COMP7005

Assn03

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2018-10-29

Section A

Q3.

	T	U	V	W	X	Y	Z
Start			3	6	-	6	8
Step 1	7	6	-	6		6	8
Step 2	7	-		6		6	8
Step 3	7			-		6	8
Step 4	7					-	8
Step 5	-						8
Step 6							-

Lowest Cost

From:	To:	Cost:
X	T	7
X	U	6
X	V	3
X	W	6
X	X	-
X	Y	6
X	Z	8

Section B

1.

((4 * pi * 2450000000hz * 1000m) / 3 x 10 ^ 8) ^ 2
L(p) = 10531964518.673577797
100.225093873dB
100.2dB

P(t) = 15dBm - 30
= -15dB

G(t) = 9dBi
G(r) = 9dBi
L(ct) = 3dB
L(cr) = 3dB

RSL = -15dB + 9dBi - 100.2dB + 9dBi - 3dB - 3dB

RSL = -103.2dB
RSL = -103.2dB + 30
= -73.2dBm

No, there is not enough of a margin for the system to work reliably, because the access point requires at least -50dBm for reliable function.

2. (a)
((4 * pi * 2450000000hz * 200m) / 3 x 10 ^ 8) ^ 2
L(p) = 10531964518.673577797
421278580.746943112
86.25dB

P(t) = 13dBm - 30 = -17dB

G(t) = 1.5dBi

G(r) = -1.5dBi

P(r) = -17dB + 1.5dBi + (-1.5dBi) - 86.25dB
= -103.25dB + 30
= -73.25dBm

= 10^(-73.25 / 10)
= 0.000000047315 mW
= 4.7 * 10 ^ -8 mW

2. (b)
((4 * pi * 2450000000hz * 2000m) / 3 x 10 ^ 8) ^ 2
L(p) = 10531964518.673577797
42127858074.694311189
106.25dB

P(t) = 13dBm - 30 = -17dB

G(t) = 1.5dBi

G(r) = -1.5dBi

P(r) = -17dB + 1.5dBi + (-1.5dBi) - 106.25dB
= -123.25dB + 30
= -93.25dBm

= 10^(-93.25 / 10)
= 0.00000000047315 mW
= 4.7 * 10 ^ -10 mW

2. (c)

The receiver in question (a) with distance 200m will work.
However the receiver in question (b) with distance 2000m will NOT work.

2. (d)

a.
((4 * pi * 2450000000hz * 200m) / 3 x 10 ^ 8) ^ 2
L(p) = 10531964518.673577797
421278580.746943112
86.25dB

P(t) = 13dBm - 30 = -17dB

G(t) = 15dBi

G(r) = -1.5dBi

P(r) = -17dB + 15dBi + (-1.5dBi) - 86.25dB
= -89.75dB + 30
= -59.75dBm

= 10^(-59.75 / 10)
= 0.000001059 mW
= 1.06 * 10 ^ -6 mW

b.
((4 * pi * 2450000000hz * 2000m) / 3 x 10 ^ 8) ^ 2
L(p) = 10531964518.673577797
42127858074.694311189
106.25dB

P(t) = 13dBm - 30 = -17dB

G(t) = 15dBi

G(r) = -1.5dBi

P(r) = -17dB + 15dBi + (-1.5dBi) - 106.25dB
= -109.75 + 30
= -79.75dBm

= 10^(-79.75 / 10)
= 0.00000001059 mW
= 1.06 * 10 ^ -8 mW

c.
The modified receiver from question a. at 200m will work as well as the modified receiver from question b. at 2000m. They both function at a reliable rate.