

ECE 732: Mobile Communication Systems
Prof. B.-P. Paris
Homework 4
Due: October 30, 2018

Reading: Goldsmith - chapter 6 and 7.

Problems Since the probability of error expressions for Rayleigh fading channels are quite cumbersome and sometimes intractable, this homework aims to find these error rates via simulation.

You may find the MATLAB script `simulateDiversity.m` helpful as a starting point for this assignment.

1. Simulate a receiver that uses selection diversity. Measure the symbol error probability and the outage probability for diversity orders $L = 1, 2, 3, 4, 8$. For each diversity order, vary the signal-to-noise ratio so that you measure bit error rates down to 10^{-4} . Summarize your results in a plot (similar to those in chapter 7 of the textbook). Make sure to indicate confidence intervals (see MATLAB function `errorbar`) on your plots. If possible, plot the theoretical error curves in the same plot.
2. Repeat problem 1 for maximum-ratio-combining (MRC).
3. Think of another form of diversity combining. You may use one of the other methods in the textbook or you can make one up (e.g, select the strongest signal - not the same as the strongest channel). Simulate the error rates for this receiver.
4. What is the significance of the confidence intervals that the MATLAB script produces?