UNIVERSITY OF TEXAS AT DALLAS Department of Electrical Engineering

EE 4365 - Introduction to Wireless Communications Systems Problem Set #1: Overview of Wireless Systems

Date assigned: 5/20/2004Date due: 5/27/2004

Late homework will not be accepted. Please check the course web site for updates.

Reading: Wireless Communications and Networking, ch. 1-2

Please use MATLAB to help you solve these problems, check answers, etc.

Problem 1.1 Introduction to Wireless Communications Identify the cellular and PCS spectrum Hint: Go to: http://www.fcc.gov/wtb/cellular/ http://www.fcc.gov/wtb/pcs/

Problem 1.2 dB in Communications

If a signal with a power level of 10 mW is inserted onto a transmission line (cable or wire) and the measured power some distance away is 5 mW, what is the loss on this line in dB?

Problem 1.3 dB in Communications

Decibels are useful in determining the gain or loss over a series of transmission media. Consider a series in which the input is at a power level of 4 mW, the first medium is a transmission line with a 12 dB loss, the second medium is an amplifier with a 35 dB gain, and the third medium is a space with a 80 dB loss. What is the net gain (or loss) of the entire transmission media? What is the output power in dBW?

Problem 1.4 Probability

In an experiment to monitor three calls, the probability mass function (PMF) of N the number of voice calls, is

$$P_N(n) = \begin{cases} 0.2 & n = 0\\ 0.5 & n = 1\\ 0.2 & n = 2\\ 0.1 & n = 3\\ 0 & \text{otherwise} \end{cases}$$

(a) Find E[N], the expected number of voice calls

(b) Find P[N < 3], i.e., the probability that the number of calls is less than 3.

(c) Find $P[1 < N \le 3]$.