

Information Management Service Standard Operating Procedure (SOP)			
SUBJECT:	Cable Installation Labeling and Testing		IT-SOP # 07-013
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Prepared by	Signature		Date
Kurt Moore			10/31/2019
Approved by	Signature		Date
Rodney Sagmit, Area Manager			

Cable Installation, Labeling and Testing

1. **Purpose:** To define policy and procedures for the labeling and identification of station drops as it applies to the cabling, face plates and patch panels in the IDFs.
2. **Policy:** The intent of this SOP is to provide documentation of the overall system including access and control.
3. **Responsibility:** Primary responsibility for the system belongs to the Telecom Group, Office of Information and Technology, (OI&T) which reports to Area Manager. Unless specific requirements otherwise dictate, cabling contractors employed to provide new voice and data drops must adhere to this document and will label and identify each station drop accordingly.
4. **Procedures:**

a. System Overview

All cabling installed by the contractor shall be accordance with EIA/TIA 568B, 569 and EIA/TIA 606 Communication System specifications, and Building Industry Consulting Service International (BICSI) Standards design manuals. The complete cable distribution system shall be labeled in accordance with the latest edition/revision level of ANSI/TIA/EIA 606, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings.

The cable interconnecting a network outlet to patch panel shall be one continuous length with no intermediate joins, splices or taps. No more than 24 cables shall be tied in a bunch. Un-terminated “future capacity” cables are not permitted. All installed cables shall be terminated at each end with documentation, labeling and test results provided electronically.

All outside cable shall be shielded, 26 AWG maximum solid conductors, solid PIC insulation, and filled core (flexgel) (waterproof) REA LISTED PE 39 or PE 89 CODE. All voice and data telecommunications outlets (TO) shall be a minimum Category 6A-compliant eight position RJ-45 non-keyed (EIA/TIA 568-C.2-10, TSB-155) for voice

and Category 6A compliant eight position RJ-45 non-keyed (EIA/TIA 568 C.2-10, TSB-155) for data. Cable installed (outside plant, inside riser, and station cabling) shall adhere to the requirements of ICEA Publications S-80-576-1988 (Ref. B1.6) as to size, color code, and insulation. Backbone cables shall be marked at each endpoint and at all intermediate pull/access points or junction boxes. Label shall indicate origination and destination, TR ID, sheath ID and strand or pair range. Horizontal cables shall be marked at each end, on the sheath indicating the TR, patch panel and panel port to which the cable is wired.

VA Long Beach utilizes a Sumitomo Air-Blown fiber backbone. All Closets in Long Beach are connected via a multiple tube cell infrastructure system for transporting the air blown fiber to all IT Communications Closets throughout the Medical Center. Single-mode OS 2 fiber optic 10Gbe and Multi-mode OM4 fiber optic 10Gbe are approval nationwide. However, at VA Long Beach, single-mode OS2 fiber optic is standard for building-to-building connections as well as interconnections between Telecom Closets and the core (in the MDF) in the same building. All fibers shall be home run from the Telecom closet to the core in the Main Distribution Frame (MDF); splicing fibers between Telecom Closets is not allowed. A minimum of 24 strands of fiber require from each Telecom closet to the core in the MDF. Closets in areas with high volume of users may require additional fiber; these locations should be discussed with IT Department for proper design of Closet. Fiber should be terminated with LC connectors at both ends meeting ANSI/TIA/EIA 568-B.3 standard. See appendix A below for more information.

b. Access Control

The Telephone Switch Room/Main Distribution Frame (MDF), the computer room and all Voice and Data Closets (IDFs) are considered major arteries in the Medical Center's network/communication system and therefore access to this system should be treated as such. Access to these areas is controlled and all requests for access must be coordinated with OI&T.

Contractors preparing do work at the VA Long Beach Healthcare System must first complete all the necessary background security requirements as outlined in VA Directive 6500 and the Veterans Affairs Acquisition Regulation (VAAR) Clause 852.273-75-*Security Requirements for Unclassified Information Technology Resources* (Interim October 2008), and all contractors must first complete the Contractors Risk Level Designation Form, VA Form 2280A.

