CSC/ECE 573 Section 002
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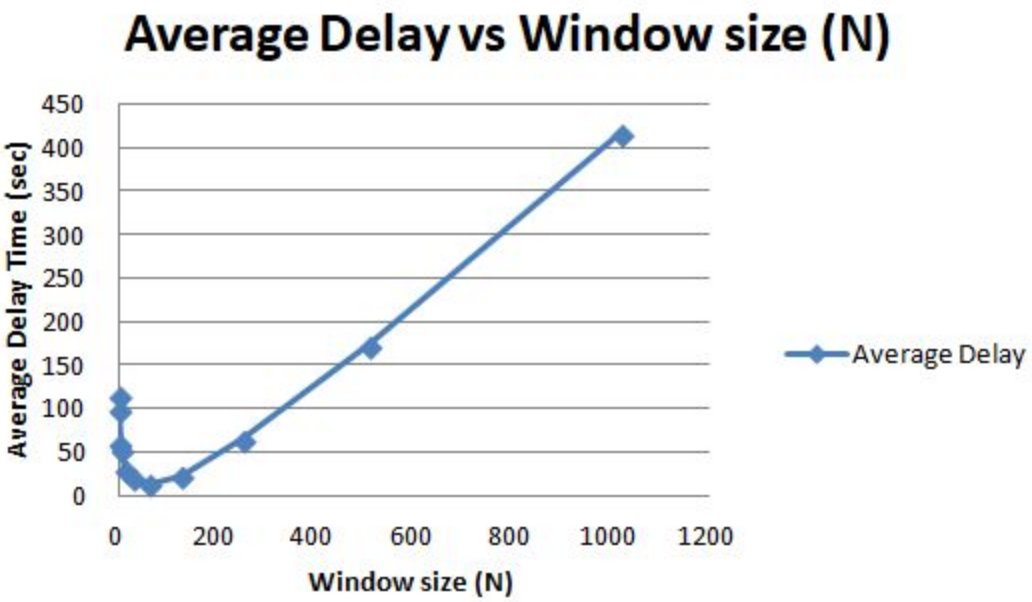
Project 2 Report

Task 1:

Task 1: GO Back N (p=0.05, MSS = 500)						
Window size (N)	1st	2nd	3rd	4th	5th	Average Delay
1	107.587	113.292	112.346	126.728	115.083	**115.00704**
2	114.19	92.5402	105.995	97.8279	80.7535	**98.26128**
4	54.8353	70.0501	59.8344	59.5228	55.5899	**59.966506**
8	49.5931	54.9939	49.0858	52.1003	63.09	**53.772616**
16	30.6043	23.5589	28.9966	32.8716	27.968	**28.79988**
32	21.3084	19.5863	24.5686	18.9645	19.6357	**20.8127**
64	14.61	13.5494	15.6145	9.6881	13.7728	**13.44696**
128	18.6396	20.6859	19.5687	25.9968	23.6685	**21.7119**
256	70.3863	63.6585	67.5581	61.2352	61.8956	**64.94674**
512	172.928	165.89	170.256	183.691	172.875	**173.12798**
1024	381.106	405.367	416.896	385.982	497.885	**417.44704**



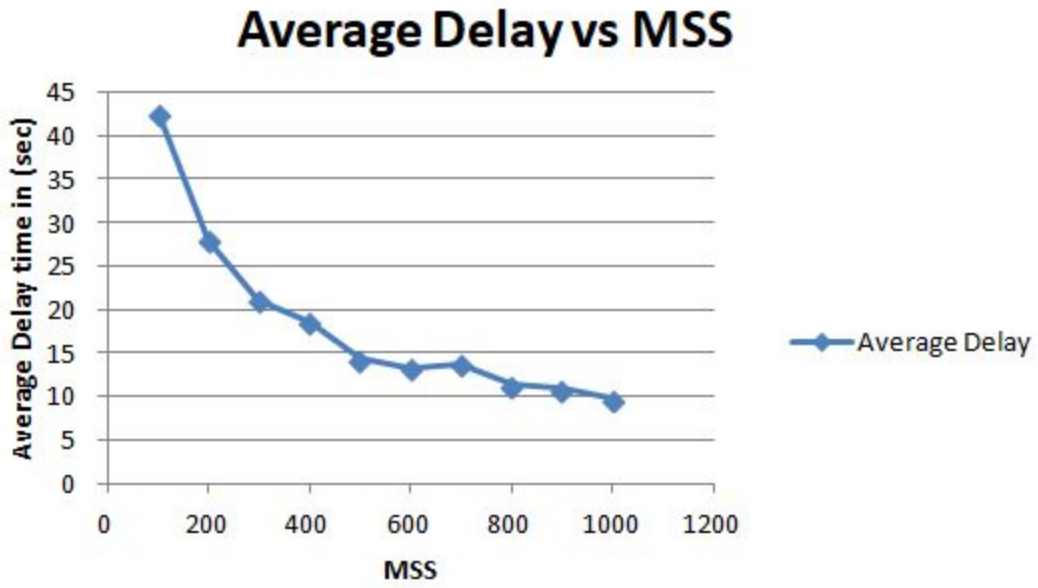
Parameter:
The window size (N) is varied from 1 to 1024, with interval of power of 2,
MSS is varied from 100 to 1000 with an interval of 100.
p is set to 0.05

Explanation:
When window size is small, less packets are transmitted at a time. The probability of lost ACK is more because upon retransmission, less packets are transmitted. There are more chances of getting a lost ACK. As the window size is less, it takes a long time to transmit the file to the server.

