

Assignment 1: Simulation of Channel Propagation Models

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Due on February 25, 2021

This assignment carries a total of 10 marks. For each exercise, you have to submit one or more python/Matlab source files, and a file storing the output. Please create separate directories named "Q<Number>" and zip the directories before submitting on Google Classroom.

Exercise 1

Assume that you are transmitting using a single antenna transmitting over a additive white Gaussian noise channel. Through simulation, plot the bit error rate (BER) for different values of SNR. Your plot should have total of 5 lines with each line corresponding to: (i) BPSK (by analysis), (ii) QPSK (by either analysis or simulation), (iii) 4-QAM (by analysis), (iv) 16-QAM (by simulation), and (v) 32-QAM (by simulation). The X-axis of the plot should contain the SNR in dB, and the Y-axis should have the BER (4 points).

Exercise 2

Assume that you have a center frequency of 1.5 GHz, and that you are in a area where there is a Rayleigh fading of 100 independent sinusoids. If the transmission is at SNR of 0 dB, plot the SNR received with respect to time (3 points).

Exercise 3

Create a client and server program using sockets. The client should send a packet containing its own timestamp to the server. The server should in turn check its current time, and then print the packet latency in milliseconds. Now, move the server program to (i) a machine which is connected over a wired ethernet network, and (ii) a machine which is connected over a WiFi network. Send a total of 100 packets for both the cases. Store the latency in each case in a file called 'wired.csv' and 'wireless.csv' (4 points).