To ensure that appropriate security controls are in place, contractors must follow the procedures set forth in the "VA Information and Information System Security/Privacy Requirements for IT Contracts" located at http://www.iprm.oit.va.gov/Security_and_Privacy_Requirements_for_Contractors.a.sp.

c. Labeling

Labels shall meet the legibility, defacement, exposure and adhesion requirements of UL 969 and shall be preprinted or laser printed type.

Where used for cable marking, provide vinyl substrate with a white printing area and a clear “tail” that self laminates the printed area when wrapped around the cable. If cable jacket is white, provide cable label with printing area that is any other color than white, so that labels are easily distinguishable.

Where insert type labels are used, a clear, plastic cover label shall be provided.

- i. **Faceplates:** All phone and data cable jacks shall be installed color coded; gray, blue, and white, except for wall phones which are addressed separately below. The faceplates and the ports on the patch panels shall be of the same corresponding color: gray-gray, blue-blue, and white-white. The gray jack will be on the top-left hand corner of the faceplate, followed by blue at the top, right-hand corner, with white at the bottom left-hand corner, below the gray. Each faceplate shall incorporate modular, universal RJ45 jack sockets meeting or exceeding the Category 6A specification.

The label on the faceplate shall be readily visible on the top of the faceplate and must contain the building number, the floor, TC for Telecom Closet, (the building floor and TC designates the IDF of origin), the faceplate number be it A, B, C, D with the patch panel id CA, CB and the port number on the patch panel 01, 02, 03 etc.

The first position is the building number, the second position is the floor, the third position is TC for Telecom Closet (if more than one closets are on a floor then the closets must be labeled as TN for North closet, TS for South closet, TE for East closet and TW for West closet). The fourth position is the panel number (CA, CB, CC...) and the fifth and sixth positions are the jack numbers (01 thru 48).

Example: 5-TC-CE-34-35-36

5 = building number

-01 = If a floor is applicable

-TC = Telecom Closet (in this case only one this area)

-CE = Patch Panel ID

-34-34-36 = Port on the patch panel



Figure 1: *Faceplate showing labeling scheme.*

- ii. **Faceplates wall phones:** The wall phones faceplates will consist of a single Category 6A drop, color coded green with the corresponding green RJ45 jack socket.



Figure 2: Faceplate wall phone

- iii. **IDF Patch Panel:** The patch panels in the IDFs shall be marked using adhesive labeling indicating the range of lines installed to it. Each port shall be labeled with the origination and destination with the original strand ID. The patch panels should be labeled as follows:

The first patch panel in the first rack will always start with **CA**; C being used simply to designate Copper and the **A** being the first panel on the first rack. The panels will then be alphabetized accordingly; CA, CB, CC, etc with the CB panel immediately below the CA panel. The first port will be gray, and labeled as 01 followed by blue, and white.

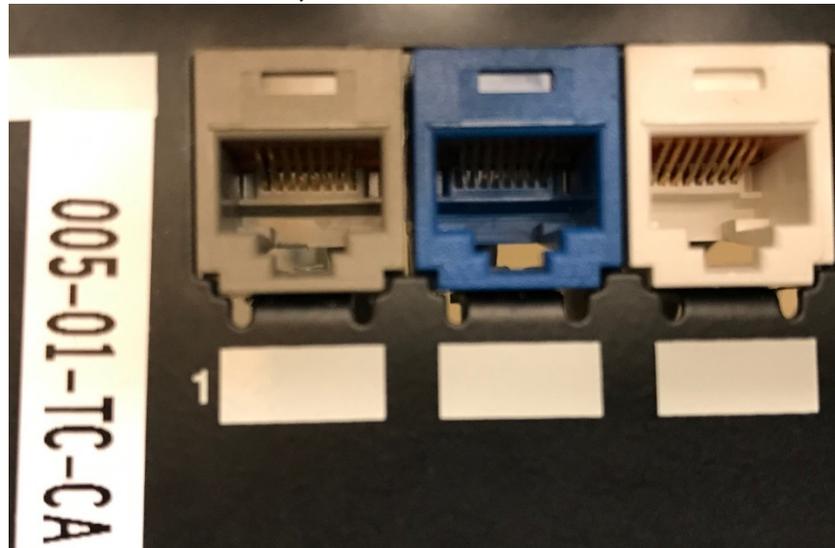


Figure 3: Patch Panel Example

- iv. **Wall phones patch panel:** Cabling for wall phones will be terminated in a dedicated 48-port patch panel unless otherwise specified Patch panel location to be determined with design of the IDF closet. The corresponding ports shall be green.



Figure 4: Wall phone patch panel

- v. **Fiber Label:** fiber label shall be visible outside of the Fiber Termination Unit cover at the Near End as well as at the Far End. Refer to appendix B for detailed explanation.
 - a. Near End Identifier:
 - i. First Line text: Building-Floor-Room Number (or Function Area)-TC or TM-Rack number- fiber type-fiber termination shelf-fiber termination shelf panel-termination shelf panel port-fiber strand count
 - ii. Second Line text: Far-end building-room number (or function area)-TC or TM- Rack number fiber type-fiber termination shelf-fiber termination shelf panel-termination shelf panel port-fiber strand count.
 - b. Far End Identifier
 - i. First Line text: Building-Floor-Room Number (or Function Area)-TC (for Telecom closet) or TM (for MDF)-Rack number- fiber type-fiber termination shelf-fiber termination shelf panel-termination shelf panel port-fiber strand count
 - ii. Second Line Text: Near-end building-room number (or function area)-TC or TM-rack number-fiber type-fiber termination shelf-fiber termination shelf panel-termination shelf panel port-fiber strand count.

5. Testing

- a. Cable performance:** Cable performance must meet the minimum acceptable values as indicated in TIA/EIA 568B.2-1 Category 6A requirements.
- b. Horizontal Copper Cabling:** The contractor shall test all cables and submit all horizontal cable test results data in an electronic format, with the resulting file formatted with one test result per 8.5" x 11" page. Minimal acceptable electronic formats include Microsoft Excel spreadsheet or Microsoft Word document.
- c. High pair copper cables:** The contractor shall test all high-count copper cables and submit test result information in an electronic format. Minimal acceptable electronic formats include Microsoft Excel spreadsheet or Microsoft Word document.
- d. Fiber cables:** The contractor shall test each strand of the fiber cable in according to ANSI/TIA/EIA 568-B.3 and submit test result information in an electronic format. Minimal acceptable electronic formats include Microsoft Excel spreadsheet or Microsoft Word document. The field test equipment shall meet ANSI/TIA/EIA-526-7 standard.
- e. Cut sheet:** The contractor shall provide a cut sheet to include all drops terminated in each IDF to include the cable ID as outlined above, IDF of origin, room of origin, faceplate #, patch panel id and date installed. This cut sheet shall remain in each IDF on 8.5" x 11" page(s) and shall be provided electronically.
- f. Quality Assurance:** All testing procedures shall comply with the applicable requirements of:
 - ANSI/TIA/EIA 568-B.1 Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements
 - ANSI/TIA/EIA 606-A administration Standards
 - ANSI/TIA/EIA 569-A Pathway and Spaces
 - ANSI/TIA/EIA 568-B Telecommunications Cabling Standard
 - ANSI/TIA/EIA 758-A Customer Owned Outside Plant Telecommunications Cabling Standard
 - BICSI Telecommunications Cabling Instruction Manual
 - BICSI Telecommunications Distribution Methods Manual

- 6. Intermediate Distribution Frame (IDF) Requirement:** this room is also called IT Communication Closet. This room provides for central connection point for backbone infrastructure cabling (Telco, T-1, Metro-E, Fiber, Copper Cabling, etc.) and the distribution point (CAT6A cabling) for end user network connectivity. All IT Communication Closets support both telephone and network data access. Refer to appendix A for the IDF requirement information.

