

27 13 00 Communications Riser Cabling

(Revision date: 4/27/12)

1.0 Purpose

- A. These guidelines provide requirements for designers to incorporate into bid documents. They are part of the University Wiring Standard (UWS), version 3.0.

2.0 General Requirements

- A. Riser Cabling. Riser cables will interconnect the BDF and all IDFs within a campus building. Cable types installed will be UTP copper (for analog voice connections), and fiber optic (for data network distribution). All riser cables will be installed in a star topology originating at the BDF.

3.0 Materials and Standards

- A. Materials. The materials used for this system are to be manufacturer and part number specific with no substitutions, unless specified as accepting "or equal." See Section 27 06 00 Schedules for Communications Systems for a list of materials acceptable for use in NC State University projects.
- B. Construction details. Detail drawings describing riser cable termination are available for download by designers at the NCSU ComTech website.
- C. Standards. All work shall also be in accordance with the latest versions of the BICSI TDMM manual and TIA-568 standard, and with manufacturer's recommendations.
- D. Voice riser cabling. Telephone services are provided to building occupants using three methods: VoIP via the campus data network, Centrex lines from AT&T, and analog gateways. These analog gateways convert dial tone from VoIP to POTS lines at the BDF. Voice riser cables are required to distribute dial tone from the analog gateways to each IDF.
 - 1. Sizing. All voice riser cables shall be 25-pr. UTP voice grade cables. Each IDF should be equipped with at least one 25-pr. cable. Additional cables should be installed as required. The quantities of cables run to each IDF should be based on providing one riser pair for each outlet in the zone served by that IDF. The number of cables may be reduced to IDFs where the number of telephone lines needed is expected to be low.
 - 2. Termination. Terminations shall be completed per manufacturer specification and as follows: Voice riser cables will be terminated on 24-port RJ-45 patch panels with 110-type blocks on rear of panel. One pair will be terminated on the 110-type block for each RJ45 jack using the standard telco color scheme. Pairs 1-24 will be terminated with pair 25 cut back neatly. In the IDF, the first 25 pair cable will be terminated in the upper-most patch panel in the IDF rack. Subsequent cables will be terminated in additional patch panels below. In the BDF, the 25 pair cables to the first IDF will be terminated in the upper-most patch panels in the BDF rack with cables to other IDFs terminated in additional patch panels below. In flush mounted cabinets, the voice riser cable will be terminated with two pairs per jack. The upper row of six jacks will be used for pairs 1-12 with pairs 13-24 terminated on the second row of six jack.

- E. Fiber optic riser cabling. Multi-mode fiber optic riser cables are primarily used to interconnect data network electronics. Single-mode fiber optic riser cables are used typically for speciality applications (i.e. inter-building connectivity).
1. Sizing. The multi-mode fiber optic riser system between the BDF and each IDF will typically consist of two 12-strand OM3 cables. Additional 12-strand cables may be installed as required. For single rack IDFs, one 12-strand cable will be installed. For surface and flush mounted cabinet IDFs, one 6-strand cable will be installed. The single-mode fiber optic riser system between the BDF and each IDF will consist of one 12-strand cable. For surface and flush mounted cabinet IDFs, one 6-strand cable will be installed.
 2. Terminations. Terminations shall be completed per manufacturer specification and as follows: Strands shall be terminated (using mechanical termination) with LC type connectors suited for the cable type (single or multi-mode). Only 12-connector panels will be installed.
 3. Multi-Rack IDF Terminations. One 2RU housing will be installed solely for riser cable terminations. This housing will contain a maximum of four connector panels installed with colored square icons facing down. The upper left and lower left connector panels will be used to terminate one 12-strand multi-mode cable each. The upper right connector panel will be used to terminate the 12-strand single-mode cable. The lower right connector panel will be used to terminate an additional multi-mode cable, if required. In each connector panel, strand F1 will be terminated (using mechanical termination) on the bottom half of the left-most duplex adapter. Strand F2 will be terminated in the top half of that same adapter. Strands F3 and F4 will be terminated in second adapter similarly. The above pattern will be repeated to complete termination of all strands in the cable.
 4. Single Rack IDF Terminations. One 2RU housing will be installed solely for riser cable terminations. This housing will contain a maximum of four connector panels installed with colored square icons facing down. The upper left connector panel will be used to terminate the 12-strand multi-mode cable. The upper right connector panel will be used to terminate the 12-strand single-mode cable. In each connector panel, strand F1 will be terminated (using mechanical termination) on the bottom half of the left-most duplex adapter. Strand F2 will be terminated in the top half of that same adapter. Strands F3 and F4 will be terminated in second adapter similarly. The above pattern will be repeated to complete termination of all strands in the cable.
 5. Surface Mounted Cabinet IDF Terminations. One 1RU housing will be installed solely for riser cable terminations. This housing will contain a maximum of two connector panels installed with colored square icons facing down. The left connector panel will be used to terminate the 6-strand multi-mode cable with the right connector panel used for the 6-strand single-mode cable. In each connector panel, strand F1 will be terminated (using mechanical termination) on the bottom half of the left-most duplex adapter. Strand F2 will be terminated in the top half of that same adapter. Strands F3 and F4 will be terminated in second adapter similarly. The above pattern will be repeated to complete termination of all strands in both cables, leaving the right half of each panel available for growth (riser).
 6. Flush Mounted Cabinet IDF Terminations. Both the 6-strand multi-mode and the 6-strand single-mode cables will be terminated using duplex LC QuickPort jacks installed in the lower right 12-port bracket. See detail drawing for layout.

7. Multi-Rack BDF Terminations. One 4RU housing will be installed for riser cable terminations. If needed, a second 4RU housing will be installed above the first for additional riser cables. These housings will contain a maximum of 12 connector panels each, installed with colored square icons facing left. For each IDF served, the multi-mode cables will be terminated in the first available connector panels, and their corresponding single-mode cable in the next available connector panel. In each connector panel, strand F1 will be terminated (using mechanical termination) on the left half of the top duplex adapter. Strand F2 will be terminated in the right half of that same adapter. Strands F3 and F4 will be terminated in second adapter similarly. The above pattern will be repeated to complete termination of all strands in each cable.
 8. Single Rack BDF Terminations. Single rack BDFs will not be used to support IDFs so no riser cables will be installed.
 9. Cabinet Mount BDF Terminations. Cabinet Mount BDFs will not be used to support IDFs so no riser cables will be installed.
- F. Cable installation/routing. The riser cabling system will consist of non-plenum cables installed in a completely enclosed pathway system consisting of a series of EMT conduits (typically 4") interlinking the BDF and IDFs. In the 4" riser conduits, plastic flexible innerduct (1" diameter) shall be installed to isolate fiber optic cables from other cables. Multiple fiber optic cables may be installed in the same innerduct. In the 2" riser conduits, no innerduct will be installed.

Route voice riser cables from entry point into BDF/IDF to nearest ladder rack. Fasten cables to overhead ladder racks to reach equipment racks where cables are to be terminated. Install an additional 10ft. cable slack loop in the cable run, and fasten to overhead ladder racks. Route cables neatly, parallel to each other, and secure with white velcro-type cable wraps to the ladder rack.

Route innerducts containing fiber optic cables from entry point into BDF/IDF to nearest ladder rack. Fasten innerducts to overhead ladder racks to reach equipment racks where cables are to be terminated. Install an additional 10ft. (minimum) cable slack loop in the innerduct runs and fasten to overhead ladder racks, securing with plastic cable ties (ty-raps). Install innerducts down from ladder rack and attach to rear of the vertical management D-rings with plastic cable ties. Stop innerduct run just above the uppermost fiber housing in the equipment rack, and extend fiber cable into the housing for termination. Use velcro-type cable wraps as required to neatly secure fiber optic cables once they exit innerduct.

- G. Firestopping. Firestopping material shall be installed inside all riser conduits after installation of the cabling is completed to form smoke barriers. Malleable foam-type bricks which can be cut to fit should be used. Putty or mineral wool should not be used. Slots or holes should be cut to allow the bricks to form tightly around cables.