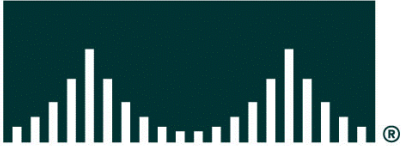
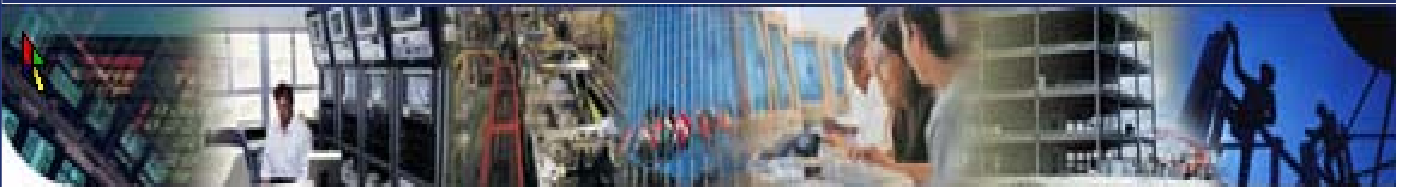


**CISCO SYSTEMS**



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## **PNIE v 2.0**

Panduit Networking Infrastructure Essentials

# **Student Journal and Study Guide**





# PNIE - Module 1

## Cabling and Safety Overview

### Vocabulary

Define the following terms. Use the online curriculum for help.

ADA -

Analog -

ANSI -

BICSI -

Class C Fire -

CWA -

DSL -

EEOC -

ESD -

EMI -

GFCI -

IBEW -

NFPA -

Plenum -

PVC -

Telephony -

TIA/EIA -

Trunk -

UL -

# **PNIE - Module 1**

## **Cabling and Safety Overview**

### **Focus Questions**

1. What is telephony?
2. Explain how a telephone system operates.
3. What is structured cabling?
4. What does BICSI do?
5. What are the results of the standardization of telephone systems in the United States?
6. What are the results of voice and data cabling being combined into one communications system?

# **PNIE - Module 1**

## **Cabling and Safety Overview**

7. Why should cable installers know about new technologies that are being developed?
  
8. What are some advantages of fiber-optic cable?
  
9. What are three costs that can be attributed to poor cabling?
  
10. What are some of the areas of specialization in the cabling job market?
  
11. What are the three different types of safety important to everyone on the job?
  
12. Why is OSHA important to employees and employers?
  
13. What is the role of the NEC in the cabling industry?

# PNIE - Module 1

## Cabling and Safety Overview

### Review Questions

1. OSHA recommends:
  - a. Company logo stickers on hardhats
  - b. OSHA logo stickers on hardhats
  - c. Safety stickers on hardhats
  - d. No stickers on hardhats
  
2. Excessive noise is commonly defined as:
  - a. 85-90 decibels
  - b. 15-30 decibels
  - c. 40-55 decibels
  - d. 60-75 decibels
  
3. Safety glasses should be worn:
  - a. When terminating fiber-optic connectors
  - b. When cutting drywall
  - c. When talking to the supervisor at the job site
  - d. All of the above
  
4. What is the most appropriate attire when working in a factory environment?
  - a. Long-sleeve shirt, shorts, safety glasses, and tennis shoes
  - b. Short-sleeve shirt, jeans, hard hat, and tennis shoes
  - c. Short-sleeve shirt, jeans, safety glasses, and hard-sole shoes
  - d. Long-sleeve shirt, shorts, hard hat, and hard-sole shoes
  - e. None of the above
  
5. TIA/EIA 607:
  - a. Supersedes the NEC
  - b. Is the code for grounding and bonding requirements for network cable installations
  - c. Defines bonding and grounding requirements for network cable installations
  - d. Is the standard for administration and labeling of cable in a structured cabling installation
  - e. A and C
  
6. When grounding The Telecommunications Main Grounding Busbar (TMGB), which of the following are acceptable grounds?
  - a. Copper water pipe
  - b. High voltage electrical ground
  - c. Building steel
  - d. Cast iron sewer pipe
  - e. B and C
  - f. C and D

# PNIE - Module 1

## Cabling and Safety Overview

7. CSA stands for:
  - a. Cabling Standards Association
  - b. Canadian Standards Association
  - c. Communications Standards Association
  - d. International Consortium of Standards Associations
  
8. According to the NEC, select the appropriate cable types for riser installations.
  - a. CMP, CMR, and OFC
  - b. CMP, CM, and OFCR
  - c. CMP, CMR, and OFNR
  - d. CMR, OFNP, and OFC
  - e. The NEC does not regulate this, TIA /EIA does
  
9. A \_\_\_\_\_ detects current leakage to ground and trips when current to ground is detected.
  
10. The arrival and popularity of \_\_\_\_\_ has made cold water pipe grounds unreliable.
  
11. According to OSHA, a body belt is required when working on scaffolding more than \_\_\_\_\_ high.
  
12. \_\_\_\_\_ ladders should not be used for cable installation work.
  
13. \_\_\_\_\_ and \_\_\_\_\_ are examples of cable insulation material suitable for use in a plenum ceiling.
  
14. Protection from \_\_\_\_\_ is one of the greatest reasons for running fiber optics between buildings.

## **PNIE - Module 2**

### **Networking Basics**

A fundamental understanding of networking basics is essential for a cable installer to install and troubleshoot local-area network (LAN) cables. Although the installer deals primarily with the physical topology, a basic understanding of network functions helps avoid problems and resolve issues as they arise. Physical topologies often differ from logical topologies. Data-link layer functions are often dependant on physical layer functions. The cable installer needs to know the difference between a Media Access Control (MAC) address and an Internet Protocol (IP) address, and which type of equipment depends on the delivery of these addresses.

#### **Concept Questions**

1. What is a network?
2. What are the three types of networks, and how are they different?
3. What is the difference between a physical topology and a logical topology?
4. What is the OSI model?
5. How do switches differ from hubs?

## PNIE - Module 2 Networking Basics

6. What is the difference between a MAC address and an IP address?

7. Match each network layer with its function.

- |                    |   |
|--------------------|---|
| _____ Application  | A. This layer segments and reassembles data into a data stream, making it responsible for reliable transportation.                                  |
| _____ Presentation | B. This layer provides the electrical, mechanical, procedural, and functional means for activating and maintaining the actual link between systems. |
| _____ Session      | C. This layer provides network services to user applications.   |
| _____ Transport    | D. This layer prepares packets for physical transmission across the network medium.   |
| _____ Network      | E. This layer provides data representation, encryption and compression.   |
| _____ Data Link    | F. This layer starts, stops, and re-synchronizes two computers as they communicate.   |
| _____ Physical     | G. This layer determines the best way to move data from one place to another across a network or the Internet.                                      |

## PNIE - Module 2

# Networking Basics

### Vocabulary

Define the following terms. Use the online curriculum for help.

Bus topology -

Bridge -

Crosstalk -

Dual ring topology -

Extended star topology -

Hierarchical topology -

Hub -

IP -

ISO -

ISP -

LAN -

MAN -

Mesh topology -

Network -

NIC -

OSI -

PBX -

PSTN -

Ring topology -

Router -

Star topology -

## **PNIE - Module 2 Networking Basics**

Structured cabling system -

Subnetwork -

Telco -

Topology -

WAN -

# PNIE - Module 2

## Networking Basics

### Focus Questions

1. Name three types of media through which computers on a network can be linked together.
2. Who developed the Internet and why?
3. What are six benefits of networking computers?
4. What does the quality of the cabling and installation determine?
5. If one cable fails in a bus topology, what happens to the connected devices?
6. If one cable fails in a star topology, what happens to the connected devices?

