Wireless Mobile Communication

Lecture 14

- Frequency Reuse Continue.....

Topics to be Covered

- Frequency Allotment & frequency Reuse.....

Frequency Reuse

- Power of base transceiver controlled
  - Allow communications within cell on given frequency
  - Limit escaping power to adjacent cells
  - Allow re-use of frequencies in nearby cells
  - Use same frequency for multiple conversations
  - 10 – 50 frequencies per cell
- *E.g.*
  - *The pattern consists of N cells*
  - K total number of frequencies used in systems
  - Each cell has K/N frequencies
  - Advanced Mobile Phone Service (AMPS) K=395, N=7 giving 57 frequencies per cell on average

Characterizing Frequency Reuse

- D = minimum distance between centers of cells that use the same band of frequencies (called cochannels)
- R = radius of a cell
- d = distance between centers of adjacent cells (d = R)
- N = number of cells in repetitious pattern
  - Reuse factor
  - Each cell in pattern uses unique band of frequencies
- Hexagonal cell pattern, following values of N possible
  - $N = I^2 + J^2 + (I \times J)$,   I, J = 0, 1, 2, 3, ...
- Possible values of N are 1, 3, 4, 7, 9, 12, 13, 16, 19, 21, ...
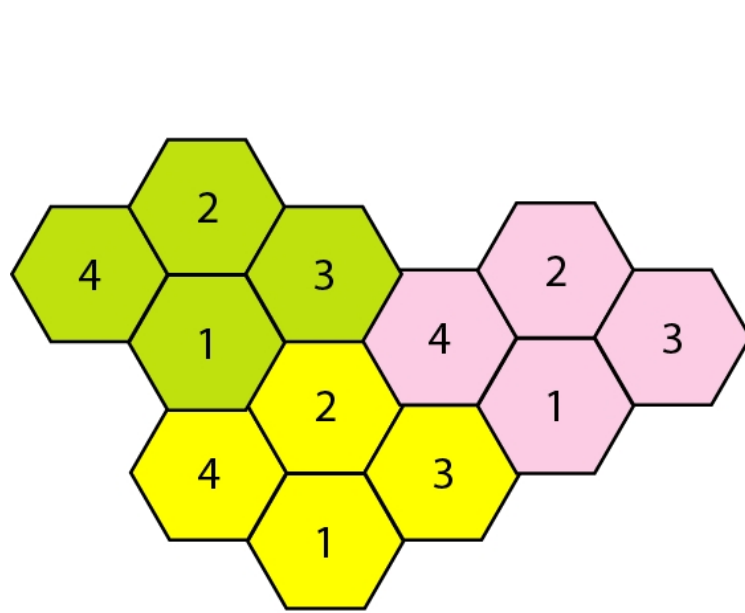- D/R= $\sqrt{3N}$
- D/d = $\sqrt{N}$

