


Assignment 01 - Delays



Q1)

$$\min_{1000}(T_B - T_A) = 2.8 \text{ ms}$$

Therefore,

$$\begin{aligned} \text{Average queuing delay} &= (11 - 2.8) \\ &+ (10 - 2.8) \\ &+ (3 - 2.8) \\ &+ (5.5 - 2.8) \\ &+ (2.8 - 2.8) \\ &\quad \underline{\hspace{1cm}} \\ &\quad \quad 5 \end{aligned}$$

$$\Rightarrow 3.66 \text{ ms}$$

$$\min_x (T_B - T_A) = \frac{\text{Packet Size}}{\text{transmission rate}} + \text{propagation delay}$$

~~let, for~~

For packet size 1000 ^{bytes} \Rightarrow in bits

$$2.8 = \frac{8000}{x} + y$$

$\xrightarrow{\hspace{1cm}}$ bits per second

$$2.8 - \frac{8000}{x} = y$$

Solving for x, \$

$$2.4 = \frac{4000}{x} + \left(2.8 - \frac{8500}{x} \right)$$

$$2.4 = \frac{4000}{x} + \left(\frac{2.8x - 8500}{x} \right)$$

$$2.4 = \frac{4000 + (2.8x - 8500)}{x}$$

$$2.4x = 2.8x - 4500$$

$$2.4x - 2.8x = -4500$$

$$-0.4x = -4500$$

$$x = \frac{4500}{0.4}$$

$$x = 11250 \text{ bits per second.}$$

$$2.8 = \frac{\cancel{8500}}{\cancel{10500}} + y$$

$$2.8 - \frac{8}{10} = y$$

$$2 \frac{28 - 8}{10} = y$$

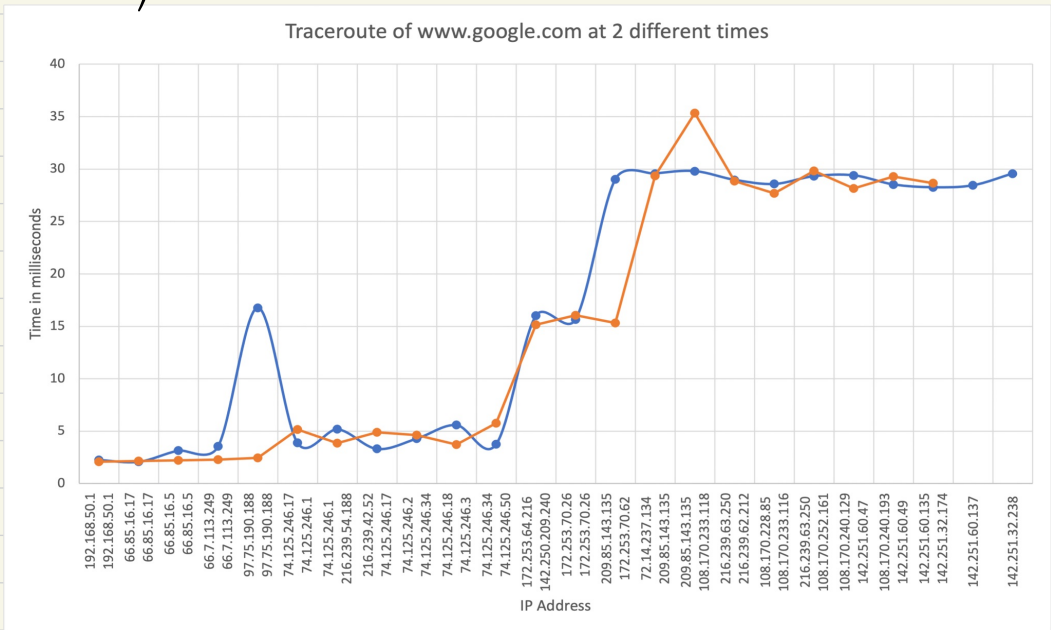
$$2 \frac{2}{1} = y$$

$$\text{transmission delay} = \frac{4800}{10000} \text{ or } \frac{600}{1250}$$

$$= 0.48 \text{ ms}$$

$$\text{Propagation delay} = 2 \text{ ms}$$

Q2:
a)



- b) i) Traffic congestion causes queuing delay
ii) Routers slow at path queuing.

Q3)

15.219.656

Please refer to ping.txt and pingResults.txt.