Sheet (3)

Wireless Channel Characteristics

1. In a street micro-cell environment, a base station transmits at a power level of 1 W at 900 MHz. the reference distance d_0 is 100m. For a mobile receiver that is moving a long the street, the path loss exponent (n) is 2 between 100 m and to a break-point distance. After that break-point distance, the path loss exponent (n) is 4. The mobile receiver measures the received power as -58.6 dBm at a distance of 1000 meters from the base station. What is the break-point distance at which the path loss exponent changes from 2 to 4 (Assume free space propagation model between transmitter and reference distance; assume antenna gains are 1).

2. Consider a transmitter which radiates a sinusoidal carrier frequency of 1850 MHz. for a vehicle moving 27 m/s, compute the received carrier frequency if the mobile is moving:

   a. Directly toward the transmitter.
   b. Directly away from the transmitter.
   c. In a direction which is perpendicular to the direction of arrival of the transmitted signal.

3. Calculate the mean excess delay, rms delay spread, and the maximum excess delay (10 dB) for the multipath profile given in the figure below. Estimate the 50% coherence bandwidth of the channel.