COMMUNICATION SYSTEMS – ASSIGNMENT 6

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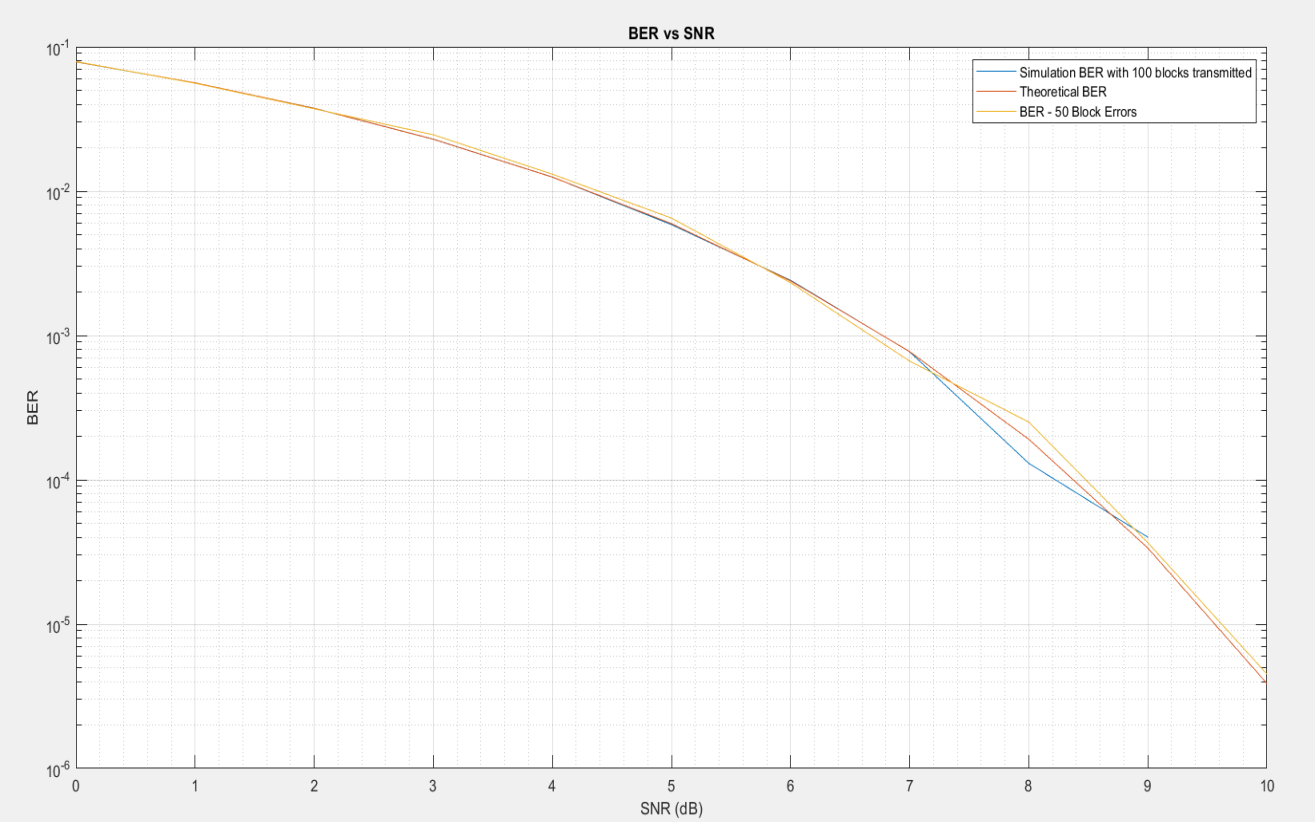
SIMULATION OF BPSK

