Table of Contents

1. Overview

1.1. The purpose of this document is to define the work standards for Lehigh University Telecommunications Room (TR) construction and cable installation, and to identify all products and their part numbers. These guidelines apply to all installation and maintenance personnel.

1.2. This standard applies primarily to large renovations and new buildings. Many renovations occur in locations where the current infrastructure (TRs and pathways) will not support our current standard of category 6A cabling. The university will confirm what type of cable shall be used and will provide a separate component list for non-6A cable if needed.

1.3. Unless otherwise specified in the project scope of work, contractor will furnish and install wire, cable, devices, equipment, and accessories for a complete system of telecommunications wiring for voice and data transmission from the Telecommunications Room (TR) to each voice/data outlet in the building. Every aspect of the EIA/TIA and BICSI standards must be followed for the duration of the project.

1.4. Cabling systems must be designed and engineered by a University selected engineering firm.

1.5. Library and Technology Services (LTS) personnel are responsible for furnishing and installing VoIP phones, network switches, battery backup units, PDUs, CAT6/6A patch cords for the TR side, and fiber patch cords.

1.6. LTS personnel are responsible for furnishing wireless access points (WAP), WAP mounts, and emergency phones. Contractor is responsible for furnishing patch cords (as listed in appendix A) for contractor-installed equipment.

1.7. Contractor is responsible for furnishing and installing all other materials and labor for a complete telecommunications system.

2. Telecommunication Rooms (TRs)

2.1. General Design

2.1.1. Telecommunications rooms (TRs) are special-purpose rooms that house voice and data communications equipment and wiring. These rooms have specific requirements due to the nature, size and complexity of the equipment and wiring housed in the room.

2.1.2. The TR shall house equipment directly related to the communications systems and associated environmental support systems. Electrical panels, other than those exclusively servicing the TR in which it is located, are strictly prohibited in TRs. Services that are not communications-related shall also be prohibited in these rooms. This includes, but is not limited to, janitorial services, supply storage, departmental storage, etc.

2.1.3. TRs shall be located above any threat of flooding.

2.1.4. To facilitate the proper installation, routing and placement of cables, wires, premise equipment and terminal fields, TRs shall be located such that:

2.1.4.1. No cable will exceed 90 meters

2.1.4.2. If the planned number of cables exceeds 1000 per TR, Library and Technology Services' approval is required.

2.1.4.3. No TR will support more than 400 cables per switch rack, refer to appendix C for layout options

2.1.4.4. Locations are approved by Library and Technology Services.

2.1.5. TRs must be accessible from building public spaces. If this is not feasible, all doors leading to the TR must have card access.

2.1.6. All work shall comply with the National Electrical Code, local building codes, and Lehigh University Facilities Services standards.

2.2. Dimensions

2.2.1. The minimum size for a TR is 120 square feet and the preferable dimensions for this room are 10'x12'. In no case shall this room be less than 120 square feet, with the minimum dimension of any side being 10 feet. This room may be shared with telephone equipment and data network equipment and racks. Library and Technology Services shall be contacted for final dimension approval. NOTE: TRs may vary according to the size of the building, number of floors and services required. Consideration to the future needs of the facility and the end users is a necessity.

2.2.2. TRs shall always be sized to accommodate no fewer than 3 racks with a minimum clearance of 3ft front/rear and 2ft on the sides

2.2.3. Doorways shall be designed with minimum measurements of 3'-0" by 6'-8" and shall open outward into the corridor.

2.2.4. The required ceiling height is minimum 8'-6". Finished ceilings are not required in TRs.

2.3. Construction Specifications

2.3.1. No plumbing, HVAC, or electrical conduit shall pass through or be directly above TRs.

2.3.2. Fire rated plywood, 3/4 inch thick, must be mechanically fastened to the walls. The fire rated plywood must be fastened in a way that is easily removable. The fire rated plywood is to begin at four (4) inches AFF (above finished floor) and end at 8'-4" AFF.