## **PNIE - Module 2 Networking Basics**

7. If one cable fails in a hierarchical topology, what happens to the connected devices?

8. If one cable fails in a ring topology, what happens to the connected devices?

9. If one cable fails in a mesh topology, what happens to the connected devices?

10. Why are repeaters used in a network?

11. What is the 5-4-3 rule?

12. What are the three most common wiring errors made by cable installers?

## PNIE - Module 2

# Networking Basics

### Review Questions

1. What does PBX stand for?
  - a. Private branch exchange
  - b. Public branch exchange
  - c. Private building exchange
  - d. Public building exchange
2. What are components of a computer network?
  - a. Workstations, printers, scanners
  - b. Hubs, bridges, repeaters
  - c. Copper cable and fiber-optic cable
  - d. All of the above
3. A LAN is:
  - a. A network that spans a small sized area
  - b. A network that spans a medium sized area
  - c. A network that spans a large sized area
  - d. Another name for the Internet
4. The actual arrangement of a network is referred to as:
  - a. Ethernet topology
  - b. Hierarchical topology
  - c. Logical topology
  - d. Physical topology
5. Which of the following are examples of typical physical topologies?
  - a. Bus, Ring, Star
  - b. Bus, Ring, Internet
  - c. Bus, Ring, Ethernet
  - d. Bus, Star, Ethernet
6. A \_\_\_\_\_ physical topology uses a single length of cable that runs from one end of the network to the other. Backbone cable could be used in a star or bus topology, backbone cabling refers to the cable that runs between telecommunication rooms and buildings.
  - a. Star
  - b. Bus
  - c. Ring
  - d. Mesh

## PNIE - Module 2

### Networking Basics

7. What is the name of the ISO standard that defines a framework for implementing network protocols in seven separate layers?
  - a. Open System Internet model
  - b. Open Standards Internet model
  - c. Open System Interconnection model
  - d. Open Standards Interconnect model
  
8. What layer of the OSI model is the media?
  - a. One
  - b. Three
  - c. Two
  - d. Four
  
9. What is the standard for a Token passing network?
  - a. 803.3
  - b. 803.5
  - c. 802.3
  - d. 802.5
  
10. The most common type of network is:
  - a. Mesh
  - b. Ethernet
  - c. Backbone
  - d. Star

## **PNIE - Module 3**

### **Signals and Wires**

Signal transmission is the conveyance of information over a certain type of media. The media can be copper wires, fiber optics, or wireless. Accurate delivery of information requires a reliable media with predictable properties. Physical limitations such as length and attenuation, coupled with anomalies such as reflections and crosstalk can limit the amount or accuracy of the data transmitted. If properties are predictable, transmission equipment can be designed to generate signals that can be reliably delivered on any type of media.

#### **Concept Questions**

1. How does impedance mismatch affect the transmission of data through a cable?
2. How does wireless transmission of data work?
3. Why is impedance more easily controlled by the cable installer than attenuation?
4. What is crosstalk?
5. Shielding and cancellation are methods that deal with RFI and EMI. How are these methods different?



## **PNIE - Module 3 Signals and Wires**

12. What is refraction?

13. How is bandwidth measured?

14. How are baseband and broadband different?

15. How can telephone signals and digital subscriber line (DSL) signals be carried on the same wires without interfering with one another?

16. Why is ISDN faster than a dial-up modem?

17. What is a token used for in a token-ring network?

## PNIE - Module 3 Signals and Wires

### Vocabulary

Define the following terms. Use the online curriculum for help.

Amp -

ATM -

Attenuation -

Bandwidth -

Bonding -

CO -

Current -

DB -

Demodulation -

DOCSIS -

DS0 -

DS3 -

DSL -

DSLAM -

E1 -

EMI -

ESD -

FDDI -

GE -

GFCI -

Ground -

## PNIE - Module 3 Signals and Wires

Ground loop -

Impedance -

Impedance mismatch -

ISDN -

Modulation -

MPOE -

Near-end crosstalk -

OC -

Ohm -

Power -

PSTN -

Reflection -

Refraction -

Resistance -

RFI -

T1 -

TBB -

TBBIBC -

TGB -

TMGB -

UPS -

Volt -

Voltage -

## PNIE - Module 3 Signals and Wires

### Focus Questions

1. Name three types of wireless transmission.
2. Describe the affect of attenuation.
3. What causes coupling loss in fiber-optic cable?
4. If E is 120 volts, and the circuit has a load of 10 amps, calculate the wattage.
5. If a circuit has 48 volts and a resistance of 1000 ohms, calculate the amperage.
6. Bonding and grounding eliminates a difference in voltage potential, explain why this is important.
7. When using a fiber optic cable, is it necessary to bond and ground? Explain.
8. Give at least two reasons why outside plant cables are not allowed to run more than 50 feet exposed inside of a building.

## **PNIE - Module 3 Signals and Wires**

9. In a wireless system, explain what measures can be taken to deal with security issues.
  
  
  
  
  
  
  
  
  
  
10. Describe how a modem can transmit and receive digital signals over an analog telephone line.
  
  
  
  
  
  
  
  
  
  
11. Describe what 10Base5 means.
  
  
  
  
  
  
  
  
  
  
12. Data over cable is delivered on how many 6-MHz channels?
  
  
  
  
  
  
  
  
  
  
13. Name at least three non-POTS services.
  
  
  
  
  
  
  
  
  
  
14. Where would you find a DSLAM?
  
  
  
  
  
  
  
  
  
  
15. What is most significant about ATM?

# PNIE - Module 3

## Signals and Wires

### Review Questions

1. What shows the relationship between amps, ohms, and volts?
  - a. Ground loop
  - b. Ohm's Law
  - c. Resistance theory
  - d. ESD
2. What can cause distortion in electronic signaling equipment used in networks?
  - a. Ground loops
  - b. Impedance
  - c. Fiber-optic cables
  - d. DSL
3. What is the process of interconnecting equipment that is grounded?
  - a. Modulation
  - b. Bonding
  - c. Grounding
  - d. Shielding
4. What is the measurement of how much resistance the flow of electrons encounters when traveling down a wire known as?
  - a. EMI
  - b. RFI
  - c. Capacitance
  - d. Impedance
5. What is it called when distance decreases the strength of a signal?
  - a. Capacitance
  - b. Attenuation
  - c. Impedance
  - d. Resistance
6. What are the electrical fields that emanate from electric motors and florescent light fixtures that interfere with the signals that are traveling down cables?
  - a. EMI
  - b. RFI
  - c. Impedance
  - d. None of the Above

## PNIE - Module 3 Signals and Wires

7. When signals inadvertently pass out of one wire within the cable and onto an adjacent one it is known as:
  - a. Interference
  - b. Crosstalk
  - c. Impedance
  - d. RFI
  
8. Two successful techniques that cable designers use in dealing with EMI and RFI are \_\_\_\_\_ and \_\_\_\_\_.
  - a. Impedance and attenuation
  - b. Cancellation and impedance
  - c. Cancellation and shielding
  - d. Shielding and attenuation
  
9. What is a static electricity discharge in the electronic environment of cables and networking called?
  - a. EMI
  - b. RFI
  - c. UPS
  - d. ESD
  
10. Properly installed telecommunications grounding will do the following except:
  - a. Eliminate the need for further protection in the form of surge suppressors and uninterrupted power supplies
  - b. Provide lower system ground reference impedance
  - c. Minimize electrical surge (spike) effects
  - d. Augment electrical grounding
  
11. OSP (outside plant cable) should not be run more than how many feet into a building unless it is within conduit?
  - a. 15
  - b. 30
  - c. 50
  - d. 90



## PNIE - Module 4 Copper Media

5. What is a cable type code?

6. How is inside plant cable constructed?

7. Fill in the chart with information from the online curriculum:

Wire Type	AWG	Bandwidth	Data Rate	Impedance
Category 3 UTP				
Category 4 UTP				
Category 5 UTP				
Category 5e UTP				

8. How is the proposed Category 6 cable different from Category 5e cable?



## PNIE - Module 4

### Copper Media

#### Vocabulary

Define the following terms. Use the online curriculum for help.

AWG -

Cable plant -

Category -

Coaxial -

Firewall -

Gigabit Ethernet -

HVAC -

IDC -

Insulation -

IP telephony -

Plenum –

Thicknet -

Thinnet -

USOC -

# PNIE - Module 4

## Copper Media

### Focus Questions

1. What organization governs the type of cables used in different installations?
2. What is the most common connector for terminating a twisted pair cable?
3. What is the current acceptable wire category for new data cable installations?
4. What is the most common coaxial cable currently in use? What type of connector is used to terminate it?
5. List at least four issues that affect cabling performance.

