Computer Communications and Networks (COMN) 2022/23, Semester 1

Assignment 2 Results Sheet

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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 the **average throughput**.

Retransmission timeout (ms)	Average number of retransmissions	Average throughput (Kilobytes per second)
5	4037	81
10	2326	80.1
15	111	71.2
20	98	63.5
25	116	60.5
30	94	59.9
40	83	58.1
50	94	53.2
75	93	46.9
100	104	39.9

Question 2 – Discuss the impact of retransmission timeout value on the 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 while ensuring a high throughput).

The first two shortest retransmission timeout showed the highest average number of retransmissions and the value of the retransmissions decreased tremendously and remained almost constant beginning from 15 till the 100. Since the transmission delay is already set to 5ms, time for a packet to be received and acknowledged would be very tight, hence, it would be assumed as lost and would be retransmitted which explains the large number of average retransmissions shown in the first 2.

However, in contrast to the average number of transmissions, the first 2 times have shown the highest throughput and this is due the fact that the shorter the retransmission timeout the shorter each packet would

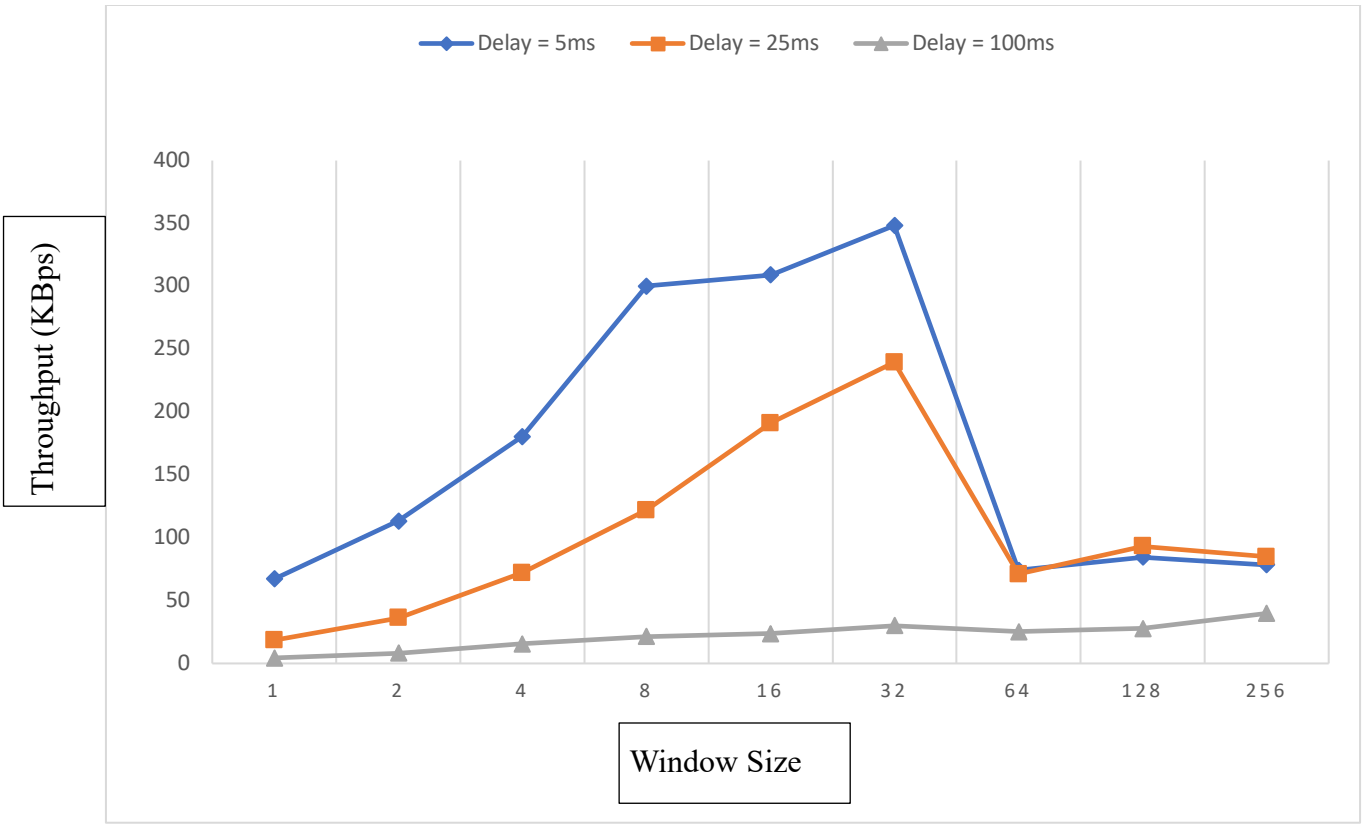
have to wait for the previous acknowledgment in order to be sent. That's why as we increase the retransmission timeout the average throughput keeps declining.

The optimal retransmission timeout in this case would be either 15 or 20 as they showed a relatively lower average retransmissions with a relatively high throughput.

Question 3 – Experimentation with Go-Back-N. For each value of window size, run the experiments for **5 times** and write down the **average throughput**.

	Average throughput (Kilobytes per second)		
Window Size	**Delay = 5ms**	**Delay = 25ms**	**Delay = 100ms**
1	67.2	18.5	4.4
2	113.2	36.3	8.3
4	180.6	72.1	15.5
8	300.2	121.9	21.4
16	309.1	191.2	23.7
32	348.3	239.5	30.1
64	74	71.1	25.2
128	84.6	93.2	27.9
256	78.4	84.9	39.8

Create a graph as shown below using the results from the above table:



Question 4 – Discuss your results from Question 3.

In the delay of 5ms, a retransmission timeout of 20ms was used as instructed. For 25ms and 100ms, I used 65ms and 215 retransmission timeouts respectively. The reason for using these numbers is that it allows the packet to reach the receiver and for the acknowledgment to return due to the RTT delay caused by 25ms and 100ms. The extra 15ms was to allow the best retransmission timeout that had a high throughput and low retransmissions. S

There is a general trend in all of the delays which is the throughput keeps increasing and reaches the peak at the window size of 32 and then falls significantly down to nearly a minimum. Besides, it's clear from the graph that the delay of 5ms has the highest throughput. The reason for this behavior is that when the window size gets larger, the receiver wouldn't be able to handle all of these packets all at once which will make the sender delay moving the window further.

Question 5 – Experimentation with Selective Repeat. For each value of window size, run the experiments for **5 times** and write down the **average throughput**.

Window Size	Average throughput (Kilobytes per second) Delay = 25ms
1	
2	
4	
8	
16	
32	

Question 6 - Compare the throughput obtained when using "Selective Repeat" with the corresponding results you got from the "Go Back N" experiment and explain the reasons behind any differences.

Question 7 – Experimentation with *iperf*. For each value of window size, run the experiments for **5 times** and write down the **average throughput**.

Window Size (KB)	Average throughput (Kilobytes per second) Delay = 25ms
1	
2	
4	
8	
16	
32	

Question 8 - Compare the throughput obtained when using "Selective Repeat" and "Go Back N" with the corresponding results you got from the *iperf* experiment and explain the reasons behind any differences.