COMP2322 - HW1

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Q1:

(a) The total end to end delay for the packet is the time spending from source to target.

$$d_{nodal} = d_{proc} + d_{proc} + \frac{L}{R_1} + \frac{L}{R_2} + \frac{L}{R_3} + \frac{d}{s_1} + \frac{d}{s_2} + \frac{d}{s_3}$$

(b)

$$\frac{L}{R_1} = \frac{1500 \times 8}{3 \times 10^6} = 0.004\,s$$

$$\frac{d_1}{s_1} = \frac{4500\,km \times 10^3}{3 \times 10^8\,m/s} = 0.015\,s$$

$$d_{process} = 2\,ms = 0.002\,s$$

$$\frac{L}{R_2} = \frac{1500 \times 8}{3 \times 10^6} = 0.004\,s$$

$$\frac{d_2}{s_2} = \frac{3000\,km \times 10^3}{3 \times 10^8\,m/s} = 0.01\,s$$

$$\frac{L}{R_3} = \frac{1500 \times 8}{3 \times 10^6} = 0.004\,s$$

$$\frac{d_3}{s_3} = \frac{1500\,km \times 10^3}{3 \times 10^8\,m/s} = 0.005\,s$$

$$\text{End to delay} = 0.004 + 0.015 + 0.004 + 0.01 + 0.004 + 0.005 + 0.002 + 0.002 = 0.046\,s$$

Q2:

(a)

$$\text{time} = \frac{\text{length of packet}}{\text{first link rate}} = \frac{L}{R_s}$$

The packet inter-arrival time at the destination is the time of the internet packet arrive the target. So the time only $\frac{L}{R_s}$.

(b)

$$\frac{L}{R_s} + \frac{L}{R_s} + d_{prop} < \frac{L}{R_s} + \frac{L}{R_c} + d_{prop}$$

Left side: time of second packet just into the second link.

right side: time of first packet, to the second link.
finished

(c)

$$\frac{L}{R_s} + \frac{L}{R_s} + d_{prop} + T \geq \frac{L}{R_s} + \frac{L}{R_c} + d_{prop}$$

$$T \geq \frac{L}{R_c} - \frac{L}{R_s}$$

∴ The min value is $\frac{L}{R_c} - \frac{L}{R_s}$.