When window size increases then, average delay time decreases up till N = 64, If the window size increases further then upon lost ACK, average delay time is increased because the time is wasted to retransit all the packets every time. For example, consider Window size to be 1024. When 1024 packets are transmitted at once. Let say the Lost ACK occurs at sequence number 3, then upon retransmission all the packets from 3 to 1024 are transmitted again and this results in high average delay time.

Task 2:

Task 2: Go back N (p=0.05, N=64)						
MSS	1st	2nd	3rd	4th	5th	Average Delay
100	55.5597	42.4277	48.8673	29.3788	37.0202	**42.65074**
200	40.2662	25.4945	24.2174	23.8693	25.8283	**27.93514**
300	30.7086	12.4225	23.0658	15.1309	23.8381	**21.03318**
400	17.871	21.616	16.3343	14.749	22.5931	**18.63268**
500	19.9105	10.7207	13.6112	11.9509	15.4264	**14.32394**
600	19.9093	8.9201	14.1198	14.1573	9.4707	**13.31544**
700	19.7069	11.4065	12.3546	10.7251	14.9061	**13.81984**
800	10.8627	11.8209	15.5484	9.47698	8.9209	**11.325976**
900	13.8104	10.8507	9.4765	9.7093	10.4518	**10.85974**
1000	12.8491	8.2662	8.8411	8.7236	9.9992	**9.73584**



Parameter:
The window size (N) is set to 64,
MSS is varied from 100 to 1000 with an interval of 100.
p is set to 0.05

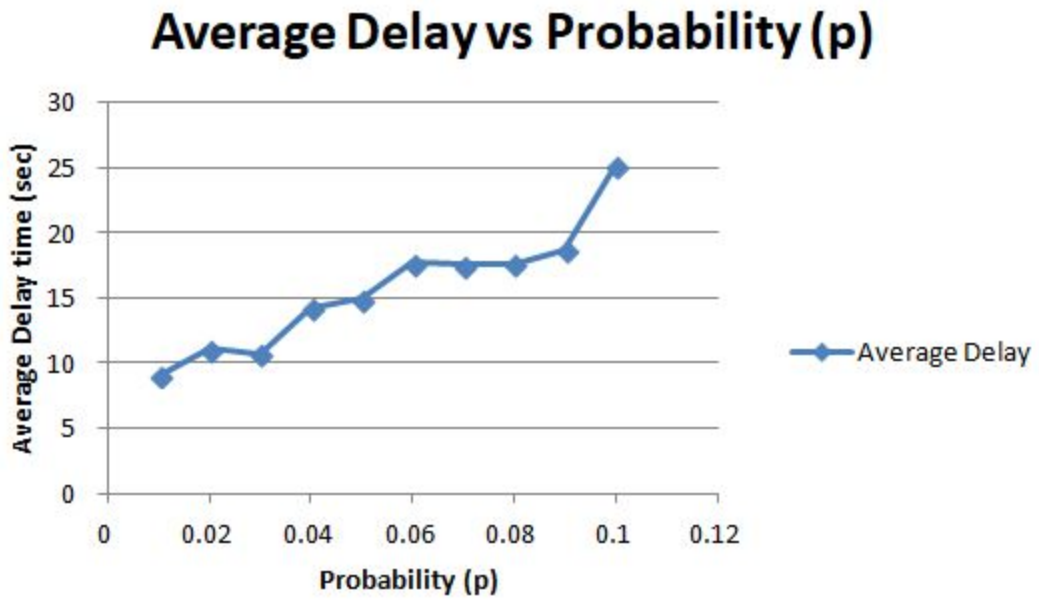
Explanation:
As the value of the MSS increases, this means that more data is transmitted in a packet therefore, there will be less number of the packet as MSS is more and thus there is less chance of retransmission due to lost packet/lost ACK.

When there is less retransmission and more data is sent in a packet, therefore as the size of MSS increases, the average time to transfer the file decreases. This is exactly as observed in the graph. The average delay time decreases from 42.6 sec to 9.73 sec.

Conclusion:
MSS is inversely proportional to average delay time.

Task 3:

Task 3: Go back N (MSS=500, N=64)						
p	1st	2nd	3rd	4th	5th	Average Delay
0.01	7.9879	9.0968	9.1402	9.4597	9.6114	**9.0592**
0.02	10.8671	14.6702	8.9666	11.4396	9.5298	**11.09466**
0.03	11.5452	10.1575	11.493	10.7871	9.609	**10.71836**
0.04	21.4986	8.2294	16.8047	11.1263	13.3073	**14.19326**
0.05	16.6906	11.607	11.818	15.7579	18.8148	**14.93766**
0.06	18.8232	17.0306	13.5638	26.6171	12.391	**17.68514**
0.07	22.6677	18.8509	14.1371	14.2882	17.5606	**17.5009**
0.08	25.0443	18.3006	16.9533	14.6536	13.2287	**17.6361**
0.09	27.0272	13.9353	14.2126	17.649	20.3507	**18.63496**
0.1	25.8711	24.4683	20.9399	29.4504	25.3597	**25.21788**



Parameter:
The window size (N) is set to 64,
MSS is set to 500.
p is varied from 0.01 to 0.1 with intervals of 0.01

Explanation:
As the value of the p increases, this means that there will be more ACK lost, thus this will lead to more retransmission because the lost ACK probability increases as p increases. The random

value is calculated between 0 to 1 and is compared with probability which varies from 0.01 to 0.1. When random value is less than p, the packet is retransmitted by the client.

This same behaviour is observed in the graph, as the value of the p increases, the average delay time increases.

Conclusion:
p is directly proportional to average delay time.