

EE 433 -- Fall 2008 -- Supplemental Propagation Problems

1. In a terrestrial microwave link (with $n = 2$ free-space propagation model), the line-of-sight transmission limits the separation of the transmitters and receivers to 40km. If a 4-GHz 200-milliwatt transmitter is used with transmitting and receiving antennas that each have a gain of 3 dB:
 - a. What is the received power level in dBm?
 - b. If the receiving antenna terminals are matched to 50-ohm impedance, what voltage would be induced across these terminals by the transmitted signal?

2. Suppose, in an office building, a 2.5-GHz Wireless LAN transmitter (located at a workstation) is separated from a user receiver by a distance of 30m. The transmission must pass through 6m of an office area ($n = 2.7$), through two plasterboard walls, and then through a single concrete wall. The transmitter antenna has a gain of 6 dBi and the receiver antenna has unity gain.

The plasterboard wall causes 2.5 dB attenuation of the signal.

The concrete wall causes 8 dB attenuation of the signal.

Assume that the reference path loss is equal to the 1 meter free-space path loss.

- a. Find the total Path Loss for the link described above.
- b. For a bandwidth of 5 MHz, a Noise Figure of 5.5 dB, a SNR of 10 dB, and a Fade Margin of 7.5 dB, determine the required transmitter output power.