2.3.3. Floors shall be sealed concrete or tile. Carpet is prohibited.

2.3.4. A minimum of 2 (two) 4 inch sleeves will be installed between TRs, with sleeves extended 4 (four) inches AFF. Buildings taller than 4 stories shall require an increase in the minimum number of sleeves, to be determined by LTS.

2.3.5. Risers shall comprise a minimum of one four-inch conduit. Each riser shall contain no more than 50 cables per four-inch conduit (or approved firestop EZPath).

2.3.6. TRs should be secured by card access

2.3.7. TRs shall be identified according to ANSI/TIA-606-B standards. Doors shall have signs identifying the space as a TR, followed by the Lehigh room number and the ANSI/TIA-606-B identifier on the line below – i.e.

TR 100 (Lehigh room number)
1A (1=floor 1, A=first closet on floor 1; other closets on floor 1 will be 1B, 1C etc.)

2.4. Environmental Controls and HVAC Design

2.4.1. All TRs shall be environmentally controlled to maintain the room environment at a temperature range of 75 to 85°F.

2.4.2. Contractor shall calculate expected heat output on TR equipment and shall install appropriate cooling in the TR.

2.4.3. When possible, building cooling should be used. Split units should be avoided if possible

2.4.4. No HVAC equipment shall be located overhead within the TR. If this is unavoidable, the HVAC equipment shall be located as far away as possible from the communications rack(s) and shall be equipped with a drip tray that includes a condensate alarm. Under no circumstances should HVAC equipment be located directly over the rack(s).

2.5. Lighting and Electrical Power Design

2.5.1. Lighting shall be four-foot fluorescent type and provide a minimum of 50 FC at 3 feet above the floor and be connected to the emergency generator when available.

2.5.2. A minimum of four AC outlets (2 convenience 20 amp 110v wall outlets, 18"AFF, 2 overhead 30 amp, 208v to feed the communications racks) must be provided to power computer interfaces, network electronics and other communications requirements.

2.5.2.1. Wall outlets: These circuits shall be 20-amp, 110V, 60Hz that support two duplex outlets with standard receptacles (convenience outlets). Locations will be specified during the project design stage. Outlets must be flush when cut through plywood 18" AFF.

2.5.2.2. Overhead outlets shall be 30-amp, 208V outlets (one circuit per outlet) with L6-30R receptacles. These will be installed overhead to support racked network equipment.

a. One of the 30-amp L6-30R outlets shall be tied to an emergency generator when available. The other will run on normal power. If no generator is available, both outlets shall be on normal power.

b. The maximum expected load on a generator will not exceed 4kW; the nominal generator usage will be approximately 2kW.

c. Fire alarm panels are network attached; therefore these generator circuits are required for life safety. The circuits are required to be on the life safety automatic transfer switch (ATS).

2.5.3. If generator power is available, LTS will furnish Uninterruptible Power Supply (UPS) units to support the network equipment in each rack. If no generator power is available, LTS may still opt to furnish a UPS depending on the type of network equipment being installed.

2.5.4. All outlets shall be labeled with panel and circuit location.

2.5.5. All breaker panels are to be labeled and identified to avoid being turned off in error. Breakers serving the TR shall be equipped with locking devices to prevent turn off.

2.6. Grounding

2.6.1. All TRs shall have a grounding bar 18 inches long by 4 inches wide by 1/4 inch thick with pre drilled NEMA bolt hole sizing and spacing. This bar shall be attached to the main building grounding system with a wire not smaller than #6 AWG copper.

2.6.2. The ground wire shall not share the cable tray with communications cabling. It may be installed in a separate conduit, which may be attached to the outside of the communications cabling cable tray.

2.6.3. Each distribution point shall be grounded to the main building ground, NEC and EIA/TIA 607 requirement shall be followed.

3. CAT 6/6A Cabling

3.1. Design

3.1.1. All jack locations to be served by minimum 1.25 inch conduit.

3.1.2. Blue light security phones: 4 cables per phone, with locations to be specified by police.

3.1.3. Wireless access points: 1 cable per AP, with AP locations to be provided by LTS.
3.1.4. TVs/monitors: 3 cables for common area IPTV service where the TV is to be mounted. No coax cable is to be installed.
3.1.5. Architectural plans to include a count of cables per floor/cable zone.

