

## **IDF/MDF Cable And Configurations**

### **I. SCOPE:**

This Standard Operating Procedure (SOP) outlines the responsibilities of the Information Technology department (IT) for the IDF/MDF Cable and Configurations.

### **II. PROCEDURE:**

#### **A. SYSTEM REQUIREMENTS:**

The purpose is to outline general requirements (ALL MANDATORY) requirements for a fiber optic and copper cabling structured cabling system. The structured cabling system design should be adhered to.

#### **B. GENERAL REQUIREMENTS (ALL MANDATORY):**

Propose a complete Structured Cabling System for the movement of LAN data and voice traffic within the Purchaser's facilities. All current LAN applications must be supported. Design must include a complete and functioning Structured Cabling System including cable routes, interconnect locations, distribution frame locations, building and floor layouts and any other items associated with the Implementation of the complete Structured Cabling System.

Only existing Structured Cabling System equipment, which is in production, shall be bid. Equipment under development or in the planning stage will not be considered. However, in order to indicate strategic direction, contractors may include future plans in a separate section with addendum material.

The Contractor must identify the manufacturer of any and all equipment included in the equal system proposal. This identification must include address, telephone number and contact person. This identification must also include part numbers, descriptions, quantities and itemized prices.

Upon the Purchaser's request, the Contractor must identify and present a local service facility of a duly authorized distributor of the equipment and material manufacturer, which is to stock manufacturer's standard parts for the Structured Cabling System.

All equipment and material shall be new and of the highest quality and reliability.

Structured cabling system components shall be sourced by a single Manufacturer or formally partnered Manufacturers (collectively referred to as the

“Manufacturer”) Products shall not be intermixed between different manufacturers unless the Manufacturer of the chosen communications cabling system has listed (in writing) another manufacturer’s component as an “approved alternative product” (or equivalent wording) and will warrant the “approved alternative product” as part of the Manufacturer’s extended Warranty, or if the product has been specifically called out as a special requirement. Additionally, for a given Manufacturer, all products shall be part of a single product line and the product line shall be specifically engineered “end-to-end” (e.g. the system and all of its components shall have been engineered to function together as a single, continuous transmission path).

At a minimum, the newly installed communications cabling system shall support data network protocols/services at rates up to 1 Gbps for transmission on copper, and 10 Gbps for transmission on fiber. It shall support Ethernet, ATM and other network protocols. The communications cabling system shall additionally support RS-232 and other dedicated point-to-point protocols. It is understood that existing fiber and CAT5 cabling that is re-used may not meet these requirements.

Installation of equipment shall be made by qualified, as well as certified personnel. All installation shall be done in a neat, professional and high quality manner and in conformity with local and federal building and fire codes and the Structured Cabling System requirements. All areas affected by installation, both inside and outside of the buildings, will be restored to their former condition. Contractor is responsible for the cost of all repairs, painting and other restoration needed due to damage caused by the installation.

The successful Contractor shall provide all tools, equipment, test equipment, cleaning material and miscellaneous hardware necessary for the cabling installation. Any equipment and material necessary for proper operation of the Structured Cabling System not specified or described herein shall be deemed as part of the specification.

An inspection of the entire installation shall be made prior to conducting performance and operational tests on the cable. The inspection of the cable shall be of the character and extent as to disclose an unsatisfactory condition, noncompliance in quality and/or code with installation specifications or any other adverse conditions resulting from failure to meet standards or requirements as stated in this specification.

The Contractor shall be responsible for the shipping, handling, and storage of all said material and equipment.

The Contractor shall be responsible for obtaining any necessary licenses, permits or certifications.

Upon completion of the Structured Cabling System testing, the Contractor will provide the Purchaser with a complete record of all testing performed, including any proprietary reading software. The Purchaser reserves the right to randomly test any cabling, both passive and active. If problems are discovered, it is the responsibility of the successful Contractor to make corrections in the time frames outlined within the previous sections.

It is the responsibility of the Contractor to calculate all actual copper and fiber cable footage required.

It will be the responsibility of the Contractor for the removal of all trash and debris from the site at the end of each working day.