7. References:

- ANSI/TIA/EIA 568-B.1 Commercial Building Telecommunications Cabling Standard, Part 1: General Requirements
- ANSI/TIA/EIA 606-A administration Standards
- ANSI/TIA/EIA 569-A Pathway and Spaces
- ANSI/TIA/EIA 568-B Telecommunications Cabling Standard
- ANSI/TIA/EIA 758-A Customer Owned Outside Plant Telecommunications Cabling Standard
- BICSI Telecommunications Cabling Instruction Manual
- BICSI Telecommunications Distribution Methods Manual

8. Review:

This document is scheduled for review annually when there is a change. Notify IT Policy/Planner and IT Project Manager for reissue.

APPENDIX A

LON IT Communication Closet Standards and Requirements

IT Communications Closet or also call Intermediate Distribution Frame (IDF) Closet.

- This room provides for central connection point for backbone infrastructure cabling (Telco, T-1, Metro-E, Fiber, Copper Cabling, etc.) and the distribution point (CAT6A cabling) for end user network connectivity. All IT Communication Closets support both telephone and network data access.
- All phone and data cabling shall be installed by the contractor and shall be accordance with EIA/TIA 568B, 569 and EIA/TIA 606 Communication System specifications, and Building Industry Consulting Service International (BICSI) Standards design manuals. The complete cable distribution system shall be labeled in accordance with the latest edition/revision level of ANSI/TIA/EIA 606, Administration Standard for the Telecommunications Infrastructure of Commercial Buildings. **All IT Network Cabling installation will follow IT SOP 07-013, Cabling Installation, Labeling and Testing.**

Security:

- Must be a secure room with access to authorized IT personnel only. Secure access to communication closet will be controlled and monitored at all times. All new closets will be added to VALBHS Card Access System to meet access requirements to IT Sensitive Areas in accordance with **IT SOP 10-005 Physical and Environmental Protection**. This space is designated only for IT infrastructure and equipment. This space cannot be shared with any other service such as Fire Alarm, Nurse Call System, etc. Access list will be displayed in each IT communication closet with authorized staff. All guests will be signed in on form.
- All walls to the IT Communications Closet will go to the ceiling to prevent intrusion to the room from the hallways or adjacent rooms.

Power:

- IT Communications closets must have a minimum of 3 dedicated 20 amp emergency power outlets and 2 dedicated normal power outlets. Each outlet will be labeled with electrical panel ID and circuit breaker number. This is to provide for easily identifying the circuit for a loss of power instance and restore power as quickly as possible.
- IT Communications Closets must have at minimum 3Kva Uninterruptible Power Supply (UPS) for protection of electronic equipment from power outages, power surges and/or power dips. The size of the UPS must be large enough to: maintain power to equipment during transitions in power from normal utility power to emergency (generator) power and back to normal utility power and to maintain power to network equipment for 20 minutes when no emergency power available.

- The current VA standard Cisco network switches in the IT Communication Closets have dual power supplies. Our standard configuration for power distribution is to have one power supply to be connected to the UPS on Emergency power and the second power supply to be connected to normal power. This configuration will provide network survivability in the instance of one the circuits goes off line.
- Closets must have an isolated ground to prevent damage to critical electronic equipment (VA Network and Telephony Systems) from stray electrical discharge. The isolated ground will be visible on the wall and have a buss bar to for racks and ground from equipment to be connected to isolated ground.