## **PNIE - Module 4 Copper Media**

6. What are three inherent disadvantages to using coaxial cable?

7. What are the three characteristic impedances of coaxial cable?

8. Why are some cables stranded?

9. Why are cables insulated?

10. Describe UTP, STP, and ScTP

## PNIE - Module 4

### Copper Media

#### Review Questions

1. What type of cable does not support Ethernet and is used only for POTS?
  - a. Category 1
  - b. Category 3
  - c. Category 5
  - d. Category 5e
2. How are Category 5 and Category 5e different?
  - a. Category 5e has a thicker shield and jacket
  - b. Category 5 has a thicker shield and jacket
  - c. Category 5e resists more crosstalk
  - d. Category 5e can transmit data both ways, but Category 5 cannot
  - e. It depends on the manufacturer
3. What shields UTP cable wires from EMI and RFI?
  - a. Grounding
  - b. Shielding
  - c. Braiding
  - d. Cancellation
4. According to EIA/TIA 568B, what color is the wire on pin 3?
  - a. White/Orange
  - b. White/Green
  - c. White/Blue
  - d. White/Brown
5. Which of the following cables can send data the farthest?
  - a. Coaxial
  - b. Twisted pair
  - c. Single mode fiber
  - d. Multimode fiber
6. What isolates the TMGB from the backboard?
  - a. Brass screws
  - b. Brass standoffs
  - c. Insulated standoffs
  - d. Insulated screws

## PNIE - Module 4

### Copper Media

7. What is the gauge of wire used for bonding and grounding telecommunications equipment?
  - a. Minimum AWG #6, but it can be larger
  - b. AWG #6
  - c. Minimum AWG #3, but it can be larger
  - d. AWG #3
  - e. There is no minimum or maximum gauge
  
8. Which of the service entrances has the lowest cost of installation?
  - a. Buried
  - b. Aerial
  - c. Tunnel
  - d. Wireless
  
9. In a 25-pair binder group, what is the order of the tip colors?
  - a. Blue, Orange, Green, Brown, and Slate
  - b. Blue, Green, Orange, Brown, and Slate
  - c. White, Black, Red, Yellow, and Violet
  - d. White, Red, Black, Yellow, and Violet
  
10. In a 25-pair binder group, what is the order of the ring colors?
  - a. White, Black, Red, Yellow, and Violet
  - b. White, Red, Black, Yellow, and Violet
  - c. Blue, Orange, Green, Brown, and Slate
  - d. Blue, Green, Orange, Brown, and Slate
  
11. In what binder group is pair 194?
  - a. Green/Red
  - b. Red/Green
  - c. Red/Orange
  - d. Orange/Red
  
12. In what binder group is pair 342?
  - a. Green/Black
  - b. Black/Green
  - c. Black/Brown
  - d. Brown/Black
  
13. How much more loss than solid-conductor cables do stranded-conductor cables have?
  - a. 15 percent
  - b. 20 percent
  - c. 25 percent
  - d. 30 percent

## PNIE - Module 4 Copper Media

14. What is the impedance of ScTP cable?
  - a. 50 ohms
  - b. 75 ohms
  - c. 93 ohms
  - d. 100 ohms
  
15. What is the impedance of RG6 cable?
  - a. 50 ohms
  - b. 75 ohms
  - c. 93 ohms
  - d. 100 ohms
  
16. Another name for an RJ45 modular connector is:
  - a. RJ46
  - b. RJ48
  - c. 6P8C
  - d. 8P8C
  
17. In a connector terminated with the T568B scheme, what color wires are on pins 3 and 6?
  - a. Blue/white-Blue
  - b. Orange/white-Orange
  - c. Green/white-Green
  - d. Brown/white-Brown
  
18. What media is terminated with a universal data connector?
  - a. STP-A cable
  - b. Coaxial cable
  - c. ScTP cable
  - d. UTP cable
  
19. When terminating Series 6 coaxial cable, what type of connector is used?
  - a. N-type connector
  - b. FJ-type connector
  - c. F-type connector
  - d. BNC connector
  
20. A 50-pin telco connector is terminated through the use of what tool?
  - a. Scotchlok tool
  - b. A telco tool
  - c. Butterfly tool
  - d. Multi-punch tool

## PNIE - Module 4

### Copper Media

21. What is the name of the component in a communication system that is the building's grounding electrode?
- TBB
  - TBBIBC
  - TGB
  - TMGB
22. According to the NEC, what is the minimum size of the grounding electrode conductor?
- #2
  - #4
  - #6
  - #8
  - This is not stated by the NEC, it is stated by TIA/EIA
23. How many TGBs are installed in a structured cabling system?
- One in each building
  - One in each TR
  - One
  - One for each cable
  - One for each floor of each building





## PNIE - Module 5

### Fiber Optic Media

#### Vocabulary

Define the following terms. Use the online curriculum for help.

Amplitude -

Angle of incidence -

Attenuation -

Buffer -

Cladding -

Core -

Demultiplexing -

Fiber-optic cable –

ILD –

LASER –

LED –

Modal dispersion -

Multimode -

Multiplexing –

OVD -

Reflection -

Refraction -

Refractive index -

Single-mode -

Transmitter -

# PNIE - Module 5

## Fiber Optic Media

### Focus Questions

1. Why are single-mode electronics so much more expensive than multimode?
2. What is the core size of a typical single-mode fiber?
3. What makes fiber optics immune to EMI and RFI?
4. According to the EIA/TIA standard, what is the maximum distance for multimode fiber?
5. According to the EIA/TIA standard, what is the maximum distance for single-mode fiber?
6. If the signal strength in a single-mode fiber is diminishing because of the distance of the run, what can correct the problem?



# PNIE - Module 5

## Fiber Optic Media

### Review Questions

1. Fiber optics use light to translate data into which of the following? What is data translated into to transmit through fiber optics?
  - a. Packet Code
  - b. Morse Code
  - c. Binary Code
  - d. Bit Code
  
2. What is Aramid yarn?
  - a. The central part of the fiber-optic cable
  - b. A protective layer that surrounds the jacket
  - c. The strength member of the fiber
  - d. The material surrounding the core of the fiber
  
3. Which of the following statements is true?  
Wearing safety glasses protects your eyes when terminating fiber  
When terminating fiber, proper ventilation is a must  
Loose fibers are safe to pick up with your fingers  
The invisible light from a laser cannot hurt your eyes
  
4. What should be used when picking up loose fiber ends?
  - a. Safety gloves
  - b. Rubber gloves
  - c. Safety tabs
  - d. All of the above
  
5. What is the name of the outer part of a fiber-optic cable?
  - a. Core
  - b. Cladding
  - c. Jacket
  - d. Buffer
  
6. In a fiber-optic cable, which part is made from Aramid yarn?
  - a. Strengthening buffer
  - b. Jacket
  - c. Strength member
  - d. Tensile cladding

## PNIE - Module 5

### Fiber Optic Media

7. In a fiber-optic cable, what has a low index of refraction to keep light from escaping the core?
  - a. Jacket
  - b. Buffer
  - c. Aramid yarn
  - d. Cladding
  
8. What type of optical fiber has a core size of eight to ten microns?
  - a. Single-mode
  - b. Multimode
  
9. What type of fiber-optic cable has the largest bandwidth and is often used in long distance telecommunications?
  - a. Single-mode
  - b. Multimode
  
10. Which type of fiber-optic cable is generally used for shorter runs and in LAN applications?
  - a. Single-mode
  - b. Multimode
  
11. What type of optical fiber has a core size of 50 or 62.5 microns?
  - a. Single-mode
  - b. Multimode
  
12. A fiber-optic cable that connects buildings in a campus is referred to as a:
  - a. Backbone cable
  - b. Horizontal cable
  
13. The outer jacket of single-mode fiber is typically what color?
  - a. Yellow
  - b. Orange
  
14. The outer jacket of multimode fiber is typically what color?
  - a. Yellow
  - b. Orange
  
15. What is the standard for measuring power loss of single-mode optical fiber cables?
  - a. ANSI/EIA/TIA 526-7
  - b. ANSI/EIA/TIA 526-14
  - c. ANSI/EIA/TIA 526-17
  - d. TSB-67

## **PNIE - Module 5 Fiber Optic Media**

16. A tight-buffered optical fiber cable is normally used for outdoor applications.
- a. True
  - b. False
17. What is the color of the boot or housing of an SC connector that terminates multimode optical fiber cable?
- a. Yellow
  - b. Beige
  - c. Orange
  - d. Red
18. In what article does the NEC cover electrical grounding and bonding?
- a. 568-B.2
  - b. Article 250
  - c. 568-B.3
  - d. Article 8003





# PNIE - Module 6

## Introduction to Cabling Standards

### Vocabulary

Define the following terms. Use the online curriculum for help.

ACA –

ACIF –

ANSI -

AS/NZS -

CE -

CEC -

CENELEC -

Code -

CSMA/CD -

EIA -

ICBO -

IEC -

IEEE -

IITAB -

ISO -

JISC -

JSA -

NEC -

NECA -

NFPA -

OSI -

QoS -

SA -

SCC -

Standard -

TIA -

TSB -

UL -

# **PNIE - Module 6**

## **Introduction to Cabling Standards**

### **Focus Questions**

1. What is the purpose of the OSI model?
2. How are IEEE standards refined as technology advances?
3. How does CSMA/CD work?
4. How does Token Ring work?
5. What is covered in TIA/EIA-568-B.1?
6. What is covered in TIA/EIA-568-B.2?

