specifications.

## **2.0 Distribution System**

### **2.1 Communications Manhole**

All communications manholes shall be constructed in accordance with the plan and section view drawings in the UNC-Chapel Hill University Design and Construction Guidelines. All new manholes shall be fitted with cable racking hardware.

#### **2.1.1 Entrance Duct**

Unless specifically directed by the UNC-Chapel Hill – ITS-Communication Technologies Office, all new buildings will be designed with a minimum quantity of four 4 inch entrance conduits. This conduit will be of a rigid metallic construction or 4" Schedule 40 PVC encased in concrete pending approval/inspection by UNC Telecom and UNC Electric Systems and will extend from a communications manhole, designated by the Communication Technologies Office, to the primary communications room in the building. One of these conduits shall be fitted with four (4) 1" Carlon inner ducts. All conduits and inner ducts shall be installed with marked pull tapes.

The service entrance conduits shall appear and be positioned in the right rear corner of the PDR (primary distribution room), 4 inches from the rear wall and shall be stubbed 4 inches above the finished floor. Plastic bushings shall be installed on each entrance duct. Typically, no more than two 90 degree bends between the manhole and the building will be permitted.

### 2.1.1

### Entrance Duct-Continued

The service entrance conduits shall appear and be positioned in the right rear corner of the PDR (primary distribution room), 4 inches from the rear wall and shall be stubbed 4 inches above the finished floor. Plastic bushings shall be installed on each entrance duct. Typically, no more than two 90 degree bends between the manhole and the building will be permitted. The use of LB, LL, or LR fittings will not be approved. All metallic entrance conduits shall be installed in accordance with National Electric Code Article 250 and 800-12C. If the service entrance ducts penetrate or appear in the building before they final terminate in the building PDR, they should transition to metallic conduit (if PVC) in an accessible and appropriately sized junction box. If the distance between the point of transition and the building PDR exceeds 50 ft., then at least one of the quantity of exposed entrance conduits MUST be rigid. In addition, where a transition junction box is installed, one of the other conduits that extend to the PDR shall be fitted w/ three 1-1/4" rated inner ducts. Contractor shall consult with UNC Communication Technologies when special pull boxes or junction boxes are required.

### 2.1.2 Duct bank between Manholes

All Telecommunications duct bank shall allow no more than 180 degrees of bends between manholes. No short radius 90 degree bends are allowed. Reference specification section for Manholes and Duct bank, for a further description of ductbank construction practices.

### 2.1.2 Duct bank between Manholes-Continued

Special thermal protection design considerations must be applied when Telecommunications duct bank crosses or runs in same vicinity as steam lines.

### 2.1.3 Acceptance of duct bank

All duct bank both from the manhole to the building, and between manholes shall be inspected and approved by a UNC Electric systems representative prior to the placement of any concrete. Additionally, this ductbank shall be mandreled after completion. After a duct line is completed, a standard flexible mandrel shall be used for cleaning followed by a brush with stiff bristles. Mandrels shall be at least 12 inches long and have diameters 1/4 inch less than the inside diameter of the duct being cleaned.

## 2.2 Communications Rooms

2.2.1 Primary Distribution Room: All buildings will have a PDR (Primary Distribution Room, generally located on the lowest level of the building. This room will be a walk-in room with MINIMUM dimensions of 10' deep x 12' wide (double doors may be required as directed by Telecom office) unless otherwise specified by the Communication Technologies Office and shall be separated from other electrical, mechanical, and housekeeping spaces.

For specific power requirements for primary distribution room refer to section 2.2.4.

2.2.2 Satellite Distribution Room: Satellite distribution rooms (SDR's) will be centrally located on each level of the building, and ideally arranged in a "stacked" fashion. Minimally, there shall be a room for each 10,000 square feet of office floor space. Rooms shall provide a minimum quantity of three (3) 4" core holes with 4" sleeves/conduits thru the floor in back left hand corner. Contractor will install a minimum quantity of three (3) 1 1/4 inch plenum rated inner-ducts in one of the four inch backbone and/or riser conduits from Telecom Room to Telecom Room.

IMPORTANT: Telecomm. Rooms shall be located in the building such that the maximum cable distance from a communications outlet to the termination point in a room does not exceed 90 meters. In addition, 10 meters is allowed for interconnect cable in the room and for station cable in the office for a total cable distance of 100 meters. Satellite rooms will have minimum inside dimensions of 10' deep x 10' wide unless otherwise specified by the Communication Technologies Office. Double doors may be specified by Communication Technologies.

2.2.3 Room Design: All communications rooms will be equipped with following:

---Ceilings "shall be open to structure"

---Room lighting (50 foot candles measured at 3' AFF) w/ light switch in TR (Telecomm. Room).

### 2.2.3 Room Design-Continued

---All rooms shall be located away from any source of water damage. No water carrying pipes shall be permitted run through or within the ceiling space or floor of rooms, except pipes associated with any required fire protection system. No showers, toilets, or similar wet rooms/areas shall be adjacent to or above Telecomm. Rooms. In addition, as much as practicable, rooms shall be located away from electrical transformers, generators, air conditioning units or radio transmission equipment.

---Door locks keyed to Telecommunications room standards. The intent is to have an electronic door access device on all telecom room doors. UNC-CH uses the UNC One Card system and minimally, all measures should be taken to ensure that door frames are equipped to accommodate these devices.

---Floors shall be covered with static resistant VCT. Sealed concrete will not be permitted.

---Doors will be one hour fire rated, and designed to provide full access to the room. These doors will be designed as either single or double doors. All doors will open into corridors or common space. The intent of this requirement is to ensure that all Telecomm. Rms. are accessible WITHOUT having to access other space.

### 2.2.3 Room Design-Continued

---3/4" Fire-retardant plywood, grade A-C equivalent, fully lining all walls to a height of eight feet and beginning at floor level. Plywood shall be painted with a minimum of two coats white fire resistant paint. At least one fire retardant stamp shall be left exposed on each sheet of plywood.

---12" wide by 1-1/2" deep tubular steel ladder runway installed around perimeter of room, 4" off wall surface, at 7' above finished floor. Equip ladder runway with bottom drop out devices at floor racks as required to ensure cable bundling is fully supported to maintain proper bend radius. Install Mono Systems ladder runway part number MR2129-12-YZ or equivalent.

---Conditioned air which meets and typically exceeds normal building standards for office space as a minimum. Heat load requirements shall be calculated based upon electronic network switch equipment that will be installed in each room. Conditioned air shall be independently controlled for each telecom room and provided 24hours/7days a week, 365 days per year. The HVAC design for all communications rooms will need to make certain that air is exchanged out of the room. UNC Telecommunications will review and approve all HVAC designs, including mean temperature and number of air exchanges per hour.

All design efforts shall attempt to locate Telecomm. Rm. cooling equipment such that it is not located in the telecom room ceiling space.

### 2.2.3 Room Design-Continued

---Signage consistent with UNC sign shop standards, labeling room as "Communications Room." Contractor to coordinate details with UNC sign shop.

---In high rise buildings, greater than four floors (stacked closets) provide a 1/8" vertical strength member for strain relief of riser cables in each riser sleeve. This strength member is not part of cable but is a separate braided cable on which riser cables are supported on. Contractor to submit product cut sheets prior to beginning work.

### 2.2.4 Electrical Requirements

Primary Distribution Room (PDR): A "dedicated" electrical distribution panel shall be provided in the PDR. It shall be a minimum 100 Ampere rated, 3 phase panel with a minimum capacity for 16 circuits. Panel shall be commercial grade with bolt-in type breakers. Panel shall be flush mounted on wall inside PDR. Panel manufacturers shall be equivalent to those specified on project OR Square D, Siemens, or Westinghouse/Cutler-Hammer. Panel feeder shall be four wire (3 phase, 1 neutral, 1 grounding copper conductors) fully sized in accordance with Table 310.16 and 250.122 of the NEC and shall originate at the MDP (Main Distribution Panel) Include minimum quantity of (6) six ¾" EMT conduits stubbed out from flush mounted panel to an accessible location above ceiling walls.