3.2. Installation

3.2.1. Contractor shall observe all manufacturer installation guidelines including: termination position/jacket removal; bend radius for UTP; recommended pulling tensions
3.2.2. All through penetrations shall have a HILTI or 3M firestop assembly matching the rating of the penetrated element or as detailed on the Telecommunications drawings.
3.2.3. Per EIA/TIA standards, no cable may exceed 90 meters in length, including slack required to dress cables in the TR.
3.2.4. Where cable tray is not present, all horizontal cable must be properly and independently supported every 4 feet. No cable will be allowed to be connected to ceiling grid wires or other building utility..
3.2.5. Under no circumstances should paint be applied to cables.
3.2.6. Exact final cable counts per jack will be indicated on the floor plans.
3.2.7. Cables should be terminated on the rack with no spaces left between the ports. Any future cabling will be added to the last patch panel in succession.
3.2.8. Outdoor cable installation shall use sufficient piping to accommodate cable requirements
3.2.9. Outdoor cable type is specified in appendix A

3.3. Labeling

3.3.1. Two sets of identifiers are associated with each cable.
3.3.1.1. The first is the patch panel ID, the ANSI/TIA-606-B identifier - i.e. 1A-4B23, where 1A is the closet, 4 is the rack number, B is the patch panel, and 23 is the port.
3.3.1.2. The second is a custom Lehigh jack identifier: the Lehigh room number and individual connector code - i.e. C305-A1, where C305 is the room and A1 is the connector code. When labeling a cube farm, the cube location should be appended to the room number. Cube location C in room 437 should be labeled 437C-A1/A2, etc
3.3.2. If Lehigh jack identifiers are not provided on the installation plans, use the following guidelines to establish them. Connector codes are to be identified starting with A at the location closest to the door going clockwise around the room (i.e. C305-A, C305-B, etc.). Wireless access points are identified as room- APx (i.e. C305-AP1, C305-AP2 etc.). Access control connections are identified as room-ACx (i.e. C305-AC1).
3.3.3. Each cable will be labeled at both ends with the patch panel ID in the form CL-PAPT, where CL is closet identifier, PA is patch panel number and PT is port.
3.3.4. In the TR, each port on the patch panels will be labeled with the Lehigh room number and individual connector code - i.e. C305-A1.
3.3.5. At the jack location, each individual connector in the jack will be labeled with its associated patch panel ID (ANSI/TIA 606B identifier). The jack will have a "super label" at the top with the Lehigh jack identifier - i.e. C305-A. There is no need to label each individual connector in the jack with the Lehigh identifier - the patch panel ID is sufficient as long as the numbering scheme is standard left to right, top to bottom.

3.3.6. Each patch cord in the closet will be labeled with the associated switch and port number.

3.4. Testing

3.4.1. Each copper cable shall be tested with a scanner capable of testing to EIA/TIA standards appropriate to the class of cable. The results of these tests shall be provided to the Telecom and Network Infrastructure Manager before acceptance and payment of the job. 100% of all placed cables must pass testing; no failures will be accepted.

3.5. Documentation / Deliverables

3.5.1. As-Builts shall be submitted by the project contractor to LTS. Contractor shall provide one paper and two digital copies (CAD and PDF). As builts will include final room numbers, furniture layout and labeled jack locations.

3.5.2. ANSI/TIA-606-B and associated LU identifier shall be provided in electronic tabular format to LTS (XLSX or CSV). An example of this table can be found in Appendix B.

