# Program Information

## Lesson:

### *Understanding Cabling Standards, Codes, and Cables*

## Training:

## Premises Cabling

## Time frame:

### 45 minutes

# Instruction Section

## Learning Objectives:

* Recognize that cabling standards are developed by vendors to ensure interoperability of networks**.**
* Compare and contrast the differences between cabling standards and codes.
* Identify common premise cabling standards and codes.
* Identify the basic types of cable used in premises cabling.

## Assessment Tools/Methods:

* Participants should be assessed based on participation in group discussions and activities.

## Learner Prior Knowledge:

# Prior to class, participants will need to read:

# Reference Guide: Fiber Optics and Cabling Standards (<https://www.thefoa.org/tech/ref/basic/standards.html>)

# Reference Guide: FOA Standards (<https://www.thefoa.org/tech/ref/1pstandards/index.html>)

# Prior to class, the participants will need to watch:

# [Premises Cabling Lecture 3: Standards](http://www.youtube.com/watch?v=BG2vB30v8dM&list=PL3F0669372E06AE8B&index=3&feature=plpp_video)

# [Premises Cabling Lecture 4: Cable Types](http://www.youtube.com/watch?v=aKoCaZBp5s4&list=PL3F0669372E06AE8B&index=4&feature=plpp_video)

## Instructional Activities:

# Welcome the participants and review the topic of premise cabling standards, codes, and basic cable types.

# Review the importance of understanding these concepts in the context of building and maintaining reliable communication networks.

# Activity 1: Premises Cabling Standards and Codes:

# Define premise cabling standards and codes as guidelines and regulations set by industry organizations to ensure the design, installation, and maintenance of structured cabling systems meet certain criteria.

# Standards are not legally binding like codes, such as fire prevention or grounding.

# Always be aware of current code requirements, especially those in United States for abandoned cabling, which must be removed.

# Discuss the significance of adhering to standards and codes for reliability, interoperability, and safety.

# Introduce common standards such as EIA/TIA 568 for Commercial Building Telecommunications, EIA/TIA 569 for Telecommunications Wiring Pathways and Spaces, EIA/TIA 570 Residential Telecommunications Cabling, EIA/TIA 606 Telecommunications Cabling System Administration, and EIA/TIA 607 Telecommunications System Grounding and Bonding Requirements.

# Ask the participants to provide examples of how adherence to standards can streamline troubleshooting and network management processes for each of the following points.

# Consistent Documentation: Answers may include following standards such as ANSI/TIA-606 for labeling and documentation ensures that cables are properly identified and documented throughout the network infrastructure. This consistency makes it easier for technicians to locate and trace cables when diagnosing connectivity issues, reducing the time spent on troubleshooting.

# Cable Identification: Answers may include standards specify labeling conventions for cables, including unique identifiers for endpoints, patch panels, and equipment. By adhering to these conventions, network administrators can quickly identify the purpose and destination of each cable, facilitating efficient troubleshooting and maintenance tasks.

# Structured Cabling Design: Answers may include standards like TIA/EIA-568 provide guidelines for structured cabling design, including cable pathways, termination points, and equipment spacing. A well-designed cabling infrastructure reduces the likelihood of cable congestion, signal interference, and physical damage, minimizing potential points of failure and simplifying troubleshooting efforts.

# Interoperability: Answers may include compliance with industry standards ensures compatibility between different components and vendors within the network ecosystem. When all components adhere to the same standards, integration issues are minimized, and troubleshooting becomes more straightforward, as technicians can rely on consistent performance expectations across the network.

# Vendor Support: Answers may include many vendors align their products and solutions with industry standards to ensure interoperability and compliance. By selecting components and equipment that adhere to recognized standards, organizations can leverage vendor support resources more effectively, accessing troubleshooting guides, firmware updates, and compatibility matrices that facilitate efficient network management and maintenance.

# Activity 2: Basic Cable Types:

# In follow up to the class preparation work, ask the participants to call out various types of cable commonly used in premises cabling.

# Unshielded Twisted Pair (UTP): Explain the structure, benefits, and variations such as Cat5e, Cat6, and Cat6a. Discuss common applications and limitations.

# Recognize UTP is available in performance level/grades from older Cat 3 to newer, Cat 4, Cat 5, Cat 5e, Cat 6 and Cat 6A, these are called class A-EA in ISO-IEC

# Coaxial Cable (Coax): Describe the construction, uses, and advantages of coaxial cables in data and video transmission.

# Fiber Optic Cable: Explain the principles of fiber optic transmission, highlighting advantages like high bandwidth and immunity to electromagnetic interference. Differentiate between single-mode and multi-mode fiber types.

# Discuss considerations for selecting the appropriate cable type based on factors such as bandwidth requirements, distance, and environmental conditions.

# Emphasize the importance of proper installation and handling techniques to maintain cable performance and longevity.

# Invite questions and open the floor for discussion to address any remaining queries or concerns.

# Activity 3: Cable Identification and Classification:

# Divide the participants into small groups or pairs, ensuring each group has access to the materials provided.

# Distribute samples of twisted pair, coaxial, and fiber optic cables to each group.

# Explain that the objective of the activity is to identify and classify each cable type based on their characteristics and applications.

# Provide participants with a piece of paper to take notes on each cable type and how that cable is used.

# Provide a brief overview of the distinguishing features of each cable type, emphasizing key points such as construction, connector types, and typical uses.

