11259022

Computer Network - HW01

1. (a) Min(500k, 2M, 1M) = 500k (bps) ※

(b) Min(500k, 2M, 200k) = 200k (bps) ※

2. (a) 2M / 100k = 20 (users) ※

(b) each user transmits only 20% of the time in average. ※

probability that the user is transmitting

(c) $C(40, n) \times 0.2^n \times 0.8^{(40-n)}$ ※

not use $0.8^{(40-n)}$ use 0.2^n

(d) $\sum_{n=21}^{40} C(40, n) \times 0.2^n \times 0.8^{(40-n)}$ ※

3. first package ⇒ 0 sec

second ⇒ $\frac{L}{R}$ sec

third ⇒ $\frac{2L}{R}$ sec

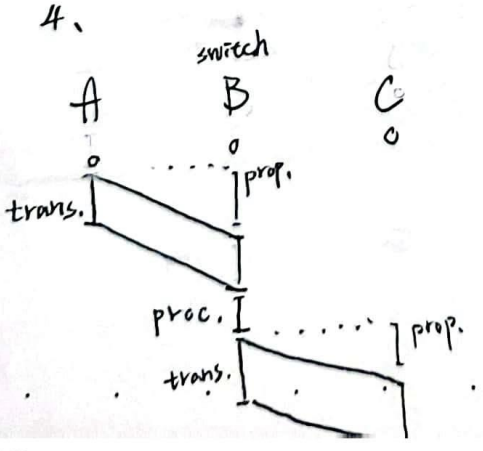
⋮

Nth ⇒ $\frac{(N-1)L}{R}$ sec

Total: $(0+1+2+\dots+N-1) \times \frac{L}{R} = \frac{N(N-1)}{2} \times \frac{L}{R}$

Avg: $\frac{N(N-1)}{2} \times \frac{L}{R} / N = \frac{(N-1)L}{2R}$ ※

4.



$D_{proc,i} = 1ms$, $D_{prop,i} = 0ms$

$D_{trans,i} = \frac{L}{R_i} \Rightarrow D_{trans,1} = D_{trans,2} = \frac{800(bits)}{2M(bps)} = 4ms$

$D_{prop,i} = \frac{d_i}{s_i} \Rightarrow D_{prop,1} = \frac{4 \times 10^6}{2 \times 10^8} = 0.02(s)$

$D_{prop,2} = \frac{1 \times 10^6}{2 \times 10^8} = 0.005(s)$

$1ms + 4ms \times 2 + 20ms + 5ms = 34ms$ ※

NAN PAO

5.

layer 1: Physical ⇒ bits on the wire

layer 2: Link ⇒ data transfer between neighboring network elements

layer 3: Network ⇒ routing of datagrams from source to destination

layer 4: Transport ⇒ process-process data transfer

layer 5: Application ⇒ supporting network applications