

Other Issues With Cells

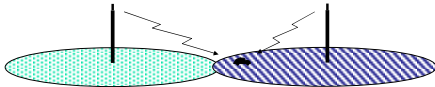
Instructor: M. A. Ingram
ECE 4823

Four Topics:

- Hand-offs
- Cell Splitting
- Sectoring
- Power Control

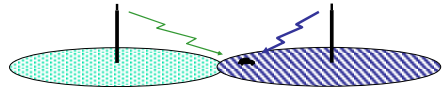
Hand-offs

- As a subscriber moves away from its serving base station, the SIR decreases
- The subscriber compares received powers from the surrounding base stations
- Eventually, the subscriber changes to another serving base station to get a better SIR



Must Change Channels

- Because the adjacent cells use a different set of channels, the carrier frequency must change during a call
- This frequency change is a "hand-off"
- Because of multipath fading, there needs to be a hysteresis to avoid excessive switching

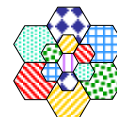


Hand-offs Have Priority

- Since it is bad for an existing call to be dropped, hand-offs have priority over new callers for channel assignments
- For this reason, the Erlang B formula is not quite applicable, but it still provides insight

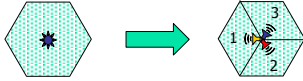
Cell-splitting

- Sometimes traffic density increases in certain cells beyond what they were originally designed to handle
- These cells may be split into smaller cells, and the transmit powers reduced



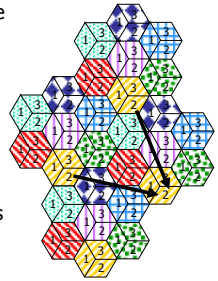
Sectoring

- Sectoring is a way to increase the SIR
- The omni antennas are replaced with 3 or 6 directional antennas
- The channel pool in the hexagonal cell is split into three disjoint pools
- Hand-offs now occur between sectors



Interference Reduced

- The significant interference now comes from only 2 sources instead of 6
- Cluster sizes can be reduced (e.g. from 12 to 7), increasing the number of channels per hexagon
- However, since the channels of a hexagon are split into 3 sectors, there is an overall loss in trunking efficiency



Power Control

- Base stations monitor the power received by subscribers
- The Base Station commands the subscriber to use the lowest power necessary to maintain GOS
- This minimizes interference from other subscribers and is important for CDMA

Summary

- A hand-off is a channel change as a subscriber moves to a new serving base station or to a new sector
- Cell-splitting is a way for a part of a network to accommodate growth
- Sectoring reduces interference and trunking efficiency
- Power control is used to minimize interference on the uplink (from subscriber to BS)