3.6. Installer Certifications

3.6.1. Communications contractor must be a Siemon certified installer and must submit pre-registration paperwork prior to installation start. Non-Siemon certified installers will be allowed on a case by case basis and must be pre-approved by LTS

4. Fiber Optic Cabling

4.1. Installation

4.1.1. Fiber must be installed in a protected manner.

4.1.2. Any rigid 4” conduit that will be utilized as part of fit out should be populated with three 1.25" innerducts.

4.1.3. Contractor shall observe all manufacturer's installation guidelines including bend radius and pulling tension

4.1.4. All through penetrations shall have an appropriate firestop assembly matching the rating of the penetrated element or as detailed on the Telecommunications drawings.

4.1.5. When there is not sufficient room in an existing termination enclosure or a new enclosure is required, the enclosure is to be sized according to **TOTAL** strand count to be terminated at the location:

- 1U - Up to 12 strands
- 2U - Up to 24 strands
- 4U - More than 48 strands (or used in a building’s main TR)

4.1.6. Termination

4.1.6.1. **New/Existing PCH enclosure -** Use fusion spliced pigtails with splice trays

4.1.6.2. **Existing CCH enclosure** - Use splice cassettes when there is an existing Corning CCH enclosure with a fanout kit or other cassettes already present.

4.2. Labeling

4.2.1. Fiber optic cable labels should be applied in each manhole, handhole, and building entry point indicating A and Z location of the cable. Cable should be labeled in such a way that the label will not become illegible from water, abrasion, or sunlight.

4.2.2. Fiber optic enclosures should be labeled with the strand numbers and Z location for each coupler panel.

4.3. Testing

4.3.1. Each fiber optic strand shall be tested with an OTDR and power meter. Light loss will be -1 dBm or better (with the exception of runs greater than 1.5km) and reflectance will be -45 dB or better. All fiber must be tested at both wavelengths (1310nm and 1550nm) and in both directions for each fiber.

4.4. Documentation / Deliverables

4.4.1. The fiber test results will be provided in two forms: A summary table, and the complete results. The summary table will include the following information: strand #, direction, wavelength, worst reflectance, total light loss. Please submit this table as either a PDF, CSV, or XLSX to net@lehigh.edu and the project manager. Along with these test results please provide a valid certificate of calibration for both your power meter and OTDR.

4.4.2. An example of a summary report can be found in Appendix B.

5. Devices

5.1. All telephone devices - including elevator phones, blue light emergency phones, and office/utility phones - shall be SIP devices, compatible with the university's Cisco Unified Communications platform. Devices provided by external vendors (i.e. elevator vendor) must comply.

6. Appendix A: Product List

CAT 6A Cabling and Components

DESCRIPTION	MANUFACTURER	PART NUMBER
Siemon-10G 6A F/UTP CMP Cable - (White Jacket)	SIEMON	9A6P4-A5-02-R1A
10G 6A F/UTP Screened Z Max Module - Hybrid (Use in Patch Panel and Select Locations)	SIEMON	Z6A-S01
Two Port Single Gang 10G Faceplate For Max Modules	SIEMON	10GMX-FPS02-(XX)
Four Port Single Gang 10G Faceplate For Max Modules	SIEMON	10GMX-FPS04-(XX)
Six Port Dual Gang 10G Faceplate For Max Modules	SIEMON	10GMX-FPD06-02
Two Port Surface Mount Box - (With/ Multimedia Bezel)	SIEMON	MX-SMZ2-(XX)
Four Port Surface Mount Box - (With/ Multimedia Bezel)	SIEMON	MX-SMZ4-(XX)
Six Port Surface Mount Box - (With/ Multimedia Bezel)	SIEMON	MX-SMZ6-(XX)
Two Port Multimedia Bezel For Surface Mounted Boxes	SIEMON	MX-SMB-MM
Stainless Steel Wall phone Faceplate with Jack	SIEMON	MX-WP-KU3-SS
24 Port 1U Angled Tera Max Panel Unloaded - (Must Supply ZMAX Hybrid Jacks)	SIEMON	TM-PNLZA-24-01
24 Port RJ45 To 110 Rack Mount Patch Panel	SIEMON	S110DB5-24RJP
300 Pair 110 Block W/Legs	SIEMON	S110AA2-300FT
110 Cross-Connect Trough W/Legs	SIEMON	S110A1RMS
Color Coding Clip For Patch Cord Identification	SIEMON	CLIP-(XX)
Color Icons For Port Differentiation	SIEMON	CT-ICON-(XX)
3-foot 6A patch cord – black	SIEMON	SP6A-S03-01B
5-foot 6A patch cord – black	SIEMON	SP6A-S05-01B
7-foot 6A patch cord -- black	SIEMON	SP6A-S07-01B

