CN-3530/CS 301 Assignment 2

1. Stop and Wait Protocol

Question 1 – Number of retransmissions and throughput with different retransmission timeout values with stop-and-wait protocol. For each value of retransmission timeout, run the experiments for **5 times** and write down the average **number of retransmissions** and **average throughput**.

Retransmission timeout (ms)	Average number of re-transmissions	Average throughput (Kilobytes per second)
5	7783.6	71.81128
10	2878.2	67.24088
15	889.6	62.17344
20	278	60.02041
25	185.4	57.39172
30	158.4	55.71998
40	123	53.27943
50	130.4	49.09442
75	125.6	43.62745
100	119.4	39.43276

Question 2 – Discuss the impact of retransmission timeout value on number of retransmissions and throughput. Indicate the optimal timeout value from communication efficiency viewpoint (i.e., the timeout that minimizes the number of retransmissions and keeps the throughput as high as possible).

From the above table, we can see that as the timeout increases, the average throughput decreases slowly.We can also see that the number of retransmissions saturates to a value for timeout greater than 25 ms.The number of retransmissions for timeout more than 20ms are only due to packet loss which is 5%.So it saturated to a value.But, before 20ms the number of retransmissions are due to packet loss and the timeout is less than the RTT(where RTT = 4*delay, dealy is 5ms).So the packets are sent again and again inside RTT since the timeout is less.So, we observe that the retransmissions are more for timeout less than 20ms(which is 4*delay).
As the number of retransmissions are less, the efficiency is more.So, efficiency is inversely proportional to number of retransmissions(keeping the throughput high).From the above table, we can see that, when timeout is 5ms, the number of retransmissions and the throughput are

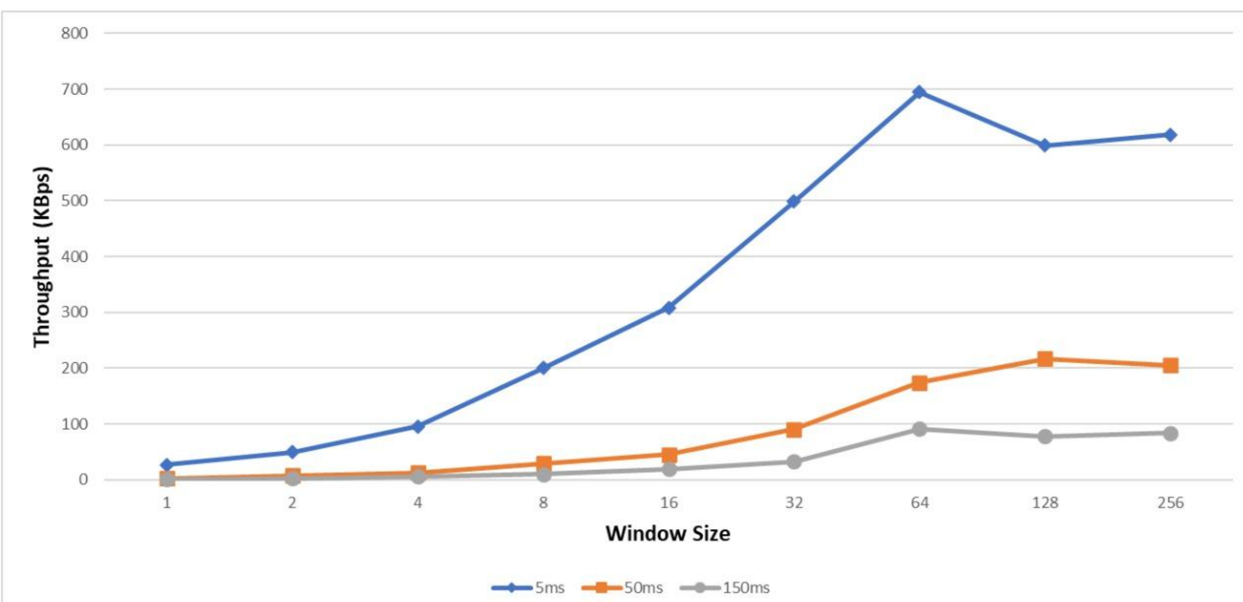
more.But, we need less number of retransmissions.So, we can see that for 40ms timeout, we have less number of retransmissions and more throughput(ratio of throughput and number of retransmissions is more of 40ms timeout).

2. Go back N Protocol

Question 1 – Experimentation with Go-Back-N. For each value of window size, run the experiments **5 times** and write down the **average throughput**.

	Average throughput (Kilobytes per second)		
Window Size	**Delay = 5ms**	**Delay = 50ms**	**Delay = 150ms**
1	26.89457	3.021452	1.07432
2	49.24859	7.41259	2.31498
4	96.06578	12.82457	5.79403
8	200.36275	29.64258	10.20156
16	308.62341	45.72357	19.23451
32	498.16659	90.32785	32.56487
64	694.87542	174.32481	91.25846
128	599.32458	217.24159	78.26419
256	618.76248	205.14285	84.32165

Create a graph similar to the one shown below using the results from the above table: (Edit: change delays to 5ms, 50ms and 150 ms as mentioned in the assignment statement)



Question 2 – Discuss your results from Question 1.

From the above table and graph, we can see that, as the delay increases, the average throughput decreases for a fixed window size.This is because the packets more time to propagate through the link as the propagation delay increases.We need to set a timeout such that it is efficient(less number of retransmissions).For one RTT, one packet has to be transmitted so that the number of retransmissions are reduced.We also need some more time(RTT+delta(T)) to keep the retransmissions minimum.By setting different timeouts, I have found that, for the value of timeout which is (4.4-4.5)*Propagation delay, we get more efficiency which means less number of retransmissions.The same thing happens in the first question as well.
Time out = (4.4-4.5)*Propagation delay.

For smaller value of timeout, I observed that there is an increase in throughput but number of retransmissions are also increasing.

PLAGIARISM STATEMENT <Include it in your report>

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