INFSCI 1072/TELCOM 2700: Wireless Networks
Homework 10

Answer the following questions.

1. What are two solutions for overcoming the hidden terminal problem? Explain the technique used in IEEE 802.11.
2. An IEEE 802.11b MS-A finds the channel idle upon sensing it. It waits for DIFS = 50 μs and transmits a packet that is 1000 bytes long at 11 Mbps. Immediately afterwards, MS A wants to send another packet. During the first packet transmission, IEEE 802.11 MSs B and C sense the channel, C sensing it 50 μs after B. When A, B, C enter backoff, they pick the backoff interval as 5, 2, and 3 slots respectively. Draw a diagram showing what happens till the last packet transmission. Assume MSs A, B and C each has one packet to transmit after A completes its first transmission. All transmissions are directed to an AP.
3. The following parameters are available for HIPERLAN mobile stations trying to access the wireless medium after a busy period. Explain clearly what happens during each part of the channel access cycle and which MS survives which phase. Which of the mobile stations is ultimately able to transmit data? Under what different circumstances would a collision occur?

Station	Priority	Elimination Burst (slots)	Yield time (slots)
MS 1	1	7	4
MS 2	3	3	3
MS 3	2	12	5
MS 4	1	6	2
MS 5	2	12	6
MS 6	1	7	3
MS 7	1	5	1

4. A mobile terminal measures signals from four base stations as a function of time. The times and signal strengths (in dBm) from the samples are given in the table below. Assume the mobile terminal is initially attached to base station 1 (BS_1). The mobile and BSC make handoff decisions by considering the signals from the base stations after each sampling time. For example, if just RSS is used, just after t = 2.5s, the mobile terminal would be connected to BS_2. Fill in the table below, as to which base station the mobile terminal communicates with at the time points listed. If a condition is met for more than one base station, assume the best one (strongest RSS) is selected.
    a. Received signal strength (RSS)
    b. RSS + hysteresis of 5 dB + threshold of −55 dBm (i.e., only handoff is current BS RSS drops below −55 dBm and RSS of another BS is 5 dB greater than current BS)

Time(s)	0	2.5	5	7.5	10	12.5	15	17.5	20
BS_1	-47	-57	-52	-56	-60	-62	-60	-65	-64
BS_2	-59	-54	-55	-54	-59	-51	-49	-58.5	-50

BS_3	-70	-72	-75	-70	-51	-50	-60.5	-62	-75
BS_4	-72	-71	-65	-60	-55	-53	-50	-49	-51
Base Station Serving Mobile Terminal									
(a)	BS_1	BS_2							
(b)	BS_1								

4. What signals are used for cell search in GSM? What signal is used in IS-95?
5. Describe the difference between a Handoff Forward and a Handoff to a Third in cellular networks. Does the radio level decision process differ in the two cases? If so explain how.