



SNS COLLEGE OF TECHNOLOGY

Coimbatore – 35

An Autonomous Institution

Accredited by NBA – AICTE and Accredited by NAAC – UGC with 'A++' Grade

Approved by AICTE, New Delhi & Affiliated to Anna University, Chennai



DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

16EC401 / Wireless Communication

IV ECE/ VII SEMESTER

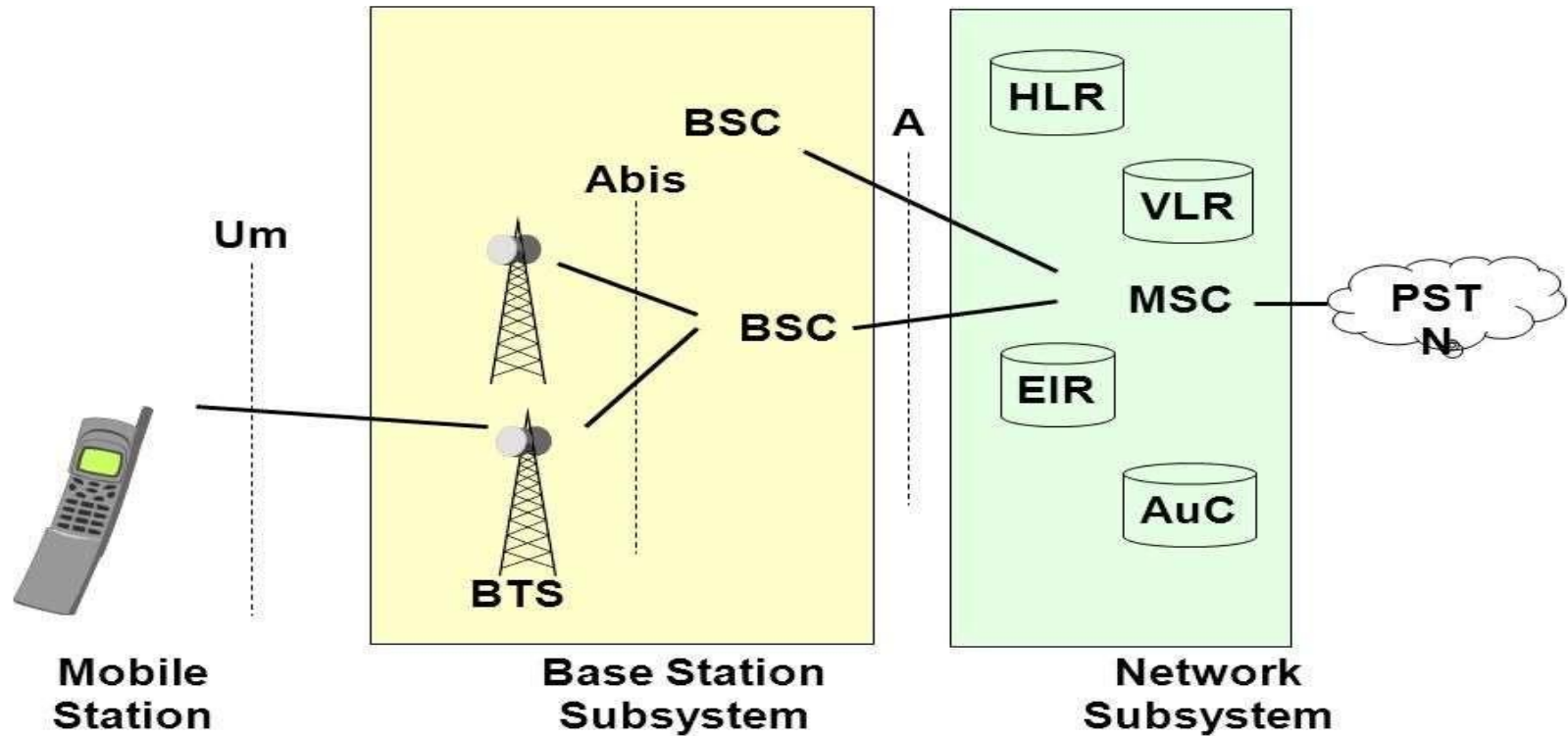
Unit II - **CELLULAR ARCHITECTURE**

Topic 6 : Channel Assignment



Cellular Architecture

Cellular Architecture





Channel Assignment Strategies

- Channel assignment strategy
 - fixed channel assignment
 - dynamic channel assignment