Prior to installation, verify the total run length for each horizontal cable from the telecom outlet to its telecommunications room using the raceways (conduits, sleeves, etc.) as installed. For run lengths that exceed 300 feet, including up/down transitions, required cable slack, etc., obtain the direction from the Project Manager prior to proceeding.

The Contractor shall maintain a set of record documents showing all additions, changes, and deletions that have been made throughout the course of construction, as well as reviewed submittal data.

Work shall comply with TIA/EIA Standards and the governing requirements listed in this document.

### **C. STANDARDS**

All design, manufacturing, testing and installation of the network shall follow all applicable NEC, State, and local codes.

The following ANSI/TIA standards shall be followed:

<b>ANSI/TIA-568-C.1</b> -- Commercial Building <i>Telecommunications Cabling Standard, Part 1: General Requirements</i>	<b>ANSI/TIA-568-C.2</b> -- Commercial Building <i>Telecommunications Cabling Standard, Part 2: Balanced Twisted Pair Cabling Components</i>
<b>ANSI/TIA-568-C.3</b> -- Optical Fiber Cabling Components Standard	<b>ANSI/TANSI/TIA-569-B</b> -- Commercial Building Standard for Telecommunications Pathways and Spaces
<b>ANSI/TIA-526-7</b> -- Measurement of Optical Power Loss of Installed Single-Mode Fiber Cable Plant	<b>ANSI/TIA-526-14A</b> -- Measurement of Optical Power Loss of Installed Multimode Fiber Cable Plant
<b>ANSI/TIA-758(A)</b> -- Customer-Owned Outside Plant Telecommunications Cabling Standard	

**D. LABELING**

Shall be in conformance with **ANSI/TIA-606(A)** standards.

Shall be coordinated with Owner’s existing labeling standards.

**E. BONDING AND GROUNDING**

Bonding and grounding shall conform to **J-STD-607-A** standards.

All equipment, racks, housings, cables (where applicable) and raceways must be bonded and grounded.

**F. TERMINATION HARDWARE – TELECOMMUNICATIONS ROOMS**

Horizontal (station) cables will terminate on Category 6 Termination Panels.

1. **CATEGORY 6 – PATCH PANELS**

Performance must meet or exceed ANSI/TIA-568-C.2 Category 6 requirements.

Patch panels must be T568B compatible.

Patch panels shall be mounted either in an Ethernet Distribution Frame (Please see section 12 – Cable Management for Distribution Frame specifications) EIA 19-inch or mounted to the wall utilizing a 19-inch hinged wall mount bracket.

Patch panels must be designed to meet Gigabit Ethernet transmission speeds.

Jacks must support a minimum of 200 re-terminations while maintaining a contact resistance of less than one (1) milliohm.

Insulation Displacement Connection (IDC) contacts must be silver-plated and support the conductor at a 45-degree angle for greater mechanical strength.

IDC must be capable of terminating 22-26 AWG solid or stranded conductors.

Must be UL certified and verified.

## 2. CATEGORY 6 – CONNECTORS

Must meet or exceed ANSI/TIA-568-C.2 Category 6 requirements.

Must be available as individual units, to allow for maximum flexibility.

Must be impedance matched for maximum throughput.

IDC contacts must be silver-plated and support the conductor at a 45-degree angle for reliable gas-tight connections.

If patch panels are modular connectors shall be black in color.

Must be universal T568B wiring.

## 3. CABLE MANAGEMENT

The accepted method of securing the cables is the utilization of reusable hook and loop cable ties, as well as Millie-Ties. Plastic zip-lock tie wraps are not acceptable. If required in open areas outside of MDF/IDF locations, cables will be enclosed in approved power poles or conduit.

## G. COPPER CABLE

### 1. CATEGORY 6 – HORIZONTAL CABLE

Performance must meet or exceed ANSI/TIA-568-C.2 Category 6 requirements.

DATA Cable color shall be agreed upon color and not to exceed 300'.

Cables shall be permitted to be non-plenum (CM/CMR, OFNR) rated in non-plenum spaces as allowed per local Governing Requirements or code. Cable shall bear non-plenum markings.

The Contractor is solely responsible for determining the plenum rating of the environment in which cable is to be installed, and for doing so prior to procurement and installation of cable. Non-plenum cable installed in an environment determined to be plenum rates shall be removed and replaced by the Contractor at no additional cost to the Purchaser.

