

UCF IT Telecommunications Design Standards

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University of Central Florida, UCF IT Telecommunications



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UCF IT Telecommunications (UCF IT) Design Guidelines and Standards

These guidelines are for assisting UCF IT, the Architect/Engineer/Construction Manager Design Team (A/E/CM) and UCF IT contractors in designing or installing any projects to the UCF IT Telecommunications industry standards.

1. General

- 1.1 All telecommunications requirements related to the project are to be included as part of an overall budget for each project. Some elements of the telecommunications system required by the project occurring off the building site may be provided for in the "infrastructure" portion of the project funds. The A/E/CM must verify the specific project situation in this regard. Additionally, the A/E/CM must remain aware of the constantly changing technology of telecommunications and its impact on the overall construction budget.
- 1.2 At the completion of the project construction, all telecommunications systems shall be operational. During the design of the systems, it will be necessary for the A/E/CM to interface with UCF IT and UCF Office of Instructional Resources (OIR) for specific requirements for the project.
- 1.3 The information in the UCF IT Telecommunications Design Guidelines is to be considered as the minimum requirements. However, quantities and sizes of items can change during the project design, according to the project's impact and needs.
- 1.4 Definitions:
 - 1.4.1 Provide: Furnish, install, and test complete and ready for intended use.
 - 1.4.2 Furnish: Supply and deliver to the project site, ready for subsequent requirements.
 - 1.4.3 Install: Operations at the project site including unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, protecting, cleaning, testing complete and ready for intended use, plus similar requirements.
 - 1.4.4 OFOI: Owner Furnished Owner Installed: Equipment/materials furnished by and installed by the owner.
- 1.5 Codes and Standards:
 - 1.5.1 All telecom installation tasks shall be performed in accordance with the most recent issue of the following Codes and Standards, in addition to these UCF IT Telecommunications design guidelines. Where there is a perceived conflict between a guideline or standard, the A/E/CM and subcontractors shall follow the chain of command protocol to get the perceived conflict resolved with the UCF IT.

1.5.1.1 NFPA-70.

- 1.5.1.2 NEC Current Edition.
- 1.5.1.3 ANSI/TIA/EIA-568-1.E Commercial Building Telecommunications Cabling Standard.
- 1.5.1.4 ANSI/TIA/EIA-569-E Commercial Building Standard for Telecommunications Pathways and Spaces.
- 1.5.1.5 ANSI/TIA/EIA-606-C Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.
- 1.5.1.6 ANSI/J-STD-607-D Commercial Building Grounding and Bonding Requirements for Telecommunications.
- 1.5.1.7 BICSI Telecommunications Distribution Methods Manual (TDMM) current edition.

2. Outside Plant Pathways

The general contractor shall provide pathways and spaces for the telecommunications as directed.

2.1 Outside Plant Safety

- 2.1.1 Follow "confined spaces" requirements while accessing MHs.
- 2.1.2 Complete entry permits required for confined spaces.

2.1.2.1 See UCF Policies

- 2.1.3 Analyze and monitor air quality at all times and ventilate if necessary.
- 2.1.4 Provide retrieval equipment, as necessary.
- 2.1.5 Pump water out of any MH, as necessary.
- 2.1.6 Call in locates with Sunshine 811 before digging on the UCF campus.

2.2 Conduit Duct Banks

- 2.2.1 The main telecommunications room of any new building shall connect to the UCF campus duct bank system with a minimum of (2) two 4" schedule 40 PVC conduits encased in concrete.
- 2.2.2 New duct banks connecting maintenance holes (MHs) shall contain a minimum of (4) four 4" schedule 40 PVC conduit encased in concrete.
- 2.2.3 Space bars allowing for 2" of concrete between the conduits shall be used.
- 2.2.4 3000 PSI concrete shall be used to fully encase the conduits with a minimum of 3" of concrete encasing all (4) four sides of the duct bank.

- 2.2.5 A minimum of (4) four #5 rebar shall be installed and epoxied into the MH at MH tie-ins and extended into encased duct bank a minimum of 3'6" to prevent shearing.
- 2.2.6 All MH tie-ins shall be finished by cast in place duct terminators.
- 2.2.7 Concrete pours not continuous must have a minimum of (4) four #5 rebar with a minimum of 24" in each pour as connectors to prevent shearing.
- 2.2.8 A minimum of 36" of ground cover is required above all encased duct banks.
- 2.2.9 A buried "cable tape" shall be placed 12" above the concrete encased duct bank.
- 2.2.10 The "cable tape" shall be place 6" wide and read "CAUTION TELEPHONE CABLE BURIED BELOW". Reef industries #540 "Extra Stretch Terra Tape" is design basis.
- 2.2.11 Where the 4" conduit turns up through the building slab, manufactured rigid metal sweeps with 48" minimum bend radius shall be installed. As the conduit rises through the building slab and enters the telecom room, rigid metal nipples shall be installed as needed, spaced 4" off finished walls and spaced a minimum of 4" apart.
- 2.2.12 Where entrance conduits exceed 50' into the building rigid metal conduit (RMC) or intermediate metal conduit (IMC) shall be used.
- 2.2.13 Test all conduit runs containing new conduit installed end to end between MHs, buildings, and stub out points. Testing is to be done by pulling a combination mandrel/stiff spine brush through each conduit. In cases where the mandrel/brush unit becomes lodged in the conduit, it shall be the contractor's responsibility to recover the mandrel/brush unit and repair any conduit and duct bank damage at no additional cost to UCF. If the mandrel/brush unit becomes damaged, it shall be the contractor's responsibility to repair/replace any damaged component of the mandrel/brush unit at no cost to UCF.
- 2.2.14 Install (1) 3 cell detectable MaxCell fabric innerduct and (2) 3 cell non-detectable MaxCell fabric innerduct in outside plant 4" conduit duct banks connecting maintenance holes.

2.3 Maintenance Holes (MHs)

- 2.3.1 MHs shall be constructed of pre-cast concrete. Typical sizes used at UCF are:
 - 4'x4' square with 4' of headroom
 - 5'x5' square with 4' of headroom
 - 6'x6' square with 4' of headroom
- 2.3.2 MHs shall have a minimum of (1) 6"x42" diameter pre-cast concrete grade ring installed around the 42" diameter roof access. U.S. Foundry #651 basis of design.

- 2.3.3 A cast iron cover with the word "COMMUNICATIONS" cast into it and pick bars shall be provided for all MHs. U.S. Foundry #CI-SSG basis of design.
- 2.3.4 Install a minimum of 12" of #57 or equivalent rock in de-watered or dry MH pits.
- 2.3.5 Install a minimum of size #6 bare copper (solid or stranded) conductor as the MH is installed. That conductor as installed shall have a minimum 20' coil outside the MH and shall have a minimum 4' coil inside the MH and shall be installed in the following manner:
 - 2.3.5.1 Two-piece MH: Run the conductor across the bottom half joint before the top half of the MH is set on top of the bottom half.
 - 2.3.5.2 One Piece MH: Drill a hole just large enough for the conductor to pass through at a point halfway up the inside wall of the MH, then insert the conductor through the hole. Seal the hole with mortar on the inside and outside of the MH.
- 2.3.6 Galvanized steel racking with cable supports shall be installed on each wall of the MH.
- 2.3.7 MHs on the UCF campus are secured areas with UCF IT locks and as such any required access must be scheduled with UCF IT in advance.

2.4 Pull Boxes

- 2.4.1 Pull boxes shall be constructed of monolithic polymer concrete with an open bottom. Size will be determined by location and situation with UCF IT. (See Addendum A)
- 2.4.2 All pull box lids shall contain "COMMUNICATIONS" on the concrete drive safe lid and be able to with stand 8,000 lbs to 15,000 lbs of pressure depending on the location.
- 2.4.3 Pull boxes will be buried to complete depth of the box with 6" to 8" of leveled crushed rock installed in the bottom before box is placed in the hole.
- 2.4.4 Conduits shall turn up into the middle of the pull box utilizing a 48" minimum bend radius.

3. Outside Plant Cabling

The ITS contractor shall install infrastructure cabling, structured cabling, cable supports, equipment racking and support structures, and bonding and grounding components as follows:

3.1 Outside Plant Copper Telephone Cabling (Installed by UCF IT)

3.1.1 Install copper PE89 cable as instructed by UCF IT through campus duct banks and MHs.

- 3.1.2 Appropriately sized (pair count) 22 or 24 AWG PE-89 DB or Bell Spec. 22 or 24 AWG ANNA type outside plant copper telephone cable shall be installed between the nearest existing copper distribution point having cable pairs available to serve the new project. This installation shall also include standard telecom cable racking installed in MHs as needed, to adequately support cables.
- 3.1.3 Install the copper cabling as one continuous cable run, not containing any splices in MH or cable vaults with new mule tape for future cable installations.
- 3.1.4 Building entrance protection for outside plant copper telephone cables entering building MDFs shall be composed of building entrance protector units, equipped with a 110-wiring field in and out for single, 6,12,25,50,100, and 200 pair outside plant copper telephone cable entrance facilities. (Circa 188 Type)
- 3.1.5 Building entrance protector units shall be equipped with balanced solid-state modules.
- 3.1.6 All terminated cabling shall have bullet bonds installed and all sheaths bonded and grounded.
- 3.1.7 Cables shall be terminated on the same wall as the building entry conduits, no slack coil shall be installed before the lighting protection equipment.
- 3.1.8 Cabling with an over-currant exposure, including equipment grounding conductors, shall not be bundled with any non-exposed cabling, or encounter cable tray.
- 3.1.9 All installed cables shall be talk-tested.
- 3.1.10 MaxCell fabric innerduct shall be utilized in conduits connecting MHs for outside plant cabling to maximize the space inside conduits.

3.2 Outside Plant Fiber Optic Cabling (Installed by UCF IT)

- 3.2.1 Install fiber optic cable as instructed by UCF IT through campus duct banks and MHs.
- 3.2.2 Install the fiber optic cable as one continuous cable run, not containing any splices in MHs or cable vaults.
- 3.2.3 Provide 10' service loops of the cable in certain MHs as directed by UCF IT and on each end of the cable run.
- 3.2.4 Provide 50' coils in the last MH before building entrance and/or in the vault associated with the core switch rooms.
- 3.2.5 The outside plant fiber optic cabling installation shall also include standard telecom cabling racking in MHs and telecom room equipment racks.
- 3.2.6 Fiber distribution centers shall be installed into a floor mounted equipment rack or wall mounted cabinet.