## **PNIE - Module 6**

### **Introduction to Cabling Standards**

7. What is covered in TIA/EIA-568-B.3?

8. What is covered in TIA/EIA-569-A?

9. What is covered in TIA/EIA-570-A?

10. What is covered in TIA/EIA-606?

11. What is covered in TIA/EIA-607?

12. What does ANSI do?

13. What is covered in NEC Article 250?

## **PNIE - Module 6**

### **Introduction to Cabling Standards**

14. What is covered in NEC Article 645?

15. What is covered in NEC Article 770?

16. What is covered in NEC Article 800?

17. What is the difference between the use of the word “shall” and the use of the word “should” when it pertains to standards and codes?

18. How are local and state codes found?

19. What is the hierarchical design of code adherence?

20. What organization is NEBS affiliated with?

# PNIE - Module 6

## Introduction to Cabling Standards

### Review Questions

1. What US agency ensures that businesses must comply with certain safety practices that protect workers on the job site?
  - a. EIA/TIA
  - b. NEC
  - c. OSHA
  - d. NFPA
2. What section of the NEC covers most telecommunications issues?
  - a. Section 150
  - b. Section 800
  - c. Section 250
  - d. Section 200
  - e. B and C
3. Bonding and grounding is covered by which ANSI/TIA/EIA standard?
  - a. ANSI/TIA/EIA 586-A
  - b. ANSI/TIA/EIA 586-B.3
  - c. ANSI/TIA/EIA 607
  - d. ANSI/TIA/EIA 606
  - e. None of the above
4. Codes address what primary purpose?
  - a. Consistency
  - b. Safety
  - c. Uniformity
  - d. Performance
5. Standards are written to ensure?
  - a. Quality
  - b. Uniformity
  - c. Safety
  - d. Consistency
6. The NEC requires that optical fiber be marked for its suitability for a particular application. What NEC article is responsible for defining the markings for optical fiber cables?
  - a. NEC Article 800
  - b. NEC Article 770
  - c. NEC Article 646
  - d. NEC Article 820

## PNIE - Module 6

### Introduction to Cabling Standards

7. Communications cabling is covered in which chapter of the NEC?
  - a. Chapter 5
  - b. Chapter 9
  - c. Chapter 7
  - d. Chapter 8
  
8. By what other name is the NEC known?
  - a. NFPA-1
  - b. NFPA-50
  - c. NFPA-70
  - d. NFPA-780
  
9. CEC part one covers?
  - a. Canadian electrical safety standards including telecommunications
  - b. California electrical safety standards including telecommunications
  - c. Construction electrical safety standards including telecommunications
  - d. Collected electrical safety standards including telecommunications
  
10. What is covered in ANSI/EIA/TIA-568-B.1?
  - a. Commercial building cabling
  - b. Cabling pathways and spaces
  - c. Telecommunications grounding and bonding
  - d. Telecommunications cabling administration
  
11. What standard governs pathways and spaces?
  - a. ANSI/TIA/EIA-568-A
  - b. ANSI/TIA/EIA-569-A
  - c. ANSI/TIA/EIA-570-A
  - d. ANSI/TIA/EIA-606
  
12. What is the TIA/EIA standard for residential cabling?
  - a. ANSI/TIA/EIA-569-A
  - b. ANSI/TIA/EIA-568-A
  - c. ANSI/TIA/EIA-570-A
  - d. ANSI/TIA/EIA-606
  
13. What TIA/EIA standard governs labeling for telecommunications cabling and administration?
  - a. ANSI/TIA/EIA-568-A
  - b. ANSI/TIA/EIA-569-A
  - c. ANSI/TIA/EIA-570-A
  - d. ANSI/TIA/EIA-606

## PNIE - Module 6

### Introduction to Cabling Standards

14. What is the TIA/EIA standard for grounding and bonding?
- ANSI/TIA/EIA-568-A
  - ANSI/TIA/EIA-569-A
  - ANSI/TIA/EIA-606
  - ANSI/TIA/EIA-607
15. Name the international standards organization standard for generic-cabling systems.
- ISO/IEC 11801
  - CENELEC EN 50173
  - AS/NZS 3080-A
  - JIS X5150
16. Which code or standard does not provide design guidelines for bonding and grounding?
- NEC Article 250
  - NEC Article 770
  - NEC Article 800
  - ANSI/EIA/TIA 607 standard
17. Areas that have \_\_\_\_\_ or more thunderstorms per year are considered exposed to a lightning hazard for inter-building circuits.
- 6
  - 10
  - 35
  - 50
  - 100
18. A made electrode is the same as a driven ground rod.
- True
  - False
19. NEC \_\_\_\_\_ covers grounding and bonding for telecommunications cables?
- Article 250
  - Article 90
  - Article 645
  - Article 800





# PNIE - Module 7

## Structured Cabling

### Vocabulary

Define the following terms. Use the online curriculum for help.

Backbone -

CP -

Demarc -

EF -

ER -

HC -

Horizontal cabling -

IC -

MC -

MPOE -

MUTOA -

POP -

TR -

Vertical cabling -

Wiring density -

# **PNIE - Module 7**

## **Structured Cabling**

### **Focus Questions**

1. What are the four rules of structured cabling?
2. What are the five subsystems of structured cabling?
3. For what part of the structured cabling installation is the service provider responsible?  
The customer?
4. How is the size of the demarc space determined?
5. Why is humidity important in a TR?

## PNIE - Module 7 Structured Cabling

6. Match each color with its designation according to TIA/EIA-606:

_____	Orange	A. First-level backbone
_____	Green	B. Horizontal cable
_____	Purple	C. Inter-building backbone
_____	White	D. Miscellaneous
_____	Gray	E. Reserved for future use
_____	Blue	F. Demarcation point
_____	Brown	G. Common equipment
_____	Yellow	H. Network connections
_____	Red	I. Second-level backbone

7. A crossover cable is commonly used in what application?

8. For what is a straight-through cable used?

9. For what is a rollover cable used? How is it wired?

## **PNIE - Module 7 Structured Cabling**

10. What are the two ways in which a HC can be connected to the MC?

11. What four items make up backbone cabling?

12. What does the TIA/EIA-568-B.1 standard say about MUTOAs?

13. What is its UL rating?

14. What is icky pic?

# PNIE - Module 7

## Structured Cabling

### Review Questions

1. What is the division between the service provider's cabling and the customer's cabling called?
  - a. Backbone
  - b. Demarc
  - c. MC
  - d. MPOE
2. What is the standard thickness of the plywood in a wiring closet?
  - a.  $\frac{1}{4}$  in.
  - b.  $\frac{1}{2}$  in.
  - c.  $\frac{3}{4}$  in.
  - d. 1 in.
3. When a cable is terminated using the T568A scheme at one end and the T568B scheme at the other end, what is it called?
  - a. Patch cable
  - b. Crossover cable
  - c. Rollover cable
  - d. Category 5e cable
4. What type of cable connects an IC to a MC?
  - a. Vertical
  - b. Rollover
  - c. Horizontal
  - d. Crossover
5. What type of cables should work area cables be?
  - a. Solid
  - b. Stranded
  - c. It does not matter
6. Into which of the following phases does cable testing fall?
  - a. Rough-in
  - b. Trim-out
  - c. Finish
  - d. Customer support
7. What makes up a typical zone?
  - a. Six to eight workstations
  - b. A single floor
  - c. An entire building
  - d. An entire cable plant

## PNIE - Module 7

### Structured Cabling

8. Where would a CP be mounted?
  - a. On a wall
  - b. In the ceiling
  - c. Below the floor
  - d. All of the above
  
9. What is used most often in a cubicle environment and routes cables into faceplates?
  - a. MUTO
  - b. HC
  - c. IC
  - d. CP
  
10. What is used most often in a cubicle environment and routes cables into networked computers?
  - a. MUTOA
  - b. HC
  - c. IC
  - d. CP
  
11. Structured cabling is all the devices and cable from a building's entry point to what location?
  - a. HC
  - b. ER
  - c. TR
  - d. Work area
  - e. All of the above
  
12. Computers, fax machines, and telephones are typically found in the:
  - a. Consolidation point
  - b. TR
  - c. Work area
  - d. Equipment room
  
13. What type of cabling is between the TR and the work area?
  - a. Vertical
  - b. Point of presence
  - c. Horizontal
  - d. Work area
  
14. What is the main trunk that is brought to the TR for the horizontal cabling connections called?
  - a. Demarc
  - b. Backbone
  - c. Work area
  - d. Consolidation point

