Review Questions

1. Which transmission characteristic is never fully achieved?

a. Latency

b. Throughput

c. Bit rate

d. Bandwidth

Answer: d. Bandwidth

Explanation: **Bandwidth** refers to the amount of data you could theoretically transmit during a given period of time but is never fully achieved. Latency describes the brief delay that takes place between the instant when data leaves the source and when it arrives at its destination. Throughput refers to the number of data bits (0s and 1s) that are actually received across a connection each second. Throughput is also called bit rate.

2. Which kind of crosstalk occurs between wire pairs near the source of the signal?

a. Alien

b. TX/RX reverse

c. FEXT

d. NEXT

Answer: d. NEXT

Explanation: **NEXT (near end crosstalk)** occurs between wire pairs near the source of a signal. Alien crosstalk occurs between two cables. FEXT (far end crosstalk) is measured at the far end of the cable from the signal source. A TX/RX (transmission/receive) reverse occurs when the TX and RX wires are crossed.

3. Which kind of multiplexing assigns slots to nodes according to priority and need?

a. WDM (wavelength division multiplexing)

b. STDM (statistical time division multiplexing)

c. TDM (time division multiplexing)

d. CWDM (coarse wavelength division multiplexing)

Answer: b. STDM (statistical time division multiplexing)

Explanation: **STDM (statistical time division multiplexing)** assigns time slots to nodes (similar to TDM) but then adjusts these slots according to priority and need. TDM (time division multiplexing) divides a channel into multiple intervals of time, or time slots. WDM (wavelength division multiplexing) carries multiple light signals simultaneously by dividing a light beam into different wavelengths, or colors, on a

single fiber. CWDM (coarse wavelength division multiplexing) lowers cost by spacing frequency bands wider apart to allow for cheaper transceiver equipment.

4. Which cable is best suited for ultra-high-speed connections between a router and a switch on the same rack?

a. RG-6 coaxial cable

b. Cat 5e twisted-pair cable

c. Cat 6 twisted-pair cable

d. Passive twinaxial cable

Answer: d. Passive twinaxial cable

Explanation: Twinax an inexpensive option for short, high-speed connections, such as when connecting switches to routers or servers in a data center; **passive twinax** is sufficient for the shortest distances of less than about 5 or 7 meters. RG-6 coaxial cables is used to deliver broadband cable Internet service and cable TV, particularly in the last stretch to the consumer's location. Cat 5e and cat 6 twisted-pair cable have more limited available throughput than twinax.

5. Which of these categories of twisted-pair cable can support Gigabit Ethernet?

a. Cat 5, cat 6, cat 7

b. Cat 5e, cat 6, cat 3

c. Cat 5e, cat 6a, cat 7

d. Cat 6, cat 7a, cat 5

Answer: c. Cat 5e, cat 6a, cat 7

Explanation: **Cat 5e** is the minimum category of twisted-pair cable that supports Gigabit Ethernet. **Cat 6a** and **cat 7** also support Gigabit speeds or higher.

6. Suppose you're creating patch cables to be used in a government office. What color wire goes in the first pin?

a. White/orange

b. White/green

c. Brown

d. Blue

Answer: b. White/green

Explanation: The federal government requires T568A on all federal contracts for backward-compatibility. Pin 1 in the T568A pinout takes the **white and green striped** wire.

7. What is the earliest twisted-pair cabling standard that meets the minimum requirements for 10GBASE-T transmissions at 100 meters?

a. Cat 5e

b. Cat 6

c. Cat 6a

d. Cat 7

Answer: c. Cat 6a

Explanation: While cat 6 cable can support 10 Gbps speeds at shorter distances, **cat 6a** is the first category of cable rated for 10 Gbps at 100 meters.

8. What type of fiber-cable problem is caused when pairing a 50-micron core cable with a 62.5-micron core cable?

a. Dirty connectors

b. Wavelength mismatch

c. Fiber type mismatch

d. TX/RX reverse

Answer: c. Fiber type mismatch

Explanation: Same-mode cables can be mismatched if the cores have different widths; a cable with a 50-micron core should not be connected to a cable with a 62.5-micron core, even though they're both MMF, as this results in a **fiber type mismatch**. Signal loss and other errors can be caused by dirty connectors. A wavelength mismatch occurs when transmissions are optimized for one type of cable but sent over a different type of cable. A TX/RX (transmission/receive) reverse occurs when the TX and RX wires are crossed in a twisted-pair cable.

9. Which part of a toner and probe kit emits an audible tone when it detects electrical activity on a wire pair?

a. TDR

b. Tone generator

c. Tone locator

d. Toner

Answer: c. Tone locator

Explanation: A **tone locator**, or probe, emits an audible tone when it detects electrical activity on a wire. A tone generator, or toner, issues a signal on a wire that is then detected by the tone locator. A TDR (time domain reflectometer) issues a signal on a cable and then measures the way the signal bounces back (or reflects) to the TDR.

10. Which fiber connector contains two strands of fiber in each ferrule?

a. MT-RJ

b. SC

c. ST

d. LC

Answer: a. MT-RJ

Explanation: The **MT-RJ** connector is unique from SC, ST, and LC connectors in that it contains two strands of fiber in a single ferrule; with two strands per ferrule, a single MT-RJ connector provides full-duplex signaling.

11. How is latency measured, and in what unit?

Answer: Latency is measured by calculating a packet's RTT, or the length of time it takes for a packet to go from sender to receiver, then back from receiver to sender. RTT is usually measured in milliseconds.

12. What is a twist ratio, and why is it important?

Answer: Twist ratio is the number of twists per meter or foot. The more twists per foot in a pair of wires, the more resistant the pair will be to crosstalk or noise.

13. What fiber is used in fiber-optic cabling to protect the inner core and prevent the cable from stretching?

Answer: To prevent the cable from stretching, and to protect the inner core further, strands of Kevlar (a polymeric fiber) surround the plastic buffer.

14. What characteristic of optical transmission is primarily responsible for the distance limitations of fiber-optic cabling?

Answer: Optical loss

15. Why is SMF more efficient over long distances than MMF?

Answer: The core of SMF is much narrower than that of MMF and reflects very little. The light does not disperse as much along the fiber.

16. Why do APC ferrules create less back reflection than UPC ferrules?

Answer: The end faces are placed at an angle to each other, and the reflection is sent back in a different direction than the source of the signal.

17. Which fiber transceiver is the same size as SFP transceivers, but can support network speeds over 10 Gbps?

Answer: SFP+ transceivers are the same module size as SFP; theoretical maximum transmission speed is 16 Gbps.

18. Suppose you're assisting with a cable installation using fiber-optic cabling that will support Gigabit Ethernet. You're approved to install segments up to 4000 m in length. What mode of fiber cable are you using?

Answer: SMF

19. What is the difference between short circuits and open circuits?

Answer: A short circuit is one where connections exist in places they shouldn't, while an open circuit is one where needed connections are missing.

20. What kind of tool can measure the distance to the location of damage in a cable?

Answer: Answers may include cable performance tester, line tester, certifier, or network tester.