

Handoff Strategies

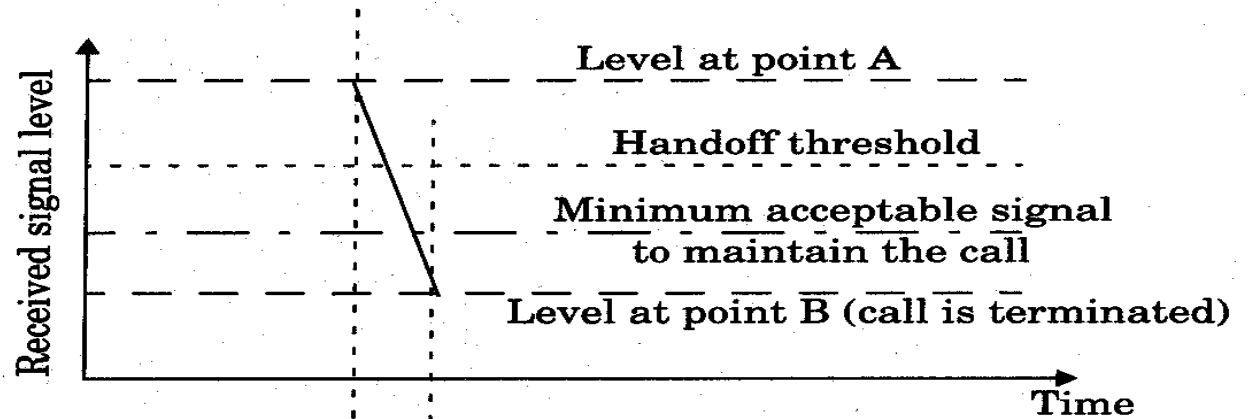
- When a mobile moves into a different cell while a conversation is in progress, the MSC automatically transfers the call to a new channel belonging to the new base station.
- Handoff operation
 - identifying a new base station
 - re-allocating the voice and control channels with the new base station.
- Handoff Threshold
 - Minimum usable signal for acceptable voice quality (-90dBm to -100dBm)
 - Handoff margin cannot be too large or too small.
 - If $r_{handoff}$ is too large, unnecessary handoffs burden the MSC
 - If $r_{minimumusable}$ is too small, there may be insufficient time to complete handoff before a call is lost.

△

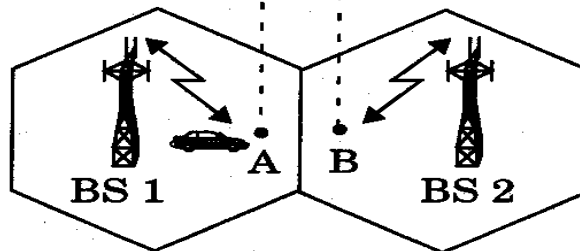
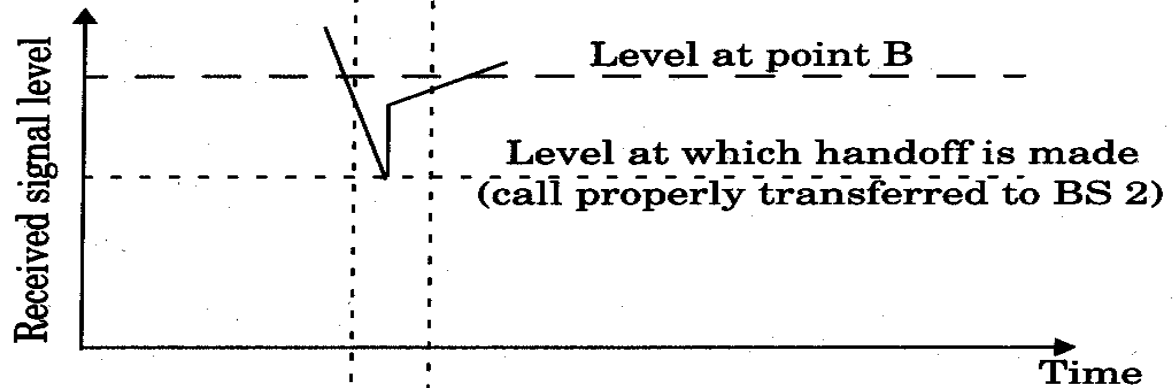


Handoff Strategies

(a) Improper handoff situation



(b) Proper handoff situation



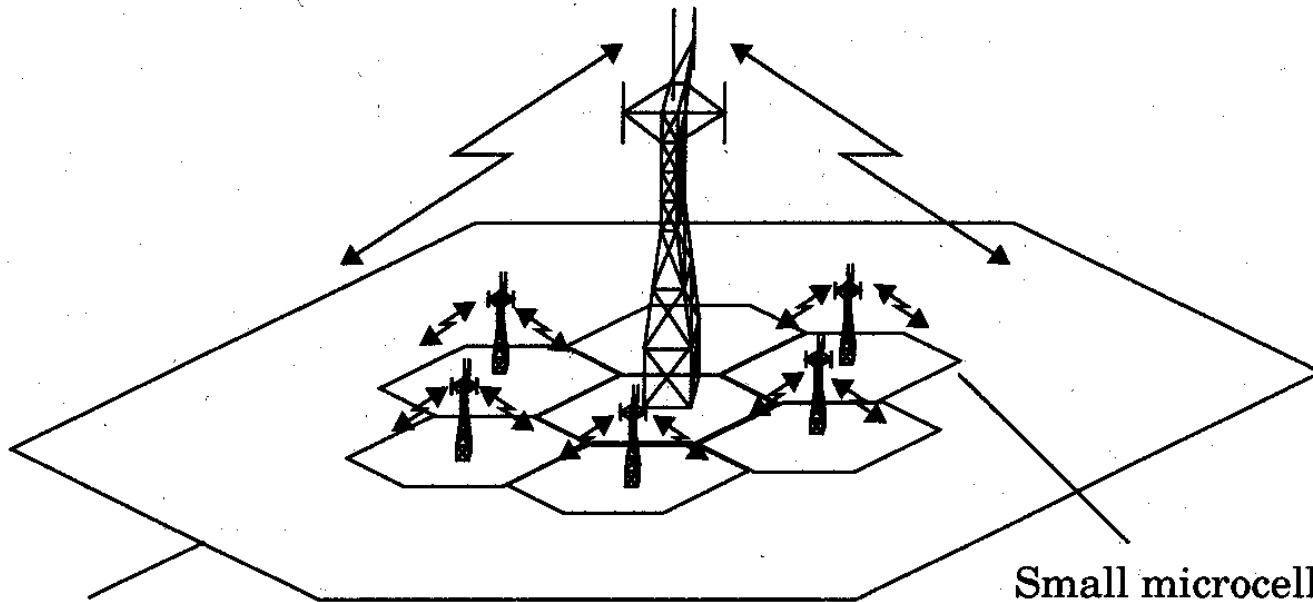
Handoff Strategies

- Handoff must ensure that the drop in the measured signal is not due to momentary fading and that the mobile is actually moving away from the serving base station.
- Dwell time: the time over which a call may be maintained within a cell without handoff.
- Dwell time depends on
 - propagation
 - interference
 - distance
 - speed

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

COVERAGE & CAPACITY EXPANSION TECHNIQUES

1. To obtain additional spectrum for new subscribers but this is expensive approach.
2. Change the cellular architecture.
3. Change the frequency allocation methodology.
4. Change the Modem and Access technology.