Polytechnic University of Puerto Rico
Electrical and Computer Engineering & Computer Science Department
COE 4330 – Computer Networks

Homework 8

Name: Coral S. Schmidt Montilla **ID#: 148830**

Completely answer all of the following questions.

1. Describe the role of the beacon frames in 802.11. (*1 points*)

   Beacon frames in 802.11 wireless networks are broadcast by access points (APs) to announce the presence of the network, synchronize connected devices, and provide essential information like SSID, supported data rates, and security protocols.

2. Describe how the RTS threshold works. (*1 points*)

   The RTS (Request to Send) threshold determines the packet size at which a device must send an RTS frame to avoid collisions; if the packet size exceeds the threshold, the device uses RTS/CTS (Clear to Send) handshake before transmitting.

3. What are the differences between a master device in a Bluetooth network and a base station in an 802.11 network? (*1 points*)

   A master device in Bluetooth controls communication in a small piconet and can connect up to seven active slaves, while a base station in 802.11 manages communication within a broader network and facilitates access to wired networks.

4. Suppose there are two ISPs providing Wi-Fi access in a particular café, with each ISP operating its own AP and having its own IP address block.

   a. Further, suppose that by accident, each ISP has configured its AP to operate over channel 11. Will the 802.11 protocol completely break down in this situation? Discuss what happens when two stations, each associated with a different ISP, attempt to transmit at the same time. (*1 points*)

      The 802.11 protocol will not completely break down, but interference and collisions will occur, leading to reduced throughput, as stations from both ISPs will compete for the same channel and resolve collisions via CSMA/CA.

   b. Now suppose that one AP operates over channel 1 and the other over channel 11. How do your answers change? (*1 points*)

      If one AP operates on channel 1 and the other on channel 11, interference is eliminated since the channels are non-overlapping, allowing the two networks to operate independently without degrading performance.

5. Describe the format of the 802.15.1 PAN frame. You will have to do some reading outside of the text to find this information. Is there anything in the frame format that inherently limits the number of active nodes in an 802.15.1 network to eight active nodes? Explain (*2 points*)

   The 802.15.1 PAN frame consists of an access code, header, and payload, with the header containing fields like type, address, and flow control. The limit of eight active nodes (1 master and 7 slaves) is inherent due to Bluetooth's piconet structure and addressing scheme, which supports only 3-bit addressing for active devices.

6. What are the differences between the following types of wireless channel impairments: path loss, multipath propagation, interference from other sources? (*1 points*)

   - Path loss refers to the weakening of a signal as it travels over a distance.
   - Multipath propagation occurs when signals take multiple paths to the receiver due to reflections, causing phase shifts and interference.
   - Interference from other sources is caused by overlapping signals from unrelated devices, degrading the quality of the intended transmission.

7. What are the four types of wireless networks identified in our taxonomy in Section 7.1? Which of these types of wireless networks have you used? *(1 points)*

   The four types of wireless networks are infrastructure-based networks, ad hoc networks, mesh networks, and sensor networks. Commonly used networks include infrastructure-based networks (Wi-Fi) and ad hoc networks (e.g., Bluetooth).

8. What does it mean for a wireless network to be operating in "infrastructure mode?" If the network is not in infrastructure mode, what mode of operation is it in, and what is the difference between that mode of operation and infrastructure mode? *(1 points)*

   In infrastructure mode, wireless devices communicate through an access point (AP) that manages network traffic and provides connectivity to other networks. If not in infrastructure mode, the network operates in "ad hoc mode," where devices communicate directly without a centralized AP, suitable for small and temporary setups.