Channel Assignment Strategies



- Fixed channel assignment
 - Each cell is allocated a predetermined set of voice channel
 - Any new call attempt can only be served by the unused channels
 - The call will be *blocked* if all channels in that cell are occupied
- Dynamic channel assignment
 - Channels are not allocated to cells permanently
 - Allocate channels based on request
 - Reduce the likelihood of blocking, increase capacity





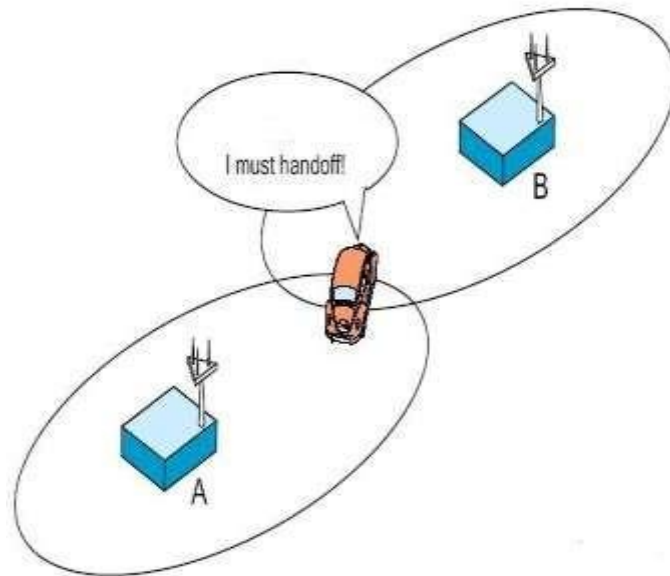
Handoff Strategies

- 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 Strategies



- Handoff Threshold

- Minimum usable signal for acceptable voice quality (-90dBm to -100dBm)

$$\Delta = P_{r,handoff} - P_{r,minimumusable}$$

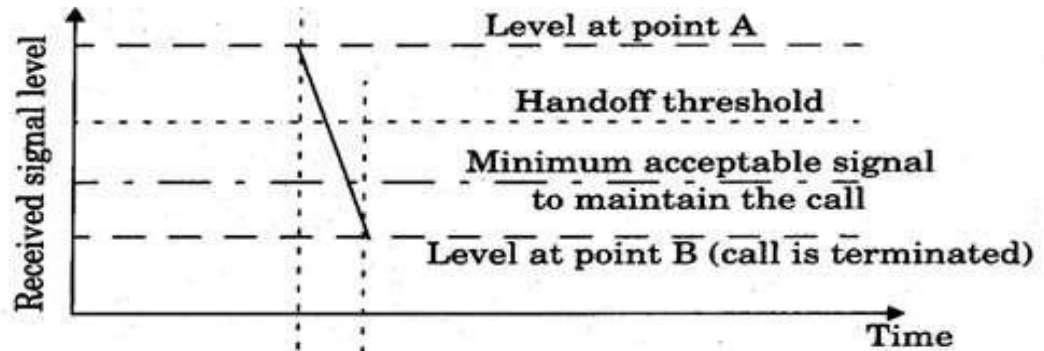
- Handoff margin cannot be too large or too small
- If Δ is too large, unnecessary handoffs burden the MSC
- If Δ is too small, there may be insufficient time to complete handoff before a call is lost



