ECE 3700: Assignment 3

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Time to send one packet:

$$t_{total} = t_{trans} + t_{prop}$$

$$t_{prop} = \frac{L}{\frac{2}{3}c} = 0.030321$$

$$t_{trans,10Kb} = \frac{F}{B} = 2(\frac{10}{1024} + \frac{10}{102400}) = 0.019727$$

$$t_{trans,1Kb} = \frac{F}{B} = 2(\frac{10}{1024} + \frac{10}{102400}) = 0.001973$$

$$t_{total,10Kb} = 0.30321 + 0.019727 = 0.0500$$

$$t_{total,1Kb} = 0.30321 + 0.001973 = 0.0322$$

Using Stop/Wait

Number of packets to send:

$$N_{data} = N_{ack} = \frac{\text{10MB}}{\text{10Kb}} = 8000$$

Total Time:

$$N_{data} * t_{total,10Kb} + N_{ack} * t_{total,1Kb} = 658 \text{ seconds}$$

$$Rate = 8192 * \frac{\text{10MB}}{658s} = 124 \text{ Kbps}$$

Using Window Flow Control

Time to send four data packets:

$$t_{total,4*10Kb} = (4 * t_{trans,10Kb}) + t_{prop} = 0.038212$$

Time until last packet is acknowledged after last packet sent:

$$t_{total,1Kb} = 0.0322$$

Finally,

$$t_{total} = \frac{8000}{4} * (t_{total,4*10Kb} + t_{total,1Kb}) = 141 \text{ seconds}$$

$$Rate = 8192 * \frac{10\text{MB}}{141s} = 581 \text{ Kbps}$$