Name

**Chapter 4 – Wireless LANs**

**Study Guide**

**Tips for success: While answering the questions read Chapter 4, review the summary, and complete the practice Quiz.**

1. Briefly highlight the key features of the following Wireless Technologies:
   1. Bluetooth – is often a small device that can exchange data over short distance.
   2. Cellular Broadband– It provides internet to your cellphones via 2g, 3g or 4g. It first became available in 1991.
   3. Satellite – Provides network access to remote sites through the use of a directional satellite dish that Is aligned with a specific geostationary earth orbit(GEO) satellite.
   4. Wi-Fi – It’s a [local area wireless technology](http://en.wikipedia.org/wiki/Wireless_LAN" \o "Wireless LAN) that allows an electronic device to participate in computer network.
   5. WiMAX – It’s a [wireless](http://en.wikipedia.org/wiki/Wireless" \o "Wireless) communications standard designed to provide 30 to 40 megabit-per-second data rates.
2. List the Wireless standards that use the following frequencies:
   1. 2.4 GHz –802.11 , 802.11b , 802.11g , 802.11n and 802.11ad
   2. 5 GHz –802.11a , 802.11n and 802.11ac.
   3. 60 GHz –802.11ad.
3. What are some benefits of IEEE 802.11n over past versions of 802.11? It supports both 2.4ghz and 5ghz and has more speed.

1. Standards are necessary when multiple vendors are creating devices that must be compatible, what is the purpose of the Wi-Fi Alliance?It is an association of vendors whose objective is to improve the interoperability of products that are based on the 802.11 standard by certifying vendors for conformance to industry norms and adherence to standards.

Complete Activity 4.1.1.8 – Identify the Wireless Technology

Complete Activity 4.1.1.9 – Compare Wireless Standards

1. Home integrated routers consist of what 3 devices: Wireless Router, Modem, ISP.
2. Compare and Contrast the following APs:

|  |  |
| --- | --- |
| **Autonomous AP** | **Controller-Based AP** |
| Referred to as heavy Aps.  Standalone devices.  Configured.  Useful where only a couple of Aps are required.  Multiple Aps can be controlled. | Require no initial configuration.  Useful where many Aps are required.  All the Aps are controlled by a WLAN controller. |

1. This type of antenna is most beneficial in an office environment when the radio signal must reach hosts located around the room: Wi-Fi.
2. This type of antenna is most beneficial when sending a focused radio signal in a specific direction: Satellite
3. What is an ad hoc wireless network, and how can it be used to create a hotspot?

It’s when a smart phone or a tablet with cellular data access is enabled to create a personal hostpot.

1. How is a BSSID created?

The Layer 2 MAC address of the AP is used to uniquely identify each BSS, which is called the Basic Service Set Identifier (BSSID).

1. How does an ESS extend the wireless coverage area?

By connecting two BSS’s through a wired DS.

Complete Activity 4.1.3.4 – Identify WLAN Topology Terminology

1. Explain the following wireless frame types:
   1. Management – Used in the maintenance of communication, such as finding, authenticating, and associating with an AP.
   2. Control – Used to facilitate in the exchange of data frames between wireless clients.
   3. Data – Used to carry the payload information such as web pages and files.
2. What are the characteristics of a Beacon Frame? (0x08) Sent periodically from an AP to announce its presence and provide the SSID and other preconfigured parameters.
3. Explain the following control frames:
   1. RTS – The RTS and CTS frames provide an optional collision reduction scheme for APs with hidden wireless clients. A wireless client sends an RTS frame as the first step in the two-way handshake, which is required before sending data frames.
   2. CTS – A wireless AP responds to an RTS frame with a CTS frame. It provides clearance for the requesting wireless client to send a data frame. The CTS contributes to collision control management by including a time value. This time delay minimizes the chance that other wireless clients will transmit while the requesting client transmits.
   3. ACK – After receiving a data frame, the receiving wireless client sends an ACK frame to the sending client if no errors are found. If the sending client does not receive an ACK frame within a predetermined period of time, the sending client resends the frame.

Complete Activity 4.2.1.6 – Identify the 802.11 Frame Control Fields

1. What mechanism is used to avoid collisions in a wireless network? Distributed Coordination Function (DCF).
2. What three step process is used by management frames to connect to a WLAN? Discover new wireless AP – Authenticate with AP – Associate with AP.
3. What must the wireless client know when using Active Mode to connect to an AP?

It must know the name of the SSID.

1. How is the Shared Key method used for authentication? Technique is based on a key that is pre-shared between the client and the AP.

Complete Activity 4.2.2.6 – Order Steps in Client and AP Association Process

1. Identify the technique used to mitigate channel saturation:

|  |  |
| --- | --- |
| Frequency-hopping spread spectrum (FHSS) | Transmits radio signals by rapidly switching a carrier signal among many frequency channels. |
| Direct-sequence spread spectrum (DSSS) | Spreads a signal over a larger frequency band making it more resistant to interference. |
| Orthogonal frequency-division multiplexing (OFDM) | Creates sub-channels that can overlap without interfering. |

1. What is the solution to interference on channels? The solution to interference is to use non-overlapping channels

Complete Activity 4.2.3.4 – Identify Channel Management Terminology

1. What is a DoS attack and how can they be avoided in a wireless network? A Dos attack is when someone tries to overflow your internet access. To minimize the risk of a DoS attack due to improperly configured devices and malicious attack, harden all devices, keep passwords secure, create backups, and ensure that all configuration changes are incorporated off-hours.
2. How does a CTS flood deny service to legitimate users? The attacker repeatedly floods the bss with clear to send (CTS) frames to a bogus STA.
3. Why are SSID Cloaking and MAC address filtering considered weak security measures? Aps and some wireless routers allow the SSID beacon frame to be disabled. Wireless clients must manually identify the SSID to connect to the network.
4. What is the difference between Open System Authentication and Shared Key Authentication? Open System Authentication is free for everyone to connect, like in a café. Shared Key Authentication is where you need to have a WEP, WPA or WPA2 key to authenticate.
5. After reading about WEP, WPA, and WPA2, which method would you choose and why?

I would use WPA for a home network and a WPA2 for a bigger network.

1. What function does a RADIUS server play in network security? It’s an authentication server that provides more security. The user must be authenticated by the RADIUS server then users must authenticate using 802.1X standard.

Complete Activity 4.3.2.6 – Identify the WLAN Authentication Characteristics

Watch Video 4.4.1.3 – Linksys Smart Wi-Fi

Watch Video 4.4.2.1 – Connecting Wireless Clients

1. When would Divide-and-conquer be a helpful troubleshooting method?

When you have a destination to ping.

1. If your PC is operational but the wireless connection is performing poorly, what are some things you should check? Is the PC out of the planned coverage area (BSA)? , Check the channel settings on the wireless client, Check for the presence of other devices in the area that may be interfering with the 2.4 GHz band.
2. What is a benefit of dual-band routers? For example, use the 2.4 GHz network for basic Internet tasks, such as web browsing, email, and downloads, and use the 5 GHz band for streaming multimedia.
3. How can you improve your wireless range without adding an access point? To improve the range of a wireless network, ensure the physical wireless router location is free of obstructions, such as furniture, fixtures, and tall appliances. These block the signal, which shortens the range of the WLAN. If this still does not solve the problem, then a Wi-Fi Range Extender or deploying the Powerline wireless technology may be used.

Complete Activity 4.4.3.5 – Identify the Troubleshooting Solution