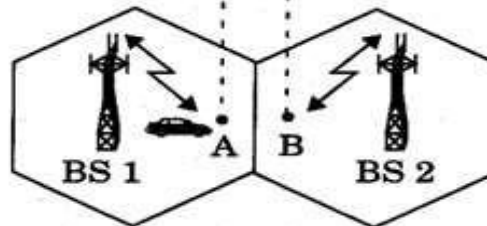
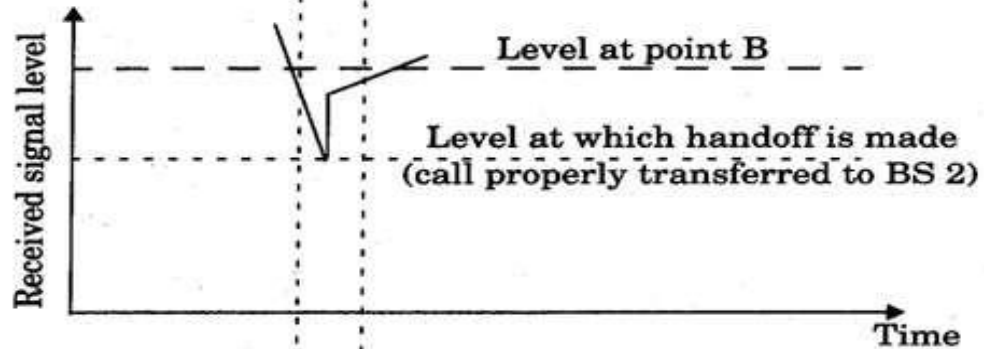
Handoff Consideration



Improper
handoff situation



Proper
handoff situation





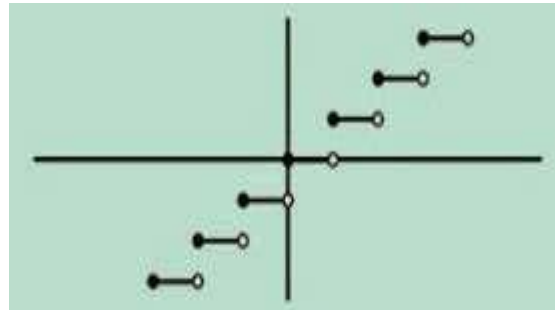
ACTIVITY



Activity : Brain teaser

1. Find the name of the movie for the below picture

9.80665 m/s²





Practical Handoff Consideration

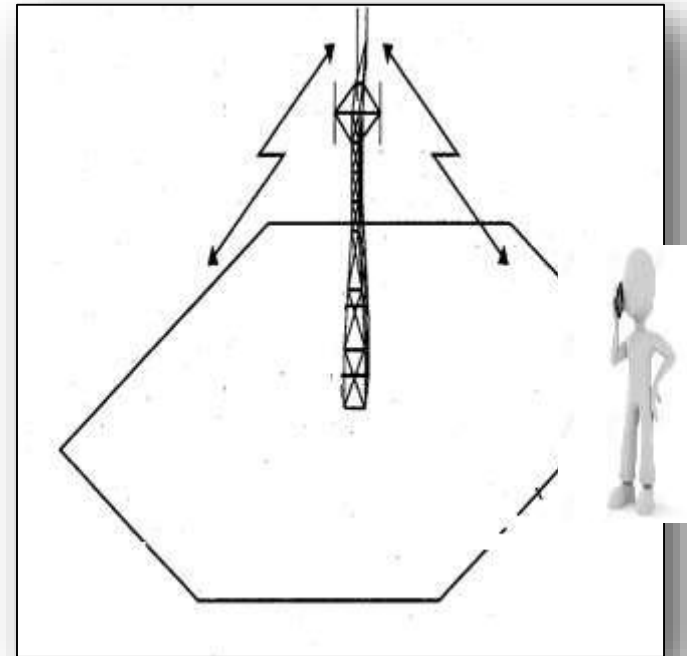


- Handoff must ensure that the drop in the measured signal is not due to momentary fading
- The mobile is actually moving away from the serving base station
- Running average measurement of signal strength should be optimized so that unnecessary handoffs are avoided
 - Depends on the speed at which the vehicle is moving
 - Steep short term average -> the hand off should be made quickly
 - The speed can be estimated from the statistics of the received short-term fading signal at the base station



