7.2.3 Infrared, Bluetooth, and NFC Facts

In addition to 802.11 specifications for wireless networking, there are several more wireless communication methods that you should be familiar with:

Method	Description
Infrared (IR)	Infrared uses invisible light waves for communication. Infrared: - Is a line-of-sight medium. Objects cannot be in the path of communications. - Communicates at 9600 bps up to 4 Mbps and uses the resources of a COM port. - Works best for devices within 1 meter, but can operate up to 30 meters in areas without ambient light interference. - Offers no security for transmissions. Infrared is typically used for remote control devices or for sending data between two devices. Most smart phones have integrated IR capabilities.
Bluetooth	Bluetooth uses radio waves in the 2.4 GHz frequency range for communication. - Bluetooth uses ad hoc connections between devices to create personal area networks called *piconets*. A piconet can have up to 7 devices, and each device can participate in multiple piconets at the same time. - By using adaptive frequency hopping (AFH), Bluetooth is able to automatically detect other devices in the area and avoid the frequencies used by those devices. It can switch between 79 channels to avoid interference. - A 128-bit proprietary encryption mechanism is used to encrypt signals. - Transmission speeds and max distance depends on the version and device class:

Version	Speed
1.2	1 Mbps
2.0	3 Mbps
3.0	24 Mbps
4.0	24 Mbps

Class	Distance
1	100 m
2	10 m
3	1 m

- Common applications for Bluetooth include the following:
  - Connecting peripheral devices (e.g., keyboard and mouse)
  - Wireless headphones and smart phone headsets
  - Peer-to-Peer communications (e.g., sharing data between a smart phone, notebook, and tablet)

Bluetooth is also able to transmit audio and video data signals

Near Field Communication (NFC)	NFC enables communication between two devices that are in very close proximity with each other.
	
	- NFC operates in the 13.56 MHz frequency and has a maximum transmission speed of 424 Kbps.
	- Special chips called NFC chips are used to send, receive, and store data.
	- Devices using NFC operate in one of three modes:
	  - Reader/writer mode is used to read information stored on an NFC chip.
	  - Peer-to-Peer mode enables two devices to communicate and exchange information.
	  - Card Emulation mode emulates the functionality of a smart card in order to perform contactless payment or ticketing (this mode is typically used by smart phones).
	- In order to communicate, devices must be within 2 inches of each other.
	- Data transmissions can be secured by using encryption algorithms.
	- NFC has seen widespread use in the following areas:
	  - Contactless payment (e.g., using a smart phone as a payment method)
	  - Identification (e.g., passports that contain an NFC chip)
	  - Video gaming
	
	Even though NFC has slower transmission speeds than Bluetooth, it consumes much less power and sets up connections much faster.