## 2.2.4 Electrical Requirements

Primary Distribution Room (PDR)-Continued: Note: Buildings that are considered UNC-CH Tier 1 buildings (buildings with critical data network equipment that feed other buildings) shall require that the electrical feeder originates from an emergency generator power source, if available.

Primary Distribution Room (PDR) and Satellite Distribution Room (SDR): All electrical receptacles shall be 250v, 20 Ampere rated commercial grade flush mounted at 6' 6" (on-center) AFF and located in the center on the three non-entrance walls. Each receptacle location will present a double-duplex outlet. Receptacles in each PDR and SDR shall be served with a minimum of three (3) dedicated 20 ampere branch circuits connecting to 20 ampere bolt in breakers in the PDR distribution panel. Wiring shall consist of (3) #12 awg (black/red/blue), (1) #12 awg neutral (white) and (1) #12 awg grounding conductor (green) in a ¾" EMT conduit. Circuits shall be "split" between receptacles such that each receptacle in each double duplex outlet is served by a different circuit. Note: Electrical receptacle outlet locations MAY need to be field coordinated with owner to ensure that two outlets are located behind racks and one outlet above telephone equipment.

All electrical panels and devices shall be UL listed and installed per manufacturers instructions and meet the requirements of the National Electric code.

#### 2.2.4 Electrical Requirements-Continued

---Contractor will install a Telecommunications Bonding Backbone (TBB) in building by extending an appropriately sized #6 to 3/0 insulated ground wire (stranded) from the Electrical Main Distribution Panel to a ground bar (Erico Part No.TMGB-A16L19PT or approved equal) in the PDR. The ground bar shall be mounted in the upper left-hand corner of the rear wall at 7' 6" AFF. A continuous appropriately sized # 6 to # 3/0 insulated ground wire grounding conductor shall extend between ground bars in subsequent Telecommunications Rooms. Additionally, the ground bar on each floor shall be bonded to building steel or electrical distribution panel ground on that floor. A ground bar shall be installed as described above in each and every Telecommunications Room. Ensure that all of the ground wires described are installed in dedicated ¾" conduits, not in riser conduits between floors. These ¾" conduits are to be installed in the very left hand corner of each Telecommunications Room.

## 2.3 Riser System

Communications rooms will be connected by a minimum of three 4 inch sleeves or conduits. Both sleeves and conduit will be located along the rear wall, in the left rear of the room and will be stubbed 4 inches above the finished floor, 4 inches off the rear wall. Sleeves shall be fitted with 4" set-screw or compression connectors and screw-on type plastic bushings. Bushings shall be installed before any cable is pulled through riser conduits/sleeves. If riser conduit extends between rooms that are not stacked, a marked pull tape shall be provided. There shall be no more than two 90 degree bends in the riser conduit runs between rooms without installation of a pull box 24" x 24" x 8"deep. LB fittings will not be accepted. See section 3.2.1 for riser cable specifications.

## 2.4 Floor Distribution

2.4.1 Return Air Plenum Ceiling: Floor distribution from communications rooms to communications outlets will be provided by individual home-runs of 1 " conduit. All conduits will be equipped with a marked pull tape. Marked pull tapes will be tagged in the room and at each corresponding outlet to identify where the string terminates on each floor. This will be the preferred method of distribution when ceiling space is used as a return air Plenum. In lieu of a system utilizing "home-run" conduits, a distribution system combining 1" conduits and centrally installed cable tray may be considered.

2.4.2 Non-Return Air Plenum Ceiling: When non-return air plenum ceilings are used, a distribution system combining 1" conduits and centrally installed cable tray should be considered the as the primary distribution system. This system will provide an open, center-hung top-rung cable tray extended throughout corridors of the building. The tray shall be 4" deep x 12" wide or sized to provide cable fill requirements with single center support. A minimum quantity of three (3) 4 inch conduits shall be used in lieu of cable tray when passing through fire walls. A 12 inch clearance shall be maintained on all sides of the cable tray. Complete clearance will also be provided below and above the cable tray. A 1-" conduit from each outlet shall extend back to the corridor and shall terminate 4" from the edge of the cable tray. The selection of the floor distribution system will depend on the design and intended use of that floor. The selected method of floor distribution must be approved by the Communication Technologies Office.