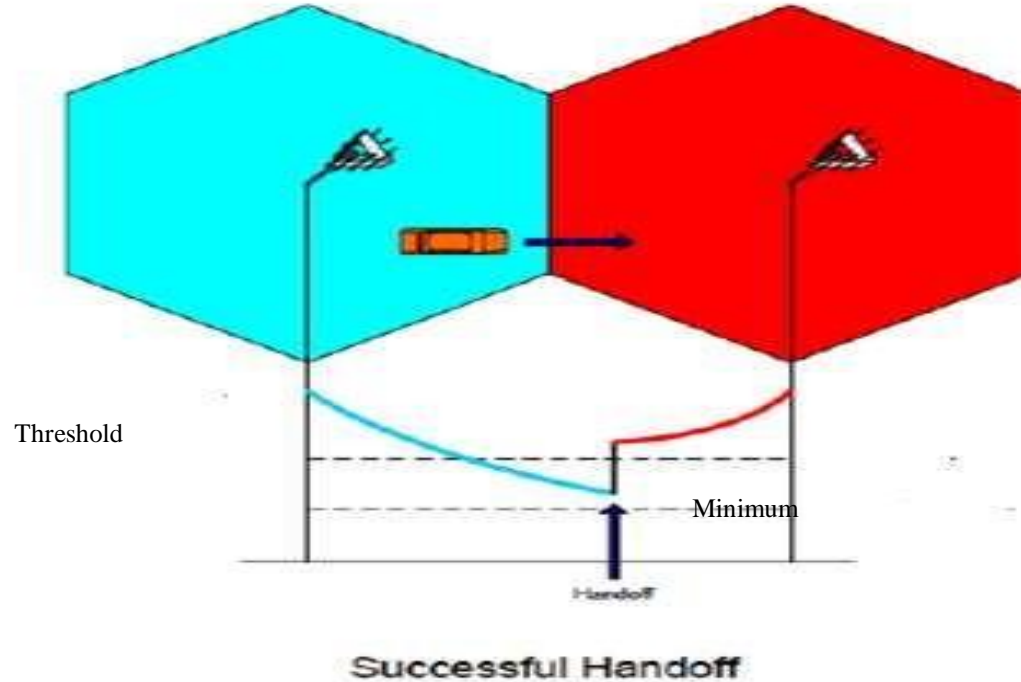
Practical Handoff Consideration

- 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



- Handoff measurement
 - In 1G systems, signal strength measurements are made by the base station and supervised by the MSC
 - In 2G TDMA, handoff decisions are mobile assisted, called mobile assisted handoff (MAHO)



Practical Handoff Consideration



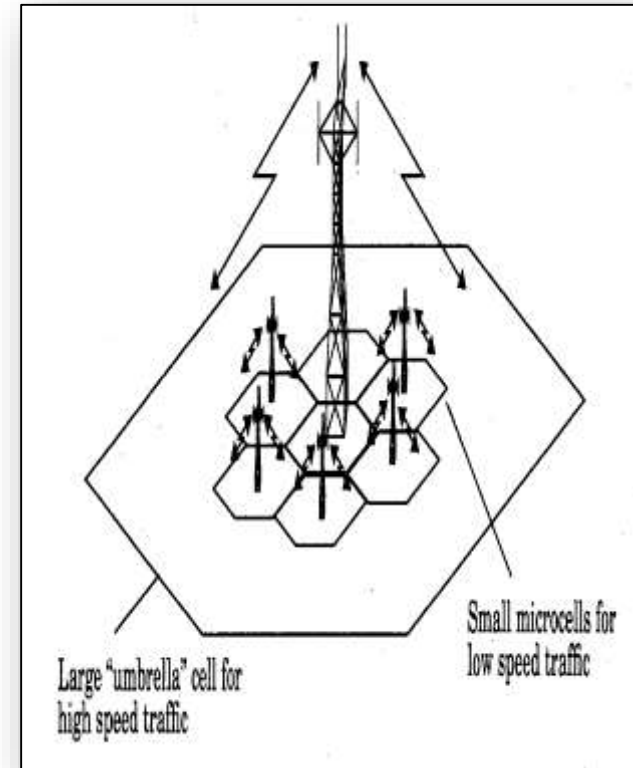
- Intersystem handoff: If a mobile moves from one cellular system to a different cellular system controlled by a different MSC
- Handoff requests is much important than handling a new call
- Different type of users
 - High speed users need frequent handoff during a call
 - Low speed users may never need a handoff during a call



