**27 11 19 BDF/IDF Termination Hardware**

(Revision date: 4/27/12)

**1.0 Purpose**

1. These guidelines provide requirements for designers to incorporate into bid documents. They are part of the University Wiring Standard (UWS), version 3.0.
2. **General Requirements**
3. Telecom rooms. An appropriate number of telecom rooms will be located throughout campus buildings. These rooms will serve as termination points for horizontal, riser, and entrance telecommunications cabling. They will also house network electronics and associated equipment to support all communications services for the building occupants. Each will serve as a hub for a specific geographic service zone for horizontal cabling originating from that room. The main telecom room will serve as the building entrance for incoming cabling as well as support its service zone. These rooms will be known as Building Distribution Frame (BDF) rooms. Satellite telecom rooms will be known as Intermediate Distribution Frame (IDF) rooms.
4. Hardware. Each BDF and IDF will equipped with a series of hardware to facilitate termination of and access to all communications cabling.

**3.0 Materials and Standards**

1. 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.
2. Construction details. Detail drawings describing various BDF/IDF termination hardware layouts (including all rack elevation details) are available for download and modification by designers at the NCSU ComTech website.
3. 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.
4. Rack views. The designer should also include an elevation (front) view of each equipment rack denoting the equipment to be installed, pertinent termination and numbering information, and labeling instructions.
5. Horizontal cross-connect racks. The termination of all horizontal cables (except voice special use lines) is performed on cross-connect panels located in one or more equipment racks in each BDF/IDF. Only horizontal cabling termination equipment is housed in these racks. Racks are categorized based on the number of standard outlets to be terminated: “192-outlet rack”, “144-outlet rack”, “96-outlet rack”, “48-outlet rack”, and “24-outlet rack”. Racks for a particular BDF/IDF should be specified to accommodate the number of telecom outlets in its service zone plus a minimum of 20% growth.
6. Electronics rack. “Electronics racks” should be used to house data network electronics, power strips, and UPSs.
7. Rack pairs. Each “192-outlet rack” and “144-outlet rack” should be paired with an “electronics rack” installed adjacent to it. Generally, network switch ports in the electronics rack will be patched to horizontal cable terminations in its paired rack. In the “96-outlet rack”, “48-outlet rack” and “24-outlet rack”, the network switches may be installed within those racks or in the “IDF rack” or “BDF rack” (without the need for a separate “electronics rack”).
8. IDF rack. Each IDF will also be equipped with an “IDF rack”. This rack houses: voice and fiber optic riser cable termination panels, power strips, and UPSs. It also may house network electronics.
9. BDF rack. The BDF will also be equipped a “BDF rack”. This rack houses: voice and fiber optic riser cable termination panels, fiber optic entrance cable termination panel, voice analog gateways and associated panels, power strips, and UPSs. It also may contain a limited amount of network electronics, typically building entrance switches.
10. Multi-rack BDF and IDF layouts. Most BDF/IDFs will require multiple racks to support the equipment and horizontal cabling for its service zone. The equipment in each rack should be installed as follows (beginning at the top of the rack and working downward). Unless noted otherwise, no space should be left between installed equipment. Refer to rack detail drawings for additional information.
	1. “192-outlet racks”. Install: 1RU top transition tray, 72-port patch panel (for outlets 1-24), 3RU horizontal cable manager, 72-port patch panel (for outlets 25-48), 3RU horizontal cable manager, 72-port patch panel (for outlets 49-72), 3RU horizontal cable manager, 72-port patch panel (for outlets 73-96), 3RU horizontal cable manager, 72-port patch panel (for outlets 97-120), 3RU horizontal cable manager, 72-port patch panel (for outlets 121-144), 3RU horizontal cable manager, 72-port patch panel (for outlets 145-168), 3RU horizontal cable manager, 72-port patch panel (for outlets 169-192), 3RU horizontal cable manager, 2RU fiber connector housing for horizontal fiber, and 2RU lower transition tray.
	2. “144-outlet racks”. Install: 1RU top transition tray, 72-port patch panel (for outlets 1-24), 3RU horizontal cable manager, 72-port patch panel (for outlets 25-48), 3RU horizontal cable manager, 72-port patch panel (for outlets 49-72), 3RU horizontal cable manager, 72-port patch panel (for outlets 73-96), 3RU horizontal cable manager, 72-port patch panel (for outlets 97-120), 3RU horizontal cable manager, 72-port patch panel (for outlets 121-144), and 3RU horizontal cable manager. Leave 8RU of empty rack space for future patch panels for outlets 145-192. Install: optional 72 port panel for video F connectors, 2RU fiber connector housing for horizontal fiber, and 2RU lower transition tray.
	3. “96-outlet racks”. Install: 1RU top transition tray, 72-port patch panel (for outlets 1-24), 3RU horizontal cable manager, 72-port patch panel (for outlets 25-48), 3RU horizontal cable manager, 72-port patch panel (for outlets 49-72), 3RU horizontal cable manager, 72-port patch panel (for outlets 73-96), and 3RU horizontal cable manager. Leave 18RU of empty rack space for future patch panels for outlets 97-144 and network electronics (by NCSU). Install: optional 72 port panel for video F connectors, 2RU fiber connector housing for horizontal fiber, and 2RU lower transition tray.
	4. “48-outlet racks”. Install: 1RU top transition tray, 72-port patch panel (for outlets 1-24), 3RU horizontal cable manager, 72-port patch panel (for outlets 25-48), and 3RU horizontal cable manager. Leave 28RU of empty rack space for future patch panels for outlets 49-96 and network electronics (by NCSU). Install: optional 72 port panel for video F connectors, 2RU fiber connector housing for horizontal fiber, and 2RU lower transition tray.
	5. “24-outlet racks”. Install: 1RU top transition tray, 72-port patch panel (for outlets 1-24), and 3RU horizontal cable manager. Leave 33RU of empty rack space for future patch panel for outlets 25-48 and network electronics (by NCSU). Install: optional 72 port panel for video F connectors, 2RU fiber connector housing for horizontal fiber, and 2RU lower transition tray.
	6. “Electronics racks”. Install: 1RU top transition tray at top of rack and 2RU lower transition tray at bottom of rack.
	7. “IDF racks”. Install: 1RU top transition tray, 1RU horizontal cable manager, 24-port patch panel (for voice riser termination – pairs 1-24), 24-port patch panel (for voice riser termination – pairs 26-47), and 1RU horizontal cable manager. Install additional 1RU horizontal cable managers and 24-port patch panels using the above alternating pattern for voice riser termination as required. Leave empty rack space for network electronics. Install: 2RU fiber connector housing for riser fiber. Leave 4RU of empty rack space for UPS equipment (by NCSU). Install: 2RU lower transition tray.
	8. “BDF racks”. Install: 1RU top transition tray, 1RU horizontal cable manager, 24-port patch panel (for voice riser termination to first IDF – pairs 1-24), 24-port patch panel (for voice riser termination to first IDF – pairs 26-47), and 1RU horizontal cable manager. Install additional 1RU horizontal cable managers and 24-port patch panels using the above alternating pattern for voice riser termination as required. Leave empty rack space for voice analog gateways and network electronics. Install: 4RU fiber connector housing for additional riser fiber if required. Install: 4RU fiber connector housing for entrance and riser fiber. Leave 6RU of empty rack space for UPS equipment (by NCSU). Install: 2RU lower transition tray.
11. Single Rack IDF. For service zones with less than 48 outlets (including 20% growth), a single rack IDF may be adequate. Install: 1RU horizontal cable manager and 24-port patch panel (for voice riser termination – pairs 1-24). Leave 2RU of empty rack space for future 24-port patch panel pairs 26-47 and horizontal cable manager. Install: 72-port patch panel (for outlets 1-24), and 3RU horizontal cable manager. If required, install second 72-port patch panel (for outlets 25-48) and 3RU horizontal cable manager. Leave 25RU of empty rack space for network electronics. Install: 2RU fiber connector housing for riser and horizontal fiber. Leave 2RU of empty rack space for UPS equipment (by NCSU).
12. Single Rack BDF. For buildings with less than 48 (including 20% growth), a small BDF may be adequate. Leave 6RU of empty rack space in the top of the rack for voice analog gateways. Install: Install: 72-port patch panel (for outlets 1-24), and 3RU horizontal cable manager. If required, install second 72-port patch panel (for outlets 25-48) and 3RU horizontal cable manager. Leave 21RU of empty rack space for network electronics. Install: 2RU fiber connector housing for entrance fiber. Leave 2RU of empty rack space for UPS equipment (by NCSU).
13. Surface Mounted Cabinet IDF. For service zones with less than 24 outlets (including 20% growth), a surface mounted cabinet may be adequate. The following equipment will be installed: 24-port patch panel (for voice riser termination – pairs 1-24), 1RU horizontal cable manager , 72-port patch panel, and 2RU horizontal cable manager. Leave 10RU of empthy rack space for network electronics (by NCSU). Install 1RU fiber connector housing for riser and horizontal fiber. Leave 2RU of empty rack space for UPS equipment (by NCSU).
14. Surface Mounted Cabinet BDF. For buildings with less than 24 (including 20% growth) and no IDFs, a surface mounted cabinet may be adequate. Leave 3RU of empty rack space in the top of the cabinet for voice analog gateways (by NCSU). The following equipment will be installed: 72-port patch panel and 2RU horizontal cable manager. Leave 9RU of empty rack space for network electronics (by NCSU). Install 1RU fiber connector housing for riser and horizontal fiber. Leave 2RU of empty rack space for UPS equipment (by NCSU).
15. Flush Mounted Cabinet IDF. For IDFs serving zones with less than 12 outlets (including 20% growth) a set of flush mounted cabinets may be adequate. The upper cabinet will be for termination of voice and fiber riser cables, as well as termination of horizontal cables. The lower cabinet will be for installation of network electronics and UPS (by NCSU). See detail drawing for specific layout.
16. Telephone entrance demarcation. ComTech will have AT&T install a small copper telephone entrance cable and terminal on the wall of the BDF. This will provide dial tone for special use lines and any Centrex telephone lines required for the facility. ComTech will install a half module blue backboard with 66 blocks adjacent the above terminal.

End of Section