2.4.3 Communications Outlet Box: As a rule, in new construction, recessed outlet boxes will be used for voice, data, and video services. Outlet boxes shall be 4" x 4" x 2-1/8" deep and shall be fitted with a double gang plaster or raised ring. Each outlet box will extend 1" conduit and each conduit will have no more than two 90 degree bends between the outlet and the designated communications room or cable tray. If more than two 90 degree bends are required, a fully accessible pull box must be installed with locations of pull boxes shown on the as-built drawings.

The use of LB, LL, and LR fittings will not be approved. Telecommunications outlets will not be permitted to be “looped” in the same run of conduit.

The recommended number of outlets is specified as follows:

Offices (per 100 square ft.)	2
Classrooms/Conference rooms (occupancy)	
1-50	1
50-100	2
100-200	3
200 or more	4
Laboratories (per 200 sq. ft.)	every 6 linear ft
Residence Hall Rooms	2
Patient Rooms (per occupant)	1

2.4.4 Grounding: All vertical and horizontal metallic distribution systems must be grounded in accordance with National Electric Code Article 250-32.

A fully developed TBB (Telecommunications Bonding Backbone) in full compliance with Joint Standard 607 shall be installed in each building renovation and/or construction project.

## 2.5 Scheduling

The full outfitting of the PDR shall be considered a critical path item. The contractor will complete the construction of all communications rooms, risers, and floor distribution in order to permit the installation of building communications wiring prior to the completion of lay-in ceilings in areas where above ceiling junction boxes and cable trays are installed.

## 3.0 Building Wiring

### 3.1 General

A communications wiring specification which complies with this document and the University Uniform Wiring Plan will be used in all new construction and major renovations. The installation of the wiring system in these structures will be the responsibility of the Building Contractor. In small scope projects the University Communication Technologies Office may decide to self perform some aspects of the work. In general, the Building Contractor will be responsible for the purchase, installation, termination, testing, and documentation of all specified communications cable and the Communication Technologies Office will be responsible for the acceptance testing of the contractor's installation. Specific Communication Technologies Office and Building Contractor responsibilities are outlined in the sections below.

### 3.2 Communication Cable

3.2.1 Cable Specification: All communications cable must meet or exceed the following cable specifications.

Acceptable vendor cable part numbers are listed, however if substitutions are made the contractor must provide vendor cable specifications, which then must be approved by the Communication Technologies Office before the cable is installed.

A. Standard Cable - minimum bundle to be installed to each communications outlet unless otherwise specified.

1. Voice Cable EIA/TIA 568 Standard

Category 5 Enhanced UTP (unshielded twisted pair)

UL Certified Category 5 Enhanced

4 Pair 24 Gauge Solid Copper

100 Ohm Impedance

Sheath color: Blue

The following are acceptable cables:

Commscope Ultra II (cmr/cmp)

Berktek LANmark-350 (cmr/cmp)

Belden DataTwist Category 5E (cmr/cmp)

General GenSPEED 5500 (cmr/cmp)

Mohawk MegaLAN Cat. 5E (cmr/cmp)

Superior ESSX Cobra Category 5e (cmr/cmp)

Hitachi Cat. 5 Enhanced UTP 350 (cmr/cmp)

2. Data Cable #1

EIA/TIA 568 Standard

Category 6 Enhanced UTP (unshielded twisted pair)

UL Certified Category 6 Enhanced

4 pair 24 Gauge Solid Copper

100 Ohm Impedance

Sheath Color: White

The following are acceptable Category 6 Enhanced cables: (Note: sheath color must be white.)

