Computer Networks

Assignment #1

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Q1:-

a) Lines are dedicated to users in Circuit Switching for data transmission

Sol:- link shared = 2mbps
transmission speed = 1mbps
so = 2/1 = 2 users are supported.

b) As transmission link supports 2mbps and given that each user uses 1mbps so the maximum capacity of link will not be overcome if users are 2 or less than 2 and heme no queing delay will come in play. However if number of users exceed 2 i.e 3 or more than 3 then the capacity of link will be exceeded and queing delay will occur.

c) Each user transmits only 20% of the time so,
20/100 = 0.2 is probability of a user transmitting.

d) Probability of 1 user = 0.2
Probability of 3 at a given time = $0.2 \times 0.2 \times 0.2 = (0.2)^3$
$= 0.008$

Q2:-

Transmission delay = L/R
= 8 bits * 1000 / 2,000000
= 4ms

Propagation delay = d/s
= 2500 / 2.9×10^8
= 18ms total time = 4 + 0.000086 = 4.1 ms

Delay dependency on packet length is not possible. Delay dependency on transmission rate is not possible.

Q3:.

a, For throughput from A to B = 500kbps

b, File size = 4 million bytes
throughput = 500kbps = 500,000 bps
file size / throughput = $4 \times 1000000 \times 8 = 32000000$ bits
$= 32000000 / 500000 = 64$ seconds.

c, R2 = 2.75 M bps = 2750 bps
R3 = 1900 bps
min = $32000000 / 500000$
= 64 seconds.

Q4:- Distance between two hosts is in meters, propogation speed along the link is s meter/s. Propagation delay d_{prop} is m/s sec.

b, Size of packet = L bits
Transmission link = R bps
So, transmission time = L/R

c, ignoring propogation delay and queing delay
= (m/s + L/R) seconds

d, $t = d_{trans}$ means time since transmission started is equal to transmission delay. At $t = d_{trans}$ the last bit of packet has been transmitted.

Q5:-

length of packet = L
Transmission Rate = R
Transmitted packet = x = L/R
No. of packets = n packets

L = 1500
R = 2.5
x = 1500
n = 4

= nL + (L - x)
= 4 x 1500 + (1500 - 750) = 6750 bytes

now 4 packets
= 6750 x 4 x R
= 67500

Queing delay = 67500 / (2.5 x 10^6)
= 0.027 sec

Q6:- a, Distance = 25,000 km
Transmission rate = 2.5 mbps
bandwidth delay of product = 25000

b, Trans. speed = 2.5 mbps
max. no. of bits at given time = 2,50,000 bits

c, Max No. of bits on transmission line = [redacted] bandwidth x delay

d, Transmission rate speed between A and B = 2.5 mbps
length of 1 bit on transmission line can be calculated
length of 1 bit = 125 meters which is greater than football field.

e, = S/R + m