CAT 6 Cabling and Components

DESCRIPTION	MANUFACTURER	PART NUMBER
Four Pair Non-shielded Cable - Violet	BERK-TEK	10033809
Clarity Single LAN Jack	ORTRONICS	OR-S21600
Clarity Duplex LAN Jack	ORTRONICS	OR-S22600
Series ll Blank	ORTRONICS	OR-40300164
Series ll Small Box	ORTRONICS	OR-404S21U
24 port Patch Panel	ORTRONICS	OR-PHD66U24
48 port Patch Panel	ORTRONICS	OR-PHD66U48
Clarity Mini 12P 89D	ORTRONICS	OR-PMP61289
1-foot Patch Cord - Black	SIEMON	MC6-01-01-28
3-foot Patch Cord - Black	SIEMON	MC6-03-01-28
5-foot Patch Cord - Black	SIEMON	MC6-05-01-28
7-foot Patch Cord - Black	SIEMON	MC6-07-01-28
15-foot Patch Cord - Black	SIEMON	MC6-15-01-28
20-foot Patch Cord - Black	SIEMON	MC6-20-01-28
Four Pair Non shielded outdoor cable -Black	BERK-TEK	10139885

Fiber Optic Cabling and Components

DESCRIPTION	MANUFACTURER	PART NUMBER
INDOOR/OUTDOOR FIBER OPTIC CABLE		
12 SM Fiber FREEDM fiber cable	CORNING	012ESF-T4101D20
24 SM Fiber FREEDM fiber cable	CORNING	024ESF-T4101D20
48 SM Fiber FREEDM fiber cable	CORNING	048EUF-T4101D20
INDOOR FIBER OPTIC CABLE		
12 SM Fiber MIC cable	CORNING	012E81-33131-24
24 SM Fiber MIC cable	CORNING	024E81-33131-24
48 SM Fiber MIC cable	CORNING	048E81-61131-24
SPLICING COMPONENTS FOR SPLICE TRAYS		
CCH Coupler Panel - 12 SM UPC SC simplex	CORNING	CCH-CP12-3C
Pigtails - 4M 12 fiber SM, SC/UPC, MicroCore Cable, Jacketed, 1FT 900UM Breakout (Smooth Transition, No Breakout Kit) to 250UM	BSCABLE	FGBE9010-004M
Splice Tray - 24 Heat-Shrink Fusion Splices	CORNING	M67-078
60mm heat shrink splice protectors (Qty 50)	CORNING	2806031-01
Splice Tray Bracket for PCH-02U	CORNING	PC2-SPLC-6SR
Splice Tray Bracket for PCH-04U	CORNING	PC4-GOV-SPLC
SPLICING COMPONENTS FOR CASSETTES		
CCH Pigtailed Splice Cassette - 12 SM UPC SC simplex	CORNING	CCH-CS12-3C-P00RE
ENCLOSURES		
1U Fiber Enclosure	CORNING	PCH-01U
2U Fiber Enclosure	CORNING	PCH-02U
4U Fiber Enclosure	CORNING	PCH-04U
MISC PARTS		
Blank Panels	CORNING	CCH-BLNK

