COLLEGE OF ENGINEERING & TECHNOLOGY

Department : Electronics & Communication Engineering

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Course Title : Telecommunication Systems Engineering

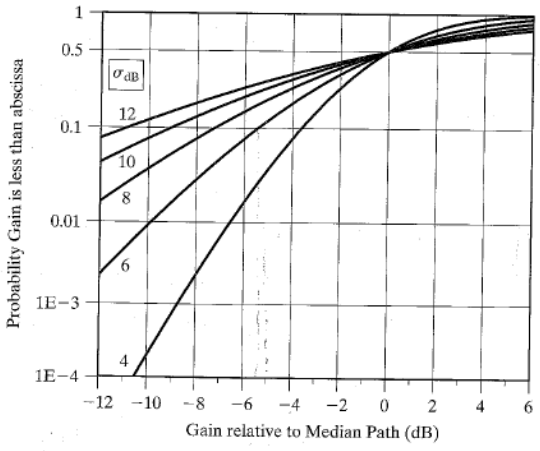
Course Code : EC 551

Sheet (1)

Wireless Channel Characteristics

1. Suppose, in an office building, a 2.4 GHz transmitter located at a workstation is separated from the network access node (receiver) by a distance of 35 m. the transmission must pass through 5m of an office, through a plasterboard wall, and then through a large open area. The propagation is modeled as free space for the first 5m and with a loss exponent of 3.1 for the reminder of the distance. The plasterboard wall causes 6-db attenuation of the signal. The isotropic transmitter radiates 20 dBm. Can the link be closed if the receiver has sensitivity of -75 dBm?

2. A measurement campaign in a large city indicates that the propagation can be reasonably well modeled with loss exponent of n=2.9. The shadowing deviation about this loss is 6 dB. What is the range of coverage if 99% availability is required for public-safety radio application? Assume that the receiver sensitivity is -100 dBm and the measured power at 10 meters is 2 millwatts.



3. A brief measurement campaign indicates that the medium propagation loss at 420 MHz is a midsize North American city can be modeled with n = 2.8 and a fixed loss (β) of 25 dB; that is, $L_P = 25dB + 10\log_{10}(r^{2.8})$ Assuming a cell phone receiver sensitivity of -95 dBm, what transmitter power is required to service a circular area of radius 10 Km? Suppose the measurements were optimistic and n=3.1 is more appropriate. What is the corresponding increase in transmit power that would be required?