



Hunter Holmes McGuire VA Medical Center
1201 Broad Rock Boulevard
Richmond, VA 23249

Structured Cabling Connectivity Solutions

Technical Specification

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PART 1 - GENERAL

1.1 Introduction

The purpose of this document is to standardize the voice and data cabling installations, extensions and modifications within the McGuire VA Medical Center.

The intention of this specification is to provide the comprehensive source of information and guidance for those involved with cabling installations within the McGuire VA Medical Center and also to its regional sites.

It shall be mandatory that these specifications be adhered to stringently by all installers of voice and data communications related work on the McGuire VA Medical Center and its regional sites.

APPLIED STANDARDS

It shall be a mandatory requirement that all McGuire VA Medical Center and regional sites Structured Cabling Systems shall conform to the requirements of the latest and current edition of:

- American National Standards Institute (ANSI)
- Electronic Industry Association (EIA)
- Telecommunications Industry Association (TIA)
- International Organization for Standardization (ISO)
- Federal Communications Commission (FCC)
- National Electrical Codes (NEC)
- Any and all applicable State and Local Codes

APPROVED INSTALLERS

All work performed on McGuire VA Medical Center must be carried out by contractors holding current manufacture **(Optical Cable Corp./OCC)** copper & fiber structured cabling solutions MDIS certification. Proof of certifications will be included in all responses and quotations.

INSTALLATION POLICY

The Network or Telecommunication Engineer must ensure that:

1. All new installations of communications cabling and any refurbishment or upgrade of existing communication cabling within the McGuire VA Medical Center comply with the standards set out in this policy.
2. Only personnel certified through Optical Cable Corp are permitted to install, extend or refurbish Communication Cabling within the center or Regional Sites.

3. All communication cabling shall be fully documented prior to any work commencing.
4. All communication cabling is approved by the Network or Telecommunication Engineer prior to any work commencing.
5. All communication cabling are “as built” documented on practical completion. A copy of the logical diagram, physical cabling layout and test results are provided to the Network or Telecommunication Engineer.
6. **Communications cabling shall not be connected to any existing devices belonging to McGuire VA Medical Center.**

INSPECTION OF WORKS

During installation of cabling the Facility Engineer is to be advised prior to enclosure of any cabling in non-accessible areas. Any Penetration required should be approved by the facility Engineer. Where possible a minimum of 24 hours’ notice shall be given to the Building Engineer.

PERFORMANCE GUARANTEES

The installing contractor is required to certify that the system is complete and operating satisfactorily to meet the requirements of the systems defined in this specification. The installing contractor is required to provide a manufactures guarantee for the performance of the system as installed, for a period of twenty (20) years. The guarantee is to cover material and workmanship.

1.2 Summary of work

- A. Furnish and install complete with all accessories a Structured Cabling System (SCS). The SCS shall serve as a vehicle for transport of data, video and voice telephony signals throughout the network from designated demarcation points to outlets located at various desks, workstation and other locations as indicated on the contract drawings and described herein.
- B. Wiring utilized for data and voice communications shall originate at owner provided Telecommunications Equipment Room (ER), the Main Cross-connect (MC), the Intermediate cross-connect (IC), and/or the Telecommunications Room (TR) location(s). Wiring, terminations designated on the plans shall be wired and installed by the SCS system contractor.
- C. The system shall utilize a network of fiber optic, and unshielded twisted pair, riser, tie and station cables.
- D. Fiber cables shall be of a tight buffered design and terminate on fiber connector panels and placed within closet connector housings located in all telecommunication room(s).
- E. All cables and terminations shall be identified at all locations.
- F. All cables shall terminate in an alphanumeric sequence at all termination locations.
- G. All balanced twisted pair cable terminations shall comply with, and be tested to

TIA/EIA568-B standards for Category 6 installations.

- H. Station cables shall terminate on one, two or three gang wall plates equipped as shown on the drawings.

All station locations require 2 voice and 2 data cables and shall have a 4 or 6 outlet configuration at each location placed from the termination location to a Telecommunications Room on the same floor. All outlets shall be yellow in color for data and blue in color for voice. Cable used for station cables shall be yellow in color for data and blue in color for voice. Station cables shall terminate in the Telecommunications Room on angled CAT 6 patch panels. Cabling shall follow the 568B wiring.

1.3 Cabling Basic Requirements

A. Cable Pathway

1. Extension of all data and voice cables within the data center, Lab and Telecom Room shall be within cable tray or other designated cable delivery system provided and installed by the contractor where concealed in raised floor in plenum spaces.
2. Extension of all data and voice distribution cables shall be within J-Hooks in all plenum rated ceilings and installed by the contractor. Basket type cable tray shall be used in all Telecommunication Rooms to bring cable from outside the room to location of termination.
3. Extension of all data and voice distribution cables in walls shall be in stub up conduits.

