Advanced Topics In Telecommunication Systems

Homework 4 Report

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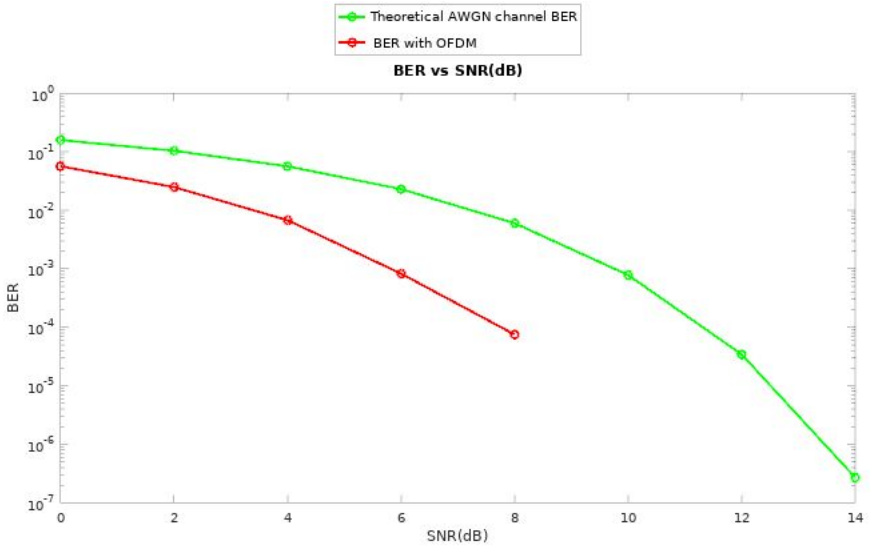
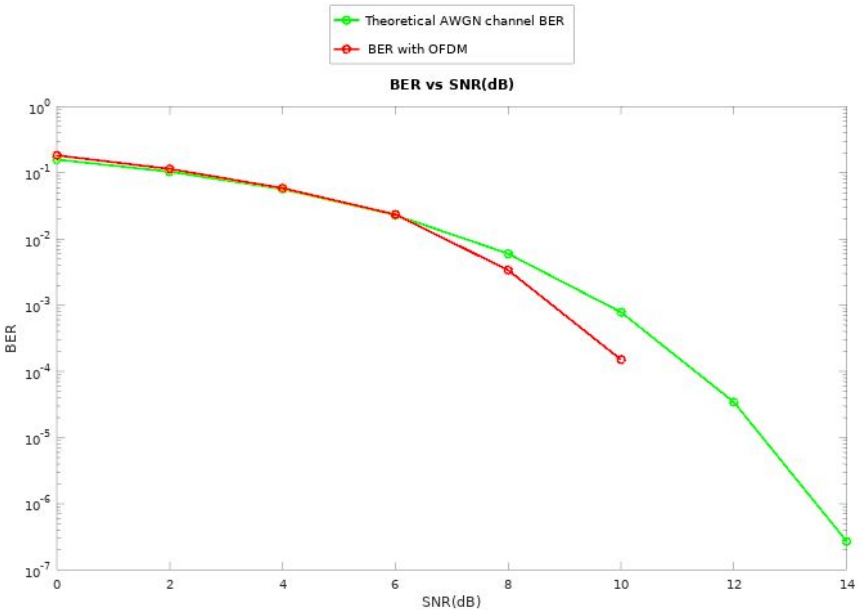
a,b) For this homework, I implemented an OFDM system with N = 64 subcarriers and a cycle prefix equal to 16. For the BER plots, of the simulation was used the following values for the constants: Rb = 10KBps , N= 13000, oversampling = 1 and Eb = 1.

