CN IoT

Assignment 1

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Ques1.

a. No. of users = $\frac{5 \text{ Mbps}}{150 \text{ kbps}} = \frac{5 \times 10^6}{150 \times 10^3}$

$= 33.33 \Rightarrow 33$ users.

b. a given user is transmitting = 0.33.

c. $n = 250$ users.

$P(m) = {}^{250}C_m \times (0.33)^m \cdot (1-0.33)^{250-m}$

d. $P(34 \text{ or more}) = P(34) + P(35) + \ldots P(250)$

$P(33 \text{ or fewer}) = P(0) + P(1) + P(2) \ldots P(33)$

$P(34 \text{ or more}) = 1 - P(33 \text{ or fewer})$

Ques3. Total size including header = $20P + P = 21P$

Transmission = $\frac{\text{Size}}{\text{bandwidth}} = \frac{21P}{R}$

Propagation delay = $\frac{D}{S}$ sec

Total time = $\left(\frac{21P}{R} + \frac{2D}{S}\right)$ Sec

b. 2 packets of equal size

∴ each packet contains = $10 + P$

$= 11P$

transmission time = $R + \frac{11P_S}{R}$

Propagation delay = $\frac{2D}{S} = S$

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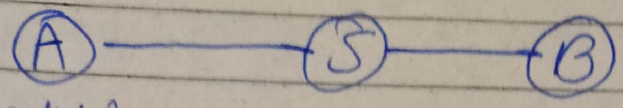
Total time $= \left(\frac{22P}{R} + \frac{2D}{S}\right)$ s

4. 

10 Mbps
and
Propagation delay on each link = 2ms

$t_{prop} = 20$ ms

$t_{trans} = \frac{12000}{10 \times 10^6} = 12 \times 10^{-4} = 1200$ μs

Packet reaches switch at = 1200 μs + 20
= 1202 μs

Packet retransmitted after 35 μs.
After 1235 sec, the packet starts transmitting from switch & reaches B after →

$1235 + t_{trans} + t_{prop}$
$= 1235 + 1200 + 20$
$= 2455$ μs

6. (a) HTTP 1.0 with no parallel connection
60 + 2 = 62 RTTs

(b) HTTP 1.1 with no pipelining
30 RTTs + 2 RTs
= 32 RTTs

(c) HTTP 1.1 with pipelining = 2 + 1 RTT = 3 RTT

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8. Queuing delay = Total Bits not yet transmitted / rate of transmission

$$T_q = \frac{n * L + L - X}{R}$$

Packet size = 1500

$$n = \frac{1500}{2} = 750$$

$$L - X = 1500 - 750 = 750$$

$$T_q = \frac{(4 * 1500 + 750) * 8}{2 * 10 * 6} = 27 ms$$

7.b. Q needs to send atleast 2 HTTP requests to S, but a single TCP connection to S is sufficient