

**Western Michigan University – Office of Information Technology & Campus
Planning, Design & Construction**

Design Guidelines for Facilities Construction:

**DESIGN GUIDELINE DG17-10 COMMUNICATIONS ADMINISTRATION:
IDENTIFICATION, LABELING, DOCUMENTATION**

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I. GENERAL

Documentation of the communications system is very important in ensuring the overall quality of the system and assuring long-term value and supportability of the system. Complete and proper labeling is necessary to assist in administering, troubleshooting and maintaining the system.

II. GENERAL DESIGN GUIDELINES

A. Identification and Labeling

At completion, components of the communications system must be clearly and permanently identified by colors, labels, etc., as defined in detail by WMU for some systems and in a rational, acceptable manner for those not defined in detail. WMU has not adopted TIA or BICSI standard identification/labeling systems for most components, as they tend to be complex and incompatible with systems already in use at the University. University component identification

does intend to accomplish most of the same results as standard systems, but with less complexity and formality.

- WMU uses an internally defined, somewhat unique, system for identification within the horizontal distribution system. It is defined in detail below.
- The fiber outlet identification requested by WMU is somewhat simpler than most standards.
- Copper pairs in the backbone system must be labeled with pair numbers defined by WMU in order to be compatible with the current telephone system database.
- WMU has developed a system for identification of wireless access points, defined below.
- Other components may require labeling in various manners as defined below. In cases where no specifics are given, good current practice will normally be acceptable. WMU/OIT should be consulted.

B. Documentation

The primary required documentation required includes test data and as-built system drawings. Both should be submitted in a combination of printed and electronic forms.

- Test data should have summaries and full simple tests submitted in printed form. Large quantities of data, such as the test results for the horizontal cables, may be submitted mainly in electronic form. Drawings should be submitted in both printed and electronic formats. Detailed requirements for different systems are given below.

III. DESIGN REQUIREMENTS

A. Identification and Labeling

Communications distribution rooms (CDRs) have three identifications: room number, IDF number and POP number.

1. Room Identification

a. Room number

- The room number is the official permanent University-assigned room number. The room will be labeled with this number according to general University standards.
- OIT understands that permanent room numbers are to be assigned very early in the project to avoid confusion that has resulted as room numbers change during the project. Where standards in communications systems call for use of the room number as part of

component identification, such identifications will not be completed until permanent room numbers are assigned. Any identification that cannot use permanent room numbers will be clearly indicated as temporary.

- OIT prefers that room identification plates visible to the general public NOT indicate that the room is a communications space for security purposes.

b. IDF Identity

- The current OIT communications database uses IDF (intermediate distribution frame) identifications as a key piece of data in the cable plant system.
- All rooms with outside or riser copper pairs present will be given IDF identifications. WMU OIT will be responsible for assigning IDF identities for CDRs and supplying them to the contractor. The assigned IDF designation will be displayed in the CDR on the sidewall opposite the face of the rack bay in permanent 2" characters.

c. POP Identity

The WMU data network designates network equipment locations as "points of presence" or POPs in plant databases. Since POPs do not always coincide with IDFs and have a separate identification.

The full POP identification consists of a 3-letter building code "point-concatenated" with a 2-character code for the individual POP. (Example: BLD.1N). The building code will be assigned by OIT. The individual POP codes may be generated by the designers subject to OIT approval. The system used to generate individual POP codes is normally simple:

- The first character designates the floor: B, 1,2, S for sub-basement and G for ground are used where appropriate. (T indicates a location within a service tunnel or crawlspace, hopefully not seen in new projects.)
- The second character for the main POP (BEF) is always P for primary. For subordinate CDRs, the second character for large buildings is generally N, S, E, W, to indicate the general geographic direction from the building center. CDRs near the building central area use the code C. Where CDRs do not readily fall into this system, more creativity is required and OIT should be consulted.

It is highly desirable that CDR codes be assigned early in a project and that contractors and others desiring a short abbreviation for communications closets use them rather than inventing their own, which simply adds to confusion.

