Digital Communications (ELEC6831)

This project has a value of 15%. This is a two-student group project and each group has to write their own distinct report with a distinct MATLAB program attached to the report.

Project description:

Consider a point-to-point communication system with the carrier frequency equals to 900MHz and bandwidth of 2MHz. The information is coming to this perfectly synchronized system with the rate of 2Mb/s. Apply an LDPC code based on DVB-S2 standard with the desired rate of 1/2 to the system. Assume the channel suffers from time spreading by a delay spread with RMS value of $\sigma_d = 100$ns, and also Doppler frequency effect due to the speed of up to 80 km/hour. In order to combat fading, we want to apply OFDM.

a) Determine the number of subcarriers for this OFDM system and choose the size of your IFFT-FFT in the system (you may use the rule of thumb formula in your subcarrier spacing calculation. Also, the guard time is assumed to be 10 times greater than RMS delay spread).

b) Simulate and draw the bit error rate of the whole system (bit error rate versus Eb/N0) if QPSK modulation is used, considering the designed OFDM system in part (a).

c) Repeat part (b) by considering 16QAM modulation and discuss the results.