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	139	306
10	119	276
15	121	237
20	132	197
25	128	172
30	120	127
40	116	140
50	119	121
75	125	88
100	107	78

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 Retransmission timeout value certainly affects the number of retransmissions and throughput.

If we keep the value of timeout too small, then there are high chances of resending a packet which is received at receiver (packet duplication), so the number of retransmissions are high. Also, the sender need not to wait for long, so throughput is high.

If we keep the value of timeout too large, sender will wait sufficient time for receiving ACKs, hence the number of retransmissions reduce. But, sender has to wait long before sending next packet, hence the throughput also reduces.

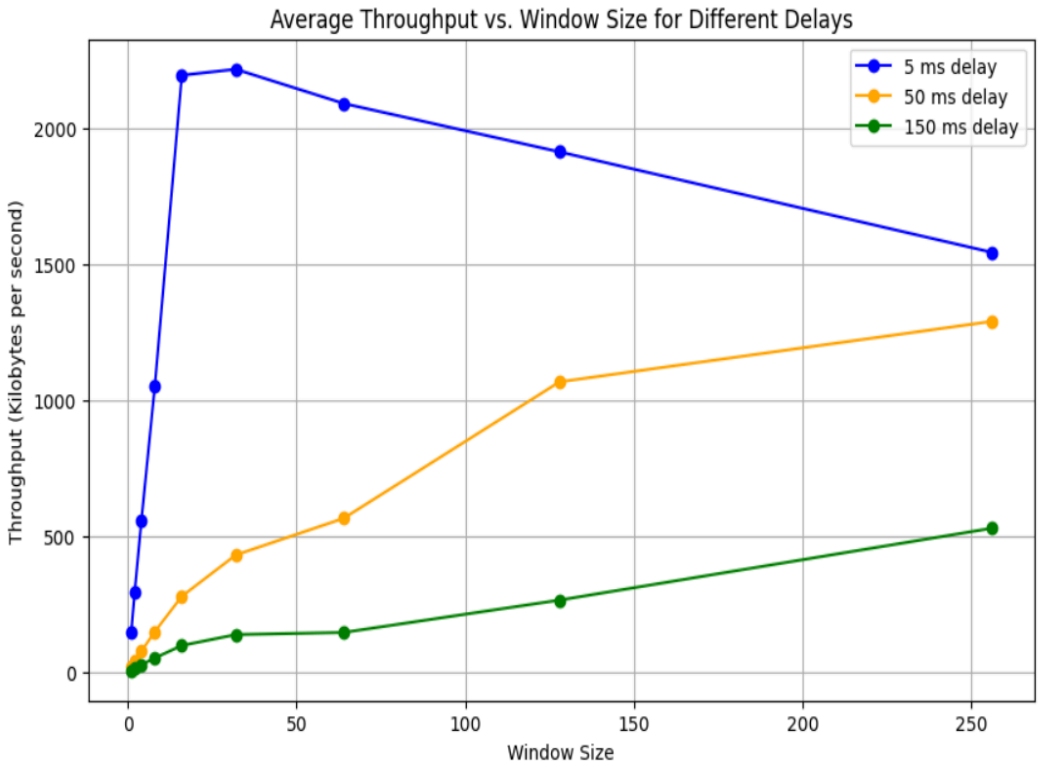
Hence, the optimal timeout value should be properly chosen which is not too small nor too large, such that we get high throughput and less number of retransmissions. From the above table, we see that optimal timeout value should be around 5 - 20 ms, but it varies on various other factors such as the size of the file which is being transferred, network conditions which we set, the device on which it runs, etc.

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	146	19	5
2	291	38	13
4	555	76	26
8	1052	148	51
16	2195	278	97
32	2217	430	137
64	2091	565	145
128	1913	1067	264
256	1544	1289	528

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.

We see that increase in window size (and for a given delay) results in the increase of throughput. This is because sender can transfer more packets before receiving ACKs. Higher delays (e.g., 50ms, 150ms) considerably reduce throughput for smaller window sizes, as the sender must wait longer for ACKs before advancing the window.