Sheet 4

3.5 A cellular service provider decides to use a digital TDMA scheme which can tolerate a signal-to-interference ratio of 15 dB in the worst case. Find the optimal value of N for (a) omnidirectional antennas, (b) 120° sectoring, and (c) 60° sectoring. Should sectoring be used? If so, which case (60° or 120°) should be used? (Assume a path loss exponent of $n = 4$ and consider trunking efficiency.)

3.8 If an intensive propagation measurement campaign showed that the mobile radio channel provided a propagation path loss exponent of $n = 3$ instead of four, how would your design decisions in Problem 3.5 change? What is the optimal value of N for the case of $n = 3$?

3.18 Show that if $n = 4$, a cell can be split into four smaller cells, each with half the radius and 1/16 of the transmitter power of the original cell. If extensive measurements show that the path loss exponent is three, how should the transmitter power be changed in order to split a cell into four smaller cells? What impact will this have on the cellular geometry? Explain your answer and provide drawings that show how the new cells would fit within the original macrocells. For simplicity use omnidirectional antennas.

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