

Indian Institute of Technology Dharwad

EE 404: Wireless Communication

Spring 2021

Coding Assignment

Due Date: 21st March 2021 09:59:59 AM

1. Implement a BPSK modulated signal transmission adopting coherent reception.
 - a) Obtain the BER vs. SNR. curves with $L = 1$ (no repetition) and $L = \{2,3,4,5\}$ repetitions over a Rayleigh fading channel. Determine the range of SNR values you want to simulate using your own intuition.
 - b) Let us say that each coherence period corresponds to 8 BPSK samples. Create your own random channel which becomes "bad" once in every four coherence time periods (you can define "bad" based on intuition). Show through BER vs. SNR simulations that "interleaving + repetition" has better performance than "only interleaving" or "only repetition".
2. Implement the 2 Tx x 1 Rx Alamouti scheme using QPSK modulated symbols. Plot the BER vs. SNR for a Rayleigh fading channel with and without Alamouti scheme. Compare the simulation results with the theoretical upper bound for the probability of error vs. SNR.
3. Build your own point-to-point OFDM system (transmitter and receiver) with 64-point IFFT/FFT and 8 samples of CP. The bandwidth is 1 MHz. Each subcarrier should carry QPSK modulated signals.
 - a) Plot BER vs. SNR for a single tap Rayleigh fading channel assuming that the channel is perfectly known.
 - b) Come up with your own pilot transmission scheme. Perform your own channel estimation at the receiver such that it works for frequency selective channels. Plot BER vs. SNR for a 4-tap Rayleigh fading channel.