## PNIE - Module 7

### Structured Cabling

15. What is the place where the outside cabling interfaces with the backbone cabling in a cable plant?
  - a. Work area
  - b. Equipment room
  - c. Telecommunications room
  - d. Entrance facility
  
16. The connections between backbone and horizontal cabling and networking equipment are housed in the:
  - a. TR
  - b. Entrance facility
  - c. Work area
  - d. IC
  
17. What type of a group is the TIA/EIA?
  - a. Federal bureau
  - b. Industry trade association
  - c. Government agency
  - d. Union
  
18. When TIA/EIA standards are followed, the cable plant will:
  - a. Comply with the law
  - b. Meet stated performance levels
  - c. Comply with safety requirements
  - d. All of the above
  
19. How many feet must an OSP be terminated upon entering a building unless it is enclosed in metallic conduit?
  - a. 50 feet
  - b. 50 meters
  - c. 90 meters
  - d. 90 feet
  
20. What is the maximum distance for a horizontal cable run?
  - a. 90 feet
  - b. 100 feet
  - c. 90 meters
  - d. 100 meters
  - e. It depends on the type of cable being installed
  
21. How many backbone levels can a structured cabling installation have?
  - a. 1
  - b. 2
  - c. 3
  - d. 4

## PNIE - Module 7

### Structured Cabling

22. What is the maximum distance for a backbone cable run?
- 90 feet
  - 100 feet
  - 90 meters
  - 100 meters.
  - It depends on the type of cable being installed
23. What type of topology does the TIA/EIA recommend for horizontal and backbone cabling?
- Ring
  - Star
  - Bus
  - It does not matter
  - It depends on the type of cable being installed
24. What are patch panels and punch-down systems used for?
- Interconnections
  - Cross-connections
  - Outlet connections
  - A and B
  - B and C
25. All four walls of a TR must have:
- Electrical outlets
  - $\frac{3}{4}$ -in. plywood backboard of at least A/C grade
  - Doors
  - Cable management
  - None of the above
26. Which of the following permanent building entrances is the most cost effective?
- Conduit
  - Aerial
  - Buried
  - It depends on the type of cable being installed
27. What protects telecommunications cables from sneak current?
- Primary protectors
  - Secondary protectors
  - Primary and secondary protectors
  - Surge protectors

## **PNIE - Module 8**

### **Tools of the Trade**

Voice and data cable installation requires the use of specialized tools and test equipment. Knowledge in the use of the tools is essential for a proper and efficient installation. Strippers, crimpers, and insulation displacement termination tools are used on a daily basis by the cable installer. Tone generators, telecommunications test sets, and special cable testing tools are necessary to ensure an accurate and trouble free installation.

Tool safety goes hand in hand with proficiency. Many tools within the cable industry are sharp and can cause injury. Job safety also includes materials and chemicals that might be used on the job site. The Occupational Safety & Health Administration (OSHA) has specific requirements regarding the information required on the job site. If hazardous materials such as cleaners for fiber-optic cable are used, material safety data sheets (MSDSs) are required on the job site.

Professionalism includes appearance and speech. Loud outbursts when working in an office environment can be disruptive to the other workers. Professionalism includes an over all attitude and ethical behavior.

#### **Concept Questions**

1. Explain why safety glasses are required on cable installation job sites.
2. Explain why using the right tool for the job is important in cable installation.
3. Why are special tools required for coaxial cable?
4. How do certification meters differ from other test equipment?

## **PNIE - Module 8 Tools of the Trade**

5. Why would you use a tone and probe set?
  
  
  
  
  
  
  
  
  
  
6. What tools can aid in cable placement?
  
  
  
  
  
  
  
  
  
  
7. Why are expensive high quality tools generally a better value than cheap tools?
  
  
  
  
  
  
  
  
  
  
8. Describe why professionalism is important on the job site.
  
  
  
  
  
  
  
  
  
  
9. Working in groups can increase productivity. What can the cable installer do to contribute to an effective group?
  
  
  
  
  
  
  
  
  
  
10. Explain why ethics is important for a cable installer.

## PNIE - Module 8

### Tools of the Trade

#### Vocabulary

Define the following terms. Use the online curriculum for help.

Splicing –

Banjo -

Scotchlok -

Voltage sensor -

MSDS -

Telephone test set -

Tone and probe set -

RSI -

Cablemeter -

Multimeter -

Certification meter -

Cable caster -

Fish tape -

## **PNIE - Module 8 Tools of the Trade**

### **Focus Questions**

1. Where would a cable caster be used?
2. Why is fiberglass fish tape preferred over steel fish tape?
3. Why is a jacket-stripping tool preferred over electrician's scissors or a knife?
4. What are the advantages of the multi-punch tool over the single punch tool?
5. Why should common pliers not be used with Scotchlock splice connectors?
6. Why do crimpers have ratcheting jaws?
7. What tests can be completed with a local-area network (LAN) cable meter?

## **PNIE - Module 8 Tools of the Trade**

8. A multimeter can measure opens and shorts. A multimeter can also contribute to job safety. Explain how.
  
9. What makes the banjo adaptor a versatile tool?
  
10. Why is a material safety data sheet important to have on the job site?
  
11. What causes RSI?
  
12. What are some guidelines for professionalism?
  
13. Stud sensors are used to find studs in covered walls. What are two different reasons to find a stud?
  
14. How are telecommunications test sets used?

# PNIE - Module 8

## Tools of the Trade

### Review Questions

1. Hidden low voltage wires inside walls can be found using which of the following tools?
  - a. Tone and probe
  - b. Wire finder
  - c. Multimeter
  - d. Cablemeter
2. MSDS is an acronym for which of the following?
  - a. Material security data sheet
  - b. Material safety data sheet
  - c. Multimeter safety data sheet
  - d. Material safety determination sheet
3. Which of the following tools would be used to terminate a cable on a 110 block?
  - a. Copper snip tool
  - b. Wire probe
  - c. Punch-down tool
  - d. Diagonal cutters
4. Which of the following tools would be used to listen for noise on a telephone circuit?
  - a. Banjo
  - b. Telephone test set
  - c. Tone and probe
  - d. Multimeter
5. The \_\_\_\_\_ and \_\_\_\_\_ of a person account for over 80 percent of the message sent when speaking.
  - a. Eye contact, tone of voice
  - b. Clothing, manner of speaking
  - c. Hair cut, body language
  - d. Body language, tone of voice
  - e. None of the above
6. About how long does it take a person to form an initial impression of a cable installer?
  - a. 15 seconds
  - b. 5 minutes
  - c. 10 minutes
  - d. One hour
  - e. One day's work

## PNIE - Module 8

### Tools of the Trade

7. What is a banjo used for?
  - a. To find a tone placed on individual wires inside a telecommunications outlet or jack
  - b. To access individual wires inside a telecommunications outlet or jack
  - c. To test for opens and shorts inside of a cable
  - d. To certify the transmission of a cable
  
8. Which of the following tools is used to strip the jacket from a Category 5 cable?
  - a. Cable knife
  - b. Multi-punch tool
  - c. Cable preparation tool
  - d. Snap N Seal tool
  
9. Which of the following tools is used to seat C clips?
  - a. Snap N Seal tool
  - b. Banjo
  - c. Multi-punch tool
  - d. Cable preparation tool
  
10. What is a LAN cablemeter able to test?
  - a. Impedance
  - b. DC loop resistance
  - c. Propagation delay
  - d. Return loss
  - e. None of the above



## **PNIE - Module 9**

### **Cabling Installation Process**

3. What is the difference between schematic diagrams and equipment diagrams?

4. Why are as-built documents one of the most important parts of completing a cabling project?

5. What role does the pre-bid meeting play in the sales phase of a cabling project?

## **PNIE - Module 9**

# **Cabling Installation Process**

### **Vocabulary**

Define the following terms. Use the online curriculum for help.

RFP –

AIA -

Take offs -

Cut sheets -

Notice to proceed -

Punch list -

Lien -

# **PNIE - Module 9**

## **Cabling Installation Process**

### **Focus Questions**

1. What are the five phases that cover all aspects of a cabling project?
2. What is involved in the pre-sales/sales phase?
3. What is involved in the rough-in phase?
4. What is involved in the trim-out phase?
5. What is involved in the finish phase?
6. What is involved in the customer support phase?
7. Name at least five items that would be found in a RFP.



