



Course name: Wireless Network
Course Code: CNE405
Lecturer: Dr. Ahmed ElShafee

Exam number: Midterm – Model Answer
Exam Date: 03/04/2016
Time Allowed: 60 minutes

Name: _____

ID: _____

1	2	3	4	Total
6	3	6	5	20

1. Define the following terms (6)

Free path loss

is the loss in signal strength of an electromagnetic wave that would result from a line-of-sight path through free space (usually air),

Multipath Fading

happens when portions of signals are reflected and then arrive out of order at the receiver

Line of Sight

That means the transmitter and receiver antennas facing each other without any opesticals including earth curvature.

2. Briefly discuss the difference between WMAN (metropolitan wireless area network, and WWAN (wireless area network). state practical application (commercially available) of each technology. (3)

WMAN:

a wireless technology support connecting different locations make them as one LAN.

It's the wireless version of MAN.

Like WiMax

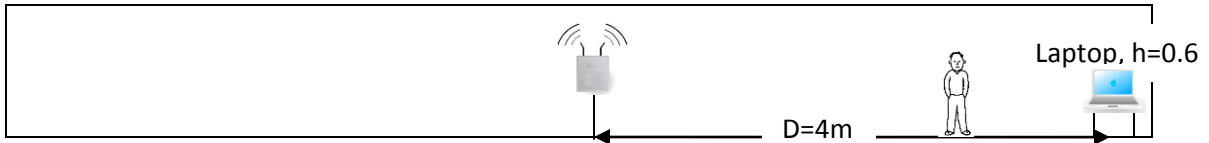
WWAN:

a wireless technology used to connect the internet

the wireless version of WAN

like LTE, 3G, Edge,GSM data.

Access point is installed in the middle of the corridor while the user sits on the ground at corridor end.



Calculating 1st Fresnel zone shortest radius

$$1^{\text{st}} \text{ Fresnel zone radius (m)} = 8.657 \times (D/f)^{0.5}$$

$$r = 8.657 \times (0.004/2.4)^{0.5} = 0.35 \text{ meters}$$

we need 60% clear path = $0.35 \times .6 = 0.21$ meters

Access point min height = $1.65 + 0.21 = 1.86$ meters

Hint, 1st Fresnel zone radius (m) = $8.657 \times (D/f)^{0.5}$

D = total distance in kilometers

f = frequency transmitted in gigahertz.

4. Assume that the access point transceiver power is 36 dbm, antenna gain is 5.2 dbi. Antenna is connected to transceivers through 3 meters cable. Cable produces 0.1 dbi losses per meter. Calculate the power in dbm and milli watts level enters the laptop transceiver which is placed in 10 meters away from the AP, considering that AP transceiver is directly connected to antenna of 3 dbi gain. (5)

$$FSP = 20 \log (10) + 20 \log (2.4) + 32.45 = 20 + 7.6 + 32.45 = 60.05$$

$$\begin{aligned} \text{Rx power} &= \text{AP power} - \text{cable loss} + \text{AP antenna gain} - \text{FSL} + \text{Laptop antenna gain} \\ &= 36 - 0.3 + 5.2 - 60.05 + 3 = -16.15 \text{ dbm} \end{aligned}$$

$$\text{Dbm} = 10 \log \text{mw}$$

$$P = 10^{-16.15} = 0.0243 \text{ mw}$$

$$FSP = 20 \log d(\text{meters}) + 20 \log f(\text{GHz}) + 32.45$$