

# Notes for Cisco Routing and Switching1 – Introduction to Networks

## Chapter 4. Network Access

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1. Encapsulation is a function of the data link layer. Different media types require different data link layer encapsulation.
2. A 0 or 1 signal can be represented on a copper cable by a variety of methods apart from the presence or absence of voltage. Network wireless technologies operate well beyond the frequency range of human hearing and do not use clicks. Encoding or line encoding is a method of converting a stream of data bits into a predefined code.
3. An encoding technique converts a stream of data bits in a predefined code that can be recognized by both the transmitter and the receiver. Using predefined patterns helps to differentiate data bits from control bits and provide better media error detection.
4. Goodput is the measure of usable data transferred over a given period of time (throughput) minus the traffic overhead for establishing sessions, acknowledgments, and encapsulation. So if the throughput is 10 Mb/s and the traffic overhead is 1 Mb/s, then the goodput is  $10 - 1 = 9$  Mb/s.
5. EMI and RFI signals can distort and corrupt data signals that are carried by copper media. These distortions usually come from radio waves and electromagnetic devices such as motors and florescent lights. Crosstalk is a disturbance that is caused by adjacent wires bundled too close together with the magnetic field of one wire affecting another. Signal attenuation is caused when an electrical signal begins to deteriorate over the length of a copper cable.
6. In UTP cables the cancellation effect can be increased by varying and increasing the number of twists in each wire pair. None of the other options will aid in enhancing the cancellation effect.
7. When a cable to an RJ-45 connector is terminated, it is important to ensure that the untwisted wires are not too long and that the flexible plastic sheath surrounding the wires is crimped down and not the bare wires. None of the colored wires should be visible from the bottom of the jack.
8. A straight-through cable is commonly used to interconnect a host to a switch and a switch to a router. A crossover cable is used to interconnect similar devices together like switch to a switch, a host to a host, or a router to a router. If a switch has the MDIX capability, a crossover could be used to connect the switch to the router; however, that option is not available. A rollover cable is used to connect to a router or switch console port.
9. A multimode fiber cable operates in half-duplex, with only one device sending the data on the cable. Two multimode fibers are required to support full-duplex operation (one fiber for each direction). Multimode fiber
10. Copper cabling is usually cheaper and easier to install than fiber optic cabling. However, fiber cables generally have a much greater signaling range than copper.
11. Light can only travel in one direction down a single strand of fiber. In order to allow for full-duplex communication two strands of fiber must be connected between each device.
12. 802.11ac provides data rates up to 1.3 Gb/s and is still backward compatible with 802.11a/b/g/n devices. 802.11g and 802.11n are older standards that cannot reach speeds over 1Gb/s. 802.11ad is a newer standard that can offer theoretical speeds of up to 7 Gb/s.

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13. The three areas of concern for wireless networks focus on the size of the coverage area, any nearby interference, and providing network security. Extensive cabling is not a concern for wireless networks, as a wireless network will require minimal cabling for providing wireless access to hosts. Mobility options are not a component of the areas of concern for wireless networks.
14. The data link layer receives packets from and directs packets to an upper layer protocol. As a consequence, the upper layer protocol does not have to worry about the media that the communication will use. The physical layer is responsible for generating the electrical, optical, or electromagnetic signals that will represent 1 and 0 on the media. Converting the stream of data bits into a predefined code is also a function of this layer. Deciding the path by which a packet will be forwarded to a remote network is a function of the network layer.
15. When data travels on the media, it is converted into a stream of 1s and 0s. The framing process inserts into the frame start and stop indicator flags so that the destination can detect the beginning and end of the frame.
16. Physical topologies show the physical interconnection of devices. Logical topologies show the way the network will transfer data between connected nodes.
17. 802.11 wireless networks are contention-based and use CSMA/CA technology. In CSMA/CA, the host waits until there is no traffic on the medium. It then sends a notification of its intent to transmit data. Once it receives clearance, it begins transmission.
18. The FCS field in a frame is used to detect any errors in the transmission and receipt of a frame. This is done by comparing the CRC value within the frame against a computed CRC value of the frame. If the two values do not match, then the frame is discarded.
19. There are one billion b/s within one Gb/s
20. Bandwidth is the capacity of a medium to carry data in a given amount of time. It is typically measured in kilobits per second (kb/s) or megabits per second (Mb/s).
21. Logical Link Control (LLC) is the data link sublayer that defines the software processes that provide services to the network layer protocols. LLC places information in the frame and that information identifies the network layer protocol that is encapsulated in the frame.