## **PNIE - Module 9**

### **Cabling Installation Process**

15. When are as-built drawings created?

16. Give two examples of crew sizes and times for the completion of a project estimated to take 600 hours.

17. What three components are included in loaded labor?

18. List at least three things to consider when selecting a supplier.

19. What is a force majeure clause in a contract?

20. What is a lien waiver and how is it used?

21. What can be included in a contract that will help eliminate disputes at the end of a project?

# PNIE - Module 9

## Cabling Installation Process

### Review Questions

1. What allows the contractor the opportunity to find issues not well represented in the specifications or drawings of a cable installation?
  - a. Force majuer
  - b. Contract
  - c. Project site walkthrough
  - d. Pre-bid meeting
2. When estimating labor cost, what is the first step?
  - a. Consult the Department of Labor.
  - b. Divide individual tasks into logical units and then assign the amount of time it takes to complete each task.
  - c. Research the company's previous jobs to find out the maximum amount of previous payments received.
  - d. Divide individual tasks by the number of workers on the crew and multiply by two.
3. What is the symbol for a telephone on a blueprint?
  - a. D
  - b. R
  - c. T
  - d. E
4. Which portion of the blueprints will help determine the North/South orientation?
  - a. Architectural
  - b. Mechanical
  - c. Electrical
  - d. Site plan
  - e. All of the above
5. Which of the following documents is the least valued by the cable installer?
  - a. Architectural plans
  - b. Mechanical plans
  - c. Electrical plans
  - d. Site plan
  - e. None of the above
6. Which of the following terms refers to building plans?
  - a. Blueprints or drawings
  - b. Blueprints and project prints
  - c. Blueprints or designs
  - d. Blueprints and sketches

## **PNIE - Module 9**

### **Cabling Installation Process**

7. For what does the acronym AMES stand?
  - a. Architectural, mechanical, elevations, and statistics
  - b. Architectural, mechanical, environmental, and structural
  - c. Architectural, mechanical, electrical, and structural
  - d. Architectural, mechanical, electrical, and sites
  
8. Which of the following drawings shows the location of a building in a campus?
  - a. Architectural plan
  - b. Mechanical plan
  - c. Electrical plan
  - d. Site plan
  
9. Which of the following people normally create telecommunications drawings?
  - a. The site manager
  - b. An electrical engineer
  - c. An architect
  - d. An RCDD
  
10. What two general categories divide pre-cabling preparation?
  - a. Installation and testing
  - b. Construction and testing
  - c. Planning and construction
  - d. Planning and installation
  
11. Before installing cable on any job, what is the first task that should be performed?
  - a. Cut-sheets
  - b. Blueprint creation
  - c. Ordering of materials
  - d. Site survey
  
12. Two well known formal planning tools for creating a job plan are:
  - a. MS Project and MS Visio
  - b. GANTT chart and MS Project
  - c. PERT chart and GANTT chart
  - d. PERT chart and MS Visio





# PNIE - Module 10

## Cabling Rough-In

### Vocabulary

Define the following terms. Use the online curriculum for help.

Bullwheel –

Cable jack -

Cable tree -

Cementitious –

Elastomeric -

IC -.

Intumescent -

Kellem grip -

MC -.

Plenum -

Raceway –

Reel rollers -

Rough-in -

Service loop -

Staging area -

# PNIE - Module 10

## Cabling Rough-In

### Focus Questions

1. Identify at least three guidelines to follow when installing horizontal cable.
2. Identify at least three precautions that should be taken when pulling horizontal cable.
3. Why would it be easier to pull cables from an upper floor to a lower floor?
4. Identify at least three guidelines to ensure the success of a cutover.
5. What is the recommended procedure when labeling cable during an installation?
6. What is the minimum bend radius for high-performance network cables?



# PNIE - Module 10

## Cabling Rough-In

### Review Questions

1. What is the maximum fill capacity for conduit?
  - 20 percent
  - 30 percent
  - 40 percent
  - 50 percent
  
2. What type of cable must not be placed without a supporting structure unless it is able to support its own weight?
  - a. Aerial
  - b. Horizontal
  - c. Backbone
  - d. Plenum
  
3. What is a raceway?
  - A type of cable management
  - A containment item that houses cable
  - The busiest segment on a network
  - Another name for plenum
  
4. What is the purpose of a surface mount raceway?
  - a. Conceal cable
  - b. Protect cable
  - c. Route cable
  - d. All of the above
  
5. What type of separation does the NEC and TIA/EIA require between low voltage cable and power cables within the same raceway?
  - a. Permanent
  - b. Removable
  - c. One inch thick
  - d. Non-conductive
  - e. All of the above
  
6. The TIA/EIA states that a pull box must be used after what amount and type of bends in conduit?
  - a. Two bends totaling no more than 180 degrees
  - b. Three bends of no more than 90 degrees each
  - c. Any number of bends, with a maximum of 360 degrees
  - d. Any number of bends totaling no more than 180 degrees
  - e. The TIA/EIA states that telecommunications conduit should not be bent

## PNIE - Module 10

### Cabling Rough-In

7. During installation, to permanently secure a cable being used as a telecommunications riser, you could use:
  - a. A cable winch
  - b. A reel brake
  - c. A split grip
  - d. A cable jack
  - e. Any of the above
  
8. The easiest way to pull cable when installing in a tall building is to install:
  - a. From the top down
  - b. From the bottom up
  - c. From the center of the building
  - d. Both top down and bottom up at once
  - e. Using lengths of cable no more than 90 m
  
9. What would be used to mount a bridle ring?
  - a. Beam clamp
  - b. Bridle clamp
  - c. Kellem grip
  - d. Split grip
  
10. When mounting a backboard in a TR, what type of plywood is used?
  - a. 1/4 inch, A/C grade
  - b. 1/2 inch, A/C grade
  - c. 3/4 inch, A/C grade
  - d. 1 inch, A/C grade
  
11. When supporting horizontal communications cables, what is the distance that is recommended between J-hooks?
  - a. 48 to 60 inches
  - b. 38 to 46 inches
  - c. 32 to 48 inches
  - d. 18 to 32 inches
  
12. Between pulling points, what is the recommended maximum length of conduit that can be installed?
  - a. 30 m
  - b. 30 ft
  - c. 100 m
  - d. 100 ft

## PNIE - Module 10

### Cabling Rough-In

13. When would it be appropriate to use a bull wheel during a cable installation?
  - a. When the cable pathway is excessively long
  - b. When the cable pathway is inaccessible
  - c. When the cable pathway has sharp changes in direction
  - d. When the cable pathway is both horizontal and vertical
  
14. How is the speed of a cable that is being installed in a vertical shaft controlled?
  - a. Cable brake
  - b. Kellem grip
  - c. Quadrant block
  - d. Split grip
  
15. Which of the following methods is recommended to route cable in an open ceiling?
  - a. One section at a time
  - b. Along building lines
  - c. From the center of the building to the outside
  - d. In a straight line to reduce costs
  
16. Who is responsible for ensuring the correct methods and procedures when installing a fire stop during a cable installation?
  - a. Contractor
  - b. Crew leader
  - c. Installer
  - d. All of the above
  
17. What causes the majority of fire-related deaths?
  - a. Smoke and super-heated gases
  - b. Super-heated gases and flames
  - c. Flames and smoke
  - d. Smoke and falling debris
  
18. Which of the following are the two basic fire-rated barrier penetrations used when installing cable?
  - a. Conduit and membrane
  - b. Through and drywall
  - c. Membrane and through
  - d. Block and conduit
  
19. Which two categories are all fire-rated systems classified as?
  - a. Drywall and block
  - b. Mechanical and non-mechanical
  - c. Sealed and non-sealed
  - d. F rated and T rated

## PNIE - Module 10

### Cabling Rough-In

20. The fire-stop material that absorbs heat energy is known as:
- Conductive
  - Endothermic
  - Intumescent
  - Ablative
21. Which of the following fire-stop materials swells when exposed to heat?
- Conductive
  - Endothermic
  - Intumescent
  - Ablative
22. Which type of fire stop creates a hard char when exposed to heat or flames?
- Conductive
  - Endothermic
  - Intumescent
  - Ablative
23. What are the two primary classifications for a fire stop?
- D and F
  - F and T
  - T and D
  - D and C
24. The H rating represents what when referring to fire stops?
- High-rise building
  - Humidity rating
  - Heat rating
  - Hose stream
25. In a UL fire rating designation, what does the first alphanumeric character represent?
- Floor
  - Wall
  - Combination
  - All of the above
26. What are the two things that make up a pipe choke assembly?
- Conductive material and a metal collar
  - Cementitious material and a metal collar
  - Intumescent material and a metal collar
  - Any of the above

## PNIE - Module 10

### Cabling Rough-In

27. Which of the following are characteristics exhibited by a fire-stop caulk material?
- a. Can be any combination of intumescent, ablative, or endothermic compounds
  - b. Skins over quickly
  - c. Dries very slowly
  - d. All of the above
28. If a temporary fire stop is not installed during construction, a fire watch can be substituted for the lack of a proper installation.
- a. True
  - b. False
29. A new construction installation is much more complex than a retrofit because there are many more installers and workers to work around.
- a. True
  - b. False
30. When installing through a floor by drilling, the installer must X-ray it or at the very least identify the floor's construction.
- a. True
  - b. False

## **PNIE - Module 11**

### **Trim Out Phase**

The trim out phase adds aesthetics to the rough cable installation. Jacks are installed at the end of the cable, and wall plates are added to cover holes cut into walls. Permanent cable supports are added where necessary. In terminal areas, cables are dressed, cut to length, and terminated. One of the most important steps in the trim out phase is labeling. Cables, terminals, and jacks are all labeled to ease future administration and maintenance.

