Comp 2322 Computer Networking

Homework One

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Questions:

1.

a)

As we assume that there's no queueing delay, so that delay for total

$$d_{nodal} = d_{processing} + d_{transmission} + d_{propagation}$$

$$d_{processing} = 2 \times d_{proc}$$

$$d_{transmission} = \frac{L}{R_1} + \frac{L}{R_2} + \frac{L}{R_3}$$

$$d_{propagation} = \frac{d}{s_1} + \frac{d}{s_2} + \frac{d}{s_3}$$

Then total end-to-end delay for the packet is

$$d_{nodal} = 2 \times d_{proc} + \frac{L}{R_1} + \frac{L}{R_2} + \frac{L}{R_3} + \frac{d}{s_1} + \frac{d}{s_2} + \frac{d}{s_3}$$

b)

$1500\ bytes = 1500 \times 8 = 12000\ bits$

$3Mbps = 3 \times 10^6 bps$

$d_{nodal} = 2 \times d_{proc} + \frac{L}{R_1} + \frac{L}{R_2} + \frac{L}{R_3} + \frac{d \times 3}{s}$

$$= 2 \times 2\ msec + \frac{4500 \times 1000}{3 \times 10^8}\ sec + \frac{3000 \times 1000}{3 \times 10^8} sec + \frac{1500 \times 1000}{3 \times 10^8} sec + \frac{12000 \times 3}{3 \times 10^6}\ sec$$

$$= 4\ msec + 0.015\ sec + 0.01\ sec + 0.005\ sec + 0.012\ sec = 46\ msec$$

The end-to-end delay for the packet is 46 msec.

2.

a) inter-arrival time: $\frac{L}{R_s}$

b)

It is possible that the second packet queues at the input queue of the second link. As we assume that second link is the bottleneck link, then transmission link is longer than the time of the first link.

c)

$T \geq \max\left(\frac{L}{R_c}, \frac{L}{R_S}\right)$