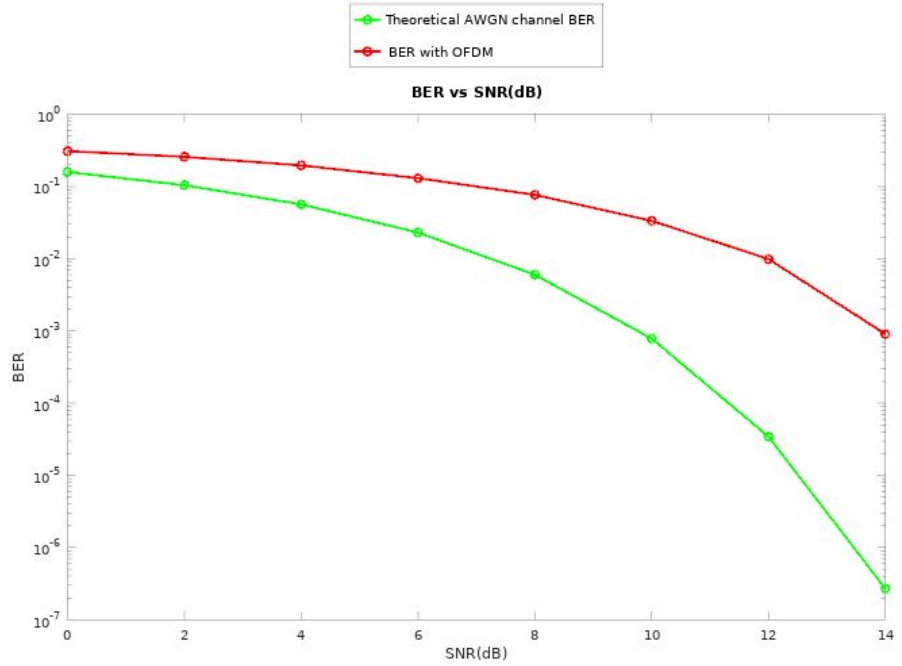
BPSK:



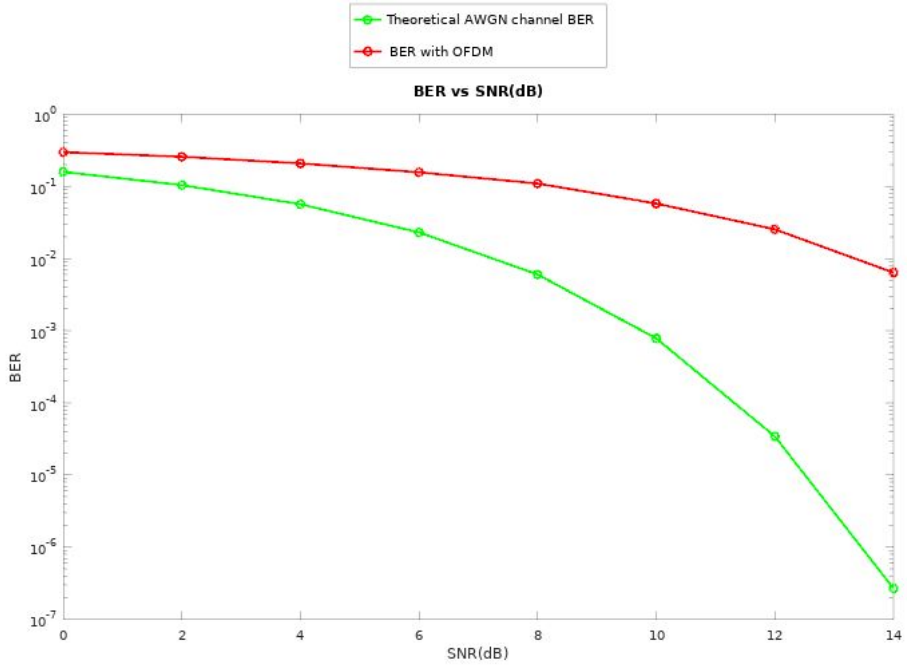
QPSK:



8-PSK:

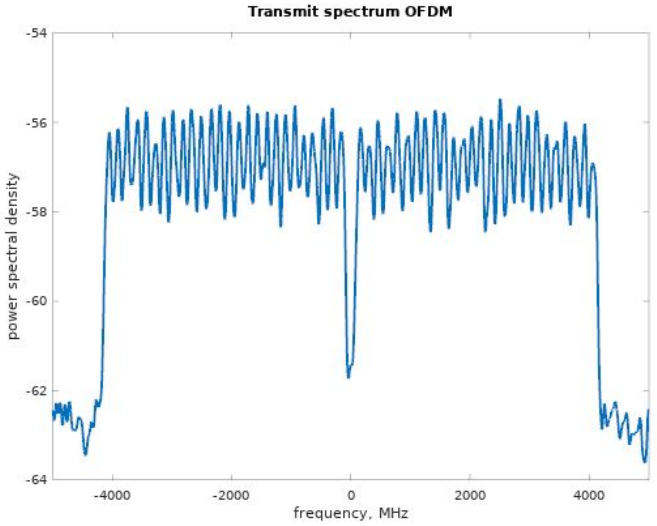

Theoretical AWGN channel BER
BER with OFDM
BER vs SNR(dB)
BER
SNR(dB)

16PSK:

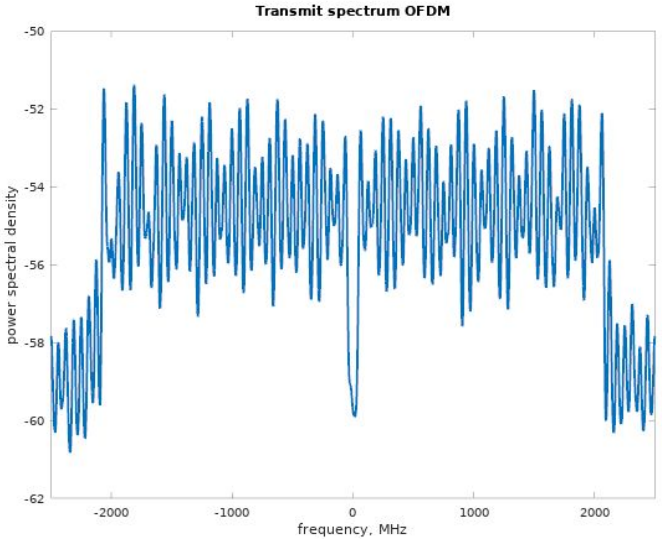

Theoretical AWGN channel BER
BER with OFDM
BER vs SNR(dB)
BER
SNR(dB)

c)For the PSD spectrum plots oh the OFDM signal, the following values was used for the constants: Rb = 10KBps , N= 13312 input bits, oversampling equal to 1, Eb = 1 and SNR(dB) = 10.

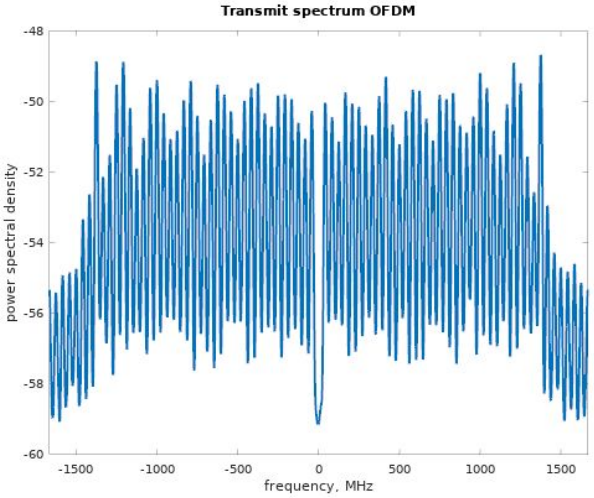
i) For BPSK:



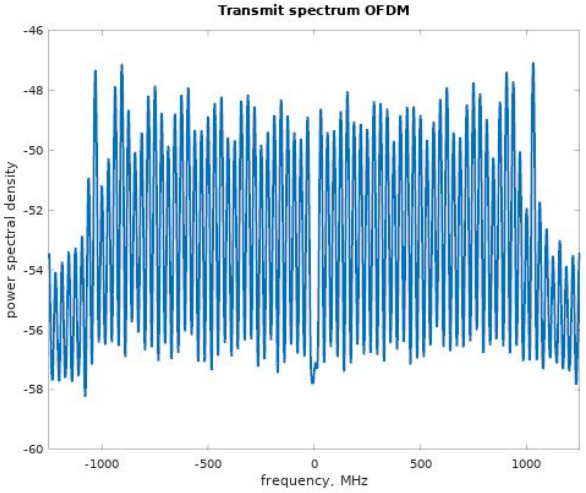
ii) For QPSK:



i) For 8-PSK:

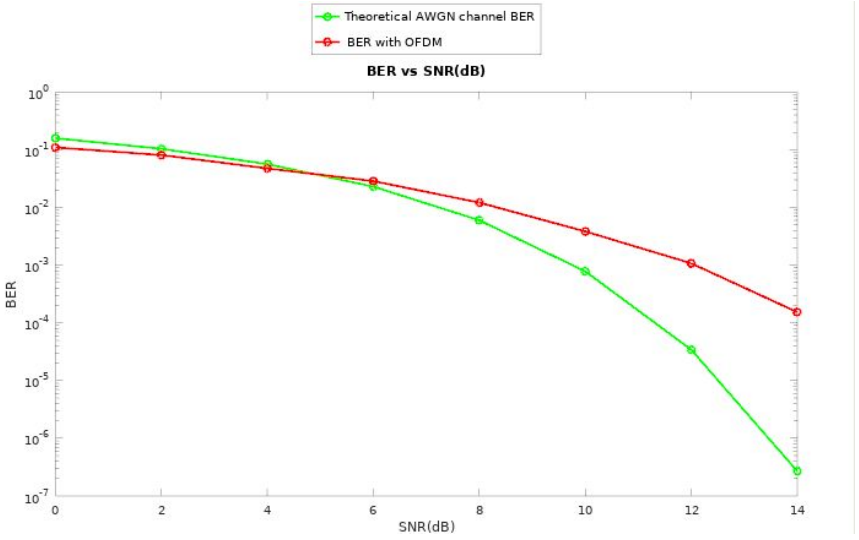


i) For 16-QAM:

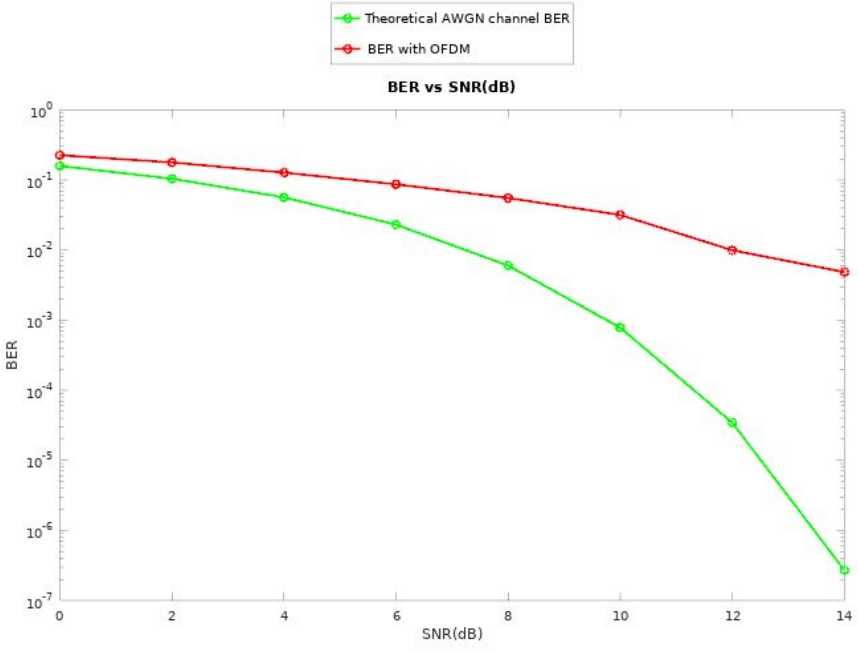


d) We assume that our channel is an LTI channel with constant h values ([0.9+0.9j, 0.6+0.6j, 0.3+0.3j]). The new cyclic prefix should be equal or bigger to the delay spread of our system. The optimal length of cycle prefix is equal to the delay spread of our channel. If we assume that our system has a delay spread equal to 3 symbol periods the CP should also be equal to 3 symbol periods.
For the BER plots, of the simulation was used the following values for the constants: Rb = 10KBps , N= 13312 input bits, oversampling equal to 1 and Eb = 1.

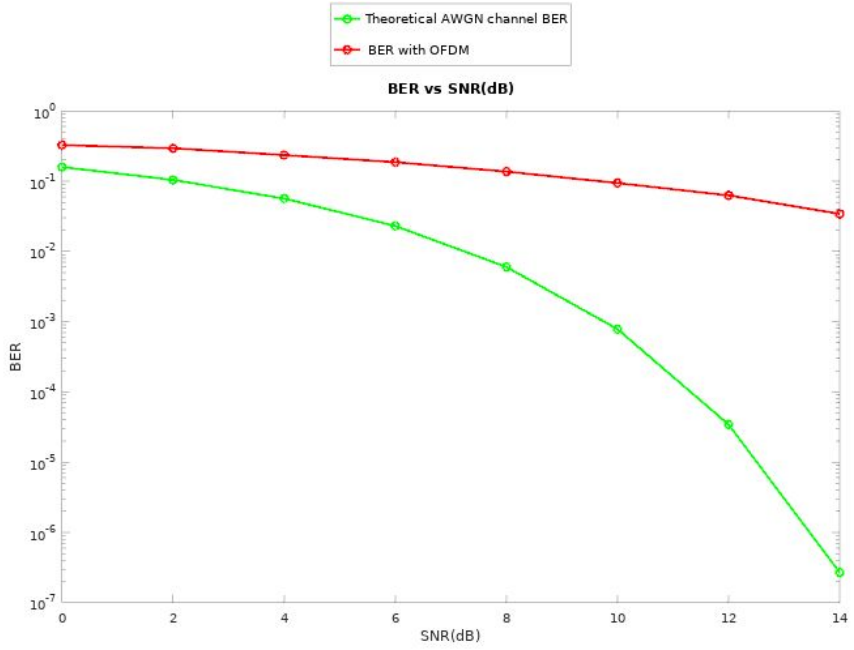
i) For BPSK:



ii) For QPSK:



iii) For 8-PSK:



iv) For 16-QAM: