The Cellular Concept

Unit 3

3.7.1 Cell Splitting

- Split congested cell into smaller cells.
  - Preserve frequency reuse plan.
  - Reduce transmission power.

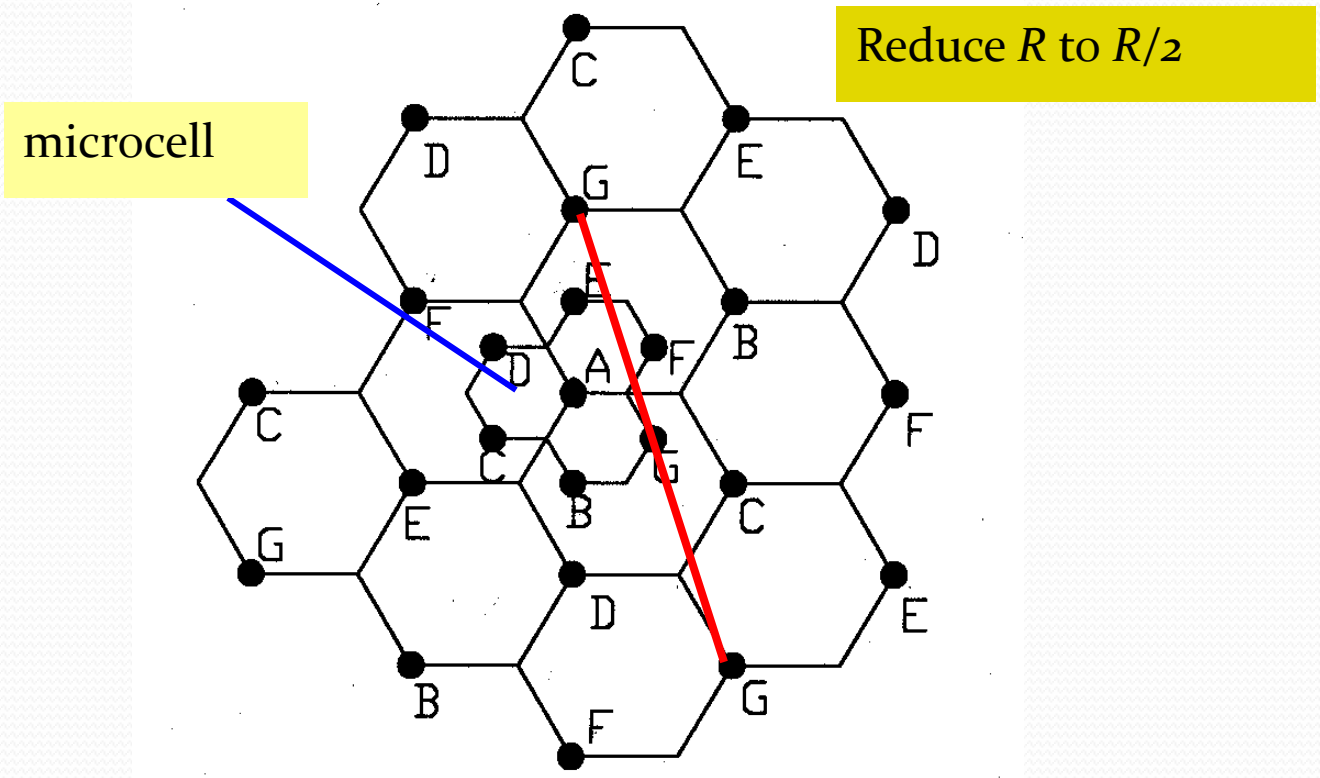
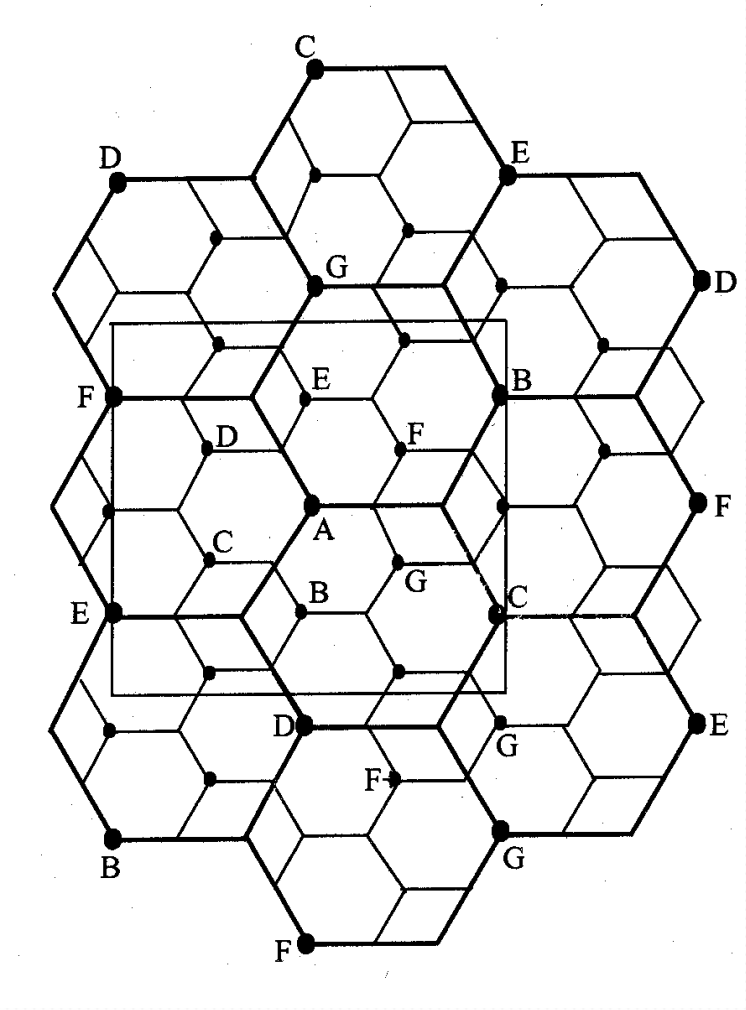


Illustration of cell splitting within a 3 km by 3 km square



- Transmission power reduction from P_{t1} to P_{t2}
- Examining the receiving power at the new and old cell boundary

$$P_r[\text{at new cell boundary}] \propto P_{t2}(R/2)^{-n}$$

$$P_r[\text{at old cell boundary}] \propto P_{t1}R^{-n}$$

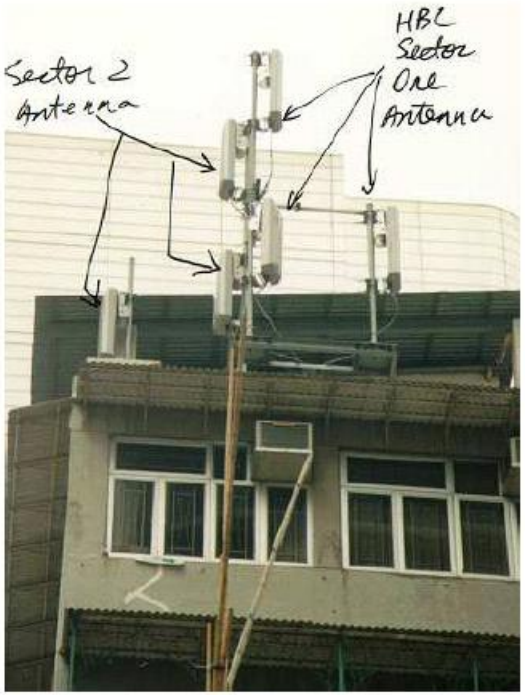
- If we take $n = 4$ and set the received power equal to each other

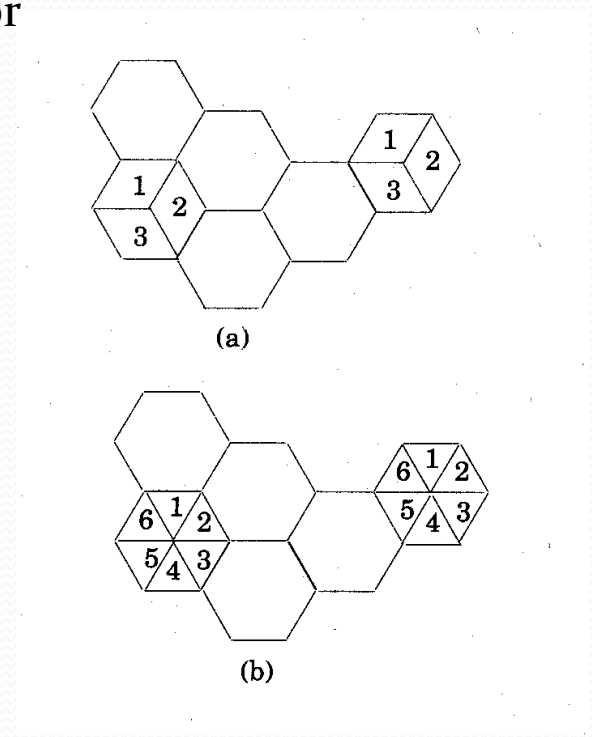
$$P_{t2} = \frac{P_{t1}}{16}$$

- The transmit power must be reduced by 12 dB in order to fill in the original coverage area.
- Problem: if only part of the cells are splited
  - Different cell sizes will exist simultaneously
- Handoff issues - high speed and low speed traffic can be simultaneously accommodated