Belden DataTwist Enhanced Category 6 (cmr/cmp)

Berk-Tek LANmark 2000

CommScope UltraPipe6 (cmr/cmp)

General GenSPEED 6600 (cmr/cmp)

Hitachi Cat.6 Enhanced UTP Supra 660 (cmr/cmp)

Mohawk GigaLAN Category 6+

Superior Essex NextGain Category 6eX

3. Data Cable #2

Category 6 Enhanced UTP specifications as above  
item #2

B. Optional Cable - to be installed to each communications outlet only if specified.

1. Video Cable - Room to Station

Comm/Scope Coax

Part # 5781/2227V (cmr/cmp)

RG-6 18 Gauge solid copper

75 Ohm Impedance

2. Multimode Fiber Cable - 2 Fiber

(4 fibers for special applications)

50/125 um fiber size

850/1300 nm wavelength

1500/500 MHz-km at 850/1300 nm (nominal)

3.0/1.5 dB/km at 850/1300 nm (nominal)

The following is an acceptable cable:

Corning 002S88-31180-29 PLENUM

3. Fiber Single-Mode Cable - 2 Fiber

8.3/125 um fiber size

1310/1383/1550 nm wavelength

1.0/1.0/.75 dB/km at 1310/1383/1550 nm (nominal)

The following is an acceptable cable:

Corning 002S88-31131-29 PLENUM

- C. Riser Cable - The backbone riser system (vertical and horizontal) will consist of the conduit/sleeve and cable required to connect the building entrance room to all communications rooms located on each floor. The contractor shall install all riser cable in conduit/sleeve and use as few conduits/sleeves as possible to allow for spare empty conduit/sleeve. The Communication Technologies Office will provide cable specifications such as product code, and will be responsible for the verification of the cable after it is installed. The types and quantities of riser cables will be determined at the design phase. Typical data/voice riser cables consist of the following: 100 Mbps Category 6 Enhanced UTP Data Cable (Sheath Color: Red), Single mode and 50 um multi-mode fiber optic cable (Gigabit plus grade).

Typical quantities minimally include a quantity of sixteen (16) Category 6 Enhanced data cables (Sheath color: Red), 12 strands of 50 um multimode fiber, 12 strands of singlemode fiber, and a voice riser cable sized at 1.5 times the number of outlets. In some large buildings fiber riser quantities may be 24mm/12sm or even greater as directed by Communication Technologies. Category 3 voice riser cable shall be a minimum 100 pr. cable. All riser cables will be in a star wired topology from the PDR to all SDR's. Note: The PDR may not necessarily be the same as the service entrance room.

D. Trunk Cable - for video broadband system.

1. Video Cable - Trunk Network

Comm/Scope Coax

Part # P3500JCAR or P3500JCAP (plenum)  
(cm/cmp)

0.600 Inch Outside Diameter

75 Ohm Impedance

Leave slack in video cable as detailed by UNC Telecom at time of installation, and leave cable unterminated.

3.2.2 Cable Identification: All cable labels shall be produced with a professional label maker. All cable shall be labeled both on the outlet and the patch panel with an alpha/numeric identification code using the following format:

(T-1) indicates telephone one (T-2) indicates telephone two

(D-1) indicates data one, (D-2) indicates data two, (V-1)

indicates video one, (F-1) indicates fiber one, etc.

If more than one room is used, for example Room B, then this will be indicated by a permanent label on the communications outlet. Ex. A-T1, A-D1, A-V1, B-T1, B-D1, B-V1. Floors that have more than one communications room shall be labeled as Communications Room A, Communications Room B, etc.

Any exceptions to this labeling scheme, for example unique media types, will need to be coordinated with a representative from the Communication Technologies Office. Labels will be positioned neatly and directly next to (right or left of) appropriate jack on faceplate.

### 3.2.3 Responsibilities

- A. The Building communications contractor will be responsible for the purchase and installation of all communications cable as specified in Sections 3.2.1. Installation will include the specified termination, testing, and documentation of all cable. The contractor will need to follow and be in compliance with all appropriate Category 6 Enhanced installation procedures as outlined in TIA/EIA 568A/B and TIA/EIA 569 standards including correct bending radius, and maintaining the appropriate twists in the pairs. Contractor shall also follow TIA/EIA 606 Standard and Joint Standard 607. The contractor will neatly bundle all cables in the room and label each cable to indicate floor and outlet number as shown in section 3.2.2.