B. Hardware

1. Required hardware includes, but is not limited to, termination blocks, fastening devices, data outlets, voice outlets, connectors and all required accessories to comply with this specification.

C. Labeling

1. The SCS System contractor shall be responsible for printed labels for all cables and cords, distribution frames, and outlet locations, according to **McGuire VA Hospital** specifications i.e., Room Number –V1/V2, IDF-D1/D2. For example: 2A101-V1/V2, 2TA-D1/D2 where 2A101 is the room # and 2TA is the IDF location. Voice Jacks should always be on top and Data jacks on the Bottom of the Faceplate. **Labels shall not be written by hand.**

1.4 Grounding and Bonding

- A. All grounding and bonding shall meet the National Electrical Code (NEC®) as well as State & local codes, which specify additional grounding and/or bonding requirements.

B. Bonding and Grounding

1. Communication bonding and grounding shall be in accordance with the NEC® and NFPA. Horizontal cables shall be grounded in compliance with ANSI/NFPA 70 and local requirements and practices. Horizontal equipment includes cross connect frames, patch panels and racks. When required by local code, provide a Telecommunications Bonding Backbone utilizing #6-AWG or larger bonding

conductor that provides direct bonding between equipment rooms and telecommunications rooms (See J-STD-607-A). This is part of the grounding and bonding infrastructure (part of the telecommunications pathways and spaces in the building structure), and is independent of equipment or cabling.

1.5 Requirements for Cable Routing and Installation

A. Cabling

1. All communications cabling used throughout the VA Hospital shall comply with the requirements as outlined in the National Electric Code (NEC®) Articles 725, 760, 770, and 800 and the appropriate local codes.
2. All balanced twisted pair cabling shall bear CMP (Plenum Rated), CM/CMR (Riser Rated) and/or appropriate markings for the environment in which they are installed.
3. All fiber optic cabling shall bear OFNP (Plenum Rated), OFNR (Riser Rated) and/or appropriate markings for the environment in which they are installed.

B. Cable Pathway

1. Cable bundles shall be supported via "J" hooks attached to the existing building structure and framework at a maximum of five (5) foot intervals.
2. Plenum rated cable ties shall be used in all appropriate areas.
3. The contractor shall adhere to the manufacturers' requirements for bending radius and pulling tension of all data and voice cables.
4. Cables shall not be attached to lift out ceiling grid supports or laid directly on the ceiling grid.
5. Cables shall not be attached to or supported by fire sprinkler heads or delivery systems or any environmental sensor located in the ceiling air space.
6. Cables shall not be attached to or supported by any electrical conduit.

C. Fire Stopping

1. SCS System Contractor shall, **under no circumstances** make any penetration of floors, walls or ceilings; to include accessing existing cable paths through floors, walls or ceilings without the prior consent of the **McGuire VA Medical Center Engineering Safety Dept.**
2. Sealing of openings between floors, through rated fire and smoke walls, existing or created by the contractor for cable pass through shall be the responsibility of the SCS System contractor
3. Sealing material and application of this material shall be accomplished in such a manner, which is acceptable to the local fire and building authorities having jurisdiction over this work **i.e. (VA Medical Center, Engineering Safety Dept).**
4. Creation of such openings as are necessary for cable passage between locations as shown on the drawings shall be the responsibility of the SCS System contractor's work.
5. Any openings created by or for the contractor and left unused shall also be sealed as part of this work.

D. SCS System Contractor Responsibility

1. The SCS System contractor shall attend and pass a mandatory safety class held by a **VA Medical Center Safety Representative.**
2. The SCS System contractor shall be responsible for damage to any surfaces or

work disrupted as a result of his work. Repair of surfaces, including painting, shall be included as necessary.

1.6 Work External to the Building

- A. Any work external to the confines of this building as shown on the drawings shall be governed by the provisions of this specification and the applicable drawings.
- B. Only cabling products approved by the manufacturer for outside use shall be installed in locations external to the confines of the building.

PART 2 - PRODUCTS - COPPER

2.1 Station cable

- A. Category 6 UTP, 4 Pair (High Performance)
 - 1. The high performance Category 6 UTP cable shall be of the **traditional round design with mylar bisector tape**.
 - 2. The cable jacket shall comply with Article 800 NEC for use as a plenum or non-plenum cable. The 4 pair UTP cable shall be UL® and c (UL®) Listed Type CMP (plenum).
 - 3. Performance shall be characterized to 550 MHz to support high-bandwidth video applications Performance series. Values represent margin over the TIA/EIA Category 6/Class E channel specifications.

OCC/SMP Solutions Category 6 Premium Plenum Yellow & Blue, 4 pair, cable approved.

