Assignment 1

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Problem 6

a

$d_{prop} = m/s$

b

$d_{trans} = L/R$

c

The end-to-end delay will be d_{total}. Then $d_{total} = d_{prop} + d_{trans}$

d

At time $t = d_{trans}$ the last bit of the packet will be being transmitted from Host A.

e

If $d_{prop} > d_{trans}$ then at time $t = d_{trans}$ the first bit will be at $d_{trans} \times s$ meters.

f

if $d_{prop} < d_{trans}$ then at time $t = d_{trans}$ the first bit will have arrived at Host B already.

g

If

$$d_{trans} = L/R = 120/56000 = 3/1400$$

then

$$d_{prop} = 3/1400.$$

Because

$$d_{prop} = m/s \Rightarrow m = d_{prop} \times s$$

then

$$m = (3/1400) \times 2.5 \times 10^8 = 535,714.28571428571428571428571429 meters$$

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The total end-to-end delay for the packets will be

$$\frac{d_1}{s_1} + \frac{L}{R_1} + d_{proc} + \frac{d_2}{s_2} + \frac{L}{R_2} + d_{proc} + \frac{d_3}{s_3} + \frac{L}{R_3}.$$

With values the delay will be

$$\frac{5000km}{2.5 \times 10^8 m/s} + \frac{1500b}{2Mbps} + 3ms + \frac{4000km}{2.5 \times 10^8 m/s} + \frac{1500b}{2Mbps} + 3ms + \frac{1000km}{2.5 \times 10^8 m/s} + \frac{1500b}{2Mbps}$$

$$= 0.02s + 0.75ms + 3ms + 0.016s + 0.75ms + 3ms + 0.004s + 0.75ms$$

$$= 48.3ms$$

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Assumption: This problem is asking for the general form, not using the specific values from the previous problem.

The end-to-end delay for this new system will be

$$\frac{L}{R} + \frac{d_1}{s_1} + \frac{d_2}{s_2} + \frac{d_3}{s_3}.$$

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