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- 3.2.7 Fiber shall be spliced in splice housings as directed by UCF IT in the switch rooms.
- 3.2.8 Fiber tubes and ribbons shall be furcated to protect unjacketed ribbons within telecom spaces.
- 3.2.9 The first half of ribbons within each cable count shall be spliced to pigtails for network use.
- 3.2.10 The second half of ribbons within each cable count shall be labeled, left dark and coiled in the splice house for future use.
- 3.2.11 Strand polarization shall be reversed at the end of cable furthest from the campus core. I.e., strands 1&2 at the switch room would show as strand 2&1 at the building communications room.
- 3.2.12 All installed cabling shall be link-loss tested with a level 3 tester.
- 3.2.13 Label cables as they are installed in MHs.
- 3.2.14 Install MH racking in MHs as directed by UCF IT.
- 3.2.15 Support cables in each MH on racking, routing cables around walls.
- 3.2.16 Mule tape shall be placed as cable is installed to replace existing pull lines for future use.
- 3.2.17 Use appropriate installation methods and devices to ensure that cable jackets are not damaged during cable placement.
- 3.2.18 MaxCell fabric innerduct shall be utilized in conduits connecting MHs for outside plant cabling to maximize the space inside conduits.

3.3 GPS Mapping

- 3.3.1 Purpose is to maintain a high accuracy up-to-date UCF campus layout of all UCF IT underground utilities.
- 3.3.2 Approved methods of detecting UCF IT underground utilities shall be a Radio Detection Precision Utility Locater, GPS Receivers and Ground Penetrating Radar.

4. Communications Rooms – Entrance Room and Equipment Room

Formerly known as Main Distribution Room (MDF) and Intermediate Distribution Room (IDF). The general contractor shall provide communication room requirements as directed.

4.1 Communication Room Requirements (See Addendum B)

- 4.1.1 Communication rooms shall be centrally located within the area they serve containing (1) Entrance Room per building and at least (1) Equipment Room per floor with one door per room opening to a publicly accessible hallway.
- 4.1.2 A communication room shall not serve an area more than 3,600 square feet.

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- 4.1.3 Communication rooms shall be a minimum of 100 square feet in size.
- 4.1.4 Communications rooms shall be wrapped around the room with ³/₄" fire treated, fire painted plywood AC or better grade.
 - 4.1.4.1 "Good" side exposed to the room.
 - 4.1.4.2 Battleship Gray in color.
 - 4.1.4.3 Installed vertically 6" AFF.
 - 4.1.4.4 Reay Spec RB-AD4896X is recommended.
- 4.1.5 Communication room ceilings shall be at least 9' from floor and open to the deck above.
- 4.1.6 Communication rooms shall have a low-static finished floor, polished or painted battleship gray is preferred.
 - 4.1.5.1 Carpet shall not be used.
 - 4.1.5.2 VCT shall be anti-static.
- 4.1.7 Communication rooms shall have at least one 120V 20A 5-20 quad receptacle on each wall fed by emergency power.
- 4.1.8 Shall have at least one L6-30R and one 5-20 quad receptable fed from generator power and one L6-30R and one 5-20 quad receptacle fed from house power on its own dedicated circuits. The power receptacles shall be installed on Unistrut supported by threaded rod 1' above the top of the relay racks (8' AFF), 24" apart as directed by UCF IT. All power outlets will be labeled back to breaker panels. (See Addendum C)
- 4.1.9 HVAC minimum requirements for communications rooms are as below:
 - 4.1.9.1 Entrance rooms contain UCF provided network electronics generating at least 35,000 BTUs per hour of heat load and are to be cooled at a constant 72 degrees Fahrenheit.
 - 4.1.9.2 Equipment rooms contain UCF provided network electronics generating at least 20,000 BTUs per hour of heat load and are to be cooled at a constant 72 degrees Fahrenheit.
 - 4.1.9.3 Split systems shall be mounted at least 3' above the door for redundancy.
 - 4.1.9.4 Communication rooms shall be serviced by general building air as well as dedicated HVAC.
- 4.1.10 A bonding conductor for telecommunications (BCT) shall be installed from the main telecom room to the grounding electrode system. It shall be a minimum of 3/0 at a maximum cable length of 84' terminated with irreversible compression

connectors. All bonding conductors shall be installed in accordance with ANSI/TIA-607-D.

- 4.1.11 Communication rooms shall not contain other systems which may require entry by services or departments other than UCF IT besides the door access system.
- 4.1.12 There shall be no plumbing or HVAC piping, or components allowed within the communication room except as required to service the communication room.
- 4.1.13 Before the buildout of a communications room it must have finished walls/floors, lighting system, a lockable door with UCF IT having the only key and HVAC (for network electronics to be installed).
- 4.1.14 All finished communication rooms shall be keyed with a Great Grand Master (GGM) key system and a door access system card reader.

4.2 Communication Room Cable Trays or Ladder Rack (Installed by UCF IT)

- 4.2.1 Wrap cable tray around the perimeter of the communications room at minimum7' AFF. Where split HVAC units are above doorways and interfere with the cable tray it will terminate on either side of the split unit.
- 4.2.2 Cable tray shall be at minimum 12" wide but sized to accommodate all installed cabling and service loops with triangle brackets used for support every 5'.
- 4.2.3 Cable tray will be used to connect perimeter cable tray to the relay rack utilizing connector brackets.
- 4.2.4 Cable tray shall be black in color.
- 4.2.5 Cable tray shall utilize Belden UL Classified bonding splices. (Belden Ladder Rack)
- 4.2.6 All cable tray sections shall be bonded with a ground wire jumper utilizing 2-hole terminals and paint shall be removed under all bonding connectors. This applies to areas when adding to existing cable tray systems.
 - 4.2.6.1 The use of Belden UL Classified bonding splice kits can be used to avoid drilling and paint removal of cable trays. (See Addendum D)
 - 4.2.6.1.1 Butt-Splice Kit (BLBSU301-15B), Butt-Swivel (BLBSS487-OUB), Junction-Swivel (BLBSS488-OUB), and Vertical-Swivel (BLVBS489-OUB).

4.3 Relay Rack (Installed by UCF IT)

- 4.3.1 Relay racks shall be installed for communication room terminations and network electronic equipment. (See Addendum E)
- 4.3.2 Relay racks shall be 7'x19", available in 3",6" and 10" deep cable management style and shall be 40" away from walls in the front and back.
- 4.3.3 UCF IT will determine the size and amount used for each design.

- 4.3.4 If a 3" rack is chosen for the installation, the vertical managers must be installed in a front or rear configuration.
- 4.3.5 Station cables shall be routed through the rear vertical management channel if the 3" rack are used for installation.
- 4.3.6 Station cables shall be routed in the 6" and 10" built in cable management channels if these racks are used for installation.
- 4.3.7 Relay racks shall be black in color with isolation pads installed between the rack and floor.
- 4.3.8 Relay racks shall be bonded to the serving cable tray and grounded individually to the bus bar.
- 4.3.9 Relay racks shall have locking enclosures installed over copper risers, copper homerun cable terminations and any network electronics.

4.4 Grounding and Bonding

- 4.4.1 The main grounding bus bar shall be at least 20" in length and any additional bonding bus bars shall be at least 10" in length.
- 4.4.2 All bonding busbars shall be at least ¼" thick and 4" in height with insulating standoff mounting brackets.
- 4.4.3 All connectors to busbars shall be 2-hole irreversible terminals affixed to copper conductors with lock washers.
- 4.4.4 The telecommunications bonding backbone cable (TBB) shall conform to the most recent version of ANSI-J-STD-A607 TBB sizing chart.
- 4.4.5 All equipment grounds shall be at least #6 AWG.
- 4.4.6 No hard bends shall be allowed in conductor routing, only sweeping bends.
- 4.4.7 The Ohms for the ground wire shall be 5 Ohms or less.

4.5 Termination Components (Installed by UCF IT)

- 4.5.1 All copper homerun station cables shall be terminated using style 568B. (See Addendum F)
 - 4.5.1.1 Belden REVconnect Termination Process: https://www.youtube.com/watch?v=37ZIYdvxUBk
- 4.5.2 Modular patch panels shall be used for termination of CAT6A cabling. (RVMPPF2U48BK-P)
- 4.5.3 Modular CAT6A jacks shall be used in patch panels alternating black and then gold. (Belden RVAMJKUBK and RVAMJKUTN)

- 4.5.4 Install (1) one 2U horizontal wire manager above and below each modular patch panel. (Belden 9511-1902-0006)
- 4.5.5 Vertical cable management for equipment racks shall be 6" vertical cable managers for all standard installations. The 3" managers may be used if space is limited. (Belden SCRAL84VCM6X9)
- 4.5.6 Provide two Power Distribution Units (PDUs Belden 9SG1-121001 and 9SB2-241008) equipped with NEMA 5-20R electrical receptacles. Provide the PDUs on the relay rack containing owner furnished owner installed network electronic equipment.

4.6 Rebox/Hoffman Solutions (See Addendum G)

- 4.6.1 Entrance/Equipment Room solutions used in appropriate situations determined by UCF IT when a standard 100 square foot room is not plausible.
- 4.6.2 May be used in an interior (Rebox) or exterior (Hoffman Box) situation.
- 4.6.3 (1) 2" or 4" conduit shall be installed to the Rebox/Hoffman box from nearest distribution point for outside plant infrastructure. Size and number of conduit(s) will be determined by UCF IT.
- 4.6.4 2" or 4" conduit(s) shall be installed from the Rebox to ceiling space for homerun infrastructure. Size and number of conduit(s) will be determined by UCF IT.
- 4.6.5 1" homerun conduit(s) shall be installed from each data outlet location to a 12"'x12" weatherproof junction box with 2" or 4" conduit(s) installed from the junction box to the Hoffman Box. Size and number of conduit(s) will be determined by UCF IT.
- 4.6.6 (1) quad 5-20 power receptacle shall be installed inside the Rebox or Hoffman Box solutions for any UCF IT equipment or devices.

5. Inside Plant Pathways

The general contractor shall provide pathways and space for telecommunications as directed.