Environmental:

- IT Communications Closets must have adequate environmental controls (cooling and humidity) to maintain temperate in room between 68 to 70 degrees and maintain humidity to acceptable levels (less than 60%) to prevent damage to electronic equipment. Environmental controls should be monitored and provide notification when temperature or humidity go out of programmed specifications

Size and Standard Layout:

- IT Communications closets must be a minimum of **10' X 10'**.
- There will be a minimum of one communications closet per floor.
- Additional communications closets will be required when the distance between a closet and its furthest supported data end-point exceeds 270 feet or approximately 80 meters.
- When a building has multiple floors, closets should be arranged such that the closets are directly above one another. This ensures direct access between closets and also provides for the shortest cable path.
- IT Communications Closet must be equipped with four post racks for equipment such as UPS, network switches, router, telephone equipment, patch panels, etc. There will be a minimum of one four post rack for equipment, one four post rack for patch panels and one four post rack for additional patch panels and/or equipment as needed. The center rack will be designated for equipment to provide for the shortest patch cable requirements from the patch panel to network equipment. The number of racks will depend on the density of the devices/users supported by this closet and should be discussed with IT to determine the number of racks needed for equipment and patch panels. The minimum separation between racks should allow for cabling management systems. The cabling management system should be provided with the four post rack. There will be ladder trays from top of racks to cable/fiber entry into closet. This is to provide a consistent neat path for cable/fiber management.
- At least one wall will have fire rated plywood with rating stamp exposed and on that wall, all patch panels, fiber termination distribution units (TDU), 110-blocks and termination equipment shall be installed.
- Locations of new IT Communication closets will be approved by Long Beach IT Department prior to construction of project.

Fiber and Cabling Standard:

- VALBHS utilizes a Sumitomo air blown fiber backbone. All Closets in Long Beach are connected via a multiple tube cell infrastructure system for transporting the air blown fiber to all IT Communications Closets throughout the Medical Center. Single-mode OS 2 fiber optic 10Gbe and Multi-mode OM4 fiber optic 10Gbe are approval nationwide. However, at VA Long Beach, single-mode OS2 fiber optic is standard for building-to-building connections as well as interconnections between Telecom Closets and the core (in the MDF) in the same building. A minimum of 12 pair single mode fiber for each closet. Closets in areas with high volume of users may require additional fiber; these locations should be discussed with IT Department for proper design of Closet. If additional fiber is required, the available empty tube cell may be used for the new fiber installation. All fiber will transition through the TDU box on wall and be terminated on top of equipment 4 post rack in fiber distribution panel. Fiber will be terminated with LC connectors on both ends.
- Approved data patch panels and telephone termination blocks that meet the standards of the **VA Office of Information & Technology Field Operations, Facility Infrastructure Standards & Improvement (FISI)** and local standards followed at VA Long Beach Healthcare System IT Staff. Data patch panels and telephone termination blocks will be separated as room size and design allows. The minimum separation should allow for cabling management systems.

All network cabling installations will follow Long Beach Standard Operating Procedure, IT SOP# 07-13, Cabling Installation, Labeling and Testing. The Long Beach IT Department will approve all network cabling installations before order or project is placed.

APPENDIX B

Labeling of fiber panels in the IDFs and MDF.

The proper labeling of the fiber panels in the IDFs and MDF is crucial to understanding and troubleshooting our network and as a result, care must be taken in the proper documentation and labeling. The main purpose of the labeling is for us to have the ability to track the fiber from the originating point in the data closet, to its termination point and vice-versa. All labels on the fiber panels will be capitalized, shall be clearly visible and in black ink. Labels shall be two (2) lines of text with the first line having the near end building, room information and rack number and the second line having the far-end building/termination point, room number followed by the fiber type (SM for single mode, MM for multi-mode fiber), fiber termination shelf panel and pair count.

Fiber termination shelves shall be labeled sequentially depending on their location within the rack starting with "A" from the top of rack going downward.

Using this format, each fiber panel that terminates on both ends on panels on campus, will be labeled with a horizontal identifier and should be as follows:

Near End Identifiers:

Near End First Line text: Building-Floor-Room Number (or Function Area)-TC- Rack Number.

Near End Second Line text: Far-End Building-Room Number/Location-Fiber Type-Fiber Termination Shelf- Fiber Termination Shelf Panel- Fiber Termination Shelf Panel Port-Fiber Strand Count.