2.2 Outlets

- A. Category 6 Gigabit outlets
 - 1. All Category 6 outlets shall meet or exceed Category 6 transmission requirements for connecting hardware, as specified in TIA/EIA 568-B.2-1 Commercial Building Telecommunications Cabling Standard and ISO/IEC 11801:2002 Second Edition.
 - 2. The Category 6 outlets shall be of a universal design supporting T568 A & B wiring.
 - 3. The Category 6 outlets shall be capable of being in a modular patching situation or as a modular telecommunication outlet (TO) supporting current 100BASE-T, 155 Mbps ATM, 622 Mbps ATM using parallel transmission schemes and evolving high-speed, high-bandwidth applications, including Ethernet, 1000BASE-T and 1.2 Gbps ATM.
 - 4. The Category 6 outlets shall be capable of being installed at either a 45° or a 90° angle in any modular faceplate, frame, or surface-mounted box avoiding the need for special faceplates.

5. General specifications:
 - a. Meets or exceeds the mechanical, electrical, and clearance specifications in FCC Rules and Regulations, Part 68, Subpart F
 - b. Meet or exceed the Category 6 requirements in ISO/IEC 11801, TIA/EIA568B

OCC/SMP Solutions KMJA609 – Data (Yellow)

OCC/SMP Solutions KMJA605 – Voice (Blue)

2.3 Faceplates

A. Designer faceplate

1. Faceplates shall be contemporary contour style
2. Physical specifications: 4.81-in H x 2.84-in W x 0.33-in D

OCC/SMP Solutions Designer Faceplates FPSK0412 (4-port)

OCC/SMP Solutions Designer Faceplates FPSK0412 (6-port)

B. Modular furniture faceplate

1. Flush-mount 3-Port faceplate
 - a. The faceplate shall be designed for use with KMJ-Series modular telecommunications outlets.
 - b. It shall fit modular furniture knockout size 1.374 in (3.49 cm) H x 2.649 in (6.73 cm) L (± 0.0118 in [0.03 cm]).
 - c. It shall be compatible with Steel Case, Haworth and Hon.

OCC/SMP Solutions FAP4-02(4-port) Modular Furniture Faceplate

2.4 Category 6 Angled panel

- A. The panel shall be angled to allow the cable to flow to each side of the rack enabling the patch cords to be routed directly into vertical cable managers also allowing the labeling scheme and port identification to be visible at all times.
- B. The panel shall be black powder covered high-strength steel and come equipped with a removable rear mounted cable management bar.
- C. The electrical performance of the panel shall be guaranteed to meet or exceed TIA/EIA 568-B.2-1 Category 6 and ISO/IEC Category 6/Class E specifications, UL listed.
- D. The panel shall support network line speeds in excess of 1 gigabit per second.

OCC/SMP Solutions ACC2488/110SIX 24-Port Angled Panel w/Universal A/B Wiring

OCC/SMP Solutions ACC4888/110SIX 48-Port Angled Panel w/Universal A/B Wiring

2.5 Balanced twisted pair patch cords

A. Category 6 Patch Cords

1. All patch cords shall exceed TIA/EIA and ISO/IEC Category 6/Class E specifications.
2. All patch cords shall be backward compatible with Category 5 and Category 5E systems.
3. The patch cords shall incorporate an anti-snag feature that provides maximum protection from snagging during moves and re-arrangements.
4. Patch cords shall support network line speeds in excess of 1 gigabit per second.

OCC/SMP Solutions Category 6/Class E Patch Cords
PCSIXxxByy Plug-Plug, 4 Pair, Stranded, B wiring Patch Cord

PART 3 - PRODUCTS – FIBER OPTICS

3.1 50/62.5µm multimode fiber optic tight buffered building cable – Interlocked Armored Plenum

A. Multimode 50/62.5µm Interlocking Armored Plenum Building Cable- Supports 300 Meter Channel @ 1Gb/s

1. The cable shall be designed specifically to support 300 meter Channel lengths for 1 GB/s applications or 600 meter link lengths for 1Gb/s applications.
2. The cable shall be of a tight buffered design, rated (OFNP) for use in riser and plenum applications and interlocking armored to eliminate the need for inner duct.

Optical Cable Corp (DX__S__9OPI7), DX series cable (OFCP) Interlocking Armored Fiber. O = Orange Jacket.

3.2 9µm singlemode fiber optic tight buffered building cable – Interlocked Armored Plenum

A. Singlemode 9µm Interlocking Armored Plenum Building Cable- meets and exceeds 300 Meter Channel @ 1Gb/s

1. The cable shall be designed specifically to support 300 meter Channel lengths for 1 GB/s applications or 600 meter link lengths for 1Gb/s applications.
2. The cable shall be of a tight buffered design, rated (OFNP) for use in riser and plenum applications and interlocking armored to eliminate the need for inner duct.

Optical Cable Corp (DX__S__9YPI7), DX series cable (OFCP) Interlocking Armored Fiber. Y = Yellow Jacket.

- 3.3 50/62.5µm multimode fiber optic tight buffered campus cable – In/outdoor rated plenum cable.

A. Multimode 50/62.5µm In/outdoor Plenum Building Cable- Supports 300 Meter Channel @ 1Gb/s

1. The cable shall be designed specifically to support 300 meter Channel lengths for 1 GB/s applications or 600 meter link lengths for 1Gb/s applications.
2. The cable shall be of a tight buffered design, rated (OFNP) for use in inter – building campus locations without the need to transition between cable types.

Optical Cable Corp. (DX_ _ _ K_ _ _9OR), DX series cable (OFNP) In/Outdoor rated fiber optical cable. O = Orange Jacket.

- 3.4 9µm singlemode fiber optic tight buffered campus cable – In/outdoor rated plenum cable.

A. Multimode 50/62.5µm Interlocking Armored Plenum Building Cable- Supports 300 Meter Channel @ 1Gb/s

1. The cable shall be designed specifically to support 300 meter Channel lengths for 1 GB/s applications or 600 meter link lengths for 1Gb/s applications.
2. The cable shall be of a tight buffered design, rated (OFNP) for use in inter – building campus locations without the need to transition between cable types.

Optical Cable Corp. (DX_ _ _ K_ _ _9YR), DX series cable (OFNP) In/Outdoor rated fiber optical cable. Y = Yellow Jacket.

- 3.5 fiber panels, connectors

A. High Density Termination Shelf (Rack Mount)

1. The high density termination shelf shall be fully modular in design, provide security and protection, be accessible from both front and rear; and shall be capable of terminating buffered fiber optic building cable or direct termination of outside plant fibers.
2. The shelf shall be a 4U (7-inch high) or 1U (1.75-inch high) designed for mounting in a 19-inch frame and be capable of handling terminations for up to LC or SC connections.
3. The shelf shall be equipped with color coded adapter strips for easy identification of 50, 62.5 or 9 micron fiber optic cable.
4. The shelf shall contain built-in slack management for each adapter strip to facilitate fiber administration and have removable adapter bezels that are removable from the front to permit easy access to the rear connector and fiber.
5. Shelf dimensions: 7”h x 17”w x 12”d (4U) or 1.75”h x 17”w x 12”d

**Optical Cable Corp. RTC18B – RTC144B, Rack Mount Enclosures
Optical Cable Corp. 6112MM or SMDLC, FiberOpticx LC Adapter Plates.**

3.6 Fiber optic connectors

A. LC Fiber Optic Connectors

1. The fiber optic connector shall be one half the sizes (double density) of conventional ST and SC connectors.
2. The connector shall have an insertion release mechanism similar to the RJ-45 intuitive push/pull-style housing.
3. The connector shall be pull-proof to prevent momentary disconnect from axial loads
4. The connector possess an anti-snag latch which facilitates routing of patch cords
5. The connector shall be field-mountable with minimal polish
6. The connector shall be polarized

Corning Solutions LC Multimode connector 95-000-99 for 0.9 mm Buffered Fiber

Corning Solutions SC Multimode connector 95-000-40 for 0.9 mm Buffered Fiber

Corning Solutions LC Single-mode connector 95-220-96 for 0.9 mm Buffered Fiber

Corning Solutions SC Single-mode connector 95-200-41 for 0.9 mm Buffered Fiber

2.1 Racks, Accessories and Connector Housings

A. Racks (Size: 19" wide by 84" height)

1. Equipment racks shall be provided for the termination of horizontal cabling and network equipment. Rack equipment shall be black in color
2. Racks shall include vertical managers on both sides to aid in cable management.
3. Racks shall be securely fastened to the floor with appropriate mounting hardware.
4. All racks shall be grounded to building ground.
5. Approved Products:
 - **B-Line or Chatsworth Products Rack**
 - **B-Line or Chatsworth Products Floor mounting kit**
 - **B-Line or Chatsworth Products Universal Runway kit**
 - **B-Line or Chatsworth Products Cable Runway Dividers**
 - **B-Line or Chatsworth Products Runway Radius Drop**
 - **B-Line or Chatsworth Products Wall angle Support kit**
 - **B-Line or Chatsworth Products Rack to Runway Mount Plate kit**
 - **B-Line or Chatsworth Products Wall angle Support kit**
 - **Panduit Products Vertical Cable Manager**
 - **Panduit Products Vertical Cable Manager Hinged Covers**