University of Massachusetts Lowell
Department of Electrical and Computer Engineering
16.582/16.418 Wireless Communication
Estimating Cell Count

Using average cell sites which have the following characteristics:

Handset Transmitter Power: 23 dBm
Base Station Height: 30 m
Handset User height: 1.5 m
Base Station Antenna gain: 14 dBd
Handset Antenna Gain: 0 dBi
Frequency: 1960 MHz.
Morphology: Euro Cost Suburban
Outside Shadowing standard deviation: 10 dB
Building Penetration Margin: 10 dB (suburban)
Building Penetration standard deviation: 8 dB
Coverage Criteria 90%cell edge/95% cell

a) Calculate the required signal level assuming you are reverse link limited, and that you would like 400 kbps minimum uplink speed, and that this requires 7 dB Signal to noise ratio.
b) Assume that you must cover 900 square km. For this set of assumptions determine how many cells are required using Cost-231 model
c) If the frequency is increased to 2500 MHz, and assuming that Cost-231 still holds, how many cells are required for the same coverage.
d) If you change the coverage criteria to 75% cell edge, 90% cell what happens to the cell count
e) Using the base assumptions, what would the cell count be if you were only trying to provide voice (13 kbps) and 64 kbps data?

What to turn in: A spreadsheet or Matlab exercise with your complete link budgets and cell count estimates