circle with radius D
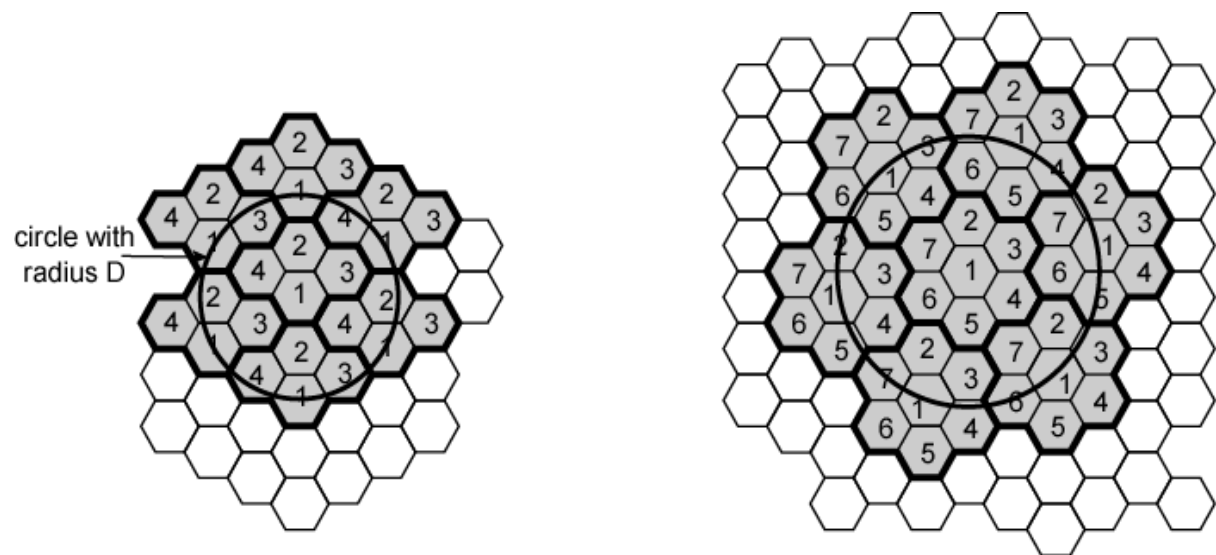
(a) Frequency reuse pattern for N = 4
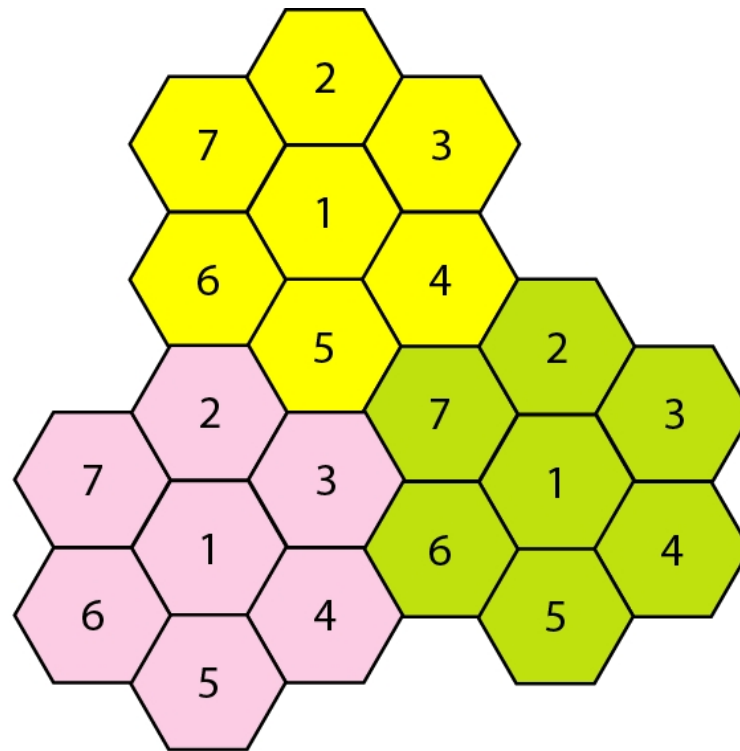
(b) Frequency reuse pattern for N = 7
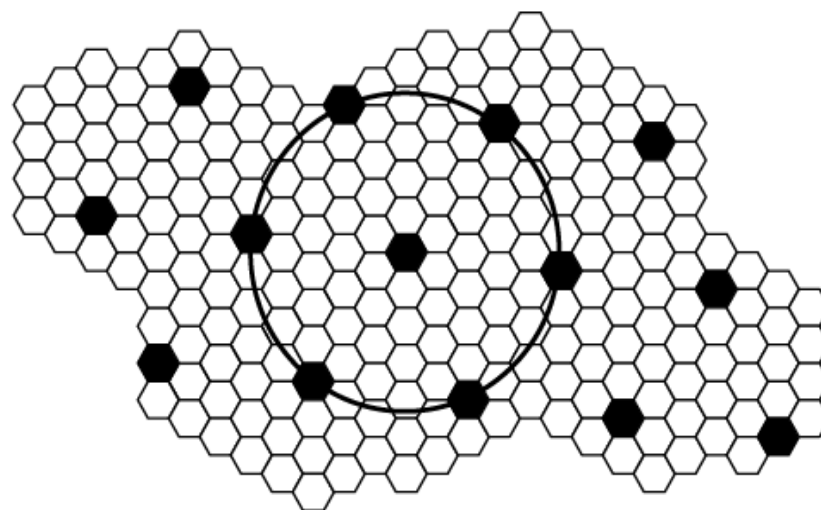
(c) Black cells indicate a frequency reuse for N = 19

Figure 16.2 *Frequency reuse patterns*

a. Reuse factor of 4

b. Reuse factor of 7