

**Problem Set 1 (due January 23, 2012).  
[100 points]**

**Important Notes:**

1. To be done in teams of two students.
2. Late submissions will result in a 10% penalty per day (e.g., 2.5 days late result in 25% penalty).
3. You can use the Internet to get some help, but you should use your own words, examples, and code when answering the questions.

**Assignment:**

This assignment requires two computers ( $MT_1$  and  $MT_2$ ) connected through a wireless access point (AP).

1. Write a program that sends a UDP packet every 100ms. The packet should have 500 bytes payload consisting of a 4 bytes sequence number, and the remaining 496 bytes all zeros. Also write a program that receives the packets.
2. Place  $MT_1$  close to the AP. For  $MT_2$ , choose 4 locations L1, L2, L3, L4. L1 being close to the access point with a very good connection, L2 with slightly worst connection, etc. Draw a map with the locations, distances, and obstructions.
3. At each location, run your programs for 5-10 minutes. On both  $MT_1$  and  $MT_2$ , run wireshark in monitor mode (to be able to see the radiotap header. Filter all the packets sent from the AP to  $MT_2$  and save them in pcap format.
4. Analyze your data for each location:
  - a. What is the packet delivery ratio (this is including retransmissions)?
  - b. Using the pcap dump on  $MT_2$  what is the distribution (histogram, average, standard deviation) of the SSI of the packet and noise? What is the distribution of the rates? How many packets were received but had an incorrect CRC?
  - c. Using the information from  $MT_1$ , what is the distribution of the packets per rate (e.g., 1Mps, 2Mbps, 5.5Mbps, 6Mbps, ..., 54Mbps). Show in a convenient way how many times was a frame retransmitted and at what rates?

**Optional:**

1. Try additional locations to make your results and presentation more complete.

**Additional information:**

- You need to use a library to parse the pcap file:  
[http://www.ccs.neu.edu/home/noubir/Courses/CS6710/S12/problems/modified-lib80211\\_pcap.tgz](http://www.ccs.neu.edu/home/noubir/Courses/CS6710/S12/problems/modified-lib80211_pcap.tgz)
- You can use your favorite language.