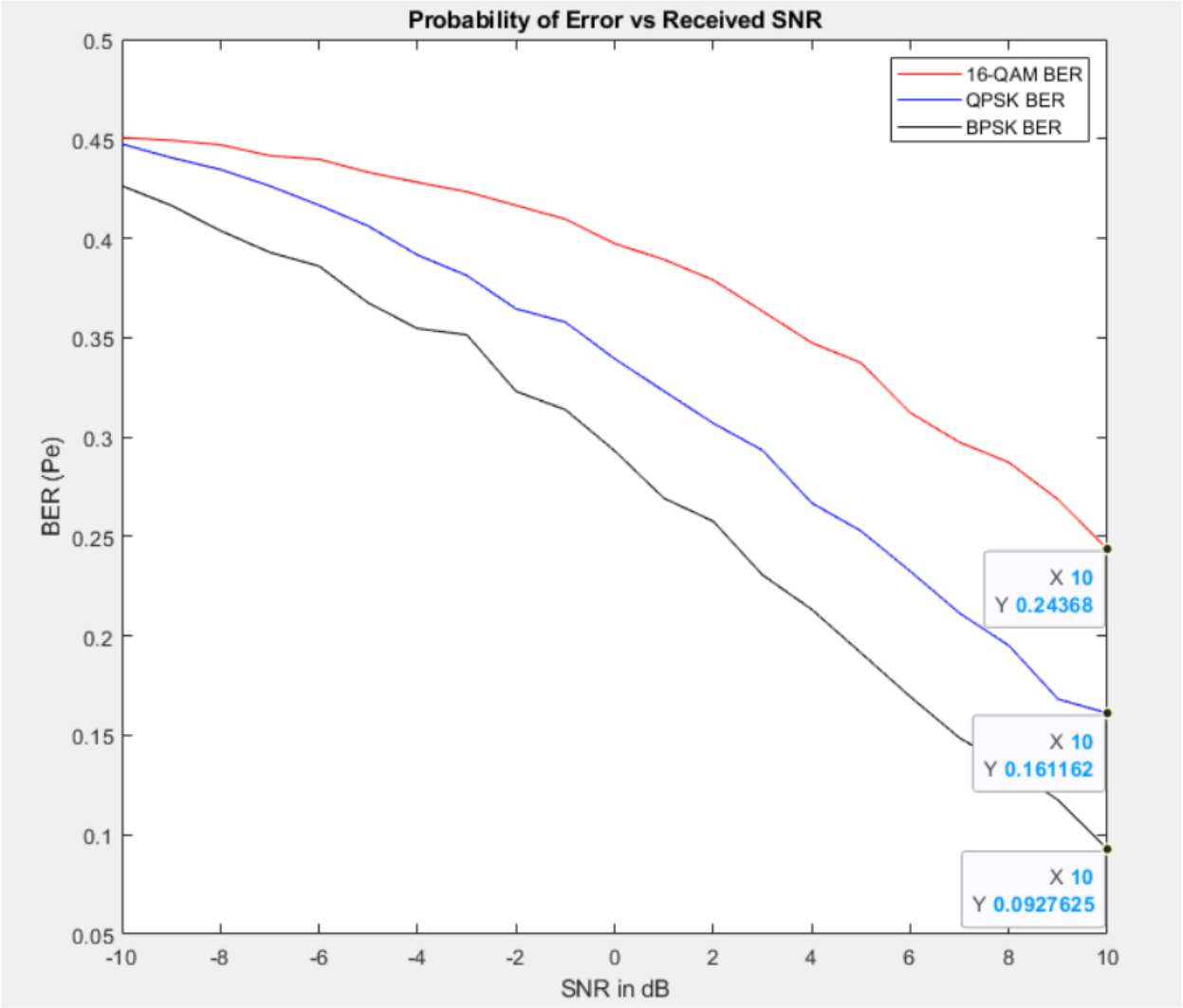
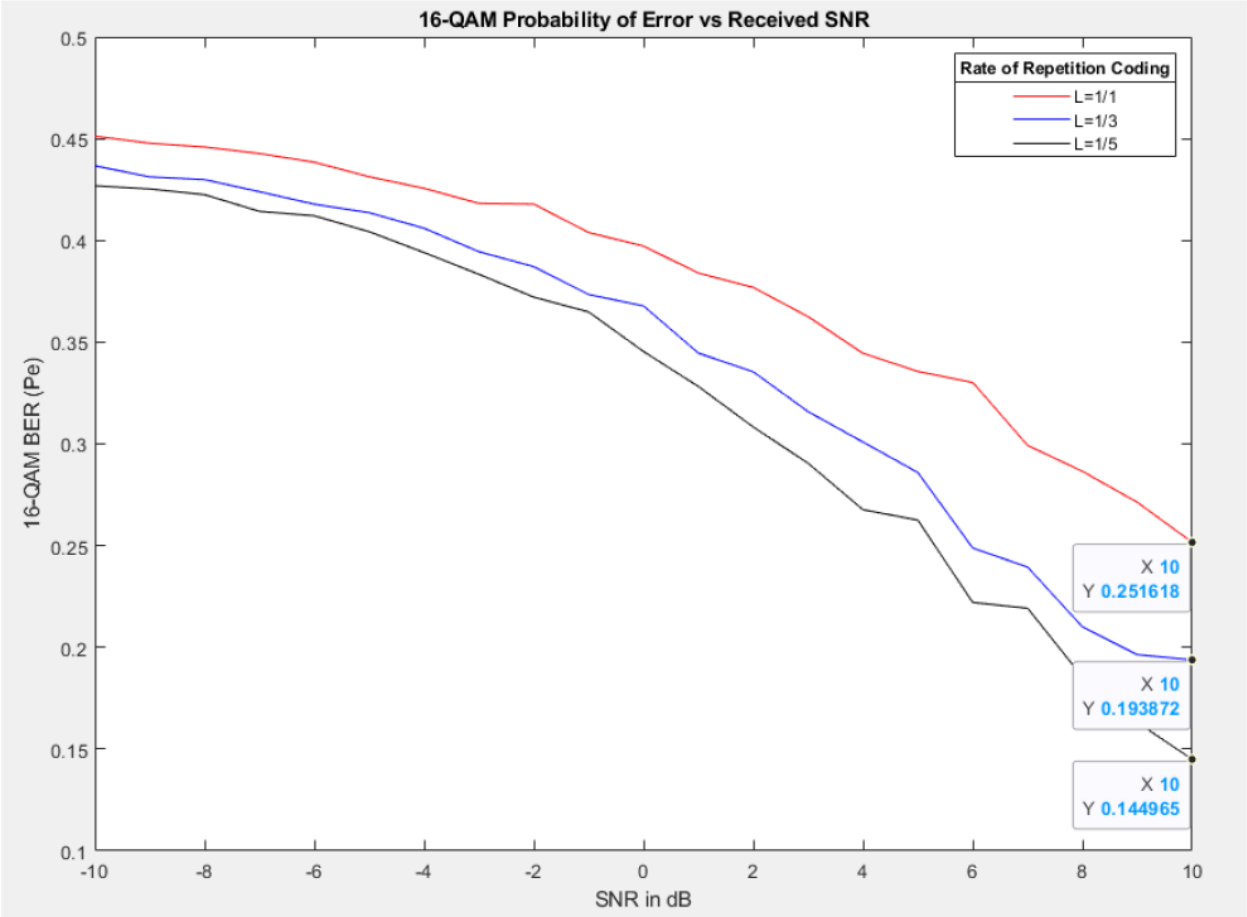
RESULTS AND PLOTS

