

20.12.2021 - SORU GÖZÜMÜ

0/20 of time  
→

Q1) Total Capacity = 500 Mbps Each User 25 Mbps

a) Circuit Switch ise  $\rightarrow \frac{500}{25} = 20$  user bağlanın.

b) Packet Switch, 40 user, 0.20 of time ise;

i) 0.20 = 0.2 Transmitting probability

ii) Only one user transmit. So  $\frac{25 \text{ Mbps}}{500 \text{ Mbps}} = 0.05$  Capacity used.

iii) 1 user is transmitting, the others not. Probability?

$$P = P(1-P)^{N-1} = 0.2 (0.8)^{39} = 3.3 \times 10^{-5}$$

not transmit

DEVAMINI GÖZLEDİ.

Q3)		1 km	4 km	8 km	32 km
Constant loss per km		-2 dB	-8 dB	-16 dB	-64 dB
Free Space loss		-4 dB	-16 dB	-22 dB	-34.1 dB

$$L = 92.4 + 20 \log_{10}(f_{\text{GHz}} \cdot d_{\text{km}})$$

aynı birliğin

$$\log(a \cdot b) = \log a + \log b$$

$$L_{1\text{km}} = 92.4 + 20 \log_{10}(f_{\text{GHz}}) \rightarrow L_{d_{\text{km}}} = \underbrace{L_{1\text{km}}}_{-4\text{dB}} + \underbrace{20 \log_{10} d_{\text{km}}}_{-12} = -16\text{dB}$$

Peki bunlar birbirini verecek yollar? =>

$$2d_{\text{km}} = 4 + 20 \log d_{\text{km}}$$

$$d = 12 \text{ km'de eşit olur}$$

BUNU KULLAN



Q2)  $C = B \cdot \log_2 \left( 1 + \frac{P}{N_0 B} \right)$

Capacity                      SNR

Noise =  $N_0 \cdot B$

$\frac{N_0}{2} = 0.5 \times 10^{-10} \frac{W}{Hz}$

$B = 1 \text{ MHz}$

$N_0 \cdot B = 10^{-4} \text{ W}$

$P_t = 1 \text{ W}$      $f_c = 100 \text{ MHz}$      $d = 10 \text{ m}$

a) Find P.

$0 \text{ dBW}$

$PL = 32.4 + 20 \log_{10} f_{\text{GHz}} + d_{\text{km}}$

Sp. Loss

b)

$30 \text{ dBm}$

$PL = 32.4 \text{ dB}$

$P_{\text{received}} = P_t - PL = \cancel{-32.4} \text{ dBW} \rightarrow P_{\text{received}} = 5.75 \times 10^{-4} \text{ W}$

$SNR = 5.75$

Formüller  $X = 2^{\frac{C}{B}}$

$X = 1 + SNR = 6.75$

$\log A = \frac{C}{B} \log 2$

$C = \frac{B \cdot \log A}{\log 2} = 2.75 \text{ Mbps}$

c)  $P_t = 1 \text{ W} \rightarrow 2 \text{ W}$  vereride. ~~C ne olur?~~

2 kat, antması, demek 3 dB antması demek.

$-32.4 \text{ dBW} + 3 \text{ dB} = -29.4 \text{ dBW} \rightarrow 10^{\left( \frac{-29.4}{10} \right)} = 11.48 \times 10^{-4}$

$\rightarrow$  Asın, f.lemeler. ( $A = 12.48 \text{ oldu}$ )

$C = 3.54 \text{ Mbps}$

$SNR = 11.48$

d)  $B = 1 \text{ MHz} \Rightarrow 2 \text{ MHz}$  vereride C de 2 katına g.iler

$C = 5.5 \text{ Mbps}$

e)  $B \rightarrow \infty$  find C. (P cinsinde)

$C = B \log_2 \left( 1 + \frac{P}{N} \right)$