SMG 3235.1

FDA STAFF MANUAL GUIDES, VOLUME III - GENERAL ADMINISTRATION

INFORMATION RESOURCES MANAGMENT

INFORMATION TECHNOLOGY CONNECTIVITY

STANDARDS FOR CABLE PLANT INSTALLATIONS

Effective Date: 10/28/2016

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1. PURPOSE.

This Staff Manual Guide (SMG) establishes cable specifications and requirements for the design, installation, labeling, testing and documentation of all new cable plant installations for offices, wiring closets, and campus areas within the FDA's facilities. This policy does not mandate rewiring changes to inherited legacy installations, only to changes and additions going forward.

2. BACKGROUND.

In order to design and efficiently maintain a highly stable and consistent network, the FDA's Division of Infrastructure Operations (DIO) has developed and implemented a strict cable plant standard across all organizations and facilities enterprise wide. This will ensure that the FDA maintains a current network maximizing the value of the switch and route infrastructure and required bandwidth capacities.

3. POLICY.

It is the policy of the FDA to establish and implement cabling standards that will ensure the bandwidth, functionality, reliability, and longevity required to support the Agency's ongoing strategic information systems initiatives. The following standards must be followed for all new cable plant installations and upgrades:

The following cabling standards are to be followed for any new cable plant installations or upgrades. In cases where costs or existing infrastructure are limiting factors, request a waiver for specific deviations with explanations for the change to the OIMT Division of Infrastructure Operations.

A. General Criteria for Standard Cable Plant

The standard cable plant shall provide:

1. **A standard connection at the desktop or other network drop locations.** The use of a standard connection will ensure that FDA can move systems between locations within the Agency without having to change hardware configurations. This will reduce not only the cost of equipment to support moves, but will also reduce time spent by support personnel in reconfiguring equipment.

2. **The ability to isolate traffic to a single connection.** The ability to isolate traffic from the desktop to a single station or connection greatly reduces security vulnerabilities. Traffic isolation also provides the capability to guarantee bandwidth to a station.

3. **The ability and flexibility to group connections by Virtual Local Area Networks (VLAN).** In order to protect the integrity and performance of specific services, VLANs may be created to isolate and protect data transmissions.

4. **The ability to support bandwidth requirements up to 10 GigaBits per Second (Gbs) to individual connections.** It is likely that requirements for high speed, large volume data transmissions will increase during the lifetime of new cable installations. We can expect that the need for transfer speeds up to 10Gbs to individual desktop units will exist.

5. **The ability to support bandwidth requirements at a minimum of 10Gbs and up to or exceeding 100Gbs for specialized applications or services.** The need for increased bandwidth for specialized applications or services, particularly for the scientific community within the FDA will exceed 10Gbs. The cable plant must be able to handle speeds in excess of 100Gbs at the backbone level.

6. **Cost-effective solutions.** The cable plant must meet future network load requirements while being cost-effective. The cost associated with the installation of a new standard cable system should not exceed the current market value for cabling a facility.

7. **A maintainable solution.** The cable plant must be maintainable and modifiable by the personnel and equipment available to the FDA. Maintenance of a cable plant includes isolation and correction of faults, modifications, and expansion into new locations.

B. **Requirements for Designing, Installing, and Maintaining New Cabling Systems.**

   1. **Office**

      a. Run Unshielded Twisted Pair (UTP) Category 6 (Cat6) or better cable from each office/workstation, conference area, or other spaces where a network drop is required (i.e., printer location) to the associated wiring closet patch panel.

      b. A minimum of two cable runs will be made for each person expected to be located in an office/workstation. Some offices or labs may require additional cable runs.

      c. Terminate all cables in wall outlets compliant with the IEC 60603-7-7 8P8C modular connector (RJ-45) specification.

      d. Label each outlet with the appropriate cable patch number where terminated in the wiring closet.

      e. Per industry best practices, and cable specifications, maximum cable length from any drop locations to the wiring closet will not exceed 90 meters or the established limitations for unshielded twisted pair cabling.

   2. **Wiring Closet**

      a. All cable runs to offices/workstations will terminate in wiring closets only.

      b. With the exception of some basements, there will generally be at least one wiring closet per floor. In large buildings, multiple wiring closets may be required for each floor. These will be uniquely designated with a letter, number and/or a compass heading (i.e., 1A, 1B, 1C or 1North, 1 South, 1 East, etc.), or with a given room number.

      c. All UTP cable runs will terminate into properly labeled IEC 60603-7-7 patch panels.

d. Multi-mode fiber will be used to connect wiring closets through riser pathways.

e. One wiring closet will function as the WAN or campus access point for the building for multi-building locations. In some cases, a secondary closet may be designated as a redundant WAN access point for failover requirements.

f. Additional fiber (both Single and Multi-mode) may be required from the WAN access point wiring closet to each of the other wiring closets. This will be scaled and designed per each facility requirements.

g. Larger facilities/installations containing two WAN access point closets will require redundant fiber from each WAN access wiring closet to all other wiring closets.

h. All fiber shall be terminated into a separate fiber patch panel using ST connectors unless otherwise noted.

i. Each wiring closet will have sufficient Uninterruptible Power Supply (UPS) capability for the installed equipment. In order to determine the UPS load requirements, first determine the VA (Volts-Amperes) rating and the required UPS runtime, based on your system and building requirements.

NOTE: To determine the VA rating, find the Voltage and Amperage requirements for each piece of equipment. The VA rating may be found on the back or bottom of the equipment. Multiply these numbers together:

VA = Volts x Amperes

If the components are measured in Watts, then multiply the number of Watts by 1.4:

VA = Watts x 1.4

j. Adequate ventilation/air-conditioning will be provided to remove the heat generated by the total watts calculated for the wiring closet with at least 20% extra capacity to accommodate growth.

C. Campus (Any Multi-Building Location)

1. The connections between buildings must provide for alternate pathways so that the loss of a single cable or cable route will not result in loss of service to the building. Alternate pathway cables cannot be

located in the same internal or external duct/conduit as primary pathways.

2. The campus must have 2 strategically separated Core switch locations where WAN circuits are divided, providing redundant pathways and failover capabilities for the campus.

3. Each of these Core locations will have a minimum of 2 fiber runs to each building on campus to provide connectivity to 2 Distribution switch points for each building. This will provide redundant pathways and failover capabilities from each building to each Core location.

4. Each building's 2 Distribution switch points will have direct fiber connectivity to each Access switch within each LAN closet. This will provide redundant pathways and failover capabilities from each floor's Access switch(es) to each Distribution switch.

D. Specifications

1. For new spaces or existing space renovations, all copper cabling must meet industry specifications for Cat 6 level UTP cable or better.

2. IEC 60603-7-7 connectors for UTP connections must be used.

3. All multi-mode fiber cable must be meet industry specifications for 62.5/125 micrometer wavelength transmission modes.

E. Installation

1. All copper and fiber cabling must be installed in accordance with ANSI/TIA/EIA-568-C Standard Commercial Building Telecommunications Wiring Standard and ANSI/TIA/EIA-569 standard for cable installations.

2. All cabling must be installed in accordance with local building codes.

3. The bend radius for all cabling must follow specifications in ANSI/TIA/EIA-568-C.

4. UTP must have a 4X cable outside diameter.

5. UTP multipair cable must have a 10X cable outside diameter.

6. Fiber (not under tension) must have a 10X cable outside diameter.

7. Fiber (under tension) must have a 20X cable outside diameter.

8. All fire stops must be properly installed when cabling is passing through fire walls or floors.

F. Labeling

1. Label all cables on each end with the appropriate cable run number.

2. Label all terminals by connector with the cable run number and the identification on the far end terminator. (For example, given a fiber optic number 87 installed from Room 15-60 Bulkhead A to wiring closet 15B-T6; Bulkhead G would have a label 87-15B-T6 Bulkhead G at the connector in Room 15-60 and the cable run numbers would be in numerically sequence. If an initial cable installation resulted in 150 cables installed, the run numbers would be 1-150. If a future install added an additional 25 cables, numbering would begin at 151 and end at 175.)

3. Install fiber optic termination panels in the following pattern.

A	B	C	D
10 20	10 20	10 20	10 20
30 40	30 40	30 40	30 40
50 60	50 60	50 60	50 60

G. Testing

1. Perform UTP Cat 6 testing on all cables in accordance with TIA TSB-67. These will include wiremap, impulse noise, near-end crosstalk, and attenuation tests.

2. Perform fiber optic testing on all cables in accordance with EIA-455-171-A-2001 and EIA-526-14-98.

H. Documentation

Document all cable plant installations. At a minimum prepare the following documents:

1. Wire list - Prepare a wire list giving each cable number and corresponding end point reference. Include these references: wiring closet and office room numbers, and terminating patch panel numbers.

2. As-built drawings - Prepare drawings using facility floor plans showing the routing of all installed cables, termination panel designs, and wiring closet equipment layouts.

I. Reference Library

The Division of Infrastructure Operations (DIO), Network and Communications Operations Branch (NCOB) will maintain a reference library within the current data repository application (i.e., ECMS or SharePoint). This digital library will, at minimum, contain all of the documents referenced in this policy and any related documents.

4. RESPONSIBILITIES.

A. Chief Information Officer (CIO).

The CIO provides leadership and direction regarding all aspects of the Agency's information technology (IT) programs and initiatives including operations, records management, systems management, information security, strategic portfolio, and executive coordination and communication activities.

B. Deputy CIO, Office of Technology and Delivery (OTD).

The Deputy CIO, OTD is responsible for the execution and implementation of infrastructure operations and application services policy and procedures throughout the FDA enterprise.

C. Division of Infrastructure Operations (DIO).

The Division of Infrastructure Operations (DIO), in conjunction with the Office of Information Management and Technology (OIMT), is responsible for reviewing agency cabling requirements, helping FDA components in designing or modifying new and existing cable plants, and approving cable plant designs and waivers in accordance with all applicable IT regulations and policies.

5. REFERENCES.

INTERNATIONAL STANDARD IEC 60603-7-7 Connectors for electronic equipment 2006

ANSI/TIA/TIA-568-C Network Cabling Standards

ANSI/TIA/TIA-569 Network Cable Pathways and Spaces Standards

TSB-67 TIA/EIA Technical Systems Bulletin 67 (TSB-67), Link Performance Specifications for Field Testing of Unshielded Twisted-Pair Cabling Systems

EIA-455-171-A- 2001Single-Mode Optical Fiber Cable Assemblies tests

EIA-526-14A-98 Optical Power Loss Measurement of Installed. Multimode Fiber Cable Plant

6. EFFECTIVE DATE.

The effective date of this policy guide is October 28, 2016.

7. Document History - SMG 3235.1, Standards for Cable Plant Installations

STATUS (I, R, C)	DATE APPROVED	LOCATION OF CHANGE HISTORY	CONTACT	APPROVING OFFICIAL
Initial	10/28/2016	N/a	Deputy CIO, Office of Technology and Delivery (OTD)	Todd G. Simpson, FDA Chief Information Officer, OO/OIMT

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