5.10.3 Wireless Networking Facts

Wireless networking is growing in popularity because of the convenience it provides, the flexibility it offers, and the time and money it saves.
Wireless networking concepts include:

Concept	Description

Wireless Access Point	A wireless access point (WAP) broadcasts information and data over radio waves.
	▪ A wireless access point functions as a wireless hub.
	▪ The wireless access point may provide a connection to a physical wired network.
	▪ The two classes of wireless access points are fat and thin.
	  ▪ Fat access points have everything necessary to manage wireless clients and broadcast the network. Fat access points are standalone devices.
	  ▪ Thin access points are basically a radio and antenna. Thin access points can broadcast the network, but require another system to manage clients and network behind them. Thin access points are referred to as controller based devices.
	▪ A WAP uses an SSID, or Service Set Identifier, which associates a name with a wireless network. This makes it easier for users to connect wirelessly.

Wireless Antennae	Wireless antennae are a key component of a Wi-Fi network. Antennae fulfill two key roles: ▪ Absorbing incoming radio signals ▪ Radiating outgoing radio signals Some wireless antennae may be mounted externally to the wireless device, while others may be embedded within the device itself. The range of a wireless antenna depends upon its power gain, which is a numeric measure in decibels (dBi) of an antenna's maximum radiation power relative to a standard reference antenna. The higher the gain, the more powerful the antenna, and the longer the ranges it can support. Commonly used wireless antennae can be categorized as follows: ▪ A normal-gain antenna usually has a gain rating between 2 and 9 dBi. ▪ A high-gain antenna usually has a gain rating of 12 dBi or higher. ▪ An omnidirectional antenna radiates and absorbs signals equally in every direction around the antenna. Because it spreads its gain in a 360 degree pattern, the overall range of an omnidirectional antenna is typically much less than that of a directional antenna. ▪ A directional antenna focuses its radiation and absorption of signals in a specific direction. Some directional antennae allow you to vary the beam from relatively wide to very narrow. The narrower the beam, the higher the gain and the longer the range. ▪ A parabolic antenna uses a parabolic-shaped reflector dish. It is highly directional, concentrating the radio waves transmitted from the sender into a very narrow beam. When the receiver uses a parabolic antenna, it can only receive a signal from one specific direction. It supports very high-gain radio signals that can be transmitted over long distances, but it requires a clear line of sight (LOS) between the sender and the receiver. Omnidirectional, normal-gain antennae are the most common type of antennae used in wireless equipment because they work reasonably well in a variety of situations. However, there are many instances in which this type of antennae is not the most appropriate choice. Consider the following examples: ▪ Suppose you need to use a Wi-Fi connection to wirelessly connect networks in two buildings that are 30 meters apart. In this scenario, there's no reason to radiate the radio signal in all directions. Rather than using a standard omnidirectional antenna, it would be more effective (and secure) to implement a high-gain directional antenna that focuses the signal into a very narrow beam between buildings. A good choice would be a *Yagi* antenna, which is a special type of high-gain directional antenna specifically designed to connect wireless networks between buildings. ▪ Suppose you need to extend wireless network coverage to the periphery of your building. Installing omnidirectional antennae near an exterior wall will likely radiate the wireless signal a great distance outside your organization, which represents a significant security risk. Instead, you should consider using low-gain directional antennae that are aimed toward the center of the building using an appropriately narrow radiation pattern. This strategy would significantly reduce the amount of signal leaking out of your structure.
Wireless Interface	A wireless interface in a device, such as a laptop or smart phone, connects to the wireless access point.
Wireless Bridge	A wireless bridge connects two wireless networks together. ▪ The bridge is typically created using a wired connection between the two access points. ▪ A bridge can be implemented wirelessly using a wireless distribution system (WDS).
Wireless Configuration	The two methods or modes of configuring a wireless network are: ▪ Ad hoc (also referred to as peer-to-peer), which provides wireless communication without a wireless access point. The wireless interfaces of communicating devices send and receive radio signals directly with each other.

	▪ Infrastructure uses a wireless access point ,which acts similarly to a hub or switch in a wired network. The infrastructure implementation: ▪ Is more scalable than an ad hoc implementation. ▪ Can also connect the wireless device to a wired network. ▪ Can be used to create a guest network so external users can connect to the internet without giving access to the internal network.
Worldwide Interoperability for Microwave Access	Worldwide Interoperability for Microwave Access (WiMAX) is the IEEE 802.16 standard for long-range wireless networking. In addition to providing wireless broadband communication to fixed devices in areas without cable or phone lines, WiMAX can provide broadband wireless data communication to cell phones and other mobile devices. WiMAX: ▪ Offers significant improvements over older cellular data communication standards. ▪ Is referred to as 4G (fourth generation) technology along with LTE (long-term evolution). ▪ Is also referred to as a metropolitan area network. ▪ Can support wireless data access of up to 10 miles for mobile phones and wireless broadband radios. ▪ Supports data rates from 30 to 40 megabits per second.
Global System for Mobile Communications	Global System for Mobile Communications (GSM) is the international standard for cellular networks and describes protocols for second generation (2G) digital mobile phones. Be aware that: ▪ The GSM standard originally implemented a digital circuit-switched network optimized for full duplex voice telephony. ▪ The GSM standard was expanded over time to include data communications. ▪ The latest version includes fourth generation (4G) LTE Advanced standards. ▪ GSM phones use a Subscriber Identity Module (SIM) smart card. ▪ GSM includes the short messaging service (SMS) that enables users to send 160-character text messages.
Near-Field Communication	Near-Field Communication (NFC) is a set of standards that allows smart phones and similar devices to communicate by touching them together or bringing them close (within 4 inches) to each other. Applications include: ▪ Contactless transactions ▪ Data exchange ▪ Simplified setup of more complex communications ▪ Coupons and rewards cards ▪ Healthcare information