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	220	310
10	128	292
15	118	243
20	115	220
25	118	197
30	120	175
40	128	145
50	137	114
75	109	101
100	120	74

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).

When retransmission time increases, the number of retransmissions will increase because sender will verify for long time before it retransmits. The throughput will decrease as the time taken will increase with retransmission time. The optimal value is 10ms.

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**.

Window Size	Average throughput (Kilobytes per second)		
	Delay = 5ms	**Delay = 50ms**	**Delay = 150ms**
1	445	403	412
2	662	687	697
4	921	903	815
8	960	974	964
16	1056	1034	1031
32	LOW TIMEOUT	LOW TIMEOUT	LOW TIMEOUT
64	LOW TIMEOUT	LOW TIMEOUT	LOW TIMEOUT
128	LOW TIMEOUT	LOW TIMEOUT	LOW TIMEOUT
256	LOW TIMEOUT	LOW TIMEOUT	LOW TIMEOUT

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)
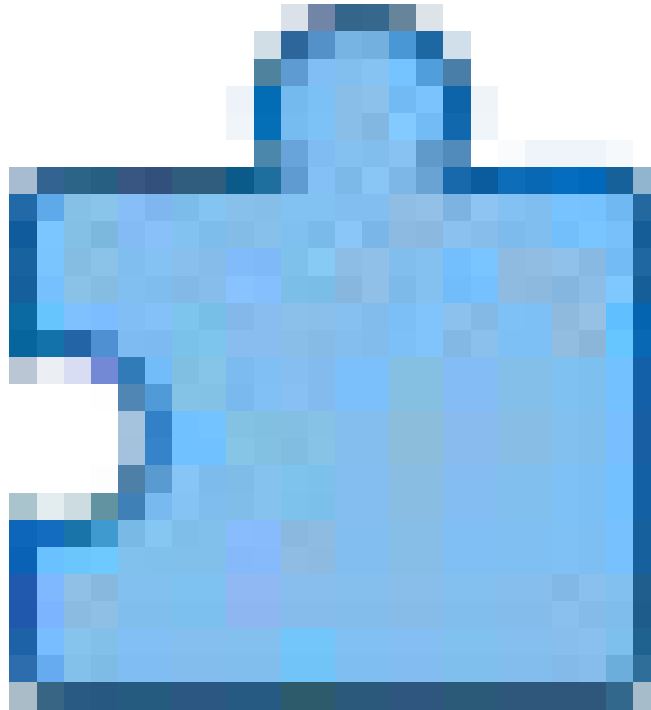

Object 3

Question 2 – Discuss your results from Question 1.

As window size increases, throughput increases because more packets are transmitted together but beyond a certain window size throughput again decreases. This is because if some packets fail , the whole window needs to be retransmitted.

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