Mobile Radio Propagation Large-Scale Path Loss

Unit-1

4.1 Introduction to Radio Wave Propagation

- Cellular systems operate in urban areas where there is no direct line-of-sight path between the transmitter and receiver.
- Presence of high rise buildings causes diffraction loss

- Due to multiple reflections from various objects, the electromagnetic waves travel along different paths of varying lengths.
- Interaction between these waves causes multipath fading at a specific location

- Strength of waves decrease as distance b/w transmitter and receiver (T-R) increases .
- Propagation model predicts the average received signal strength at a given distance from a transmitter.

- Propagation model estimate the radio coverage area of a transmitter and are known as *large-scale* propagation models.

4.1 Introduction to Radio Wave Propagation

- Electromagnetic wave propagation
  - reflection
  - diffraction
  - scattering
- Urban areas
  - No direct line-of-sight
  - high-rise buildings causes severe diffraction loss
  - multipath fading due to different paths of varying lengths

- Large-scale propagation models predict the mean signal strength for an arbitrary T-R separation distance.
- Small-scale (fading) models characterize the rapid fluctuations of the received signal strength over very short travel distance or short time duration.

- Small-scale fading: rapidly fluctuation
  - sum of many contributions from different directions with different phases
  - random phases cause the sum varying widely. (ex: Rayleigh fading distribution)
- Local average received power is predicted by large-scale model (measurement track of 5 λ to 40 λ)