KFUPM - COMPUTER ENGINEERING DEPARTMENT

COE-543 – Mobile Computing and Wireless Networking

Assignment 2 – Due Sunday May 18th, 2008

Chapter 1: Overview of Wireless Networks

Textbook Problems: 4.1, 4.4, 4.7, 5.2, 5.4

Problem 1: Wireless channel presents complications in terms of the multiple access technique. For wireless local network, two issues that could arise are: "Hidden Terminal" problem, and "Exposed Terminal" problem. Explain these two issues briefly. Explain how IEEE802.11 alleviates these two issues.

Problem 2: Consider a cellular system with 395 total allocated voice channels of 30 kHz each. The total available bandwidth in each direction is 12.5 MHz. The traffic is uniform with average call holding time of 120 seconds, and call blocking during the system busy hour is 2%. Calculate:

a) The calls per cell site per hour

b) The mean SIR

c) The spectral efficiency in Erlangs/km2/MHz

Solve (a), (b), and (c) for a cell reuse factor of N equal to 4, 7, and 12, respectively, and for omni-directional, 120◦, and 60◦ systems, calculate the call capacity. Provide the answers for (a), (b), and (c) for different N and different sectorization in a table.

d) Plot spectral efficiency versus cell radius for $N = 7$ and comment on the results. Assume that there are 10 mobiles/km2 with each mobile generating traffic of 0.02 Erlangs. The slope of path loss is a = 40 dB per decade.

Show your calculations and include the Matlab code used in the solution and in plot.

Hint: *This question is solved in the slides package!*