# Encourage participants to examine the samples closely and discuss among their group members to identify the type of each cable.

# Once they have identified each cable type, instruct the groups to label or mark the samples accordingly with their classifications (e.g., Twisted Pair, Coaxial, Fiber Optic).

# Walk around the room to facilitate discussions, answer questions, and provide guidance as needed.

# After the groups have labeled their samples, reconvene as a whole class.

# Discuss any discrepancies or uncertainties, allowing for clarification and further explanation of cable characteristics.

# Conclude the activity by summarizing the key points learned and emphasizing the importance of correctly identifying and classifying cable types in accordance with premise cabling standards and codes.

# Activity 4: Basic Components of Structured Cabling:

# Review that structured cabling forms the backbone of modern information networks. It's a standardized approach to designing and managing a cabling system that supports various hardware and services within a building or campus. Whether you're setting up a new office, upgrading an existing network, or simply curious about the infrastructure behind your internet connection, understanding the six components of structured cabling is essential.

# As participants proceed through the discussion, ensure that they include the relevant information for each component of structured cabling architecture.

# Horizontal Cabling: Horizontal cabling refers to the cables that connect the work area outlets (such as wall jacks) to the telecommunications rooms or data center. This component typically includes twisted-pair copper cables (e.g., Cat 5e, Cat 6, Cat 6a) or fiber optic cables. Horizontal cabling is crucial for connecting end-user devices like computers, phones, and printers to the network.

# Backbone Cabling: Backbone cabling, also known as vertical cabling, provides interconnection between telecommunications rooms, equipment rooms, and entrance facilities. It carries data between the horizontal cabling and the main equipment, such as switches and routers. Fiber optic cables and high-capacity copper cables (e.g., Cat 6a, Cat 7) are commonly used for backbone cabling due to their ability to transmit large amounts of data over longer distances.

# Telecommunications Room (Telecom Closet): Telecommunications rooms serve as consolidation points for the horizontal and backbone cabling. They house the network equipment, such as switches, patch panels, and routers, necessary for distributing data throughout the building or campus. Properly designed telecommunication rooms facilitate efficient cable management, troubleshooting, and future scalability of the network infrastructure.

# Work Area Components: Work area components are the interface between the end-user devices and the cabling infrastructure. These components include wall outlets, surface-mounted boxes, and patch cables. Wall outlets provide the physical connection point for devices, while patch cables connect devices to the outlet. Work area components should be installed in convenient locations to accommodate the needs of users and ensure easy access for maintenance.

# Equipment Rooms: Equipment rooms house the network hardware and servers that control and manage the data flow within the structured cabling system. They typically contain equipment racks, power distribution units (PDUs), cooling systems, and other infrastructure components. Equipment rooms should be designed with considerations for power availability, environmental conditions, and security to ensure the reliable operation of network equipment.

# Data Center/Main Cross Connect: A specialized facility that houses computer systems, servers, networking equipment, storage systems, and other hardware components essential for processing, storing, and distributing vast amounts of data. Cross-connects used to facilitate flexible and efficient connectivity between active equipment, servers, switches, and other network devices within a data center.

# Display the Structured Cabling Architecture Graphic Organizer on the screen. Pass out copies of the Structured Cabling Architecture Graphic Organizer for participants to complete during activity.

# Have participants identify one component at a time.

# Once a component is identified, have the participants discuss the function of that component. Refer to information in #2 as the discussion is taking place to ensure key points are covered.

# To conclude the lesson, summarize the key points from the lesson, including premise cabling standards, codes, basic cable types, and structured cabling architecture.

##  Resources:

# Whiteboard and markers

# Samples of twisted pair, coaxial, and fiber optic cables (one of each type per participant or small group)

# Labels or markers

# Structured Cabling Graphic Organizer

## Differentiation:

# For participants who are ready for a challenge, have them explore further resources and certifications related to premise cabling to deepen their knowledge and stay updated on industry best practices.

# Provide an answer key for participants if they are struggling to identify the parts of the Structured Cabling Architecture Graphic Organizer.

*This lesson is supplemental to the Fiber Optics lesson within FOA's Fiber U curriculum and not part of the FOA required curriculum to obtain the Certified Premises Cabling Technician certification. If interested in becoming an approved school and/or obtaining a certification, please contact FOA at*[*thefoa.org/contact-foa.html*](https://www.thefoa.org/contact-foa.html)*.*

*Note: AI, specifically ChatGPT 3.5, was used to generate timeline for this contextualized lesson plan.*

## Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

##  Structured Cabling Architecture Graphic Organizer

### Diagram of a diagram of a room  Description automatically generatedMatch the correct term from the box below with the number on the graphic.

|  |  |
| --- | --- |
| **Equipment Room Cabling** | **Data Center/Main Cross Connect** |
| **Horizontal Cabling** | **Telecommunications Closet** |
| **Work Area Cabling** | **Backbone Cabling** |

1. **\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ 2. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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## Answer Key: Structured Cabling Architecture Graphic Organizer

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|  |  |
| --- | --- |
| **Equipment Room Cabling** | **Data Center/Main Cross Connect** |
| **Horizontal Cabling** | **Telecommunications Closet** |
| **Work Area Cabling** | **Backbone Cabling** |

1. **Work Area Cabling 2. Horizontal Cabling**

**3. Telecommunications Closet 4. Backbone Cabling**

**5. Data Center/Main Cross Connect 6. Equipment Room Cabling**