The Cellular Concept

Unit 3

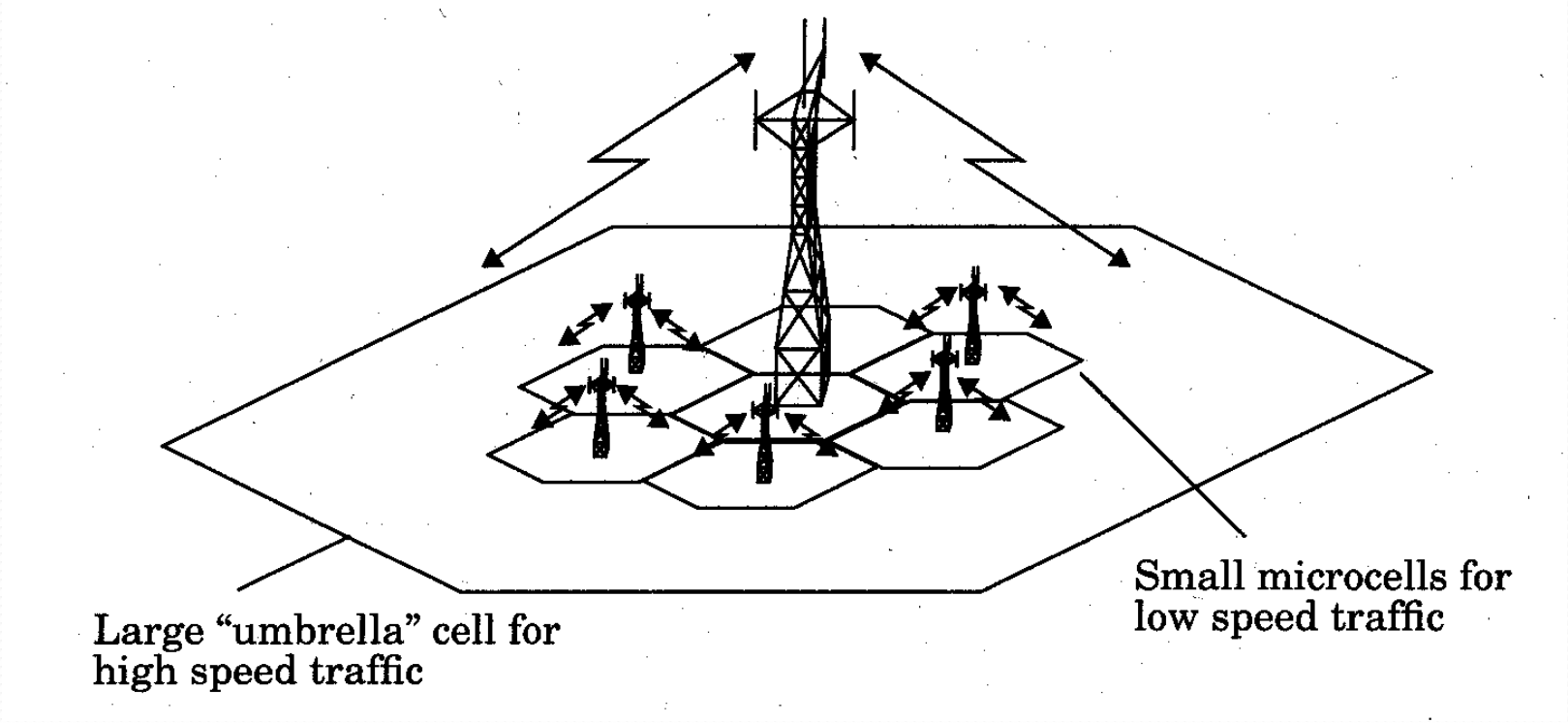
- Handoff measurement
  - In first generation analog cellular systems, signal strength measurements are made by the base station and supervised by the MSC.
  - In second generation systems (TDMA), handoff decisions are mobile assisted, called mobile assisted handoff (MAHO)
  - Mobile station measures the power received from the surrounding base stations, continually reports the results to the serving base station
  - When power received from neighboring cell base station exceeds the power received from the current base station by certain level or for a period of time , handoff is initiated.

- Intersystem handoff: If a mobile moves from one cellular system to a different cellular system controlled by a different MSC.
- Handoff requests is much important than handling a new call.

Practical Handoff Consideration

- Different type of users
  - High speed users need frequent handoff during a call.
  - Low speed users may never need a handoff during a call.
- Microcells to provide capacity, the MSC can become burdened if high speed users are constantly being passed between very small cells.

- Minimize handoff intervention
  - handle the simultaneous traffic of high speed and low speed users.
- Large and small cells can be located at a single location (umbrella cell)
  - different antenna height
  - different power level
- Cell dragging problem: pedestrian users provide a very strong signal to the base station
  - The user may travel deep within a neighboring cell


Large “umbrella” cell for
high speed traffic
Small microcells for
low speed traffic

- Handoff for first generation analog cellular systems
  - Δ 10 secs handoff time
  - Δ is in the order of 6 dB to 12 dB
- Handoff for second generation cellular systems, e.g., GSM
  - 1 to 2 seconds handoff time
  - mobile assists handoff
  - Δ is in the order of 0 dB to 6 dB
  - Handoff decisions based on signal strength, co-channel interference, and adjacent channel interference.

- IS-95 CDMA spread spectrum cellular system
  - Mobiles share the channel in every cell.
  - No physical change of channel during handoff
  - MSC decides the base station with the best receiving signal as the service station