- **Building:** Two to four, 4 alpha-numeric character identifier. For example, 126 or 126A.
 - Trailers shall be identified as such with a capital T at the end of the building number. Example, 167T, 168T
 - Buildings that are a part of a specific Engineering workspace shall be identified with the building number followed by **ENG** to designate an Engineering workspace, followed by a 3-digit identifier to describe the function of the workspace. For example, **PWR** for power substations. **05B-ENG-PWR**
 - This is the same for areas designated as VA Police's workspace but **POL** (to designated Police) must be used instead of the **ENG**.
 - Buildings that are identified by their function and have no building number will be designated with the name of the building. Example, **FISHER HOUSE**.

- **Floor:** The floor location in the building of the data closet. This is a two to four numeric character identifier with the basement area of any building designated as 00. Example, building 150 basement area will be 150-00.
- **Room Number or Function Area:** The room number is a two to four-digit numeric identifier. The function area is the description of the occupied space in the event there is no room number on the closet door. For example, V1 or T1 to describe areas in building 150.
- **TC:** A two-digit alphabetic identifier that identifies the closet occupied as telecommunications space. This is fixed.
- **Rack Number:** Rack numbers in the IDFS shall be numbered on top, visible to all as you enter the door, starting with the letter **R** for rack. Racks shall be numbered from left to right. The rack number identifier is a two to four-digit alpha-numeric identifier. For example, from left to right, R1, R2, R3 and so on. In the event the equipment is in a cabinet, then the identifier must be changed to a **C**, for cabinet, followed by the cabinet number. Example, C1, C2, C3.
- **Fiber Termination Shelf:** A two-digit alphabetic identifier that starts with **F** for fiber followed the first fiber panel being designated as A, the second B and so on. This shall be labeled sequentially, starting with the top most fiber shelf and going downwards.
- **Fiber Termination Shelf Panel:** A single alphabetic identifier to designate the fiber breakout panel that houses the fiber.
- **Fiber Termination Shelf Panel Port Number:** A two-digit numeric identifier that identifies the port number of the first fiber strand where the fiber is terminated in.
- **Fiber Strand Count:** A two to four-digit alpha-numeric identifier that gives the total number of fiber strands, by pairs, in the fiber termination shelf, panel port. Example C1-E12.

Far End Identifiers:

Far end information shall be identified with the second line of text.

- **Far End Building:** Building number of the termination point of the fiber. A two to four alpha-numeric character identifier.
- **Far End Floor:** The floor location in the building for the terminating fiber. This is a two to four numeric character identifier with the basement area of any building designated as 00.

- **Far End Room Number or Function Area:** The room number is a two to four-digit numeric identifier. The function area is the description of the occupied space with the Main Distribution Frame (MDF) having a special function. The MDF shall be identified by **TM**, meaning Telecommunications Main.
- **Fiber Type:** A two-digit identifier being either **SM** for single-mode fiber or **MM** for multi-mode fiber.
- **Far End Rack Number:** Rack numbers in the MDF are numbered on top, visible to all as you enter the door. **Racks are numbered from right to left.** The rack number identifier is a two to four-digit alphabetic identifier. For example, from right to left, 1, 2, 3 and so on. There are no cabinets in the MDF.
- **Far End Fiber Termination Shelf:** Fiber Termination Shelves in the MDF is a two-digit alphabetic identifier that starts with the letter **F** followed by the first fiber panel being designated as A, the second B and so on.
- **Far End Fiber Termination Shelf Panel Identifier:** A single alphabetic identifier to designate the fiber breakout panel that houses the fiber.
- **Fiber Termination Shelf Panel Port Number:** A two-digit numeric identifier that identifies the port number of the first fiber strand where the fiber is terminated in.
- **Far End Fiber Strand Count:** A two to four-digit alpha-numeric identifier that gives the total number of fiber strands, by pairs, in the fiber termination shelf, panel port.