Practical Handoff Consideration

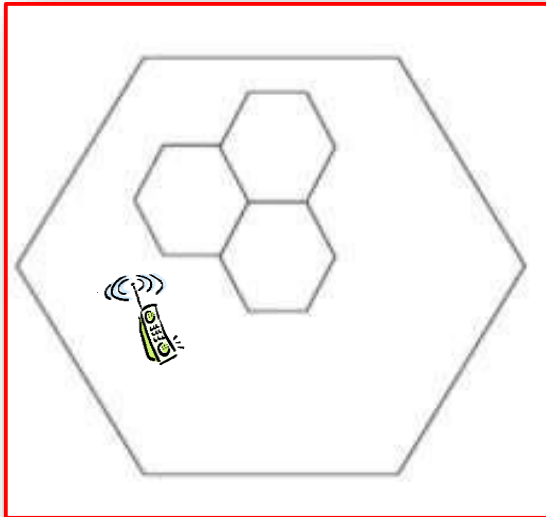


- Microcells to provide capacity, the MSC can become burdened if high speed users are constantly being passed between very small cells
- Minimize handoff intervention
 - handle the simultaneous traffic of high speed and low speed users





Practical Handoff Consideration

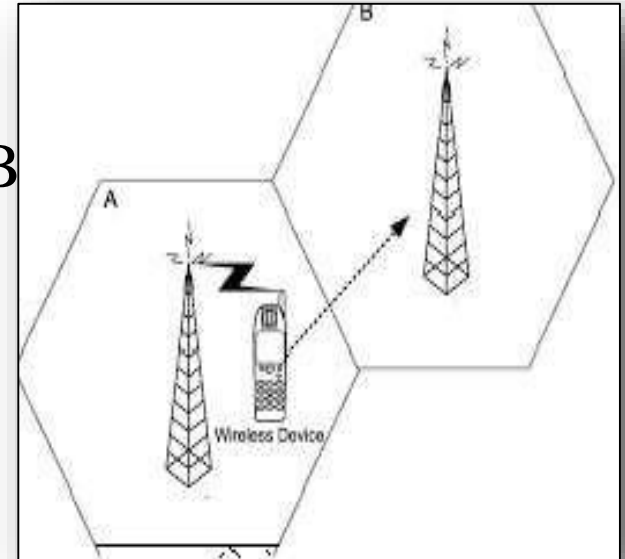


- Large and small cells can be located at a single location (umbrella cell)
 - different antenna height
 - different power level
- Cell dragging problem: pedestrian users provide a very strong signal to the base station
 - The user may travel deep within a neighboring cell



Practical Handoff Consideration

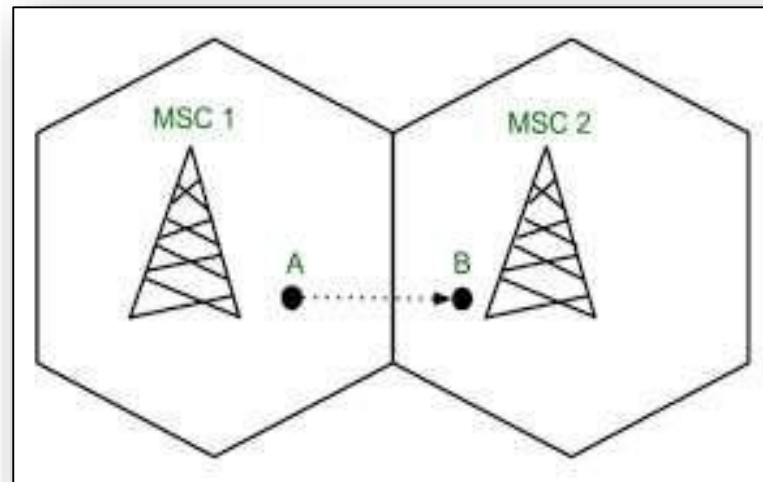
- Handoff for first generation analog cellular systems
 - 10 secs handoff time
 - Δ is in the order of 6 dB to 12 dB
- Handoff for second generation cellular systems, e.g., GSM
 - 1 to 2 seconds handoff time
 - Mobile assists handoff
 - Δ is in the order of 0 dB to 6 dB
 - Handoff decisions based on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





Practical Handoff Consideration

- 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





Assessment



1. Illustrate a handoff scenario at cell boundary.





Thank you