All cable will be labeled both at the termination point in the room and on the wall plate at the wall outlet. In addition to the bundle of installed cables the contractor will provide a pull string to each outlet for future cable installations. The contractor will conduct standard Category 6 Enhanced links compliance tests of all cable links including tests for continuity and pair reversal. The contractor will perform this testing on 100 percent of cabling to certify that the cable and termination meets the established specifications for Category 6 Enhanced compliance as documented in the standards noted above. The contractor will provide UNC-Communication Technologies, power meter and Tektronix Fibermaster OTDR test results for all installed fiber optic cables. Video station cables shall be tested for DC resistance (including continuity) and attenuation. Coaxial station cables shall also be tested utilizing a TDR, providing a hard copy printout.

- B. The Communication Technologies Office will perform acceptance testing. This testing may be done in conjunction with testing being performed by the communications contractor. All cabling failing to meet the TIA/EIA current published standards will be replaced by the contractor at no cost to the university.

### 3.3 Communication Outlet

The communications wiring plan standard includes communications outlets in all work areas in accordance with specifications provided in Section 2.5.3. All outlets in office spaces will be wired to support one voice and two data communications connections. In non-office locations, in addition to data connections, at least one outlet will include a voice connection. Wall telephone outlets shall be wired with one voice connection. Laboratories/classrooms shall include a wall telephone outlet at each entrance doorway. All fixed classroom auditorium podiums shall also include a wall telephone outlet in the left side of the podium. All podiums shall be served with a minimum of one outlet with 1-voice...1-RG-6 coaxial cable and 4-Category 6 enhanced data cables. Outlets will be designated on the building electrical or communications floor plan. (Dependent on selection of outlet.)

Any additional service options or deviations from the following communications outlet standard must be coordinated with and approved by the Communication Technologies Office.

All outlets will be labeled in accordance with the cable identification scheme as detailed in section 3.2.2.

3.3.1 Outlet Specification: All communications outlets must use the acceptable vendor communications outlet part numbers as listed. However, deviations from the standard or optional communications outlet specifications will be addressed on a case-by-case basis during the design phase.

The following summarizes the components provided at each communications outlet. All data outlets/patch panels must be UL certified as Category 6.

A. Standard Voice/Data Flush/Surface Mount Jacks

1. Flush Mount Jacks

Hubbell IFP260W Double Gang Flush Office White Faceplate (6 slots equipped w/ 3 blanks)	Quant. 1
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Hubbell HXJU8OW Voice RJ45 USOC	Quant. 1
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Hubbell HXJ6BK Data RJ45 Black non-keyed EIA/TIA 568B	Quant. 2
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Hubbell SFB blank buttons and ICONS	As required
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2. Surface Mount Jacks

In general, the use of surface mount outlet boxes is discouraged unless fiber optic cable is terminated at the outlet at the time of installation. If surface boxes are required the contractor will coordinate specific Hubbell part numbers with UNC Communication Technologies.

## B. Optional Video Outlet

1. Video Connector and wall plate

F Type Crimp-on Connector

Hubbell SFF Office White with snap-in fitting with  
Female/Female

Flush Mount wall plate

## C. Wall Telephone

1. Voice Connector and Wall Plate - USOC wired

Hubbell BR630XX or equivalent

D. Auxiliary Voice and Data Connection Requirements: Connection requirements include voice connections for building elevator controllers...Fire Alarm System Control Panel....Fire Alarm System Digital Dialer...HVAC controllers...Chilled Water Control Cabinets...Steam Metering cabinets and Fire Alarm Control Panel.3.3.2

## Outlet Identification

All outlets will be labeled using the cable identification method detailed in section 3.2.2. All outlet labeling will be permanent, non-erasable, stick-on, labeling using a professional labeling machine.

### 3.3.3 Responsibilities

The contractor will be responsible for the purchase, installation, and labeling of all wall plates, patch panels, and connectors. The contractor will also be responsible for the installation of a 1 inch conduit from the outlet box to the communications room (home run) or to the cable tray as specified in Section 2.5.3.

## 3.4 Communications Room

The communications room will contain terminations for all horizontal and vertical cabling. All rooms will be vertically interconnected via the vertical riser system.