At a minimum the cable must be compliant to the following ratings and standards:

- UL Subject 444
- (UL) – C(UL) Type CMP or CMR (depending if cable is Plenum or Riser)
- ICEA S-90-661
- NEC 800 Type CMP or CMR (depending if cable is Plenum or Riser)
- ISO/IEC 11801 Class E or D
- ANSI/TIA-568-C.2 Category 6 horizontal cabling requirements

## **H. FIBER CABLE**

### **1. OPTICAL FIBER DISTRIBUTION CABLE (INDOOR): RISER AND PLENUM CABLES**

50/125 Mm multi-mode OM3+ type or single-mode.

Available in 2 to 144 fiber counts.

Shall operate within a wide temperature range -20° to +75° C (-4° to +167° F).

Buffer tubes shall be color-coded.

### **2. CONNECTORS**

For multi-mode or single-mode fiber provide field installable connectors.

Connector types shall be SC at the patch panel and LC at the device.

### 3. PATCH CABLES

Provide 50/125 Mm multi-mode or single-mode Duplex SC to LC patch cables.

Coordinate quantities and Lengths with Purchaser prior to purchasing the patch cables.

Coordinate patch cord routing with Purchaser prior to installation of patch cords.

## I. WORK AREA SOLUTIONS

### 1. WALL OUTLET TERMINATION

#### a) Category 6 – Jacks

Must meet or exceed ANSI/TIA-568-C.2 Category 6 requirements.

Must be available as individual units, to allow for maximum flexibility.

Must be impedance matched for maximum throughput.

IDC contacts must be silver-plated and support the conductor at a 45-degree angle for reliable gas-tight connections.

Connectors shall be used for existing CAT5 cables that are being reused and reterminated. The IDC must support a minimum of 200 reterminations.

Jacks shall be terminated per manufacturer's recommendations.

Must be universal T568B wiring.

#### b) Faceplates

Must be constructed of durable ABS plastic, which meets UL 1863 safety rating and UL 94V30 rating.

Available in a variety of port sizes: 2, 4, 6, 8, & 12 port configurations.

Shall be made available a variety of styles, i.e. furniture, angle port, surface, and flush mount configurations.

Coordinate faceplate color with Architect and electrical contractor prior to purchasing faceplates.

- c) For walls and other non-specialized locations:  
Faceplates shall be plastic and capable of flush-mounting connectors.

Faceplates shall be complete with blank inserts/fillers for covering unused connector openings.

Faceplates shall be complete with port identification labels, and shall be provided with appropriate adapters and fittings as required.

Provide blank faceplates, matching those faceplates in use, for all unused communications backboxes.

- d) Outlet Configuration for Installation  
Install outlets in quantities and locations as shown on drawings.

Outlets shall be terminated using the T568B standard wiring pattern.

## **J. FIBER PANELS AND CONNECTORS**

### **1. FIBER DISTRIBUTION UNITS (FDU) AND TERMINATION**

Fiber patch panels shall be dual purpose, capable of both termination/connection and splicing (fusion or mechanical) of fiber in the same enclosure, shall support both regular and high-density connectors as required. Fiber patch panels shall consist of enclosures pre-assembled with connector panels, blank connector panels (for unused connector slots), strain relief, splice trays (as required) and splice incidentals. Fiber patch panels shall be complete with bulkheads as required to accommodate all fiber strands within the panel, and filler plates as required for all unused bulkhead slots, and with all incidental materials necessary for mounting. Rack mount panels shall mount into 19.3 inch racks. Patch panel connector will identify polarity automatically.

### **2. FIBER CONNECTORS**

All fiber optic cable and panels shall utilize SC connectors.

Fiber connectors shall be made available with ceramic or zirconia ferrules.

## **K. CABLE MANAGEMENT SOLUTIONS**

### **1. EQUIPMENT RACK**

Equipment racks shall be 19 inches wide with universal alternating hole patterns on both sides of the posts, 3 inch channels, 2 posts, top angles,



self-supporting bases, and assembly hardware. Provide CPI or approved equal.

2. **CABLE MANAGEMENT FOR EQUIPMENT RACKS (NEW AND EXISTING)**  
Cable management shall be used in conjunction with Equipment Rack. Provide CPI or approved equal.