5.1 Telephone/Data Outlet/Raceways

- 5.1.1 Each telephone/data/TV outlet shall be served by (1) 4"x4" square steel outlet box with a minimum depth of 2-1/8" equipped with a single gang mud ring. Install (1) 1.25" metallic conduit in homerun fashion to the nearest communications room or cable tray.
- 5.1.2 Indoor Emergency Telephone Outlet/Raceway: Provide (1) 4"x4" square outlet box with a single gang mud ring 44" AFF with (1) 1.25" metallic conduit from the outlet box to the nearest communications room or cable tray.
- 5.1.3 Emergency Blue Light Phone (EBLP) outlet/raceway: Provide each EBLP an appropriate size conduit for a dual 5-20 GFCI power outlet, plus (2) 1" conduits to

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the nearest communications room or cable tray. Install the concrete base pad according to the installation design (See Addendum H) and ground rod at determined location. UCF IT will work with the UCF Emergency operations center and the UCF Police Department for locations. Must be ADA compliant.

- 5.1.4 Outdoor Wireless Access Points outlet/raceway: Provide (1) 4"x4" square weatherproof outlet box on the exterior of the building sleeved through the exterior wall to a 4"x4" square outlet box inside with a blank cover.
- 5.1.5 Outdoor Security Camera outlet/raceway: Provide (1) 4"x4" square weatherproof outlet box on the exterior of the building sleeved through the exterior wall to a 4"x4" square outlet box inside with a blank cover.
- 5.1.6 Elevator Equipment Room outlet/raceway: Provide (1) 4"x4" square outlet box 44" AFF in the elevator control room with (1) 1.25" conduit from the outlet box to the nearest communications room or cable tray. Provide (1) 1.25" metallic conduit from the data outlet box to the elevator control panel. UCF IT shall install a dual cable outlet for elevator phone with a single patch cable from outlet box to the elevator control panel.
- 5.1.7 Fire Alarm Circuit outlet/raceway: Fire alarm runs over radio-mesh. In cases this does not happen then provide (1) 1.25" metallic conduit between the nearest communications room and the fire alarm panel.
- 5.1.8 Building Automated System (BAS) outlet/raceway: Provide (1) 4"x4" square outlet box 44" AFF to BAS control panel area with (1) 1.25" conduit from the outlet box to the nearest communications room or cable tray. Provide (1) 1.25" metallic conduit from the data outlet box to the BAS control panel. UCF IT shall install a dual cable outlet for BAS with a single patch cable from outlet box to the BAS control panel.
- 5.1.9 Floor outlet locations in slab on grade/non slab on grade raceway: Provide (1)1.25" metallic conduit from the floor box to the above ceiling space associated with the same floor location.
- 5.1.10 Floor outlet boxes in *Slab on Grade* shall be Wiremold/Legrand-Walker box (RFB4-Cl-1) with:
 - 5.1.9.1 Two (2) CILT-4TKO communication brackets.
 - 5.1.9.2 Two (2) CILT-D Duplex receptacle brackets.
- 5.1.11 Floor Outlet boxes *Non-Slab on Grade* shall be Wiremold/Legrand-Walker box (RFB4SS) with:
 - 5.1.10.1 Two (2) RFB-4TKO-SS communication brackets.
 - 5.1.10.2 Two (2) RFB-RB-SS internal duplex electrical receptable brackets.

- 5.1.12 Floor box covers shall be Wiremold/Legrand-Walker (S40BBTC) in the finish the architect chooses.
- 5.1.13 All communications conduits shall be brushed and reamed end-to-end prior to cable installation.
- 5.1.14 All wall outlet metallic conduit(s) shall run up in the wall into the ceiling space and be within 4' of the nearest telecommunications pathway system.
- 5.1.15 Conduit(s) shall be run parallel and perpendicular to building structure.
- 5.1.16 Metallic conduit(s) shall be grounded in accordance with ANSI/TIA-607-D.
- 5.1.17 A 1.25" metallic conduit serving a workstation outlet requiring more than 270 degrees of bend must be presented to UCF IT. If a pull box is required, it shall be accessible and unobstructed. Conduit(s) shall enter and leave a pull box creating a straight path for cables and not cause the cable to bend within the pull box.
- 5.1.18 Conduit Fill Ratio (<u>https://tools.belden.com/conduit-capacity-calculator/</u>):

5.1.17.1 CAT6A – GigaLan10 – Diameter 0.265

5.1.17.2 CAT5E – MegaLan – Diameter 0.200

5.2 Cable Tray Raceway Systems

- 5.2.1 Overhead cabling tray system designed for telecommunications cabling infrastructure shall be provided as a telecommunication distribution system thought the facility.
- 5.2.2 The cable tray system shall be an open mesh design, also known as a wire basket tray system, that is "UL Classified" and suitable for use as an electrical conductor for grounding and bonding.
- 5.2.3 Cable tray brands approved by UCF IT for use is Snake Tray (Cable Management Solutions).
 - 3.2.3.1 801 Series Mega Snake Tray, Mega Snake Under Tray, Series 454 Universal Snake Tray. <u>(See Addendum I)</u>
- 5.2.4 Cable trays installed in an open ceiling environment shall have a paintable removable cover to protect cables from paint during construction.
- 5.2.5 Install cable tray level, straight, parallel, and perpendicular to building structure in above ceiling space 1-1/2' above ceiling grid.
- 5.2.6 Provide all hardware, accessories, fasteners, anchors, threaded rods, and support channels required to provide a complete cable tray system.
- 5.2.7 Cable trays shall terminate at any rated wall and resume on the opposite side of the wall. Hilti speed sleeves shall be installed in the rated wall sized at 50% fill to accommodate the quantity of cables the cable tray is designed to carry.

- 5.2.8 Cable tray shall be hand bendable or have "Bolt on" transition components in "Tee", 45-degree and 90-degree angles.
- 5.2.9 Quick installing splice kits must create both mechanical and electrical bond.
- 5.2.10 No other cable infrastructure shall be permitted to be installed inside or on any UCF IT cable tray.

5.3 J Hooks (Installed by UCF IT)

- 5.3.1 Install J Hooks and cable slings to buildings structures where cable trays are not present and built to support future growth. (See Addendum J)
- 5.3.2 J Hook and/or cable sling supports shall not exceed 4' of spacing in between.
- 5.3.3 J Hook and/or cable slings shall be rated for use in plenum spaces.
- 5.3.4 J Hook *supports* may be shared by compatible signal type cables depending on the UCF IT cable load. The load will need to be determined by the manufacturer and approved by UCF IT.

6. Inside Plant Cabling

6.1 Riser Cabling (Installed by UCF IT)

- 6.1.1 Install fiber optic riser cabling as instructed by UCF IT.
 - 6.1.1.1 Riser fibers shall be individually stranded.
 - 6.1.1.2 Fibers that are tight buffered shall utilize splice connectors.
 - 6.1.1.3 Fibers that are loose tube shall be ribboned and utilize pigtail splices.
 - 6.1.1.4 Cables shall be labeled on the sheath within 6" of termination.
- 6.1.2 Install copper riser cabling as instructed by UCF IT.
 - 6.1.2.1 Copper pairs terminated at the Entrance Room end shall be terminated on loaded telco patch panels from main protector 110 block.
 - 6.1.2.2 Copper pairs terminated at the Equipment Room end shall be terminated on 24 port patch panels leaving the 25th pair un-terminated.
- 6.1.3 Install hardline coax riser cabling as instructed by UCF IT.
 - 6.1.3.1 .500 Hardline coax cables shall have 5' of slack coiled at each end for termination by CATV prover.
 - 6.1.3.2 .500 Hardline coax cables shall not be kinked, dented, or rippled.
 - 6.1.3.3 All cables shall be labeled.

6.2 Horizontal Cabling (Installed by UCF IT)

- 6.2.1 Install CAT6A homerun cabling without splices from the serving floor communications room to the work area outlet.
- 6.2.2 Cabling shall be rated for use in plenum spaces.
- 6.2.3 Cabling shall be properly supported using UCF IT approved pathways and shall not be tied to or supported by conduits, pipes, or ducts.
- 6.2.4 UTP cabling installed in cable trays shall not be tightly bundled to allow for POE heat dissipation.
- 6.2.5 Cables shall be secured with UCF IT approved Velcro and shall not be secured with zip ties. Service loops shall have minimum of 2 points secured with Velcro.
- 6.2.6 3' of slack shall be coiled above each work outlet.
- 6.2.7 10' of slack shall be left in communication rooms place on the cable tray in one large "U" shaped service loop.
- 6.2.8 (1) loop of service slack shall be left in each wall outlet 4"x4" box.
- 6.2.9 CATV RG6 cabling homeruns shall have no splices from the serving communications room to the TV outlet with a 3' service loop.
- 6.2.10 CATV cabling shall be routed into the CATV cabinet, labeled, coiled, and terminated with RG6 fittings.
- 6.2.11 Minimum of 10' of coax RG6 shall be left in the communications room, placed on the cable tray in one large "U" shaped service loop.
- 6.2.12 Slab on grade locations shall be fed by cabling rated for damp or wet locations, not plenum rated.
- 6.2.13 Transition points shall be used where conduits do not extend into the communications room from an underground location. Underground rated cable shall be terminated on the back side of the transition point and plenum rated cable terminated on the front side in the ceiling space.
- 6.2.14 Transition points shall consist of Belden REVConnect CAT6A couplers mounted in the junction boxes large enough to enclose the couplers and mounting frames required to mount the couplets and allow for slack management. (Belden RCACPKUBK)
- 6.2.15 All installed cabling shall be tested to category CAT6A specifications with a level 3 tester.