### 3.4.1 Patch Panel Specification

All Category 6 Enhanced cable will be terminated in patch panels equipped with UL Certified Category 6 compliant jacks. The EIA/TIA 568B punch down sequence will be used on all Category 6 compliant jacks. Wire Management panels will be used as spacing in between all patch panels. One wire management panel will be installed in between each 48 port patch panel. Vertical and Horizontal Wire Management panels will be installed.

#### A. Hubbell Patch Panels

Hubbell P624U 24 port panel for data network riser links.

Hubbell P648U 48 port panel for horizontal station cables.

B. Panduit Products Wire Management Panels

Panduit Part No. CMPHH2 Front side Horizontal Wire Management Panel

Panduit Part No. WMPHF2E Rear side Horizontal Wire Management Panel

Panduit Part No. RV6X6/N Vertical Cable Management Panel .

3.4.2 Cable Termination

All cable runs, regardless of media type, shall be able to reach any communications room wall. Cable within a room will be bundled and terminated via standard Category 6 compliant patch panels, as detailed above, or special vendor equipment as indicated below. Cable bundles shall be secured using Velcro style tie wraps as detailed in Section 7.0. Contractor shall not use any traditional plastic tie wraps. All patch panels will be mounted in 19" racks as detailed below. All wiring of patch panels will begin from the top down in racks, and the mounting of switch equipment will begin from the bottom up. All cable termination points will be labeled to indicate floor, room, room outlet, and terminal drop number as specified in section 3.2.2.

B. 66M1-50 Style connect blocks or approved equivalent shall be used to terminate "all" 100 ohm twisted pair Category 5 Enhanced telephone cable. Patch panels shall be used to terminate UTP data cables.

Connect blocks and backboards will be color coded blue to designate telephone terminations. 66M1-50 blocks shall be mounted on 183 Metal blue backboards as manufactured by Lucent and 187 Metal white pegboards shall also be used. All connecting blocks and patch panels will be labeled in accordance with section 3.2.2. Voice cable will be installed in metal "D" rings down the corner of the wall and across bottom. 183 back boards will mount starting 12" from the floor, and 8" from the corner of the room, double stacked.

C. All patch panels will be mounted to either floor mounted standard 19 inch equipment racks. 19 inch free-standing flange racks shall be 7 ft. tall, of aluminum construction painted black with double sided screw holes. All cable types will be physically separated into individual groups. Install Homaco Part Number PS-48-20A-10P in all racks in quantities specified by UNC Telecom.

D. Superior Modular Products "Fiberopticx" cabinets shall be used to terminate all multimode and single-mode fiber cable. ST connectors will be used to terminate the fiber cable. Must use hot melt glue and polish ST connectors. In some cases, such as in the Primary room, campus dark fiber will be spliced through and housed in splice trays.

E. In general all video station cables shall be left un-terminated in the Telecomm. Rm..

### 3.4.3 Responsibilities

- A. The Building Contractor will be responsible for the purchase and installation of all room power outlets, lights, paneling, and riser conduit in accordance with Section 2.3. The contractor will also be responsible for the purchase and installation of all hardware, including all racks, panels, connectors, and miscellaneous parts. The contractor will be responsible for firestopping all wire and conduit penetrations consistent with all National, State, and local fire and electrical codes.
- B. Patch Panel Labeling - All patch panels will be labeled using a professional labeling machine as detailed in 3.3.2.A.1. All RJ45 jacks will be labeled with the type of service and outlet number.
- C. The Communication Technologies Office must approve before installation any equivalent cable termination hardware used as outlined in section 3.4.1 above.

### 3.5 Documentation

All cabling systems will be documented in hard copy and floppy disk copy. These as-built drawings will provide documentation of the entire installed wiring system. This documentation will include a spreadsheet (Microsoft Excel compatible format), and be submitted on both 3.5" disk and hard copy in the following format:

Building Name		
Telecom Room	Data Jack Number	Room Connected To
3rd Floor South	D-47	357
5th Floor Room	D-137	End of hall room, lab

One hard copy of spreadsheet documentation shall be attached to rack in each room. Additionally, the contractor will provide three (3) copies of paper blueprint drawings marked with jack numbers. These as-built drawings will also be provided on 3.5" disk copy in Autocad.dwg format.