Bit Error Rate vs SNR



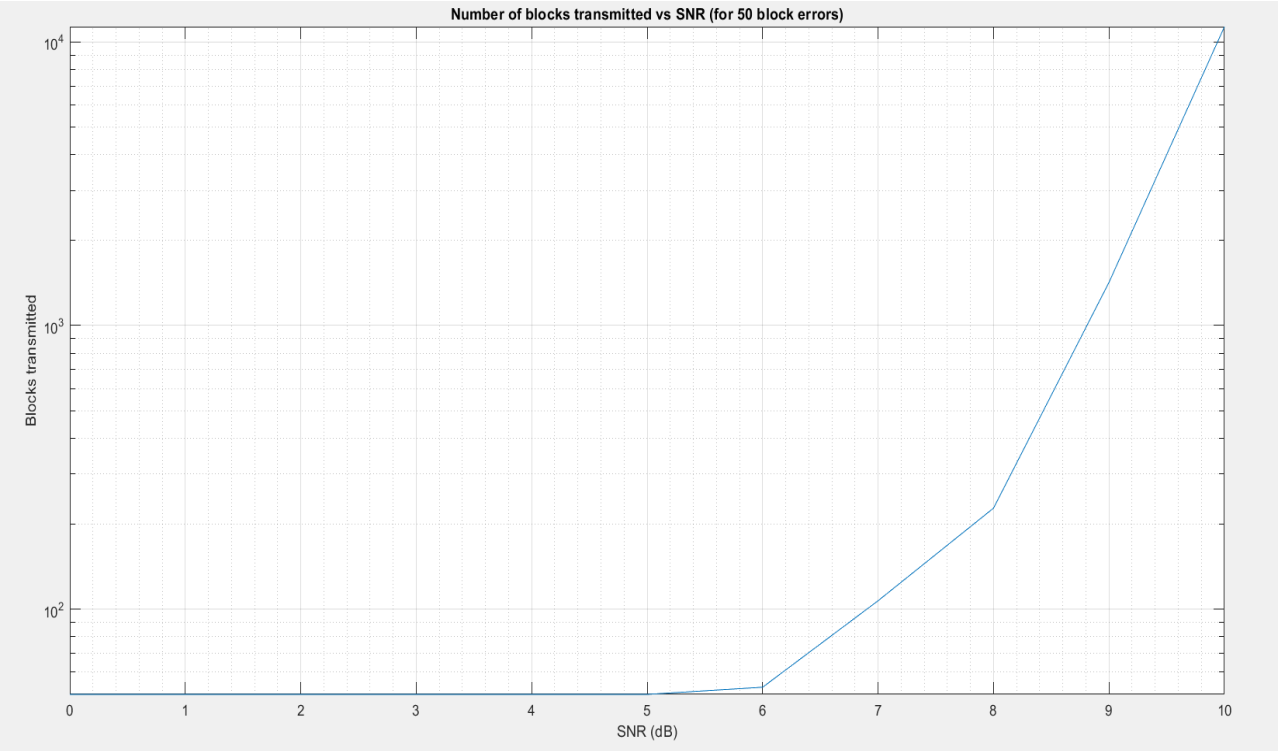
Since Nf = 100(Number of blocks) and Na = 1000 (bits per block). The simulated BER drops drastically as we increase the SNR.

The minimum possible BER (from simulation) is 10^{-5} $\left(\frac{1}{N_f N_a}\right)$. At 10 dB, it drops to zero (Hence, not marked in the graph)

The Simulated BER (calculated after 50 block errors) gives a better estimate of BER. It is closer to the theoretical BER given by

$$Q\left(\sqrt{\frac{2E_b}{N_0}}\right) = \frac{1}{2}\operatorname{erfc}\left(\sqrt{\frac{Eb}{N_0}}\right)$$

The below graph shows the number of blocks that need to be transmitted to obtain 50 block errors



Initially till 5 dB, all blocks transmitted have error (Nf = 50). After this, the number of blocks that need to be transmitted increases exponentially. More than 10,000 blocks need to be transferred to obtain 50 block errors for 10 dB SNR.