6.3 Work Area Outlets (Installed by UCF IT)

6.3.1 Faceplates shall be single gang except when requiring more than (6) cables.

- 6.3.2 Face plates shall be modular Belden brand. (AX106670)
- 6.3.3 Faceplates shall have a blank insert with the UCF IT logo in the middle section when space is available. (Belden AX107531)
- 6.3.4 Category 6A jacks shall be used for terminations using 568B method alternating black and gold. (Belden RVAMJKUBK and RVAMJKUTN)
- 6.3.5 Coaxial jacks shall be modular and fit within the faceplate insert. (Belden AX102903)
- 6.3.6 Any unused faceplate space shall have blank inserts installed. (Belden AX101762)
- 6.3.7 Any unused sing faceplate ports shall have a single blank insert installed. (Belden AX102261)
- 6.3.8 Wall phone outlets shall utilize faceplates with mounting post. (Belden AX104126)
- 6.3.9 Elevator equipment room phone outlets shall include a tamperproof faceplate and jacks that create a network interface to the elevator equipment for testing purposes.
 - 6.3.9.1 (1) single gang four port tamper resistant face plate. (Belden AX104688)
 - 6.3.9.2 (2) jacks in the top two ports.
 - 6.3.9.3 (1) blank placed in the bottom two ports.
- 6.3.10 Time Clock/Key Tracker System: (2) Category CAT6A cables to be installed in the location determined by stakeholder for connectivity.
- 6.3.11 All terminations shall be industry standard 568B.

6.4 Labeling (Completed by UCF IT)

- 6.4.1 All labeling shall be machine generated.
- 6.4.2 Faceplates shall be labeled by room number and faceplate number. The first faceplate number in a room begins on the left side of the main entry door and runs clockwise around the walls, then to the floor outlets, then to the ceiling outlets. I.e., the first faceplate in room 101D to the left of the door is number 101D-1, the next outlet is 101D-2, etc. (See Addendum K)
- 6.4.3 Outlets in faceplates shall be labeled with letters left to right, top to bottom. I.e., the first (upper left) port in faceplate 101D-1 would be 101D-1A, the second (upper right) would be 101D-1B, etc. (See Addendum L)
- 6.4.4 All cables shall be labeled with 2" of termination behind wall plates and patch panels.
- 6.4.5 All patch panel ports shall be labeled with the same ID as on the faceplates.

6.4.6 Labels shall be affixed to the ceiling grid below any outlets located above accessible ceiling spaces with the outlet ID.

7. Security

7.1 Security Camera Infrastructure (Installed by UCF IT)

- 7.1.1 Internal camera's will be fed with (1) CAT6A homerun cable with a 1-port surface mount at the device end.
- 7.1.2 External camera's will be fed with (1) CAT6A homerun cable with Ditek surge protectors at the device end and communication room end.
- 7.1.3 Physical cameras are to be installed by others.

7.2 Security Access Control Infrastructure (Installed by UCF IT)

- 7.2.1 Single conductor or composite cable will be installed from the main door access control panel to each door utilizing the card reader system.
- 7.2.2 The access control cable shall be terminated by others.

8. Emergency Blue Light Phones (EBLP)

- 8.1 Overview and Types (See Addendum M)
 - 8.1.1 UCF IT is responsible for the phone installation, maintenance, and operation of UCF IT installed EBLPs located throughout UCF campuses.
 - 8.1.2 The designed location of any EBLPs will be coordinated with the Emergency Operations Center (EOC) and UCF PD.
 - 8.1.3 Testing and inspections of all EBLPs will be coordinated with UCF PD and completed on a quarterly basis.
 - 8.1.4 The models of EBLPs are subject to change based on technology advancements and to accommodate the interest of the university.
 - 8.1.5 Gai-Tronics Red Alert VoIP and Analog Phones shall be used on campus with either stand-up stanchion or wall mount style housings. Model will be determined based on location.

8.2 Installation (See Addendum H)

- 8.2.1 The interior of the EBLP shall be installed with product supplied cables, following specific directions located with the product. Including EBLP phone, lights, grounding, cameras.
- 8.2.2 The EBLPs require a constant and dedicated 5-20 GFCI Quad 120V AC power outlet.
- 8.2.3 EBLPs shall have a specific concrete base pad installed by a contractor.

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8.3 Cabling

- 8.3.1 Stand-up stanchions shall have a quad CAT6A underground grade data outlet installed with a 4-port Ditek surge protector installed at the phone location and communication room for lighting protection. A weatherproof box shall be installed inside the EBLP for data cable terminations.
- 8.3.2 Wall mount EBLPs shall have a dual CAT6A data outlet installed with a 2-port Ditek surge protector installed at the phone location and communication room for lighting protection.

9. Wireless - Wireless Access Points (WAPs) and Radio Distribution Antenna System (DAS)

- 9.1 The wireless network design will be coordinated with the UCF IT Wireless department to develop a wireless heat map survey. The design shall be established to provide 100% high quality wireless internet building coverage.
- 9.2 Install a CAT6A dual data outlet to each Wireless Access Point (WAP) with a 2-port surface mount box at location per the wireless survey completed by UCF IT.
- 9.3 External WAPs will be fed with dual CAT6A data outlet with Ditek surge protectors at the device end and communication room end.
- 9.4 WAP cabling shall have 20' of slack coiled at the designed location and supported with a figure 8 service loop incase WAP moves to a new location according to heat map.
- 9.5 Ceiling Grid/Tile Installation: A grid mounting solution shall be installed using a WAP grid plate and grid mounting kit. The ceiling tile installation shall be completed with a flush mount enclosure that is used in replacement of a ceiling tile. Each installation requires to plug in patch cables for WAP activation and WAP monitoring. (See Addendum N)
- 9.6 Hard Cap Ceiling Installation: (See Addendum O)
 - 9.6.1 A flush mount WAP enclosure shall be used for this situation.
 - 9.6.2 A template of the enclosure shall be produced to verify accurate dimensions in order to cut out the exact measurements in the hard ceiling drywall.
 - 9.6.3 Install flush mount enclosure to hard ceiling following detailed instructions provided with enclosure.
 - 9.6.4 Mount WAP inside enclosure with provided bracket and 2-port surface mount box.
 - 9.6.5 Plug in patch cables for WAP activation and WAP monitoring.
- 9.7 Floating WAP Installation: (See Addendum O)

- 9.7.1 General contractor to provide (1) 1.25" conduit from closest communications room or cable pathway to WAP location utilizing a 4"x4" metal outlet box on the end with WAP.
- 9.7.2 Mount WAP enclosure to the 4"x4" metal outlet box and 2-port surface mount box inside the metal outlet box.
- 9.7.3 Install WAP to enclosure with metal WAP bracket.
- 9.7.4 Plug in (2) patch cables for WAP activation and WAP monitoring.
- 9.8 Exterior Installation: (See Addendum P)
 - 9.8.1 Install seal tight rubber conduit from the general contractor provided weatherproof box to the WAP exterior wall mount bracket.
 - 9.8.2 Run shielded CAT6A patch cables from the Ditek surge protector on the inside of the building through the wall conduit and seal tight conduit to WAP wall bracket.
 - 9.8.3 Screw WAP wall bracket to exterior wall with Tap Con screws followed by silicone surrounding the wall bracket for weather protection.
 - 9.8.4 Install an exterior model WAP onto the wall bracket.
 - 9.8.5 Plug in path cables for WAP activation and WAP monitoring.
- 9.9 WAP installation standards can adjust and adapt to specialized circumstances to meet unique criteria.
- 9.10 Distributed antenna systems may be placed inside buildings for increasing wireless signals on the UCF campus to support cell phone coverage, radios, first responders and public safety.
- 9.11 Shall be designed to meet National Fire Protection Association (NFPA), International Fire Code (IFC), Federal Communications Commission (FCC), First Responder Network Authority (FirstNet) and any state or local fire jurisdiction requirements.
- 9.12 Each building shall be surveyed using radio frequency (RF) testing equipment to adhere to building coverage code.
- 9.13 A minimum signal strength of -95 dBm is required for adequate coverage.
- 9.14 System shall operate with a 800 MHX P25 phase 1 trunked radio system and trunked channels transmitting between 850.000-860.000 MHZ and receiving between 805-815 MHZ.
- 9.15 UCF IT supports the Motorola XPR6550 two-way radio that meets the FCC mandated narrowband channel spacing of 12.5 and 6.5 MHz.

10. Firestopping

- 10.1 All wall/floor penetrations shall be appropriately fire stopped with an approved firestop system.
- 10.2 There are two broad categories of firestop: Mechanical and Non-Mechanical (putty, caulk, or sealant). (See Addendum Q)
 - 10.2.1 Mechanical -2" and 4" Hilti Speed Sleave. (CP 653 BA)
 - 10.2.2 Non-Mechanical 3M Fire Barrier Putty Pad, Hilti Fire Brick, Hilti Firestop Plugs, and fire wool.
- 10.3 Cable tray firestopping for new construction shall be accomplished by terminating cable tray at wall to be penetrated, install the quantity of Hilti Speed Sleeves that at 50% fill capacity will accommodate the stated cable capacity of the cable tray, then continue the cable tray on the other side of the wall.
- 10.4 Hilti Speed Sleeve fill capacity shall be 50% of either the 2" or 4" sleeve.
- 10.5 Conduits terminating in communication rooms shall be fire stopped by using Hilti Plugs or 3M Putty Pads.
- 10.6 Cable tray firestopping for existing tray shall be accomplished by using Hilti Firestop Blocks. The wall at cable tray penetration shall be framed around cable tray to ensure a tight seal.
- 10.7 Firestopping for existing cabling that penetrates a wall but ins not currently fire stopped shall be by Hilti Firestop Retrofits Sleeves. (Split Sleeve 2" or 4")

<u>11. Telecommunications Designer, Contractor/Installer Certifications</u></u>

- 11.1 The telecommunications subcontractor and their technicians installing structured cabling shall be factory trained and factory certified by Belden to install structured cabling in compliance with the Belden Partner Alliance Network cabling program, for 25 Year Extended Warranties.
 - 11.1.1 Line Warranty includes all telecommunications infrastructure parts from the terminated jack at the wall plate to the terminated jack in the patch panel and everything in between.
 - 11.1.2 Channel Warranty includes everything the Line Warranty states plus the patch cable at the wall plate to the network device and the patch cable from the patch panel to the switch.
- 11.2 The telecommunications subcontractor shall furnish UCF IT with a copy of the BICSI RCDD Certification of their technician on staff.
- 11.3 The telecommunications subcontractor shall furnish UCF with a copy of a valid Belden Partner Alliance Company Certificate as well as Training certificates of each foreperson, lead technician, and installation technician on a yearly basis.

