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	3261.2	45.08
10	1346.6	54.68
15	214.8	53.49
20	134.2	53.655
25	125.4	53.89
30	129	50.16
40	121.4	47.974
50	112.6	46.83
75	120.8	38.47
100	128.4	37.20

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

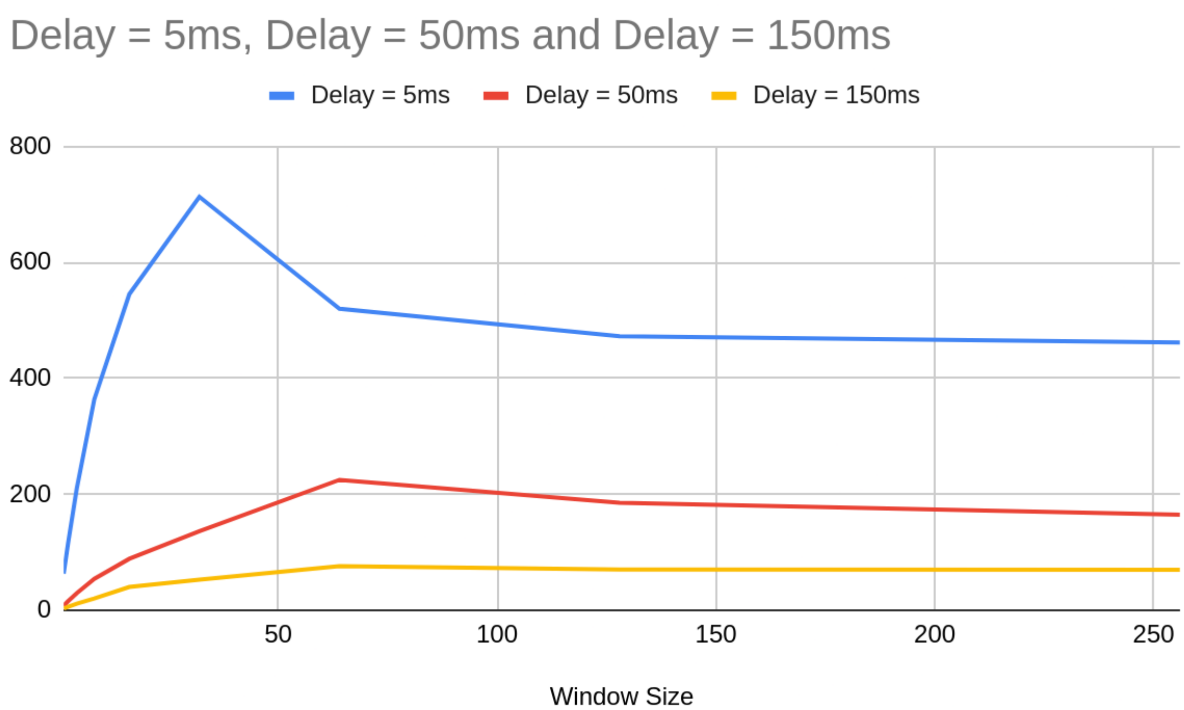
The throughput for initial values of retransmission time is small, and the average number of retransmissions is also very high as the propagation delay is much higher than the RTT. As we increase the retransmission timeout to around 30 msec, the throughput increases and the number of retransmissions also decreases. I observed that average throughput was highest at timeout=10 msec although the number of retransmissions at this timeout value is also high, the values of throughput are similar at timeout = 15 to 25 msecs. The best value for timeout is 25 as the throughput is near the highest observed value. The number of retransmissions are also low. In theory, the timeout should be around 2*RTT. From the ping command we observe that timeout is somewhere between 12 msec to 20 msec. A timeout of 25 fits well enough even with the theory result.

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	62.87	7.85	3.01
2	115.117	15.43	5.93
4	210.07	29.51	11.25
8	363.81	54.15	20.28
16	545.11	88.68	40.09
32	713.184	136.07	52.73
64	519.93	224.81	75.91
128	472.5077	185.37	70.01
256	461.77	164.54	69.73

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.

The throughput is inversely proportional to the propagation delay. I have chosen nearly 4*propagation delay (at sender <u>or</u> receiver) + some small extra time. The timeouts considered are

1. 25 ms for 5 ms delay
2. 220 ms for 50 ms delay
3. 620 ms for 150 ms delay.

The throughput increases on increasing the propagation delay because the packets take longer to be received. Consequently, I also scaled the timeout which causes delay in packet retransmission.

Further, I got that the throughput for each of the 3 cases was higher around window size 32 or 64. This is because for small window sizes, a lot of time is wasted by small increments in base, while for considerably large window sizes, a lot of packets are on the fly since only few packets are lost; this tends to work good by helping move the base by larger steps. While, if we increase the window too much (128 or 256) then it might happen that a lot of packets are being retransmitted just because an intermediate packet got lost. This increases retransmissions a lot, thus decreasing the throughput.

PLAGIARISM STATEMENT <Include it in your report>

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