

## NET3900: Quiz 2

Name: \_\_\_\_\_

This Quiz is based on Modules 3, 4 and 5. Answer the questions on this sheet. Always show your calculations or provide explanation for your answers. The marks value for each question follows the question number.

Q1/6: The algorithm used by a wireless station to get access to a channel is called the DCF - Distributed Coordination Function. What are the three main steps in this algorithm? Briefly explain each one.

1. Listen for clear channel: Use Physical Carrier Sense and Virtual Carrier Sense to determine when the channel is available.

2. Station Waits its Turn to Transmit: The wait periods are as follows.

a. Interframe Spacing: The basic wait period is DIFS (DCF Inter-Frame Space). This ensures a station with a higher priority message transmits before a station with a lower priority message.

b. Contention Window: A station waits a random period of time within the Contention Window. This separates users over time to reduce the likelihood of collision.

3. Transmit the Frame: This follows the expiry of the Contention wait.

If an ACK is received the transmission is complete. If no ACK is received then re-transmit at the next opportunity.

Q2/2: What is the difference between Layer 2 and Layer 3 roaming?

Layer 2 roaming is used when the destination controller supports the user VLAN and Layer 3 is used when the destination controller does not support the user VLAN.

Q3/4: Consider a point-to-point wireless bridge between two buildings 2 Km apart. An application is transmitting data frames which are 500B in length including all layer 2 headers. The data is transmitted using 802.11a at a PHY rate of 120 Mbps. Assume the following durations: DIFS=34us, Avg CW wait = 67us, PHY header=20us, SIFS=16us and the ACK=24us. What is the maximum Effective Channel Throughput?

The PHY rate implies that the 11n extensions are used.

First calculate the Data Frame Duration.

$$DFD = \text{Length} / \text{PHY rate} = 500 \times 8 / 120 = 33 \text{ usec.}$$

Therefore the Total Frame Duration = DIFS + Avg CW wait + PHY + Data Frame + SIFS + ACK

$$\begin{aligned} \text{Total Frame Duration} &= (34 + 67 + 20 + 33 + 16 + 24) \text{ usec} \\ &= 194 \text{ usec} \end{aligned}$$

$$\text{Channel Throughput} = 500 \times 8 / 194 \text{ us} = 20 \text{ Mbps}$$

Q4/2: Identify and briefly explain two security features that make PEAP more secure than PSK.

1. Unique username and password for each user: This is in contrast with PSK which uses the same password for every user and no username.

2. Encrypted Tunnel: User credentials are sent in an encrypted tunnel

See your notes for other options.