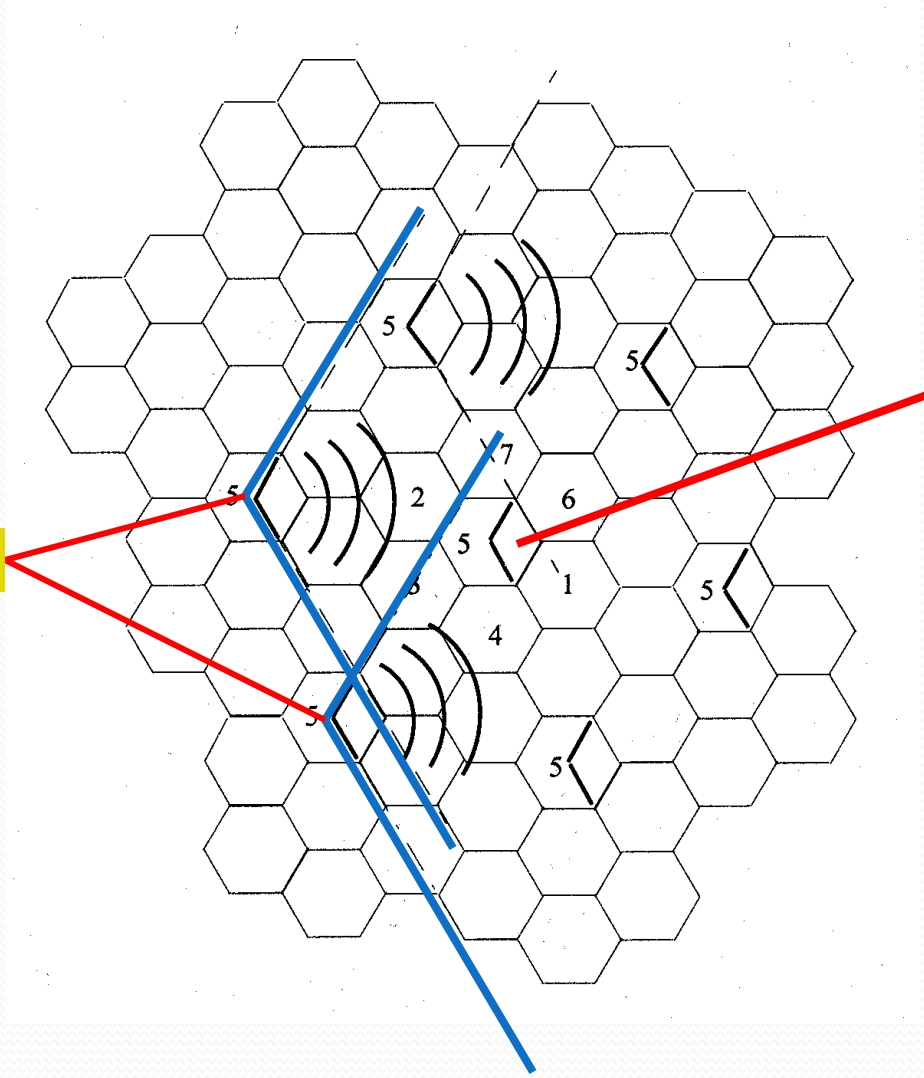
3.7.2 Sectoring

- Decrease the *co-channel interference* and keep the cell radius *R* unchanged
  - Replacing single omni-directional antenna by several directional antennas
  - Radiating within a specified sector





- Interference Reduction



position of the mobile

interference cells

3.7.3 Microcell Zone Concept

- Antennas are placed at the outer edges of the cell
- Any channel may be assigned to any zone by the base station
- Mobile is served by the zone with the strongest signal.

- Handoff within a cell
  - No channel re-assignment
  - Switch the channel to a different zone site
- Reduce interference
  - Low power transmitters are employed