Backbone Cabling and Components

DESCRIPTION	MANUFACTURER	PART NUMBER
25 Pair Category 3 CMP UTP Cable	BERK-TEK	10032111
100 Pair Category 3 CMP UTP Cable	BERK-TEK	10032113
110 Rack Mount Panel 200 Pair	SIEMON	S110DA1-100RFT
110 Wall Mount Panel 300 Pair	SIEMON	S110AB2-300RFT
Category 3 Copper Premise Cable, Plenum, 300 Pair	SUPERIOR ESSEX	3P300P24-GY-R-ESS-PP-CUT REEL
Telecom Outside Copper, 24 AWG,Filled Core, Shielded	GENERAL CABLE	DB-300P24-AL-89-GCC-CUT REEL
Aerial Closure Kit with Floating Bond	3M	SLIC-5.6X33
Analog 350V 5 pin gas module	CIRCA TELECOM	3B1E
100 Pair Compact CO Protector	PORTA SYSTEMS	P399-WW-24-50
100 Pair Building Entrance Protector - Stub in/110 Out	PORTA SYSTEMS	25100-ST-M110C
Solid State Protector Modules With Heat Coil 240V 5-Pin	PORTA SYSTEMS	115SCG-240
Labeling System For Each End Of Riser Cabling	ALMETEK	MINI-TAG

Racks, Pathway and Delivery Systems

DESCRIPTION	MANUFACTURER	PART NUMBER
Siemon RS Rack System	SIEMON	RS-07E
Single Sided Vertical Patching Channel With Cover - 6"	SIEMON	VPCA-6
Horizontal Cable Manager	SIEMON	WM-145-5
S110/S210 Horizontal Cable Managers	SIEMON	S110-RWM-01
2U Rack Mounted Equipment Drawer	MIDDLE ATLANTIC	UD3
1U Rack Mounted Sliding Shelf	MIDDLE ATLANTIC	SS
2" CP653 Speed Sleeve	HILTI	236323
4" CP653 Speed Sleeve	HILTI	236324
4" Fire Barrier Pass-Through Device	3M	PT4SD
2.5" Fire Barrier Pass-Through Device	3M	PT25SD
1.25” Riser Orange Innerduct	CARLON	DG4X1C-CUT REEL
1.25" Plenum Orange Innerduct	CARLON	CG4X1C-CUT REEL
Large J-Hooks For Routing Of Innerduct	CADDY	CAT64
Miscellaneous EMT Conduit And Fittings	ANY	ANY
18" Wide Aluminum Redi Rail Cable Tray - 6" Load Depth	B-LINE	RSI07A06SL-18-120
18" Wide 3 Way Bend - Aluminum Finish	B-LINE	RSI07A09HT-18-R12
18" Wide Horizontal Bend - Aluminum Finish	B-LINE	RSI07A09HB-18-9OR 12
Universal Splice Plates - Aluminum Finish	B-LINE	R7A-SSP
Universal Bonding Jumper Connection	B-LINE	99-30
Bend Radius Waterfall - Aluminum Finish	B-LINE	RAA-OUT-18
Telecommunications Grounding Busbar 2 X 12"	PANDUIT	GB2B0306TPI-1
Telecommunications Grounding Busbar 4 X 12"	PANDUIT	GB2B0312TPI-1
Paint Piercing Grounding Washer Kit	PANDUIT	RGW
Rack Grounding Strap	PANDUIT	RGS
Equipment Grounding Jumper Kit	PANDUIT	RGEJ
#6 AWG Ground Wire	ANY	ANY
#6 Two Hole Ground Lug	ANY	ANY
3/0 Telecommunications Bonding Backbone	ANY	ANY
3/0 Two Hole Ground Lug	ANY	ANY
Velcro Cable Tie 6' (Pkg 25)	SIEMON	VCM-250-06-01
Velcro Cable Tie 12" (Pkg 250)	SIEMON	VCM-250-12-02
Velcro Cable Tie 18" (Pkg 250)	SIEMON	VCM-250-18-03
Pan-Way T-70 Non-Metallic Surface Raceway System	PANDUIT	varies

6. Appendix B: Data Format

Fiber Test results

"A" Location	Linderman		
OTDR #	27		
Tester Name	John Smith		
Company Name	YourCompanyName		
1310 nm Laser Source Reference	-5.21	dB	
1550 nm Laser Source Reference	-5.1	dB	
1625 nm Laser Source Reference		dB	

"Z" Location	Dravo		
OTDR #	20		
Tester Name	James Smith		
Company Name	YourCompanyName		
1310 nm Laser Source Reference	-5.86	dB	
1550 nm Laser Source Reference	-5.96	dB	
1625 nm Laser Source Reference		dB	

Network Span:	Linderman to Dravo															
RR & FDP							RR & FDP									
FDP-	FDP-	Fiber	Span Distance	Loss in dB @ 1310nm			Loss Per Km	Loss in dB @ 1550nm			Loss Per Km	Reflection @ 1550nm			Reflection @ 1310nm	
Port "A"	Port "Z"	Type	Km	Loc "A"	Loc "Z"	Avg.	dB/Km	Loc "A"	Loc "Z"	Avg.	dB/km	Loc "A"	Loc "Z"		Loc "A"	Loc "B"
13	13	SM	0.53	0.38	0.14	0.26	0.4906	0.32	0.2	0.26	0.4906	-48.08	-52.23		-50.04	-54.16
14	14	SM	0.53	0.68	0.17	0.43	0.8019	0.24	0.41	0.33	0.6132	-46.93	-53.28		-49.17	-54.24
15	15	SM	0.53	-0.34	0.17	-0.09	-0.1604	-0.01	0.12	0.06	0.1038	-47.96	-54.77		-50.48	-56.46

