CC443 Mobile &Wireless Communications Sheet No.1

Name: I. D.

1-Calculate the power level of a signal having power=10 mwatt in dBW and then in dBm. Comment on the results.

L in dBm $\Rightarrow$ $L = 10 \log \frac{10 \times 10^{-3}}{1 \times 10^{-3}}$ $\therefore L = 10 dBm$

L in dBW $\Rightarrow$ $L = 10 \log \frac{10 \times 10^{-3}}{1}$ $\therefore L = -20 dB$

$\therefore$ dBm = dBW + 30

2-Calculate the value of the free space path loss between a wireless transmitter and receiver if the frequency=820 MHz and the distance d=2.0Km.what will be the answer if the distance is doubled.?Comment.

Sketch L_{FS} as function of the distance (d) using semi-log paper

$L_{FS} = 32.44 + 20 \log f + 20 \log D$

$L_{FS_1} = 96.7 dB$

$L_{FS_2} = 102.71 dB$

3-Repeat the first part of problem(2) but when the frequency is doubled.Comment on the new results

$L_{FS} = 32.44 + 20 \log (2 \times 820) + 20 \log (2)$

$= 102.7 dB$

Doubling the distance will inc the freespace Path-loss by 6 dB $= 20 \log (2) = 6 dB$

4-Repeat problem 2 (the first part) considering the additional losses and the gains of transmitting and receiving antenna to get actual losses

FM=15dB

G_T=12dB

G_R=14dB

Total losses = L_{FS} + FM - (G_T + G_R)

TL = 96.7 + 15 - (12 + 14)

TL = 85.7 dB.

Total losses maybe less than free space loss. Depending on the value of FM, G_T & G_R.