COMP 3203 Assignment 3

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1.

Given:

Propagation speed $= \frac{2*3*10^8}{3} = 2*10^8 \frac{m}{s}$

Length of the EXA North and South Submarine cable = 12200 KM = 12200000 m(according to the internet)

packet size L = 1200 bytes = 1200*8 bits = 9600 bits

Transmission rate R = 10 Gbps ($10^{10} \; bps$)

propagation delay RTT= $\frac{distance}{propogation}$

$= \frac{12200000}{2\times10^8} \; s$ (meter cancel each other out)

$= \frac{61}{10^3} \; s = \frac{61}{1000v} s = 0.061 \; s = 6.1\times10^{-2} s$

To find:
Number of packets in

a. Dtrans = L/R = $\frac{9600}{10^{10}}$ = 9.6×10^{-7} seconds

t = RTT +L/R = $6.1\times10^{-2}s + 9.6\times10^{-7}\;s = (6.1+0.000096)\times10^{-2}s = 6.100096\;\times10^{-2}s$

For 20% utilization we use .20=$9.6\times10^{-7}\times npacket$ /6.100096 $\times10^{-2}$

Npacket = $\frac{0.2*6.100096*10^{-2}}{9.6*10^{-7}}$

$= 0.1270853*10^5 = 12708.533\;packets$

2.

Given:
SampleRTT 1 = 98ms
Sample RTT 2 = 95ms
Sample RTT 3 = 120ms
Sample RTT 4 = 110ms
Sample RTT 5 = 75ms

a. Formula used to estimate Estimated RTT = $\alpha \times SampleRTT + (1 - \alpha) \times Estimated1$

EstimatedRTT 1 = $0.125 \times 98\ ms + (0.875) \times 100 = 99.75\ ms$

EstimatedRTT 2 = $0.125 \times 95\ ms + (0.875) \times 100 = 99.375\ ms$

EstimatedRTT 3 = $0.125 \times 120\ ms + (0.875) \times 100 = 102.5\ ms$

Estimated RTT 4 = $0.125 \times 110\ ms + (0.875) \times 100 = 101.25\ ms$

Estimated RTT 5 = $0.125 \times 75\ ms + (0.875) \times 100 = 96.875\ ms$

b. DevRTT = $\beta \times |SampleRTT - EstimatedRTT| + (1 - \beta) \times Dev1$

Dev 1 = 5ms

DevRTT 1 = $0.25 \times |98 - 99.75| + 0.75 \times 5\ ms = 4.1875\ ms$

DevRTT 2 = $0.25 \times |95 - 99.375| + 0.75 \times 5\ ms = 4.84375\ ms$

DevRTT 3 = $0.25 \times |120 - 102.5| + 0.75 \times 5\ ms = 8.125\ ms$

DevRTT 4 = $0.25 \times |110 - 101.25| + 0.75 \times 5\ ms = 5.9375\ ms$

DevRTT 5 = $0.25 \times |75 - 96.875| + 0.75 \times 5\ ms = 9.21875\ ms$

c. TimeoutInterval = $EstimatedRTT + 4 * DevRTT$

TimeoutInterval 1 = $99.75 + 4 * 4.1875 = 116.5\ ms$

TimeoutInterval 2 = $99.375 + 4 * 4.84375 = 118.75\ ms$

TimeoutInterval 3 = $102.5 + 4 * 8.125 = 135\ ms$

TimeoutInterval 4 = $101.25 + 4 * 5.9375 = 125\ ms$

TimeoutInterval 5 = $96.875 + 4 * 9.21875 = 133.75\ ms$