HOMEWORK 1 — Cellular Networks

Exercise 1. Hexagonal Cell Layouts

Show that, in a hexagonal cell structure, any cell can be reached from the cell of interest by moving $i$ cells in a direction perpendicular to one of the edges and then at 60° to this direction, $j$ cells.

Exercise 2. Cluster Size

Prove that the number of cells in a cluster is given by $i^2 + ij + j^2$ for some $i > 0$ and $j ≥ 0$.

Exercise 3. Signal to Interference Ratio

Redo the calculations of SIR in Example 1.3 of the notes, this time for the case in which the base station uses antennas with 120° sectoring capability.

Exercise 4. Power Control

If the minimum usable received power at a mobile is -90 dBm for the AMPS system, calculate the total 1-meter far field power (in both dBm and Watts) at the base station. Assume a cell radius of 3 km and 120 total users.

All assignments are covered by the Honor Code. You may work together, but do not directly copy the solutions of other students.