The POP 2-character code should be displayed in 2-3" characters placed high on the exposed face of the outer vertical cable manager as early in the project as possible. In any event the code should be posted at this location in permanent characters at the completion of the project.

Other locations, like server rooms, which house network distribution electronics will be assigned POP codes by OIT. This is normally not a factor during construction, but could be in large projects. They generally are given codes that do not fit the system outlined above.

2. *Backbone system*

a. General

The WMU communications backbone plant generally uses relatively simple identification systems and labeling. Use of both is increasing, but requirements are still normally less complex than EIA/TIA standards. The specifications here apply only to the backbone system: outside or inter-building cables and riser cables. The horizontal distribution cables use a different system described in a separate section.

b. Copper Cables

Entry cable Labeling

- Label 110 blocks and each jack with pair number(s). Start with pair 1 and number pairs sequentially. Pairs terminated on two-pair jacks (see 17152) will be at high end of count.
- Label individual jack panels prominently with "T" and a sequence number in pair-count order.
- Label each 25-pair jacket with an identical sequential identification number at each end.

Riser Identification and Labeling

- Label each riser cable bundle with destination CDR at the BEF near point of entry to conduit and near rack termination point.
- Label each 25-pair jacket with an identical sequential identification number at each end.
- Label riser jack termination panels (or appropriate areas of panel) with source/destination room identifiers as defined by owner. (Subdivide panels into no less than 12-jack groups.)
 - Additionally, label each separate riser jack panel as a unit in upper left corner with "R" and a sequence number in logical order for the housing CDR.
- Label each riser jack with assigned pair numbers. Specific pair number ranges will be assigned or agreed to by WMU OIT.

c. Fiber BB Identification and Labeling

- All fiber cabinets will be labeled with bright yellow stickers warning of possible eye damage.
- Riser fiber optic cables will be identified based on their function as links between two points of presence (closets or rooms). Individual fibers will be identified by the fiber number within the cable based on manufacturer color-coding.
 - Termination panels for cables will be labeled with a cable designation as “from” or “to” appropriate CDR. CDRs can be identified by room numbers or POP codes or both. “From” and “to” indication is based on a tree of cables directed to the BEF from outside source buildings and to individual rooms from the BEF within building. Any peer-to-peer cross cables installed will be marked as “to/from” the other space.
- Labels will be permanent, non-smearing and will be applied neatly and logically.

3. *Horizontal system*

a. General

The system required here is WMU specific.

Work area outlet (WAO) jack designations are based on the RJ-panel location of the corresponding jack in the CDR. The full unique identity of each jack is a combination of this with the CDR room number. This is designed to assure identifications carry the needed useful information in minimal text and are as unambiguous as possible for each jack in the system.

Outlets as such have no identity in the WMU system. This is occasionally inconvenient, but has not been enough of a problem to justify the extra layer of data required to support it.

Within individual work area outlets, jacks have different colors. The presence of different colors is intended as a troubleshooting tool for assurance beyond jack ID that the correct jack is being discussed. The colors used are indicative of expected service available from the jack, but services and colors are not required to be linked. Standard color patterns for various types of outlets recommended by WMU OIT are shown on a separate drawing. The expected services for the Panduit color set is listed below.

b. Outlet Labeling

Even though outlets have no individual identity, the WAO outlet faceplate should be labeled with the communications room serving the WAO. This

label should be placed in the outlet's main or top label location for most faceplates. Separate drawings of outlet standards indicate this.