#### Concept Questions

1. How does a foldback splice differ from a butt splice?
2. Why is an insulation displacement connection used when punching down wires?
3. How is a MUTOA different from a consolidation point?
4. What is the difference between single-mode connectors and multimode connectors?



# PNIE - Module 11

## Trim Out Phase

### Vocabulary

Define the following terms. Use the online curriculum for help.

BNC connector -

Consolidation point -

Cross-connect -

D-rings -

D-type connector -

DS3 -

Duplex –

F connector -

FC connector -

IDC –

Mushroom -

MUTOA -

Patch panel -

Pin -

Raceway -

SC connector -

Service loop -

ST connector -

STP -

UTP -

# **PNIE - Module 11**

## **Trim Out Phase**

### **Focus Questions**

1. Why is it recommended to leave long cable ends in the rough in process?
2. What can be done if a cable label is inadvertently cut off or lost in the trim out phase?
3. What are some special considerations for outside plant cables that must be spliced?
4. Explain how a punch-down tool works.
5. Describe the traits of properly dressed cables.



## **PNIE - Module 11**

### **Trim Out Phase**

11. What type of cable ties must be used for outdoor applications?

12. Give two examples of applications for coaxial connectors.

13. Name four types of twisted pair terminals.

14. What does the black tracer in the fiber-optic color code signify?

15. Why should special care be taken when handling fiber-optic connectors?

# PNIE - Module 11

## Trim Out Phase

### Review Questions

1. BNC and F connectors are used to terminate which type of cable?
  - a. Fiber-optic cable
  - b. Coax cable
  - c. STP cable
  - d. UTP cable
2. Which of the following standards pertains to labeling?
  - a. T568A
  - b. EIA/TIA 570
  - c. EIA/TIA 606
  - d. T568B
3. Which of the following components terminates many horizontal cables in a single location?
  - a. MPOE
  - b. Transition point (TP)
  - c. Consolidation point (CP)
  - d. MUTOA
4. Which of the following devices can replace a transition point in a horizontal cable run?
  - a. MPOE
  - b. Transition point (TP)
  - c. Consolidation point (CP)
  - d. MUTOA
5. Which of the following fiber-optic connectors is the recognized standard for terminating fiber-optic cable?
  - a. SC and LC
  - b. SC and MT-RJ
  - c. ST and SC
  - d. ST and MT-RJ
6. Which of the following methods will not connect a fiber-optic cable properly?
  - a. Crimp
  - b. Anaerobic
  - c. Anabolic
  - d. Hot melt
  - e. All of the above

## PNIE - Module 11

### Trim Out Phase

7. What is the minimum bend radius for a fiber-optic cable?
  - a. 6 times the diameter of the cable
  - b. 8 times the diameter of the cable
  - c. 10 times the diameter of the cable
  - d. 12 times the diameter of the cable
  
8. Most telecommunications racks have all the following types of cable management except:
  - a. Front
  - b. Back
  - c. Vertical
  - d. Horizontal
  - e. None of the above
  
9. IDC is an acronym that stands for:
  - a. Insulation displacement contact
  - b. Interconnection displacement contact
  - c. Insulation displacement connection
  - d. Interconnection displacement connection
  
10. How big is one rack space on a standard telecommunications rack?
  - a. 1.25 inches
  - b. 1.5 inches
  - c. 1.75 inches
  - d. 2.0 inches
  
11. What color pair is terminated on pins 3 and 6 on a T568B jack?
  - a. White/Blue, Blue
  - b. White/Orange, Orange
  - c. White/Green, Green
  - d. White/Brown, Brown
  
12. What color pair is terminated on pins 1 and 2 on a T568A jack?
  - a. White/Blue, Blue
  - b. White/Orange, Orange
  - c. White/Green, Green
  - d. White/Brown, Brown
  
13. What color pair is terminated on pins 4 and 5 on a T568B jack?
  - a. White/Blue, Blue
  - b. White/Orange, Orange
  - c. White/Green, Green
  - d. White/Brown, Brown

## PNIE - Module 11

### Trim Out Phase

14. What color pair is terminated on pins 4 and 5 on a T568A jack?
  - a. White/Blue, Blue
  - b. White/Orange, Orange
  - c. White/Green, Green
  - d. White/Brown, Brown
  
15. Which of the following blocks uses IDC that are silver?
  - a. Krone
  - b. 66
  - c. BIX
  - d. 110
  
16. USOC is an acronym that stands for:
  - a. United States Order Code
  - b. Universal Service Official Code
  - c. Universal Service Order Code
  - d. United States Official Code
  
17. Which of the following cables uses a drain wire to ground stray voltage?
  - a. UTP cable
  - b. STP-A cable
  - c. Coaxial cable
  - d. ScTP cable
  
18. On which of the following types of cable is a universal data connector used?
  - a. UTP cable
  - b. ScTP cable
  - c. STP-A cable
  - d. All of the above because it is universal





## **PNIE - Module 12**

### **Finish Phase**

9. Why should customer service be a top priority to a cabling company?

10. Why must all problems, questions, and solutions be documented meticulously?

11. How is customer service structured within a business?

12. Why should abandoned cables be removed?

## PNIE - Module 12

### Finish Phase

#### Vocabulary

Define the following terms. Use the online curriculum for help.

ACR -

As-builts -

Attenuation -

Certification -

Channel test -

Crosstalk -

Delay skew -

ELFEXT -

FEXT -

Foreign voltage -

Link test -

Megger -

NEXT -

Power-sum ELFEXT -

## **PNIE - Module 12**

### **Finish Phase**

Propagation delay -

Return loss -

Reversal -

Short -

Specified frequency range -

TDR -

Punch list -

Warranty -

RNM -

## **PNIE - Module 12**

### **Finish Phase**

#### **Focus Questions**

1. What four common errors are found when testing cables?
2. Identify at least three tests commonly done with a multimeter.
3. Identify at least three common uses for a telephone test set.
4. When using a tone and probe, why is it unnecessary for the amplified probe to directly touch the conductor?
5. What is the only accepted performance test that is defined by EIA/TIA-568-B.1?
6. What two voltages are commonly found on cables fed by the PSTN?



## **PNIE - Module 12**

### **Finish Phase**

13. Identify at least seven tests required for cable certification.

14. What is the purpose of the final walk-through?

15. What are common items found on a punch list?

16. What items would not be covered under warranty?

17. How can the contractor minimize sending a technician to the job site for support?

18. Describe each feature of a web-enabled call center:

a. Call Back:

## **PNIE - Module 12**

### **Finish Phase**

b. Automated E-mail Response:

c. Interactive Chat:

d. Voice over Internet Protocol (VoIP):

e. Shared Web Browser Sessions:

19. What types of questions would be found in the FAQ section of a website?

# PNIE - Module 12

## Finish Phase

### Review Questions

1. Cable certification is in which phase of the project?
  - a. Finish phase
  - b. Rough-in phase
  - c. Customer support phase
  - d. Trim in phase
2. When performing a permanent link test, the patch cords are always considered to be a part of the circuit under test.
  - a. True
  - b. False
3. Which pair of items can test a fiber-optic link?
  - a. A flashlight and a VOM
  - b. A flashlight and an office locator
  - c. A light source and a power meter
  - d. A light source and an OTDR
  - e. An OTDR and a flashlight
4. In a phased cutover, the job is broken into many small segments, some of which must follow others before completion.
  - a. True
  - b. False
5. A floating backboard:
  - a. Is a technique for setting up new wiring systems or expanding old ones, while the current system is still operating
  - b. Is a technique for isolating a patch panel from ground
  - c. Uses standoff insulators
  - d. Cannot be achieved; it is a textbook idea and is impractical in real practice
  - e. Is impossible due to gravity
6. A flash cutover usually results in service loss to nearly all users for a short period of time, and a phased cutover can also result in losses of service, but to fewer customers at a time.
  - a. True
  - b. False
7. What is the standard for propagation delay and delay skew?
  - a. ANSI/TIA/EIA-568-B.2
  - b. ANSI/TIA/EIA-568-A.3
  - c. ANSI/TIA/EIA-568-A.4
  - d. ANSI/TIA/EIA-568-A.5