### 4.0 Design and Construction Drawings

All design and construction drawings will have a communications riser diagram which illustrates all components of the building communications distribution system. Appropriate notes will be provided to describe the size of conduit and other special instructions to the contractor. In addition, electrical drawings for each floor will illustrate components of the floor distribution system and outlet locations.

## 5.0 Building Access

The Contractor will be required to permit Communication Technologies Office personnel or agents to test and verify all communication cable and wiring system hardware in new buildings prior to final building inspections. All work performed by the Communication Technologies Office personnel or its agent will be coordinated with the University Project Engineer.

## 6.0 Telecommunications Contacts

UNC-Chapel Hill-ITS-Communication Technologies Infrastructure Design Engineers  
Primary: (919) 966-5745 or Secondary: (919) 962-0809 or (919) 962-4193

## 7.0 Parts List Summary

### o UNSHIELDED TWISTED PAIR

Voice Category 5 Enhanced	Commscope-Ultra II Berk-Tek LANmark-350 Belden DataTwist 350-Category 5E General GenSPEED 5500 Mohawk MegaLAN Category 5E Superior Essex Cobra Category 5e Hitachi Category 5 Enhanced UTP 350 (sheath must be blue color)
Data Category 6 Enhanced	CommScope UltraPipe 6+ Berk-Tek LANmark 2000 Belden DataTwist 600e General Gen SPEED 6600 Mohawk GigaLAN Category 6+ Superior Essex NextGain Cat. 6+ Hitachi Hi-Net Supra Category 6e (sheath must be white color)

o **OPTIONAL/RISER CABLES**

Category 6 Enhanced Riser Cable	See Category 6 Enhanced part numbers above. (Must be red sheath color.)
Video Cable	Comm/Scope Coax #5871/2227V (cm/cmp)
MM Fiber Cable`	Corning MIC 012S81-33180-24 riser Corning MIC 012S88-33180-29 plenum
SM Fiber Cable	Corning MIC 012E81-33131-24 riser Corning MIC 012E88-33131-29 plenum
Trunk Cable	Comm/Scope #P3500JCAR/P3500JCAP (cmr/cmp)

o **COMMUNICATIONS OUTLETS**

		<u>Quantity</u>
Flush Mount Jack	Hubbell IFP260W double gang Flush Plate	1
	Hubbell HXJU8OW Voice RJ45 USOC	1
	Hubbell HXJ6BK Data Cat. 6 RJ45 Non-keyed	2
	Hubbell SFB blank buttons/ICONS	As required
Video	Video Wall Plate/F Connector Hubbell SFF Female/Female	
Wall Telephone	Wall Telephone Plate/USOC Connector Hubbell BR630XX	

- o **PATCH PANELS**

Hubbell Patch Panels

Hubbell 24 port panel for riser links (red) Hubbell Part No. P624U  
 Hubbell 48 port panel for station cables (white) Hubbell Part No. P648U

Quan

Wire Management Panels

Panduit Part No. CMPHH2 front side horizontal cable management panel  
 Panduit Part No. WMPHF2E front side horizontal cable management panel  
 Panduit Part No. RV6X6/N vertical cable management panel

Wiremold – Perma Power Strip (20AMP)

Perma-Power Part No. R5BZ20

Superior Modular Products  
 “Fiberopticx” Cabinets  
 Require locked cabinets all keyed the same.

RTC-36

RTC-36

RTC-48

RTC-72

RTC-144

Multimode ST (6) coupler plate  
 Singlemode ST (6) coupler plate  
 Splice Tray Holders

616-MMST

616-SMST

Superior Modular Products

- o **PATCH CABLES**

- o **RACKS AND GROUNDING**

Standard 19" Free-Standing Rack 7ft. tall, aluminum, painted black at factory with double sided screw holes CPI Dracon/Chatsworth 46353-703 (factory black.)  
 Hubbell #HPW84RR19  
 Erico Ground Bar Part No. TMGB-A16L19P