Lab 1 Report
CSE 190
4/2/2015

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1. **How will you measure bandwidth with reasonable accuracy?** In attempt to avoid the overhead caused by the interrupts, we put our code to measure time directly in the interrupt functions. We sent 128 bytes sequentially. We sent 127 ‘a's followed by one ‘b’ as a transmission terminal flag. We calculated the time for the transmissions for one character and added them to the total time. Then we divide the number of bytes that were transmitted by the total time to get the bandwidth. We do appropriate math in order to get the unit in kbps. We ended up getting about 85 kps in average.

2. **How will you determine whether a packet has been dropped?** To test packet loss we sent 128 bytes with a message terminating byte. While we did not receive the terminating byte we incremented a counter. Once the termination byte was we received we calculated the percentage of packet loss by computing (128 - bytes received) / 128.

3. **Do you think you can send data in both directions a quickly?** In short, no. The current protocol does not seem to allow bi-directional communication. While we were transmitting from one radio we were unable to receive from the other. We used our test of sending 128 bytes, but this time we performed the test on both units simultaneously. Whichever unit began transmitting first had its data delivered with little packet loss. The data from the other unit seemed to have all of its packets lost.

4. **How do these measurement vary as the boards move farther apart?** At close distances our average throughput was 75-85 kbps with 1% packet loss. We seemed to lose ~5kbps of bandwidth and ~1% additional packet loss for every 20 feet of separation. At ~120 feet we averaged 65 kbps and 6% packet loss. In conclusion, with increasing distance, the error rate goes up.

Generally, we didn't have a lot of problems doing this lab. Most of the road-blocks we encountered was due to our lack of knowledge in what the bandwidth is and in the radio functions. For example, we didn't know that the interrupts were called for after transmissions of each characters. Because of not understanding the whole picture, we were having hard time trying to come up with the algorithm to calculate the bandwidth. After we understood about the radio functions, we were able to finish the lab with an ease. The results of the lab are shown in the above answers.