EE5801: CSP Lab/ EE5301: DSP Lab

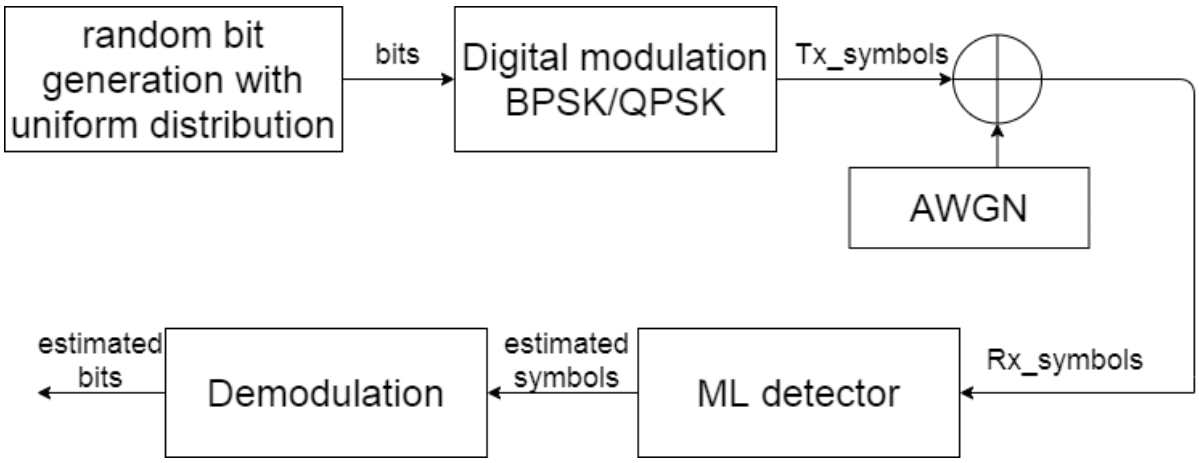
EE3701: Communication Systems Lab

Assignment 4

Problem:

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

Technical details:



- For each value of E_b/N_0, take number of iterations at least 1e4 or more. Refer to the pseudo code given in Lecture 5 pdf.
- 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 symbol in this iteration. Use a counter to count the number of decoding errors for a particular value of E_b/N_0.

- Then find BER and SER and plot them using ‘semilogy’ Matlab command.

Submission Details:

- Write Matlab code to implement above communication system.
- **Coding format:** Write a single main.m which contains main code and functions for BPSK, QPSK and ML detection.
- Write your observation from the plot in your own words in MS word or latex.
- Plot all BER and SER plots in a single figure and save as pdf. Use ‘legends’ also in figure and do ‘grid on’. Your figure should contain 6 plots i.e. simulated BER and SER of BPSK, BER and SER of QPSK, 2 theoritical plots.
- Upload the below files in a single zip file with your id, Example: EE22MTECH11010_**A4**.zip.
    1. main.m
    2. BER and SER plot for both BPSK and QPSK in a single pdf file. Plot both simulated and theoritical.
    3. Pdf of your MS word or latex document.

Grading policy:

- Output – 50%
- Coding format – 20%
- Pdf submission – 30%
- Late submission – (-5)%

Notes:

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