- Probability of Error vs. Received SNR



Observation: The bit error rate reduces with a higher received SNR. Out of the 3 modulations, the BPSK had the best BER, followed by the QPSK and the 16-QAM, respectively. Yet, adopting BPSK over 16-QAM, for example, has a big tradeoff; the bit rate for 16-QAM quadruples the bit rate of BPSK, allowing for faster data transfer. As a designer, there will be some scenarios in which a decision must be made to decide what solutions will work best.

- Probability of Error vs. Received SNR for 16-QAM with Repetition Coding



Observation: The bit error rate reduces with the number of repetitions using the repetition coding technique. For a 16-QAM system, for a single repetition at 10dB SNR, we get a BER of 0.25; for 3 repetitions of each bit, BER is 0.19, and for 5 repetitions, BER is 0.14. Channel encoding reduces the probability of error for a given SNR. Yet, this technique will increase the time it takes to send the information, since the same bits are sent multiple times.

- Bit Rate Calculations

If a given Bandwidth is given, the bit rate can be calculated easily using the following formula: Bit rate = Bandwidth * log2(N). If the system has a 10MHz bandwidth, the bit rate for the BPSK, QPSK, and 16-QAM are:

For BPSK, Bit rate = 10e6 * log2(1) = 10Mbps

For QPSK, Bit rate = 10e6 * log2(4) = 20Mbps

For 16-QAM, Bit rate = 10e6 * log2(16) = 40Mbps