

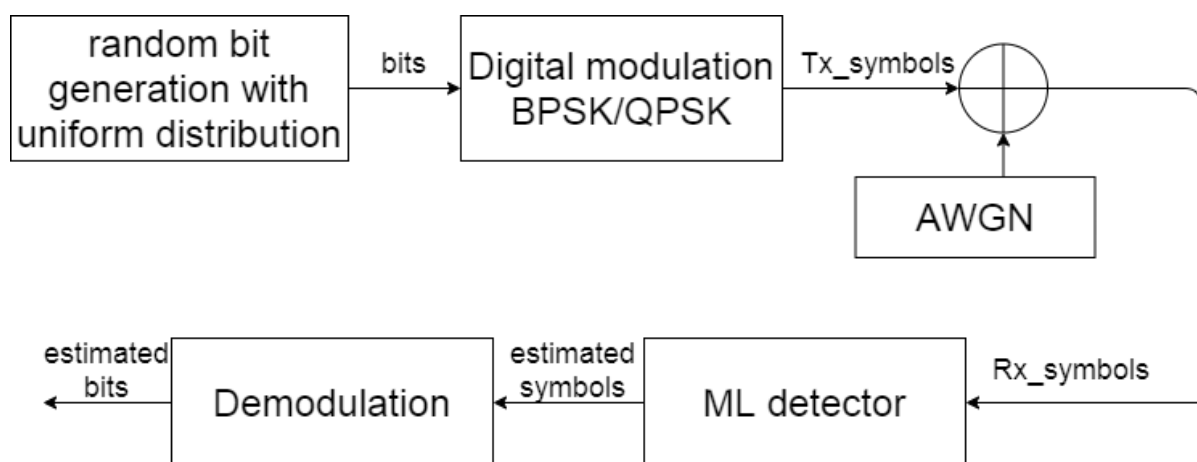
EE5801: CSP Lab

Communication Assignment 1

Problem:

Bit error rate(BER) and symbol error rate(SER) performance evaluation of BPSK and QPSK.

Technical details:



- For each of the two modulation schemes and for each value of E_b/N_0 , the simulation involves a number of iterations of the AWGN baseband channel. For each value of E_b/N_0 , you must perform sufficient number of iterations so that you collect at least $1e4$ decoding errors during the simulation.
- Use the system model as $y = x + n$, where $n \sim CN(0, N_0)$
- The receiver must decode y based on the ML detection or minimum distance decoder. Then use the decoded output to check if the decoder was able to correctly identify the transmitted vector in this iteration. Use a counter to count the number of decoding errors for this value of E_b/N_0 .

- Then find BER and SER as discussed in lecture and plot them using 'semilogy' Matlab command.

Submission Details:

- Write Matlab code to implement above communication system.
- Write a single main.m file and write separate functions for digital Modulation and ML detection
- Upload main.m, function.m files and all BER and SER plots in a single figure in '.fig' format. '.fig' is matlab figure format file. Use 'legends' also in figure and do 'grid on'. Your figure should contain 4 plots i.e. simulated BER and SER of BPSK and BER and SER of QPSK.
- Also write your observation from the plot in your own words and upload a pdf file.
- Submit all files in a single zip file with your id, Example: EE20MTECH11010_**A1.zip.

Notes:

- Compare your simulated BER and SER with theoretical formula as given below.
- Theoretical formula:
 - BER of BPSK = SER of BPSK = BER of QPSK = $Q \sqrt{2 * (E_b/N_0)_{lin}}$
 - SER of QPSK = $2 * Q \sqrt{2 * (E_b/N_0)_{lin}}$