- 11.4 The telecommunications subcontractor shall provide Belden with all test results and all Belden 25 Year Warranty paperwork, to have structured cabling system they installed to be warranted by Belden per project. The test results and Belden Warranty will then be provided to UCF IT.
- 11.5 The telecommunications subcontractor shall be a Siemon Certified Installer in good standing and compliance with all manufacturer installation, testing and best practices requirements. Subcontractors shall furnish UCF IT with a certification copy on a yearly basis.
- 11.6 The telecommunications subcontractor shall furnish UCF IT with a valid Siemon Warranty for the optical fiber systems installed per project.

12. Glossary and Acronyms

ADA - American with Disabilities Act

A.F.F. - Above Finished Floor

AHECTA - Association of Higher Education Campus Television Administrators

Aerial Service - Telecommunications cabling installed on supporting structures such as poles, buildings, and other structures.

Alternating Route - A secondary communications path used to reach a destination if the primary Path is unavailable.

ANSI - American National Standards Institute

ASTM - American Society for Testing and Materials

AWG - American Wire Gauge

BICSI - Building Industry Consulting Service International RCDD - Registered Communication Distribution Designer

Backboard - A ³/₄ plywood board coated with fire retardant paint (Battleship Gray) used in telecom room for mounting equipment.

Backbone Cable - A line or set of lines that local area networks connect to for a wide area network connection or within a local area network to span distances efficiently.

Bridge Tap - A conductor that connects the non-current carrying parts of electrical equipment raceways or enclosures to the system grounding conductor.

B.E.P. - Building Entrance Protection

Buried Cable - A cable installed under the surface of the ground in such a manner that it cannot be removed without disturbing the soil.

Cable Bend Radius - The radius that a cable can bend before risk of damage or decrease in transmission performance.

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Cable Tray - A ladder, trough, solid -bottom or channel raceway system intended for, but not limited to the support of telecommunications media.

CATV - Community Antenna Television (Cable TV)

Coaxial Cable - A cable consisting of an inner core and an outer flexible braided tube, both of conductive material separated by an insulator, used to transmit high-frequency signals at high speeds- typical for CATV.

Conduit Duct Bank - A routing of multiple conduits for the purpose of electrical/communication wiring. Conduits may be made of metal, plastic, fiber, or fired clay.

Cross Connection - A connection in which computing devices are connected via cable network switch, hub, or routers.

D Ring - Distribution ring used for cable management and routing.

Decibel (DB) - A unit for measuring the relative strength of a signal.

Demarcation point - (D-marc) A point at which two services may interface and identify the division of responsibility (i.e.) a service provided handoff.

EIA - Electronics International Associates is a standards association that publishes test procedures.

Electrode Conductor - A conductor, not necessarily metallic, through a current enters or leaves a nonmetallic medium, as an electrolytic cell, arc generator vacuum tube, or gaseous discharge tube

Electromagnetic - The interference in signal transmission reception resulting from the radiation of electrical or magnetic electrical and magnetic fields.

EMT - Electro metallic tubing

Entrance Protector - The Building entrance protector terminate, protect, and distribute central office cable pairs on the subscriber premises. These are ideal for use in multi-tenant dwelling and PABX installations.

Entrance Room – An entrance to a building for network service cables, building network equipment, and continuance to equipment rooms.(Formerly MDF)

Equipment Ground - A conducting connection between an electric circuit or equipment and the earth.

Equipment Room - A room in which telecommunications equipment/risers/homerun infrastructure is housed.(Formerly IDF)

Exposed Cable - Cable that is visible and exposed to the elements IE no protective member to hinder contact.

F Connector - A plug and socket for interconnecting coaxial cable commonly used to interconnect television receivers, videocassette recorders and cable or antenna sources.

Faceplate - Covering of a station location that is intended to provide a termination point at the station end, in addition to, protecting cabling end hardware from damage or injury.

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FCC - Federal Communication Commission

Gas Tube Protector - An arrangement of electrodes in a gas within an insulating, temperature-resistant envelope. Although the envelope is typically glass, power tubes often use ceramics, and military tubes often use glass-lined metal. Gas tubes are tubing whose electrical characteristics are substantially influenced by the pressure and composition of gas contained inside.

Telecom Ground Bus Bar - A grounded metal bar in a telecom closet where grounding and bonding conductors can be connected and divert lightning strikes and power surges form electronic equipment.

Grounding Electrode - Provide the essential function of connecting the electrical system to the earth.

HVAC - Heating Ventilation and Air Conditioning

Horizontal Channel - A pathway for cabling that extends cabling in a lateral manner.

ICEA - Insulated Cable Engineers Association is a professional organization dedicated to developing cable standards for the electrical power, control, and telecommunications industry.

IDF - Intermediate Distribution Frame

IEEE - Institute of Electrical and Electronics Engineers, Inc

ISO - International Standards Organization

Innerduct - Additional conduit placed inside a larger diameter conduit (subduct) used for pathways and protection of network cabling.

LAN - Local Area Network

Loose Buffer - Loose buffer means the diameter of the buffer tube in the outer jacket of the cable is larger than the outer diameter of optical fiber placed. There is a gel present in the space between the fibers and outer jacket for protection from the elements.

MH (Maintenance Hole) - Telecom Utility Vault Underground vault used to house an access point for making connections or performing maintenance on underground and buried public utility, telephone, and electricity.

Maintenance Loop - A term used for the amount (in feet) of cabling that is required and left at segmented points for future repair to the cabling infrastructure.

Marker Tape - A strip of identifiable plastic tape that running above the pathway of the newly placed conduit/cable to prevent damage to the conduit/cable directly underneath.

MDF - Main Distribution Frame

Media - The physical carriers of electrical energy or electromagnetic radiation (IB). The various types of wire and optic fiber cable used for transmitting voice or data signals. Typically, wire cables include twisted pair, coaxial and twin axial. Optical fiber cable includes single, dual, quad, stranded and ribbon.

MHz - One MHz represents one million cycles per second. The speed of microprocessors, called the clock speed, is measured in megahertz.

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NEC - National Electric Code

NESC - National Electric Safety Code

NFPA - National Fire Protection Agency

Network - A network is a series of points or nodes interconnected by communication paths.

Non-Plenum Rated Cable - Not rated for plenum spaces. A Non-Plenum cable is cable that is placed in the spaces where ductwork facilitates air circulation for heating and air conditioning systems.

OFOI - Owner Furnished Owner Installed

OIR - Office of Instructional Resources

OSHA - Occupational Safety and Health Administration

OSP - Outside Plant

Pathway - A decided path or route taken.

PE Cable (Polyethylene Cable) - A thermoplastic material commonly used to make outdoor cable jacketing.

PM - Project Manager

PSI - Pounds per square inch

Plenum Cable - Cabling that is placed in the plenum spaces of buildings. The plenum is the space that can facilitate air circulation for heating and air conditioning.

Pull Box - A pull box is a junction box inserted in a long conduit run to facilitate the installation of cabling.

Relay Rack - A standardized frame or enclosure for mounting telecommunications equipment and cabling.

RFI - Request for Information

RFP - Request for Proposal

RG - Short for Radio Guide, RG is a designation for different types of coaxial cable, which is a type of wire that consists of a center wire surrounded by insulation and then a grounded shield of braided wire.

Riser Cable - A type of inside cable intended for use in non-plenum vertical applications such as between floors of a building.

Service Entrance - The location where the incoming electrical line connects to the building infrastructure.

Single Mode Fiber Optical Cable - Single mode fiber is optical fiber that is designed for the transmission of a single ray or mode of light as a carrier and is used for long-distance signal transmission.

STP - Shielded Twisted Pair

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Sump (Maintenance Hole/MH) - Area at the bottom of a maintenance hole into which water drains and is then pumped out.

T-1 (Carrier) - High-capacity telephone line suitable for high-speed digital access to the Internet, handling 24 voice or data channels simultaneously.

TBB - Telecommunication Bonding Backbone

TBBIBC - Telecommunications bonding backbone interconnecting bonding conductor.

Telecommunications Bonding Backbone (TBB) - Route exposed cables from grounding bars in the telecommunications rooms to telecommunications room main grounding bar

Telecommunications Room - The area of the building that contains horizontal communication cabling.

Telecommunications (UCF IT) - Telephone/data division of University of Central Florida

Terminal Block - A cluster of five captive screw terminals at which a telephone pair terminates; the center terminal is for the ground wire and two other terminals are used for the tip and ring wires.

Terminal Box - An enclosure which includes, mounts, and protects one or more terminals or terminal boards; it may include a cover and such accessories as mounting hardware, brackets, locks, and conduit fittings.

TGB - Telecommunications Grounding Bus bar

TIA - Telecommunication Industry Association

Tight Buffer - In a fiber optic communication cable, one type of component used to encapsulate one or more optical fibers for the purpose of providing such functions as mechanical isolation, protection from physical damage and fiber identification.

TMGB - Telecommunications Main Grounding Bus bar

TSB - Telecommunication Service Backboard

UPS - Uninterruptable Power Supply

USOC - Universal Service Order Codes

UTP - Unshielded twisted pair

WAN - Wide Area Network

WAP - Wireless Access Point

Wiremold - Brand names for surface raceway that protects and covers exposed cable.

13. UCF IT Telecommunications Policies

13.1 UCF Policies

13.1.1 https://policies.ucf.edu/

- 13.2 UCF IT Policies
 - 13.2.1 Telecommunications Services: https://policies.ucf.edu/documents/4-003.pdf
 - 13.2.2 Telecommunications Rooms and Vaults:

https://policies.ucf.edu/documents/4-013.pdf

13.2.3 Radio Frequency Spectrum: <u>https://policies.ucf.edu/documents/4-011.pdf</u>

13.2.4 Confined Spaces Entry Procedure:

https://ehs.ucf.edu/wp-content/uploads/2019/08/Confined-Spaces-Entry-Procedures-1.pdf



Addendum A

Example of Pull Box



Pull Box Lid



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Addendum B

Entrance Room (MDF)/Equipment Room (IDF) Basic Layout



Addendum B

Entrance Room/Equipment Room Basic Layout - Power

Legend



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Addendum B

Entrance Room/Equipment Room Basic Layout - HVAC

Legend

Ladder Rack
 Fire retardant Back board
Split Units – At least 3' above door frame (redundancy)
Supply
Return
* Any drip pans will be located outside any communication rooms.