Shall provide integrated horizontal and vertical cable management.

Shall provide built-in bend radius protection for network integrity.

Horizontal cable managers shall be provided in 1U or 2U sizes as necessary.

Vertical cable managers shall be provided in 6 inch widths and be complete with double-hinged section covers, “finger” style side cable openings capable of accommodating up to 48 patch cords and horizontal cables.

#### **L. CLOSET REQUIREMENTS (IDF/MDF)**

Designated IT space shall meet the following requirements:

- 16 Sq. Ft. (minimum) for a single 19” two-post rack (adjacent racks add 4.5 Sq. ft.) This calculation is for the rack only and does not include any space for storing additional networking equipment and/or supplies.
- Power provided will be 15 amp outlets for up to 4 UPS units (close proximity to racks). UPS require 1.25 ports per device power plug.
- The space will have limited access (IT, Facilities, security, and other authorized staff. Access will be controlled by lock and key or electronic access.
- The space should be able to maintain a temperature of 68°. Typically, there will be at least two network switches and at least two UPS units in the space generating heat. Additional equipment may also share the space (additional 3rd party vendor switches, monitoring equipment, etc.) .

#### **M. CABLE RUNWAY (LADDER RACK)**

Cable raceway system shall be complete with all fittings, miscellaneous hardware, and other incidental hardware required for a complete and fully fitted system, including but not limited to splice kits, support hangars, rods, brackets, center supports, j-bolts, foot kits, vertical wall brackets, wall angles, support hardware, grounding hardware, and protective end caps for exposed cable raceway ends. Provide CPI or approved equal.

Cable raceway system shall be bonded per manufacturer’s recommendations.

On the Bill of Materials show separate line item for ladder rack. Show quantity (in feet) of ladder rack to be installed in the facility as well as material cost of ladder rack to be installed.

## **N. LABELING**

The successful contractor shall coordinate labeling scheme with Purchaser and provide the Purchaser with a spreadsheet showing the labeling scheme prior to labeling cables and outlets.

Labels shall be permanent (i.e. not subject to fading or erasure) and permanently affixed. Handwritten labels are not acceptable.

## **O. SYSTEM TEST AND SETUP**

### **1. GENERAL REQUIREMENTS**

Testing shall be completed by a Level III or higher field tester.

Testing shall follow ANSI/TIA-568-C.3.

### **2. COPPER PLANT TEST REQUIREMENTS**

Testing must be conducted in accordance with the requirements of ANSI/TIA-568-C and/or ISO/IEC3 11801:2002 standards and manufacturer's recommendations.

Testing results shall be provided to Purchaser.

### **3. FIBER PLANT TEST REQUIREMENTS**

Testing of optical fiber shall follow ANSI/TIA-526-14A and ANSI/TIA-526-7 requirements and manufacturer's recommendations.

Fiber optic cable shall be factory tested and test results will be made available upon request.

All measurements shall be plus or minus 1 dB of submitted loss budget calculations.

If loss figures are outside the plus or minus 1 dB range, the cable shall be tested with an optical time domain reflectometer to troubleshoot the cause in variation.

Fiber optic cable shall be tested at 850 and 1350 nm for multi-mode and single-mode optical fiber.

Testing procedures shall utilize “Method B” – One jumper reference.

Testing of fiber optic cable shall be bi-directional.

If required by owner, conduct OTDR testing on each optical fiber and document test on each fiber and present to owner.

Provide testing results to Purchaser.

#### **P. QUALITY CONTROL**

A Project Manager shall be assigned to the project and is responsible for quality control during installation, equipment setup and testing.

Owner and/or Project Manager shall at any time request a shop visit of the manufacturing facilities of the equipment being installed for a quality audit of product.

### Q. CURRENT CONFIGURATION

#### CURRENT WALLPLATE CONFIGURATION

IDF/MDF/Room Location

WALL-PLATE PORT #



#### CURRENT IDF/MDF PATCH PANEL CONFIGURATION

ROOM #

WALL-PLATE PORT#



***CAT6+ will be used at all remote sites for new installations.***

**R. PREFERRED MANAGEMENT**  
**PREFERRED DATA CABLE MANAGEMENT**



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