BCairo University
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Sheet 1: Basic Concepts of Wireless Communication

1) Is it possible to transmit a digital signal, e.g., coded as square wave as used inside a computer, using radio transmission without any loss? Why?

2) What are the main problems of signal propagation? Why do radio waves not always follow a straight line? Why is reflection both useful and harmful?

3) How to counter fading?

4) What are the types of interference?

5) A wireless base station transmits at the unlicensed carrier frequency of fc = 5.775 GHz. Its maximum transmit power is 1 W according to FCC rules. Assume that the base station and receiver antenna gains are 4. We use dBm = 10 log10(power), where power is represented in mW. Thus 1 W = 30 dBm.

    a. What is the wavelength of the wireless channel?
    b. What is the received signal power in dBm, in the free space, of a signal from the base station to a receiver who is at a distance of 1 mile (1.6 km)? What is the transmission delay in ns?
    c. Assume that a receiver has a sensitivity level of -91 dBm, what is the maximum distance of the receiver, in the free space, from the base station?