COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Electronics & Communication Engineering

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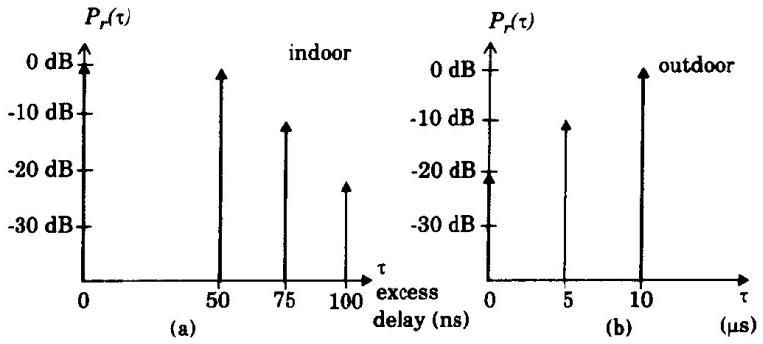
Course Title : Telecommunication Systems Engineering

Course Code : EC 551

Sheet (4)

Wireless Channel Characteristics

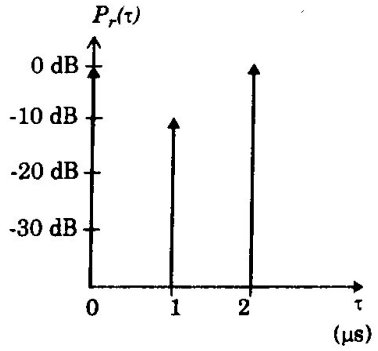
1. If a particular modulation provides suitable BER performance whenever σ_τ / $T_s \leq 0.1$, Determine the smallest symbol period T_s (and thus the greatest symbol rate) that may be sent through RF channels in the following Figure.



2. The local average power delay profile in a particular environment is found to be $P(\tau) = \sum_{n=0}^{2} \frac{10^{-6}}{n^2+1} \delta(\tau - n10^{-6})$

   a. Sketch the power Delay profile of the channel in dBm.
   b. What is the local average power in dBm?
   c. What is the rms delay spread of the channel?
   d. If 256 QAM modulation having a bit rate of 2 Megabits per second is applied to the channel, will the modulation undergo flat or frequency selective fading? Explain your answer.
   e. Over what bandwidth will the channel appear to have constant gain?

3. A local spatial average of a power delay profile measured at 900 MHz is shown in the following Figure.



a. Determine the rms delay spread and mean excess delay for the channel.
b. Determine the maximum excess delay (20 dB).
c. if the channel is to be used with a modulation that requires an equalizer whenever the symbol duration T is less than 10 σ_τ, determine the maximum RF symbol rate that can be supported without requiring an equalizer.
d. If a mobile traveling at 30 km\hr recives a single through the channel. Determine the time over which the channel appears stationary (or at least highly correlated).