## PNIE - Module 12

### Finish Phase

8. What defines field testing UTP and ScTP cables?
  - a. ANSI/TIA/EIA-568-B.2
  - b. ANSI/TIA/EIA- 570 A
  - c. ANSI/TIA/EIA - 568 A
  - d. ANSI/TIA/EIA – 10BaseT
  
9. What defines centralized optical fiber cabling?
  - a. OSHA
  - b. NFPA
  - c. ASPCA
  - d. EIA/TIA
  
10. What is the first step in the cable certification procedure?
  - a. Physical inspection (visual verification)
  - b. Calibrate the cable tester
  - c. Confirm cable test to be performed
  - d. Perform the cable test
  
11. What defines the transmission requirements for UTP and STP-A cable?
  - a. ANSI/TIA/EIA-568-B
  - b. ANSI/TIA/EIA-569-A
  - c. ANSI/TIA/EIA-570-A
  - d. ANSI/TIA/EIA-606
  - e. ANSI/TIA/EIA-607
  
12. What is the most basic device to test a communication cable for continuity?
  - a. VOM or continuity tester
  - b. VOM and certification tester
  - c. Certification tester and TDR
  - d. Power meter and OTDR
  
13. The basic link test tests what three cabling components?
  - a. Work area line cord, telecommunications outlet, and horizontal cabling
  - b. Telecommunications outlet, horizontal cabling, and horizontal termination
  - c. Horizontal cabling, horizontal termination, and the equipment patch cords or jumpers
  - d. Work area line cord, horizontal cabling, and equipment patch cords or jumpers
  
14. What tests are required to be performed for a Category 5e cable by TSB-67?
  - a. Wire map, length, attenuation and NEXT
  - b. Wire map, length, attenuation and PS-NEXT
  - c. Wire map, attenuation, NEXT and ACR
  - d. Length, attenuation, NEXT and PS-NEXT

## PNIE - Module 12

### Finish Phase

15. What additional tests are defined by TSB-95 for a Category 5e cable?
- Return loss and PS-NEXT
  - Return loss and ELFEXT
  - Return loss and PS-ELFEXT
  - ELFEXT and PS-ELFEXT
16. Return loss measures reflected energy caused by what phenomenon in a cable system?
- Signal disruptions
  - Wire configuration problems
  - Impedance mismatches
  - Cable category mismatches
17. What is the maximum delay skew allowed for a Category 5 cable segment?
- 25 ns
  - 35 ns
  - 45 ns
  - 50 ns
18. What is the maximum allowable loss for 50/125 multimode optical fiber cables at 1300 nm?
- 0.5 dB/km
  - 1.0 dB/km
  - 1.5 dB/km
  - 3.5 dB/km
  - 3.75 dB/km
19. What does an OTDR measure?
- Signal quality and cable integrity
  - Cable length and power loss
  - Cable length and network bit error rates
  - Signal quality and network bit error rates
20. When identifying cables, which of the following testers can be used on a spare pair and will not interfere with signals being transmitted over other conductors?
- Continuity testers
  - VOM
  - Toners
  - All of the above

## PNIE - Module 12

### Finish Phase

21. The practice of using a fiber flashlight to identify optical fibers on an active patch panel is a poor and dangerous practice because it can cause cable installation workers to look into active ports by accident.
- True
  - False
22. Which of the following types of testers will aid in the quick identification of undocumented work area outlets?
- Tone and probe
  - TDR
  - Continuity tester
  - Cable certification tester
23. Which of the following is not a common item on a punch list?
- Missing labels
  - Broken electrical socket
  - Loose jacks
  - Dirty ceiling tiles
24. Which of the following items would not be covered under a warranty?
- Defective patch panel
  - Defective cable
  - Damage caused by improperly grounding equipment
  - Damage caused by water leaks
25. What is the last step customer support personnel should try when troubleshooting a customer's problem?
- Telephone service
  - Web-based support
  - Service call
  - RNM
26. Which of the following is not a reason to supply a customer with web-based support?
- To save the installation company money
  - To provide the customer with contact information
  - To address FAQs
  - To provide the customer with electronic forms
27. When is the biggest upgrade opportunity possible?
- Before the project starts
  - During the project installation
  - At the completion of the project
  - After the customer has determined that the original installation does not yield the desired results



## **PNIE - Module 13**

### **Cabling for Special Situations**

3. Explain the importance of high-quality cabling in relationship to network security.

4. As copper cabling improves, how will cable installation practices affect how the network operates?

## PNIE - Module 13

### Cabling for Special Situations

#### Vocabulary

Define the following terms. Use the online curriculum for help.

ASP -

AVVID -

BAN -

CDN -

Convergence -

DSL -

E-Business -

IR -

ISP -

IXC -

LATA -

Local exchange -

MAN -

NAS -

SAN -

SMS -

VPN -

VoIP -

# **PNIE - Module 13**

## **Cabling for Special Situations**

### **Focus Questions**

1. Describe the evolution of LAN speeds.
2. Describe two storage network concepts.
3. In what two forms is security implemented on a network?
4. Identify at least five key growth areas for the cabling industry.

## **PNIE - Module 13**

### **Cabling for Special Situations**

5. What are co-location facilities?

6. What two types of cabling is the residential sector most concerned about?

7. What are the benefits of a wireless LAN?

# PNIE - Module 13

## Cabling for Special Situations

### Review Questions

1. What technology covers the largest geographical area?
  - a. WAN
  - b. BAN
  - c. LAN
  - d. MAN
2. What type of technology supports VPN?
  - a. ATM
  - b. TCPIP
  - c. Ethernet
  - d. All of the above
3. What does security add to the network?
  - a. Speed
  - b. Network overhead
  - c. Reliability
  - d. Throughput
4. Which of the following is not a telecommunications service provider?
  - a. LEC
  - b. IXC
  - c. CLEC
  - d. FCC
5. Which of the following is not a wireless technology?
  - a. Infrared
  - b. Microwave
  - c. Blue tooth
  - d. Laser
6. What percentage of network down time can be attributed to cabling problems?
  - a. 20 percent
  - b. 70 percent
  - c. 90 percent
  - d. 50 percent





# PNIE - Module 14

## Standards Around the World

### Vocabulary

What do the following acronyms stand for? Use the online curriculum for help.

AIIM -

AES -

AFNOR -

ANSI -

ASQ -

ASTM -

BSI -

CECC -

CENELEC -

CEPT –

CSA -

DIN -

ECMA -

EIA/TIA -

ETSI -

ICEA -

IEC –

## **PNIE - Module 14 Standards Around the World**

ICEQ -

IEEE -

IMAPS -

IPC -

ISO –

ITU –

JIS –

JISC –

JSA –

JTC1 –

NCITS –

SMPTE -

SNZ -

UL -

# **PNIE - Module 14**

## **Standards Around the World**

### **Focus Questions**

1. List at least five standards organizations from around the world.
2. Explain SI.
3. Provide at least three examples of simple conversions from American measurements to metric.
4. Provide an example of local codes overriding the NEC.
5. Explain how different construction techniques can affect cable installation.



# PNIE - Module 14

## Standards Around the World

### Review Questions

1. Which of the following is not a metric unit of measure?
  - a. English pound
  - b. Kilogram
  - c. Kilometer
  - d. Decimeter
  
2. A liter measures
  - a. Distance
  - b. Weight
  - c. Volume
  - d. Time
  
3. According to the electrical code in the city of Chicago, is it allowable to run plenum cable?
  - a. Yes
  - b. No
  
4. What is not a trait of a lath and plaster wall?
  - a. Thicker than wall board or drywall
  - b. Easier to cut than wall board or drywall
  - c. Superior sound deadening
  - d. Wooden backing with a plaster coating
  
5. Which of the following is not an American standards organization?
  - a. EIA
  - b. TIA
  - c. ANSI
  - d. CSA
  
6. What do the self-employed cable installer and contractor have in common?
  - a. Both must have insurance
  - b. Both must be licensed if the local authority requires it
  - c. Both must file tax returns
  - d. All of the above
  
7. Which union is not an American -based union?
  - a. CWA
  - b. CWU
  - c. IBEW
  - d. AFL CIO

## **PNIE - Module 14**

### **Standards Around the World**

8. Which organization does not provide certification for installers?
  - a. Panduit
  - b. BICSI
  - c. Avaya
  - d. Amp