

6.2.4 Network Infrastructure and Device Facts

This lesson covers the following topics:

- Physical Infrastructure
- Other Networking Devices

Physical Infrastructure

The following hardware devices are used to create a network's physical infrastructure:

Component	Description
Media	<p>The networking <i>medium</i> provides the path for signals to pass between devices.</p> <ul style="list-style-type: none"> ■ Copper cables use electrical signals. ■ Fiber optic cables use light pulses. ■ Wireless networks use radio waves or infrared waves. <p>Networking media that use cables are considered bounded, because the transmission signals are contained within the wire. Networks that use wireless communications are considered unbounded.</p>
Network Adapter	<p>A <i>network adapter</i> is responsible for creating and receiving transmission signals that are sent along the networking medium.</p> <ul style="list-style-type: none"> ■ A network interface card (NIC) uses a cable medium (such as twisted pair or fiber optic cables). ■ A wireless network adapter transmits radio waves.
Hub	<p>A <i>hub</i> provides a central connecting point for multiple media segments on the same subnet. When a hub receives a signal, it is sent out to all the ports on the hub. Hubs operate in <i>half-duplex</i> mode because the path between devices is shared, meaning that devices can only send when no other devices are sending data.</p> <p>Hubs are a legacy network device and are rarely used because they lack features and perform poorly.</p>
Switch	<p>A <i>switch</i> provides a central connection for multiple media segments on the same subnet. A switch receives a signal on one port and forwards that signal only to the port where the destination device is connected.</p> <p>Switches learn where a device is connected by copying the MAC address of the source device and placing it into the MAC address table. The port number the frame entered is also recorded in the table and associated with the source MAC address. If the switch doesn't know which port a destination device is connected to, it will send the frame in question to all ports.</p> <ul style="list-style-type: none"> ■ Switches use the MAC address to send frames to the destination device. ■ Switches can operate in <i>full-duplex</i> mode, where a device uses a different channel for sending and receiving and where the transmission paths are dedicated to only the communicating devices. ■ You should use a switch instead of a hub in every situation. ■ Many switches allow you to configure Quality of Service (QoS) settings, which prioritize certain types of network traffic over others. For example, if your network includes Voice over IP (VoIP) telephones, you could increase the priority of VoIP traffic on the switch to increase call quality. ■ You must configure a switch before you implement it. An unmanaged switch is a low-end switch that you plug it into a power outlet and connect your network devices with UTP cables. While unmanaged switches are convenient and easy to implement, they lack many of the advanced management and security features available. It is preferable to use a managed switch instead. A managed switch is a switch that must be configured before you can use it.
Router	<p>A <i>router</i> connects two network segments that have different subnet addresses.</p> <ul style="list-style-type: none"> ■ A router has multiple network connections, and each connection is on a different subnet. ■ Routers use the IP address within a packet to move packets between networks. ■ Routers maintain a list of known networks and the next router in the path to reach the destination network.
Bridge	<p>A <i>bridge</i> connects two segments within the same subnet. Bridges learn which side a host resides on by copying the MAC address of the source device and placing it into the MAC address table. The port number the frame entered is also recorded in the table and associated with the source MAC address.</p> <p>Another functionality of a bridge is to convert one type of transmission medium into another. A common example of this is a wireless bridge, which converts wired transmissions into wireless transmissions and vice versa.</p>

Other Networking Devices

In addition to the physical infrastructure, networks are also made up of other networking devices that provide specific services or perform a specific role.

Component	Description
Server	<p>Networks contain two types of hosts, hosts that consume a service, and hosts that provide a service. Hosts that provide a service are called servers. The following are some of the more common types of servers:</p> <ul style="list-style-type: none">▪ File and Print Server - Provides file sharing and print sharing services.▪ Application Server - Provides access to a shared network application (a database server that contains customer information).▪ Directory Server - Handles user authentication. Also stores user credentials, permissions, and settings.▪ Remote Access Server - Provides remote access to network resources.▪ Web Server - Serves web pages and web content via HTTP.▪ DNS Server - Uses the domain name service to map IP addresses to domain names.▪ DHCP Server - Automatically configures network hosts with an IP address, subnet mask, DNS server, and default gateway.
VoIP	<p>VoIP devices provide voice communication over a packet-switched network (an IP network). The most common VoIP device is an IP phone. Instead of using the standard public switched telephone network, IP phones connect to an Ethernet network using an RJ45 connection. Basic VoIP services include Skype or Google Voice.</p> <p>Businesses that use VoIP typically hire a third-party entity (such as Vonage or Jive) to set up the service and configure devices.</p>
Internet Appliance	<p>An internet appliance is a specialized device that performs a specific network role. The following are some common internet appliances:</p> <ul style="list-style-type: none">▪ Web proxy▪ Content filter▪ Malware scanner <p>Internet appliances are typically more expensive than configuring a server to perform the same task. However, internet appliances perform much better and have more features.</p>
Network-Attached Storage (NAS)	<p>A NAS is a device that is optimized to provide a single service: file sharing. NAS devices range in price from several hundred to several thousand dollars. A NAS can be connected to a network and configured very easily. This makes them a great choice for most networks needing a file sharing service.</p>

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