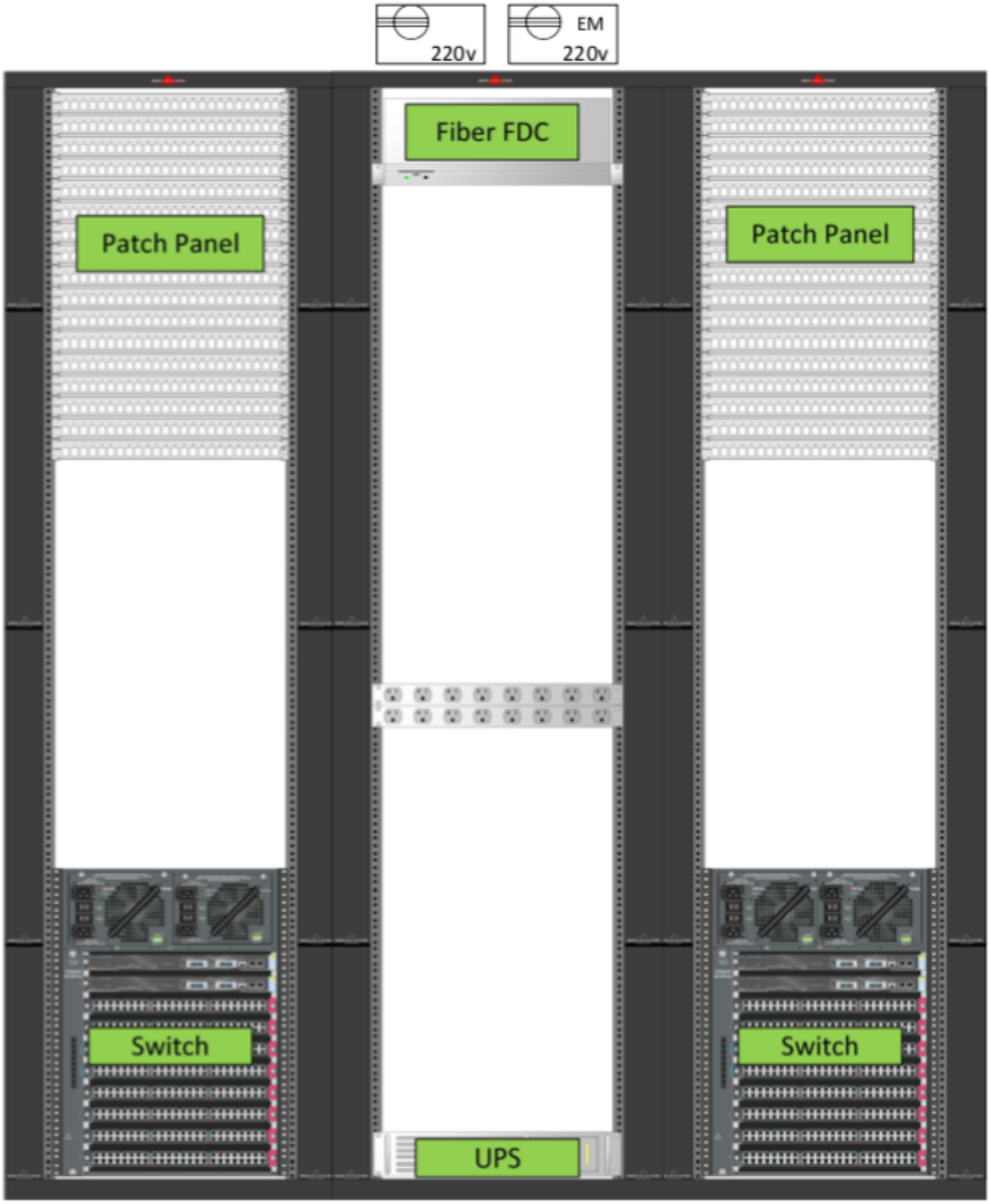
Jack Labeling Table

Example layout, Lehigh can furnish copies upon request

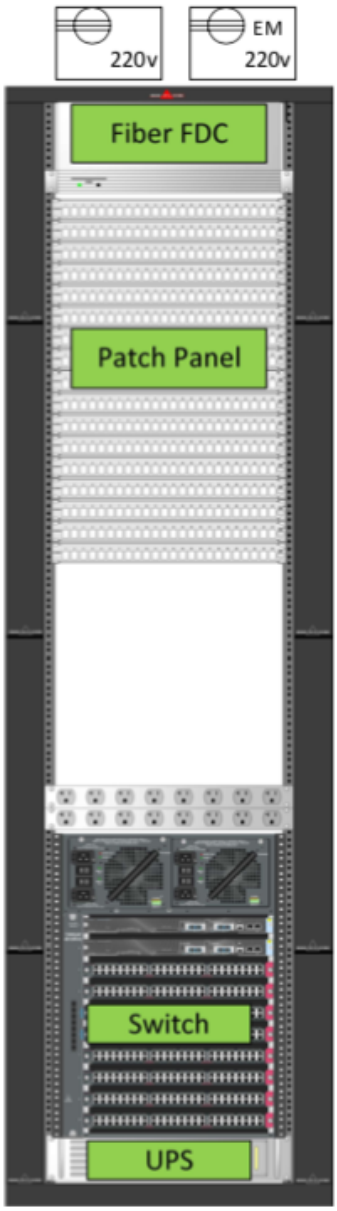
Building	Room	Jack Location	Cable type	Closet	Rack	P.P.	P.P. Position	Switch	Card Port	Notes
							1			
							2			
							3			
							4			
							5			
							6			

7. Appendix C: Rack Layouts

Three-rack Layout



One-rack Layout



8. Appendix D: Standard Jack Designs

Space Requirements

Offices	2 data outlet locations per room; 2 data cables per outlet.
Conference rooms	Depending on size, 1 or 2 jack locations per room; 2 cables per jack location. AV designers may specify additional requirements.
Classrooms	1 wall jack with 1 cable near instructor's station for utility phone; 1 jack location at instructor's station with 5 cables. AV designers may specify additional requirements.
Special use rooms (i.e. grad offices)	1 wall jack with 1 cable for utility phone; other jack locations variable and dictated by department.
Common areas	Variable but typically 1 jack location per area; 2 cables per jack location
Residences	1 jack location per bedroom; 1 cable per jack location

Device Requirements

TVs / Displays	1 jack location per display; 3 cables per jack location
Wireless Access Points (WAPs)	1 cable per WAP
Access Control	1 cable per panel
Building Controls	2 per panel. MEP designers may specify additional requirements.
Wall/utility phones	1 cable per phone; locations vary by project.