c. Jack identification

Jack Identification and Labeling

- Designer or installer should be responsible for developing jack identities as defined below with guidance from owner. In either case, installer should be responsible for assuring designations are complete and correct and for completing a correct as-built floor layout showing designation for each jack.
- Identification/designation system:
 - Individual jack (circuit) identification is based its location within an alphabetically designated 48-jack termination panel in a CDR as described below.
 - Panels in CDRs will be assigned in alphabetical order from top to bottom, left to right, per room as installed in racks. Where there are less than 800 jacks for the entire building, panel letter assignments will extend through the entire building. Where there are less than 800 jacks for each floor of a building, panel letter assignments will extend across each entire floor. (I.e., Each lettered panel will be unique throughout a floor or building, eliminating any ambiguity where possible.) Where this system cannot be used comfortably, each closet will have panels starting with A and extending as far as necessary.
 - Individual jacks (connections) will be identified using the letter of the panel in which they terminate and the jack number within that panel. (A-1 through A-48 followed by B-1 through B-48, etc.)
- Label each jack at the outlet end with assigned designation using labels appropriate to the faceplate.
- Label each jack panel in CDR with assigned letter in upper left corner. Assure each jack in panel is clearly labeled with sequence number either by permanent markings from time of manufacture or applied labels.
- Apply labels for jacks in accordance with Panduit recommendations.

d. Jack Colors

Jack colors within individual outlets are indicative of the expected use to be made of the jack. However, all horizontal connections are to be wired the same and pass the same tests, so any service may be supplied through any color jack. The expected uses for the Panduit colors are

listed below. These are expectations rather than any form of required standard.

- IW – Off white – jacks for phones and access points. These will be connected to power-over-Ethernet ports by default.
- BU – Blue – jacks planned for computer or other standard data network connections.
- OR – Orange – jacks that are planned as a second data network connection for an outlet already equipped with a blue jack.
- YL - Yellow – jacks that may be used for various uses, including use for current-loop voice service such as FAX machines.
- GR – Green – used for the third data network connection in outlets already equipped with blue and orange.
- EI – Electrical Ivory – used for the fourth data network jack in a single outlet. (This has been a confusion problem with IW and use should be minimized).
- VL – Violet - use not fully defined yet. Available for various purposes.
- RD – Red – use not fully defined yet. Intended for special or emergency services.
- BL – Black – jacks which do not meet Category 6 standards or where it is known the usage device will be non-data. Used mainly for riser jacks. KWP-6 style wall phone jacks are generally black and should be matched.
- IG – Gray – similar to black. Currently used primarily for circuits with only one pair connected, such as at the entry cross-connect.

D. *Wireless system*

1. General

Within the cable system, wireless access points should use regular horizontal outlets that have been placed appropriately (as above ceiling) for an access point. Access points are to be white, since they are powered devices. There is no special wireless system designation associated with the circuit.

Individual access points as units have identities or names that identify them and are programmed into them. These identities include a sequence number within a floor that should be assigned by the designer or installer in conjunction with the required wireless survey.

2. Identification

WMU's internal system for naming of wireless access points is composed of several parts concatenated/separated with dashes:

- A Building abbreviation string assigned by WMU OIT.
- Floor number.
- Unique/sequence number within floor.

- Room number location of the device (nearest door if in hallway).
- One or two channel numbers: 802.11a followed by 802.11g if both are active.
- For example: BLD-2-7-2222-64-1

These name codes should be used to identify access points on completion of the wireless survey. Generation of these codes requires cooperative effort between WMU OIT and the wireless designer.

E. *CATV system*

1. General

WMU's CATV system requires little special labeling. Basic labeling concepts should be followed in most cases: cables should be labeled with source and destinations, etc. WAOs are the primary point where labeling is required for troubleshooting.

2. WAO jack Identification

Video and RF jacks at outlets will be labeled with source tap identification.

- Video connection identifications will use a series of T designations, with each tap unit in a CDR being assigned a sequential number starting at the source cable, followed by a dash and the tap number used (e.g., starting at T1-1 through T1-8 followed by T2-1, etc.)
- Tap cases will be visibly labeled with the T number- black characters approx. ½" high on white label.

B. **Documentation**

The following should be submitted or placed as specified at completion of the project.

1. *Administrative Data Lists*

Spreadsheets per CDR with room numbers, all installed jack identifications, and colors, as a minimum, should be prepared. A binder with two copies of such lists, one sorted by jack and one sorted by room should be placed in each CDR. Electronic copies should be provided to owner.

Spreadsheet list of wireless access points with identification (as above), locations, configuration specifications, serial numbers, and MAC addresses. A sorted paper copy should be placed in the BEF. Electronic copies should be provided to owner.

2. *Test Data*

a. Backbone test data

Test data for riser system should have one printed copy of appropriate data or summaries placed in a binder in the BEF and one copy provided to WMU OIT. All data from tests should be provided in electronic form.

b. Horizontal UTP circuits

Full test data in Agilent format for all horizontal copper connections should be provided to owner on CD. Files should work with current version of Agilent ScopeDataPro (or successor) software on a desktop-level Windows-based computer. One copy of printed summary list of test results sorted by jack should be placed in binder (above) in each CDR. Second printed copy of these lists should be provided to WMU OIT.

3. *Drawings*

a. Backbone Cable Systems

As built drawings showing details of riser and entry cable system with BEF, CDRs, pair counts, pair-number ranges, etc. will be posted in the BEF on accessible clear wall protected by Plexiglas or similar clear covering. One paper copy should be provided to owner, along with electronic version in AutoCAD format.

As-built simplified riser diagrams with the local CDR high lighted will be posted under protective covering in each CDR.

b. Horizontal connections

As-built drawings clearly showing full floor plan of area supported by CDR clearly delineated and showing location and identification of all jacks supported from the CDR will be mounded under clear protective covering in each CDR. One printed copy will be provided to WMU OIT, along with electronic copy in AutoCAD format.

c. Wireless System

As-built drawings showing all access point (AP) locations and coverage areas will be prepared. Separate drawings should be supplied for 802.11a coverage and 802.11g coverage with AP coverage areas color-coded by channel. One drawing per floor is acceptable, unless another format makes the information clearer. A copy of the applicable floor drawings will be posted in the main CDR for each floor and one paper copy of each should be supplied to WMU OIT, along with electronic copies in AutoCAD format.

d. Drawing Format

AutoCAD format copies of floor plans and other relevant drawings should be made available to contractors to aid in their preparation of requested drawings.

Posted Drawings: Drawings will be of a size where relevant data is legible. Protective covers will be secured to plywood or wall with replaceable screws at each corner. Additional screws will be placed along edges which exceed 3'

e. Other

All manuals, included software, unused accessories, etc. supplied with equipment installed under this contract will be turned over to owner on completion.

IV. SPECIFIC REQUIREMENTS

A. Products

1. General Labels

All labels will be good quality, permanent, high contrast, and designed for high legibility. Panduit brand recommended wherever applicable. Fonts will be of adequate size with clear distinction between the following in all cases:

- Number 0 and Letter O.
- Number 1 and letter I.
- Number 2 and letter Z.
- Number 5 and letter S.

2. Cable Labels

- Small inside cables
 - UV-resistant machine-printed labels that wrap completely around cable with clear section overlapping text.
 - Acceptable Manufacturers: Panduit, Brady
- Large inside cables, outside cables, cable bundles
 - UV-resistant self-laminating labels or label holders fastened to cable with permanent cable ties.
 - Acceptable Manufacturers: Panduit, Brady.

3. *Outlet Labels (for use on faceplates and panels)*

Panduit brand labels intended for use with Mini-Com series jacks, faceplates and panels.

4. *Drawing covers*

Drawings posted in CDRs will be covered with clear transparent protective shatterproof coverings of Plexiglas or an equivalent material.

- Coverings for displays of 24"x24" will be at least 1/16" thick.
- Coverings for displays of larger areas will be at least 1/8" thick.

B. Execution

Backbone Exterior Entry Cable

- Cable will have a permanently attached tags with pair number range as indicated by owner at point of entry and all intermediate access locations (vaults, tunnels, etc.).
- Protection blocks will be clearly and permanently labeled with appropriate pair numbers from range assigned by owner.

Labeling of Panduit termination systems will be accomplished in accordance with Panduit recommendations.

END OF SECTION