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**Week 13 Homework**

**Review Questions:**

**R1)** If a wireless network is operating in infrastructure mode, it means the hosts are connected to a base station. If the network isn’t in this mode it is operating under an ad hoc mode in which the host must now provide routing, address assignments, DNS-like name translation, etc., the services normally provided by a base station.

**R2)** The four types of wireless networks identified in Section 6.1 include: single-hop, infrastructure based; single-hop, infrastructure-less; multi-hop, infrastructure based; and multi-hop, infrastructure-less. I have used all of these networks in my life.

**R3)** Path Loss is incurred by physical obstructions (distance, walls, etc.), Multipath Propagation is caused by signals paths varying in length, and Interference from other sources is caused by other devices (phones, laptops, microwaves, routers, etc.) producing their own electromagnetic waves of varying strength.

**R4)** As a mobile node gets farther away from its base station, the base station can use more power to increase its signal strength or use adaptive modulation and change channels to ensure the loss probability of a transmitted frame does not increase.

**R5)** Beacon Frames in 802.11are used by hosts to find access points which send out beacon frames containing their SSID and MAC address.

**R6)** False, it can send a RTS frame to prevent loss and if it does it waits for an ACK frame contained in the return CTS frame.

**R7)** Acknowledgement frames are used in 802.11 because in wireless transmissions collisions are unavoidable as multiple sources, some of which can be hidden from one another, can be transmitting simultaneously to the same access point, whereas Ethernet can avoid collisions because all sources are seen.

**R8)** False, LANs us collision detection whereas, WLANs use collision avoidance. Thus, WLAN frames contain avoidance frames.

**R9)** The RTS threshold is used to “reserve” access to a channel and is done by sending a RTS frame to the access point, requesting the needed time to send the DATA frame and ACK frame. Upon receiving the “request”, the access point sends out a CTS frame saying that the host sending the RTS frame has reserved a slot for its DATA. This prevents others from sending DATA at the same time and thus, avoids collisions.

**R10)** If RTS and CTS frames were as long as the DATA and ACK frames they would lose their advantages as it would take an equal amount of time to send a new request as it would to send all of the data and thus if there wasn’t a collision it would take a base time of double the time to send the data. The result would be a transmit time equal to or longer than if a collision would occur.

**R11)** The access point might need to send a “spoofed” MAC address because if it were to change its current MAC address it would have to terminate its ongoing TCP connections and obtain a new IP address.

**R12)** A master device in Bluetooth determines when salves can transmit data, whom can only transmit after receiving word from the master, and determines the order. On the other hand, a base station is more closely related to the slave where hosts are the master in that information travels through the base station to other hosts depending on the destination given to it by the host.

**R13)** A super frame in ZigBee is a frame that contains the beacon frame, RTS, CTS, and DATA frames, as well as the inactive time of the fame. Essentially it encompasses all necessary aspects of a single communication frame needed to perform a task.

**R14)** The role of the “core network” in 3G is to connect the data network to the voice network. It is what allows data to be handled through cellular networks and give internet access to mobile devices such as smartphones.

**R15)** RNC acts as a controller for 3G data and voice data going through the same radio access network by sharing a common first/last-hop.

**Practice Problems:**

**P5) a)** The 802.11 protocol will not break when two ISPs with their own APs provide Wi-Fi access in the same café on the same channel. What will happen when they both attempt to transmit at the same time is they will both send out an RTS frame that will reply with a collision. This will result in both APs backing off for a random amount of set time and attempting to retransmit after the random amount of time. This will hopefully result in a successful transmission for both.

**b)** If they operate over different channels, the two APs will not collide and both will b able to transmit freely.