Addendum C

Communications Room Power Requirements Per Rack



Ditek Surge Protectors (1-Port, 4-Port, and 8-Port)



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Addendum D

Butt-Splice Kit

Swivel Splice Kit





Butt Swivel Splice Kit





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Addendum E

Relay Rack Elevation

Drawing Item #	Description	Belden Part #
1	Rack, 19"W x 10"D	XDRAL84191012S1
2	Fiber Panel, 2RU, w LC Duplex	ECX-02U
3	Wire Mgr. 2RU	9511-1902-006
4	REVConnect Panel, 2RU 48-port	RV6PPF2U48BK



Addendum F

568B Terminations

Mod Plug Pinout



CAT6A REVconnect Terminations
https://www.youtube.com/watch?v=37ZIYdvxUBk





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<u>Addendum G</u>

Exterior Hoffman Box Solution



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EBLP Base Template for Bolts and Base Installation

UCF IT and Power Conduits - Middle of the Stanchion



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1. Place the 24-inch diameter concrete form tube on a bed of crushed stone in the excavated hole.

2. Place an 18-inch diameter by 38-inch-long rebar reinforcement cage into the concrete form tube before pouring the concrete. The following materials are necessary to construct the reinforcement cage:

Materials Needed:

- (4) 38-inch long #4 rebar rods
- (3) 18-inch diameter #4 rebar stirrups

Precut wire ties

To construct the reinforcement cage:

- 1. Tie a horizontal stirrup at the center of the four 38-inch rebar rods.
- 2. Tie the two remaining horizontal stirrups 18 inches above and below the center point (see Figure 3).

3. Place the cage on one-inch block spacers, centering the cage within the concrete form tube. The top of the cage should be at least three inches below the top of the pier.

Anchor Bolt Location-Embed the anchor bolts a minimum of nine inches into the concrete. Anchor bolt positioning is critical for tower body mounting.

1. Immediately submerge the anchor bolts into the concrete pier after pouring the concrete.

2. Use the template provided in the hardware kit to position the anchor bolts at the correct height and in the proper locations.

3. Install the four anchor bolts so that they extend at least three inches above the top surface of the pier



EBLP Tower Mounting Needs and Process

Tower Mounting

- Thread the ³/₄-inch hex nuts onto the anchor bolts until the tops of the nuts are 1-1/8 to 1-3/8 inches above the top of the pier. Verify that they are level. Place one washer over each nut (see Figure 6).
- Place the tower on top of the four level hex nuts with washers. Verify that a ¼-inch minimum air gap exists between the base of the tower and the top of the concrete pier (see Figure 7). This air gap must not be obstructed with soil, mulch, stone, etc. Failure to maintain this air gap will cause moisture entrapment that will result in corrosion.



Figure 6. Exploded View

 Entering through the rear access panel cutout, place the four remaining washers on the anchor bolts and secure with the ³/₄-inch hex nuts. Tighten the 3/4-inch hex nuts to a torque of 85 lb-ft.



Figure 7. Assembled View



Addendum I

801 Series Mega Snake Tray

Series 454 Universal Snake Tray



Mega Snake Under Tray



Caddy Wire Management Clips



Addendum J

J Hooks w/ clip



J Hooks Wall Mount



J Hooks Beam Clamp





Pathway Slings





45



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Addendum K



Addendum L

Work Station Wall Plate Layout



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Addendum M



Emergency Blue Light Phone (EBLP) Example

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Addendum M

EBLP Stanchion



EBLP Wall Mount



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Addendum N

Ceiling Grid Wireless Access Point



Addendum O

Hard Cap Ceiling Wireless Access Point





Floating Wireless Access Point





Addendum P

Exterior Wireless Access Point



Addendum Q

3M Fire Putty Pad

Hilti Firestop Brick



Hilti Firestop Muffin (Plug)



3M Fire Wool



Hilti Seep Sleeves



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Performance and Warranties Profile for REVConnect® 10GX Systems Certified Installations

Overview:

Belden will provide its authorized PartnerAlliance Networking Installers, for the benefit of their end-users, with both an extended Belden Component Warranty and a Lifetime Application Assurance Program for all Belden Certified Networking Systems installed by the Certified PartnerAlliance Networking Installer.

The extended Belden Component Warranty and the Lifetime Application Assurance Program are offered to the Certified PartnerAlliance Installer by Belden Inc., in accordance with the following terms and conditions.

This Belden Component Warranty and this Lifetime Application Assurance Program apply only to Belden Certified Networking Systems installed by the Certified PartnerAlliance Networking Installer in compliance with the PartnerAlliance Networking Agreement.

A Belden Certified Networking System is a structured cabling system that has been engineered, designed and installed by the Belden Certified PartnerAlliance Networking Installer. The engineering, design and installation of the Belden Certified Networking System must be performed in accordance with all applicable Belden guidelines, practices and other Belden Program Documentation in effect at the time of installation. Belden structured cabling installations that meet these requirements will receive a Certification Registration Number and certification plaque or certificate from Belden and will then be designated as a Belden Certified Networking System, eligible for the extended Belden Component Warranty and Lifetime Application Assurance Program described below.

In order to maintain the validity of the extended Belden Component Warranty and the Lifetime Application Assurance Program, the Belden Certified Networking System must be maintained in accordance with the Belden End-User Guide in effect at the time of installation.

Extended Belden Component Warranty:

Belden warrants that:

- 1. The Belden components installed in the Belden Certified Networking System are covered by a manufacturer's warranty against defects in material and workmanship for a period of twenty-five (25) years from the date of installation at the original installation location.
- 2. The Belden Certified Networking System will meet or exceed the UTP channel transmission requirements specified by:

Category 6A ANSI/TIA-568.2-D and ISO/IEC 11801-1, Class EA

Once an installed Belden passive component has been deemed defective by Belden, Belden shall repair or replace, at Belden's discretion, the defective component. Belden may use refurbished materials in either repair or replacement procedures, and the repaired or replaced component will be warranted for the balance of the original twenty-five-year warranty period, or ninety (90) days, whichever is longer.

The repair or replacement of a defective component under this warranty includes the reasonable costs of labor required to repair or replace the defective component. The decision to repair or replace components, and the selection of labor services to perform the repair or replacement, are at the sole discretion of Belden Inc.

Lifetime Application Assurance Program:

In addition to the extended Belden Component Warranty, Belden also provides a Lifetime Application Assurance Program for all Belden Certified Networking Systems.

Belden's Lifetime Application Assurance Program warrants that the Belden Certified Networking System will be capable of supporting all industry-standard applications during its entire installation life at its original installation location.

Industry-standard applications include:

- All Category 6A and Class E_A applications identified in the current (at time of installation) Belden Program Documentation, and;
- 2. Any Category 6A applications introduced at a future date by recognized standards bodies and user forums that use ANSI/TIA-568.0-D, ANSI/TIA-568.1-D and ANSI/TIA-568.2-D, or Class D, E or E_A in ISO/IEC 11801-1 and 11801-2 channel specifications for cabling.

In the event that the Belden Certified Networking System is unable to support an existing or future industry-standard application as defined above, and such failure can be attributed to a deficiency in the Belden Certified Networking System, Belden will provide, at its expense, reasonable expertise, Belden materials and labor as required to remedy the problem and/or resolve the claim. The decision to repair or replace materials, and the selection of labor services to perform the remedial services, are at the sole discretion of Belden Inc.

Limitations:

Belden Inc. will not be liable for, nor pay for, any loss of use of the Belden Certified Networking System or products; costs of substitute goods, facilities or services; or for any other economic losses or incidental, consequential or exemplary damages.

This extended Belden Component Warranty and Lifetime Application Assurance Program for the Belden Certified Networking System does not cover any deficiencies in the System that result from failure to comply with Belden Design Guides, Program Documentation and installation procedures, as well as ANSI/NECA/BICSI 568-2006, Standard for Installing Commercial Building Telecommunications Cabling. Belden connectivity conforms to requirements of IEC 60603-7 and is interoperable with all connectivity meeting this requirement. This warranty does not cover products not supplied by Belden Inc., including port damage to active equipment.

The following plugs are not covered by this warranty:

- 1. C6PFCU-B24
- 2. CAPFCU-B25
- 3. C5PFCF-B25
- 4. CAPFCF-B25

Belden Inc. shall not be liable for damages or defects resulting from circumstances beyond its control, including, but not limited to, any misuse, abuse, neglect, alternation, unauthorized or improper repairs, acts of God or accidental damage or exposure (including, without limitation, damage by fire, water, paint, chemicals or natural disaster). Repair or replacement of the Belden Certified Networking System by Belden Inc. is your exclusive remedy.

This is the only warranty for the Belden Certified Networking System. There are no other warranties, express or implied, offered by Belden Inc.

PartnerAlliance



Belden REVConnect® 10GX Systems Cabling Solution:

In addition to the extended Belden Component Warranty and Lifetime Application Assurance Program described on the previous page, Belden Certified REVConnect 10GX Systems that conform to the Belden REVConnect 10GX System Channel Configuration are guaranteed to meet or exceed the following performance parameters for the duration of their installed lifetime at the original site of installation. All conditions regarding original design, installation and maintenance for Belden Certified Networking Systems must be met in order to validate these performance parameter guarantees.

Notes:

Values proposed or statements represent guaranteed 10GX channel margin against ANSI/TIA-568.2-D-2018 Category 6A standard.

The margin is the additional headroom (in dB or %) compared to the minimum specified value for Category 6A at each frequency point over the specified frequency range.

The worst-case margin is determined at the frequency where the measured data point is closest to the limit line. The Category 6A limit line equations are used to determine the worst-case margin over the frequency range from 500 MHz to 625 MHz. This margin applies for worst-case short and long channel configurations as defined in ANSI/TIA-568.2-D Annex L. Special consideration to be given with 28AWG patch cords.

Notes:

- 1. In the frequency range of 20 MHz to 500 MHz.
- NEXT and PSNEXT margins can be lower for short channels with more than two connectors using 10GX Shielded Modular Jacks.
- 3. Specified at 500 MHz.

Extended Channel Distance for Application-Specific Requirements

Belden Certified REVConnect 10GX Systems using a

2- to 4-connector topology are guaranteed to meet or exceed the following PoE and data speed performance levels at the extended channel distance shown in the table to the right. All conditions regarding original design, installation and maintenance for Belden Certified Networking Systems must be met in order to validate these performance parameter guarantees at the provided distances.

Belden REVConnect TUGX Systems Performance					
10GX System	10GXW	10GX	S UTP	10GX	F/UTP
Bandwidth	500 MHz 625 MHz				
Data Rate Capacity	10 Gb/s				
Frequency Range	1-500 MHz	1-500 MHz	500-625 MHz	1-500 MHz	500-625 MHz
Parameter	*** Worst-Case Margin ***				
Insertion Loss	3%	8% ¹	8%	3%	-
Return Loss	3 dB	3 dB	3 dB	2 dB	2 dB
NEXT	3.5 dB	5 dB	2 dB	2.5 dB ²	-
PSNEXT	5 dB	6 dB	3 dB	3.5 dB ²	1.5 dB
ACRN	5 dB	9 dB	6 dB	4 dB	-
PSACRN	6.5 dB	10 dB	7.5 dB	5 dB	1.5 dB
ACRF	8 dB	10 dB	8 dB	8 dB	6 dB
PSACRF	10 dB	12 dB	10 dB	10 dB	8 dB
PSANEXT	4 dB	4 dB	4 dB	10 dB	10 dB
PSAACRF	10 dB	12 dB	12 dB	12 dB	12 dB

Extended Reach with Belden REVConnect 10GX Systems						
Channel Reach	PoE	10BASE-T	100BASE-T	1000BASE-T	2.5G/5GBASE-T	10GBASE-T
	15W PoE (Type 1)	185 m (607 ft)	150 m (492 ft)	110 m (361 ft)	106 m (348 ft)	100 m (328 ft)
10675	30W PoE (Type 2)	150 m (492 ft)	150 m (492 ft)	110 m (361 ft)	106 m (348 ft)	100 m (328 ft)
10072	60W PoE (Type 3)	150 m (492 ft)	150 m (492 ft)	110 m (361 ft)	106 m (348 ft)	100 m (328 ft)
	100W PoE (Type 4)	120 m (394 ft)	120 m (394 ft)	110 m (361 ft)	106 m (348 ft)	100 m (328 ft)
	15W PoE (Type 1)	140 m (459 ft)	140 m (459 ft)	100 m (328 ft)	100 m (328 ft)	100 m (328 ft)
10CYW	30W PoE (Type 2)	130 m (426 ft)	130 m (426 ft)	100 m (328 ft)	100 m (328 ft)	100 m (328 ft)
IUUXW	60W PoE (Type 3)	130 m (426 ft)	130 m (426 ft)	100 m (328 ft) ⁻	100 m (328 ft)	100 m (328 ft)
	100W PoE (Type 4)	120 m (394 ft)	120 m (394 ft)	100 m (328 ft)	100 m (328 ft)	100 m (328 ft)

System	Horizontal Cable	Connectivity	Patch Panels	Outlets
REVConnect 10GX UTP Systems	10GXW UTP System Cable 10GXS UTP System Cable 10GX Pre-Term Cable Assemblies commend mixing KeyConnect and MD	10GX REVConnect Modular Jacks and Plugs 10GX KeyConnect Modular Jacks 10GX Modular Jacks (MDVO-style) ¹ 10GX KeyConnect RJ45 Couplers 10GX Pigtails 10GX Patch Cords 10GX REVConnect Wall-Mount System 10GX Traceable Patch Cords	10GX Patch Panels REVConnect, KeyConnect Modular and AngleFlex Patch Panels KeyConnect Front Access Patch Panels Flex Modular Patch Panels (MDVO-style) ¹	KeyConnect Faceplates and Accessories KeyConnect Adapters and Boxes MediaFlex Outlet Systems Multi-User Outlet Box Multimedia Outlet Box Interface Plates (MDVO-style) ¹ MDVO Adapters and Boxes ¹
REVConnect 10GX Shielded System	10GX Shielded System Cable 10GX Shielded Pre-Term Cable Assemblies	10GX Shielded REVConnect Modular Jacks and Plugs 10GX Shielded KeyConnect Modular Jacks 10GX Shielded KeyConnect RJ45 Couplers 10GX Shielded Pigtails 10GX Shielded Patch Cords	KeyConnect Shielded Modular Patch Panels	KeyConnect Faceplates and Accessories KeyConnect Adapters and Boxes MediaFlex Outlet Systems Multi-User Outlet Box



www.belden.com

REVConnect 10GX Warranty Profile | V3_ECOS_BDC_0220_A_AG

Partner Alliar

The ChannelMATE[™] Solution

Campus Wide Program







Now Featuring BELD EN Connectivity!





ChannelMATE[™] Warranty



Mohawk, a progressive manufacturer of UTP Copper, F/UTP Copper, Fiber Optic and Special Application cable products, is an ISO 9001 certified company developing cable products that meet and support TIA, ISO/IEC, ICEA and NEMA standards.

Through an improved sales structure, Mohawk cables are easily combined with connectivity products from Belden, a global leader in signal transmission solutions. With a large network of MACs (Mohawk Accredited Contractors) supporting both brands, customers have access to more products, expanded technical and sales support, and an enhanced 25-year warranty.

"Not only can Mohawk customers more easily select Belden's high-performance connectivity, they can also gain peace of mind under the ChannelMATE warranty that combines Mohawk's cable with our connectivity partners, including the entire breadth of Belden products," says Kristen Poulos, product line manager.

ChannelMATE is offered exclusively through our MAC contractor network to ensure that your system is designed and installed to meet the specified performance requirements of ANSI/TIA-568-C.

Mohawk Accredited Contractors (MAC's)



Carefully planning a cabling system is a time consuming process in which you are choosing numerous components. Think about the "physical layer" of your installation project —the cable component is the foundation of your data transmission. Mohawk offers a wide variety of cable delivering the performance essential to building a solid foundation for expanding data demands.

To ensure your system requirements are maintained, Mohawk offers added protection through the ChannelMATE 25-year extended warranty. This protection is offered when any Mohawk cable, from Backbone to Horizontal, is installed by a MAC Contractor.

- •MAC Contractors are carefully selected and trained to install Mohawk cable and approved connectivity.
- MAC Contractors receive BICSI accredited training conducted by experienced instructors. Topics include Standards and Codes, hands-on termination, testing and troubleshooting.
- Installations by MAC Contractors are performed to current industry standards and fully tested for compliance.
- The MAC training program is backed by Mohawk's comprehensive technical support group providing product information, installation troubleshooting, updates to industry standards and Technical Advisories.

Customize your ChannelMATE Solution with Mohawk cables and Belden connectivity products from the tables below.

Category 6A/10GX

Description	Part Number
Category 6A Mohawk Cable	
500 MHz GigaLAN-10 CMR	M58650
500 MHz GigaLAN-10 CMP	M58646
10GX Belden KeyConnect Modular	Jacks
Gray	AX102280
Almond	AX102281
Electrical White	AX102282
Black	AX102283
lvory	AX103073
Orange	AX104152
Red	AX104153
Yellow	AX104154
Green	AX104155
Blue	AX104156
Purple	AX104157
Orange, TIA 606	AX102284
Red, TIA 606	AX102285
Yellow, TIA 606	AX102286
Green, TIA 606	AX102287
Blue, TIA 606	AX102288
Purple, TIA 606	AX102289
10GX Belden KeyConnect Patch Pa	inels
24-Port, 1U, Titanium (Preloaded)	AX103254
48-port, 2U, Titanium (Preloaded)	AX103256
48-Port, 1U, Titanium (Preloaded)	AX103264

Category 6-6E/CAT6+

Description	Part Number
Category 6-6E Mohawk Cable	
250 MHz 6LAN CMR	M58292
250 MHz 6LAN CMP	M58281
350 MHz AdvanceNet CMR	M57202
350 MHz AdvanceNet CMP	M57193
500 MHz GigaLAN CMR	M57419
500 MHz GigaLAN CMP	M57414
CAT6+ Belden KeyConnect Modula	r Jacks
Gray	AX101318
Almond	AX101319
Electrical White	AX101320
Black	AX101321
lvory	AX103079
Orange	AX104189
Red	AX104190
Yellow	AX104191
Green	AX104192
Blue	AX104193
Purple	AX104194
Orange, TIA 606	AX101322
Red, TIA 606	AX101323
Yellow, TIA 606	AX101324
Green, TIA 606	AX101325
Blue, TIA 606	AX101326
Purple, TIA 606	AX101327
CAT6+ Belden KeyConnect Patch P	anels
24-Port, 1U, Black (Preloaded)	AX103253
48-Port, 2U, Black (Preloaded)	AX103255
48-Port, 1U, Black (Preloaded)	AX103263

Category 5E/CAT5E	
Description	Part Number
Category 5E Mohawk Cable	
100 MHz 5eLAN CMR	M57553
100 MHz 5eLAN CMP	M57546
250 MHz MegaLAN CMR	M56167
250 MHz MegaLAN CMP	M56168
CAT5E Belden KeyConnect Modula	r Jacks
Gray	AX101307
Almond	AX101308
Electrical White	AX101309
Black	AX101310
lvory	AX103079
Orange	AX104182
Red	AX104183
Yellow	AX104184
Green	AX104185
Blue	AX104186
Purple	AX104187
Orange, TIA 606	AX101311
Red, TIA 606	AX101312
Yellow, TIA 606	AX101313
Green, TIA 606	AX101314
Blue, TIA 606	AX101315
Purple, TIA 606	AX101316
CAT5E Belden HD Patch Panels	
24-Port, 1U, Black (Preloaded)	AX103258
48-Port, 2U, Black (Preloaded)	AX103259
48-Port, 1U, Black (Preloaded)	AX103262

ChannelMATE Protection



Mohawk's ChannelMATE warranty offers the confidence that your link and channel installation will continue to operate for years to come.

Along with expert installation performed by Mohawk's MAC Contractor base, you also have the assurance of end-to-end protection backed by Mohawk's ChannelMATE 25-year warranty. This extensive warranty offers guaranteed standards-based performance for Mohawk cable and your choice of connectivity components.

ChannelMATE 25-year warranty coverage ensures your cable installation and connectivity components:

- Are free from defects in materials and workmanship.
- Meet or exceed the applicable mandatory permanent link or channel electrical or optical performance requirements of ANSI/TIA-568-C.

This **"Campus Wide**" warranty protection encompasses Mohawk's extensive cable products and your chosen connectivity. This includes Horizontal 4-Pair UTP and F/UTP cable and connectivity, Backbone copper high pair count cable and connectivity, fiber cable and connectivity, and coax cable and connectivity.

The above is a summary of certain aspects of the ChannelMATE warranty. For complete terms and conditions, please visit **www.mohawk-cable.com** or call us at 800-422-9961.



Mohawk's ChannelMATE Campus Wide enterprise solution warranty protection.





- Finance Department network connections, VOIP PoE 4-Pair Cat 5e, Cat 6 and Cat 6A
- 2 Training Facility network connections, VOIP PoE 4-Pair Cat 5e, Cat 6 and Cat 6A
- Cubicles with network connections, VOIP PoE 4-Pair Cat 5e, Cat 6 and Cat 6A
- Lunch / Break room with Flat Panel LCD display, Wireless access points and broadband video with 4-Pair Cat 5e, Cat 6 and Cat 6A, RG6 or RG11 Coax
- Equipment / Telecommunications room of SAN; file servers; and distribution of voice data video – Fiber Backbone Laser Optimized 50 micron OM3 and OM4 Multi Mode and Interconnections; Copper Multi-pair Cat 3 and Cat 5e
- (3) Entrance, visitor information and directions, information kiosk, calendar of activities network connections, VOIP PoE - 4-Pair Cat 5e, Cat 6 and Cat 6A; 4-Pair Low Skew video cable

- Card Key entry to non-public areas 4-Pair Cat 5e and Cat 6
- (3) Customer Service network connections, VOIP PoE 4-Pair Cat 5e, Cat 6 and Cat 6A
- O Human Resources with secure data base network connections, VOIP PoE - 4-Pair Cat 5e, Cat 6 and Cat 6A
- Executive offices network connections, VOIP PoE 4-Pair Cat 5e, Cat 6 and Cat 6A
- Conference room Audio Video conferencing network connections, VOIP PoE - 4-Pair Cat 5e, Cat 6 and Cat 6A
- Plat Panel LCD display for broadband video with 4-Pair Cat 5e, Cat 6 and Cat 6A, RG6 or RG11 Coax
- BoE Wireless Access Points Cat 5e and Cat 6
- Campus Backbone Fiber Laser Optimized 50 micron OM3 and OM4 Multi Mode, and or Single Mode



Belden-Mohawk	Description
	IACKS
REVConnect	C5E, UTP
RV5MJKUBK-B24	C5E, UTP jack, black, (24 bulk pack)
RV5MJKUTN-B24	C5E, UTP jack, Gold/TIA brown, (24 bulk pack)
RV5MJKUAL-B24	C5E, UTP Jack, Office white, (24 bulk pack)
RV5MJKUEW-B24	C5E, UTP Jack, electrical white, (24 bulk pack)
	C6A, UTP
RVAMJKUBK-B24	C6A, UTP jack, black, (24 bulk pack)
RVAMJKUTN-B24	C6A, UTP jack, Gold/TIA brown, (24 bulk pack)
RVAMJKUEW-B24	C6A, UTP Jack, Office white, (24 bulk pack)
	SHIELDED JACKS
RV5MJKSME-B24	C5E, Shielded jack, (24 bulk pack), Hubbell is ordered in either A or B wiring
RVAMJKSME-B24	C6A shielded jack, (24 bulk pack)
	MOD-PLUGS FOR DIRECT CONNECT
RVAFPUBK-B24	C6A, Direct connect mod plug, UTP, 24 pack
RVAFPSME-B24	C6A, Direct connect mod plug, Shielded, 24 pack
Belden PN	FACEPLATES
	FRONT LOADING WALL PLATES
AX106670	1 gang, front loading faceplate bezel, squared edges, Office white/almond, standard ID window .
AX106674	2 gang, front loading faceplate bezel, squared edges, Office white/almond, standard ID windows.
AX101746	1 gang plates, MedaFlex, rounded edges almond, Larger ID window.
AX101870	2 gang plates, MediaFlex, rounded edges, almond, Larger ID window.
AX101773	Extra clear windows for MediaFlex larger ID windows (25 pack)
AX102410	2 port, riat jack insert, almond, (1/3 plate fill), 10 pack
AX102412	
AX101762	2 Unit blank insert. 1/3 blank, almond, (10 pack) front loading blank, (fills 1/3 of the plate)
AX101758	1 Unit blank insert, 1/6 blank, almond, 10 pack, (fills 1/6 of the plate)
AX107531	UCF logo blank, 1/3 fill, almond, (with UCF specified UCF IT LOGO)
AX405252 AI	1 part bicquit surface mount box. Office white/almond
AX105352-AL	2 port biscuit surface mount box. Office white/almond
AX105355-AL	4 port biscuit surface mount box. Office white/almond
AX105355-AL	6 port biscuit surface mount box. Office white/almond
, strobood / 12	
	FACEPLATE FEED THROUGH INSERTS AND BLANKS
AX102903	F-connector feed through (bag of 10)
AX102261	1 port, blank, Office white/almond, (bag of 10)
Belden-Mohawk	Description
Item Number	Description

	PATCH PANELS		
	UTP, UNLOADED PATCH PANEL		
AX108321	12 port, unloaded patch panel, 89D bracket wall mount style		
AX103114	24 port, 1U, unloaded patch panel, no label ID windows		
AX103115	48 port, 2U, unloaded patch panel, no label ID windows		
AX103121	48 port, 1U, <i>high density</i> , patch panel, no label ID windows		
	UTP, UNLOADED REVCONNECT PATCH PANEL		
	(These are recommended patch panels for new designs)		
RVMPPF1U24BK	24 port, UNLOADED, REVConnect patch panel, with label ID windows, FRONT AND REAR LOADABLE		
RVMPPF2U48BK	48 port, UNLOADED, REVConnect patch panel, with label ID windows, FRONT AND REAR LOADABLE		
	SHIELDED, UNLOADED PATCH PANEL		
AX104563	24 port, unloaded, shielded patch panel		
AX104564	48 port, unloaded, shielded patch panel		
Belden PN	PATCH CORDS		
	C5E, UTP		
C501104002	2' C5E, patch cord, yellow		
C501104004	4' C5E, patch cord, yellow		
C501104007	7' C5E, patch cord, yellow		
C501104010	10' C5E, patch cord, yellow		
C501104015	15' C5E, patch cord, yellow		
	C5E STP		
C5F1106002	2' C5E, patch cord, black, shielded		
C5F1106004	4' C5E, patch cord, black, shielded		
C5F1106007	7' C5E, patch cord, black, shielded		
C5F1106010	10' C5E, patch cord, black, shielded		
C5F1106015	15' C5E, patch cord, black, shielded		
	C6A, UTP, 28AWG, SMALL DIAMETER		
CAD1104002	2', C6A Small diameter patch cords, yellow		
CAD1104004	4', C6A small diameter patch cords, yellow		
CAD1104007	7', C6A small diameter patch cords, yellow		
CAD1104010	10', C6A small diameter patch cords, yellow		
CAD1104015	15', C6A small diameter patch cords, yellow		
	C6A, STP		
CAF1100002	2' C6A shielded patch cords, black		
CAF1100004	4' C6A shielded patch cords, black		
CAF1100007	7' C6A shielded patch cords, black		
CAF1100010	10' C6A shielded patch cords, black		
CAF1100015	15' C6A shielded patch cords, black		
Boldon Mehawk			
Item Number	Description		
Belden/Mohawk PN	PLENUM CABLE		
	CATEGORY 5E UNSHIELDED CABLE		

M56093B	Mohawk MegaLAN C5E plenum, UTP yellow jacket		
1213 004U1000	Belden C5E plenum, UTP yellow jacket		
	CATEGORY 5E SHIELDED		
M57366	Mohawk C5E, plenum shielded, black jacket		
1533P 0101000	Belden C5E, plenum shielded, black jacket		
	CATEGORY 6A, UTP		
M59148RB	Category 6A, UTP, Small diameter, plenum, .265 OD, Mohawk, yellow jacket, reel in a box		
	CATEGORY 6A, SHIELDED		
M58892	Mohawk, Cat 6A, shielded plenum, black jacket		
10GX53F	Belden, Cat 6A, shielded plenum, black jacket		
	4K, TWISTED PAIR, ULTRA-HD, AV CABLE, SHIELDED		
2183P	Belden, 4K/HDBase-T, Ultra High definition cable, (for ultra high end AV applications including 4K)		
	PLENUM ACCESS CONTROL CABLE		
658AMJ 0061001	Access Control Cable, 3-22 awg, 4-18 awg, 4-22 awg and 2-22 awg, overall jacket		
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PN	Description	Notes
FSE-5U-01-F	Fiber Splice Enclosure, 5U	
FSE-MFS-12-01-E	Ribbon Splice Tray, 144F	
RIC3-E-24-01	Fiber, Enclosure, RIC, Rack Mount, 2U, Sliding Access, 4 Openings, Black, Expanded	
RIC3-E-36-01	Fiber, Enclosure, RIC, Rack Mount, 2U, Sliding Access, 6 Openings, Black, Expanded	
RIC3-72-01	Fiber, Enclosure, RIC, Rack Mount, 4U, Sliding Access, 12 Openings, Black	
TRAY-4-R-MFS	Splice Tray, Mass or Ribbon, 6 Splices	
FSM-12-LSSM-03	SM LC Shuttered Fiber Splice Module, Ribbon, 3m, Side A	
FSM-12-LSSM-03B	SM LC Shuttered Fiber Splice Module, Ribbon, 3m, Side B	
FSM-12-LSSM-04	SM LC Shuttered Fiber Splice Module, Ribbon, 4m, Side A	
FSM-12-LSSM-04B	SM LC Shuttered Fiber Splice Module, Ribbon, 4m, Side B	
RIC-F-BLNK-01	Blank Adapter Plate	
9BRBP0072AE305A	SM ISP Ribbon Fiber, 72F, OFNP	
9PRBF0072AE301A	SM OSP Ribbon Fiber, 72F, MDPE	
9PRBF0144AE301A	SM OSP Ribbon Fiber, 144F, MDPE	
FBK-A01	12-288F Central Tube, Non-Armored, Ribbon Cable Breakout Kit	
HT-MFS	Ribbon Heat Shrink Sleeve	

Approved Fiber Optic Cable and Components