**Assignment components:**

**Wireless Standards**

♣ What are the Seven (7) IEEE WLAN standards in use today?

802.11a, 802.11b, 802.11g, 802.11n, 802.11ac, 802.11ac, 802.11ax

♣ What are the Wi-Fi Alliance names associated to each IEEE standard?

802.11a = Wi-Fi 2, 802.11b = Wi-Fi 1, 802.11g = Wi-Fi 3, 802.11n = Wi-Fi 4, 802.11ac (Wave 1) = Wi-Fi 5, 802.11ac (Wave 2) = Wi-Fi 5, 802.11ax = Wi-Fi 6

When was each standard released?

802.11a = 1999, 802.11b = 1999, 802.11g = 2003, 802.11n = 2009, 802.11ac (Wave 1) = 2013, 802.11ac (Wave 2) = 2016, 802.11ax = 2019

♣ Which standards are listed at 2.4 GHz and which standards are listed at 5 GHz?  **2.4 GHz**

802.11b, 802.11g, 802.11n, 802.11ac, 802.11ac, 802.11ax

**5 GHz**

802.11a, 802.11n, 802.11ac (Wave 1) 5 GHz, 802.11ac (Wave 2), 802.11ax

♣ What is the maximum theoretical speed that each standard can handle? (Please refer to the 802\_11-standards.pptx presentation)

802.11a = 54 Mbps, 802.11b = 11 Mbps, 802.11g = 54 Mbps, 802.11n = 600 Mbps, 802.11ac (Wave 1) = 1.73Gbps, 802.11ac (Wave 2) 3.47 Gbps, 802.11ax = 14 Gbps

♣ How many channels are in the 2.4 GHz spectrum (USA standards)? What are the non-overlapping channels in the 2.4 GHz Spectrum?

There are 14 channels in the 2.14 GHz spectrum. Channels 1,6, and 11 are designated as non-overlapping channels in the 2.4 GHz spectrum.

♣ How does Channel Bonding work in the 5 GHz spectrum? Give one reason why you would use Channel Bonding.

Channel bonding combines multiple channels, increasing bandwidth and throughput, allowing for faster transmission of data.

♣ In the 2.4 GHz spectrum which of the following channels would overlap with Channel 6? Choose all that apply.

A. Channel 1

B. Channel 2

C. Channel 3

D. Channel 4

E. Channel 5

♣ Which are WIFI standards that only support communication on the 5 GHz frequencies? Choose all that apply.

A. 802.11b

B. 802.11a

C. 802.11g

D. 802.11n

E. 802.11ac

F. 802.11ax

♣ Give a brief description of how CSMA/CA works? How does that differ from CSMA/CD?

**Carrier Sensing:** A device checks the line to ensure it's free before transmitting.

**Collision Detection:** If two devices transmit simultaneously and a collision occurs, they detect it through changes in the signal.

**Backoff and Retry:** Both devices stop transmitting and wait for a random backoff period before trying again.

CSMA/CA tries to prevent collisions from happening, while CSMA/CD just detects and deals with the collision as it happens.

**Wireless Infrastructure**

♣ What is the Service Set Identifier (SSID)? Name 4 characteristics of an SSID.

Name of WLAN (wireless Local Area Network)

* 32 characters long
* Case sensitive
* Distinguishes wireless networks
* Wireless network name
* Each WLAN gets own SSID

♣ List 3 different Service Sets and list 1 characteristic that differentiates each Service Set.

Basic Service Set: Single access point in the network.

Extended Service Set: Multiple access points in network to give broader coverage than BSS.

Independent Basic Service Set: clients establish links with other clients, no access points

♣ What is RSSI and what does it measure?

Received Signal Strength Indicator (RSSI) used to measure how powerful a signal strength on the client.

♣ Users are reporting intermittent connectivity when connected in certain areas of your WIFI 6 deployment. What are the first three tasks that will help you better understand coverage issues?

Look at AP placement, do a Site Survey, build a Heat Map

♣ Users in your WLAN are unable to roam between access points. What changes allow for seamless roaming? Choose two.

A. Configure the WLAN as an ESA (ESS)

B. Configure the WLAN as a BSA (BSS)

C. Configure the WLAN as an IBSA (IBSS)

D. Place Access Points in the same SSID

E. Place Access Points in different SSIDs

♣ What could be affected to alter the coverage extended by a single access point when interference is not a concern? Choose all the apply.

A. Change the Antenna Power

B. Change the AP placement

C. Change the Channel

D. Change the Antenna

♣ Your users are reporting poor performance. Upon investigating, you notice a new SSID from an adjacent business. Tuning which variable is likely to assist in allowing your SSID to coexist with the new SSID?

A. MIMO

B. Channel Bonding

C. Channel Value

D. Match the SSID of the adjacent business

♣ While investigating your WLAN, you discover users that are close to an AP are more likely to connect to an AP across the floor, much further away. What would you consider changing?

A. Change the polarization

B. Change the AP Placement

C. Change the Channel

D. Change the Antenna Power

**Wireless Security and Encryption Standards**

♣ List 4 WIFI Security standards used in Wireless Networks. List 2 characteristics for each cryptographic protocol.

Wired Equivalent Privacy: Original 802.11 wireless security standard, uses 24-bit initialization vector.

WIFI Protected Access (WPA): Uses message integrity check, Temporal Key Integrity Protocol

WIFI Protected Access 2 (WPA2): Uses Advanced Encryption Standard, supports two modes: Personal and enterprise.

WIFI Protected Access 3 (WPA3): Strong, Uses SAE, 128-bit or 192-bit encryption

♣ List 2 Authentication Methods and the major component/standard used for each Method.

Network Authentication 802.1x: Each wireless user authenticates with their own credentials

Pre-Shared Key: AP and clients use same encryption key, all clients need to know the same password

♣ What WIFI security standard uses AES as the primary encryption cipher?

A. WEP

B. WPA

C. WPA2

D. WPA3

♣ You need an authentication protocol that encrypts passwords and uses digital certificates. What should you use?

A. AES

B. WPA2

C. TKIP

D. EAP-TLS

♣ Describe a Dissociation Attack and what the result would be of this attack.

The attacker then forges dissociation frames and sends them to either the client or the AP. The client or AP, upon receiving the dissociation frames, believes that the other party has initiated a disconnection and subsequently drops the connection.

By forcing repeated disconnections, an attacker may try to capture sensitive data during reconnection processes.

Cisco Packet Tracer: