

**Name:** Frank Lin  
**Course:** CSC 573  
**Section:** 001  
**Title:** Project 2 Report

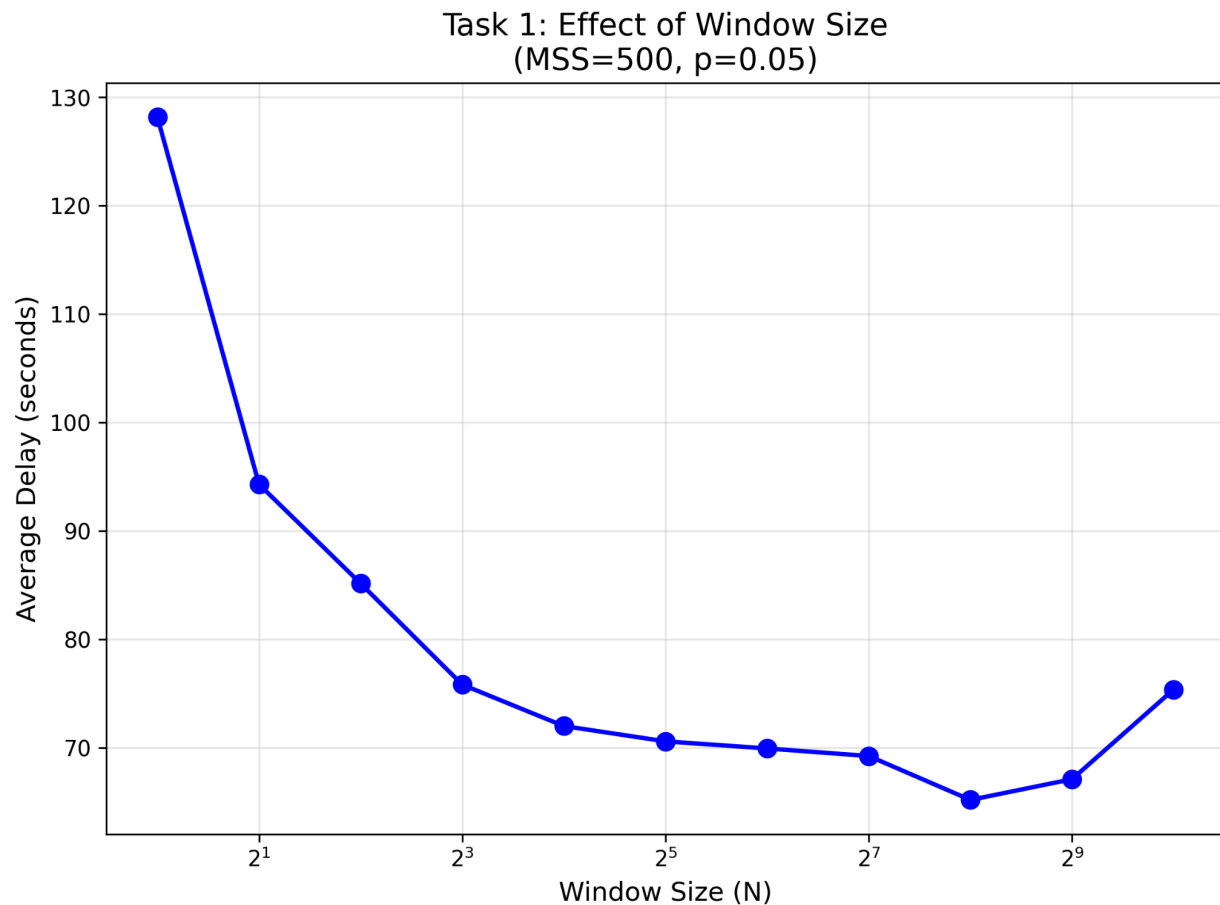
---

**Introduction:**

File size: 1048576 bytes (1 MB)  
RTT: 30.289 ms (using traceroute)  
Source: My laptop location  
Destination: 152.7.178.180 (VCL Server)

---

**Task 1 Analysis:**



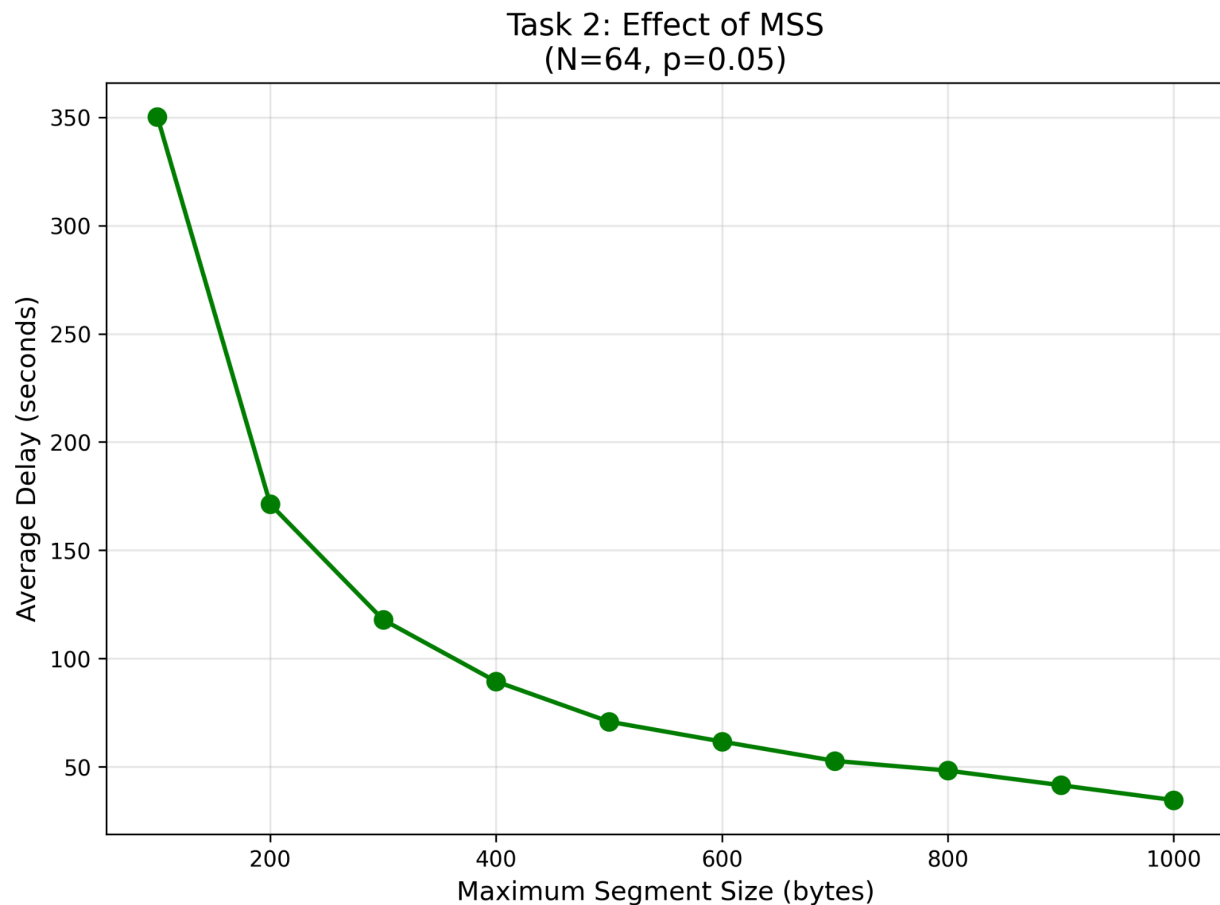
*Explain how the value of N affects the delay and the shape of the curve.*

As the window size increases, the delay decreases until it reaches very large N, which then plateaus. With small windows sizes, the sender must wait to receive ACKs before sending the

next packet, which means that the sender is idle while waiting during the RTT. As  $N$  increases, the sender can have several packets in flight simultaneously, improving throughput. But once  $N$  is large enough to fill the pipe, further increases don't help. In fact, with the retransmission penalty and how Go-back- $N$  works, when a packet is lost, all packets from that point must be retransmitted, which means more packet retransmission on each loss, meaning that very high  $N$  can actually be detrimental to performance. This could explain why the delay starts increasing after  $N=2^8$ .

---

### Task 2 Analysis:

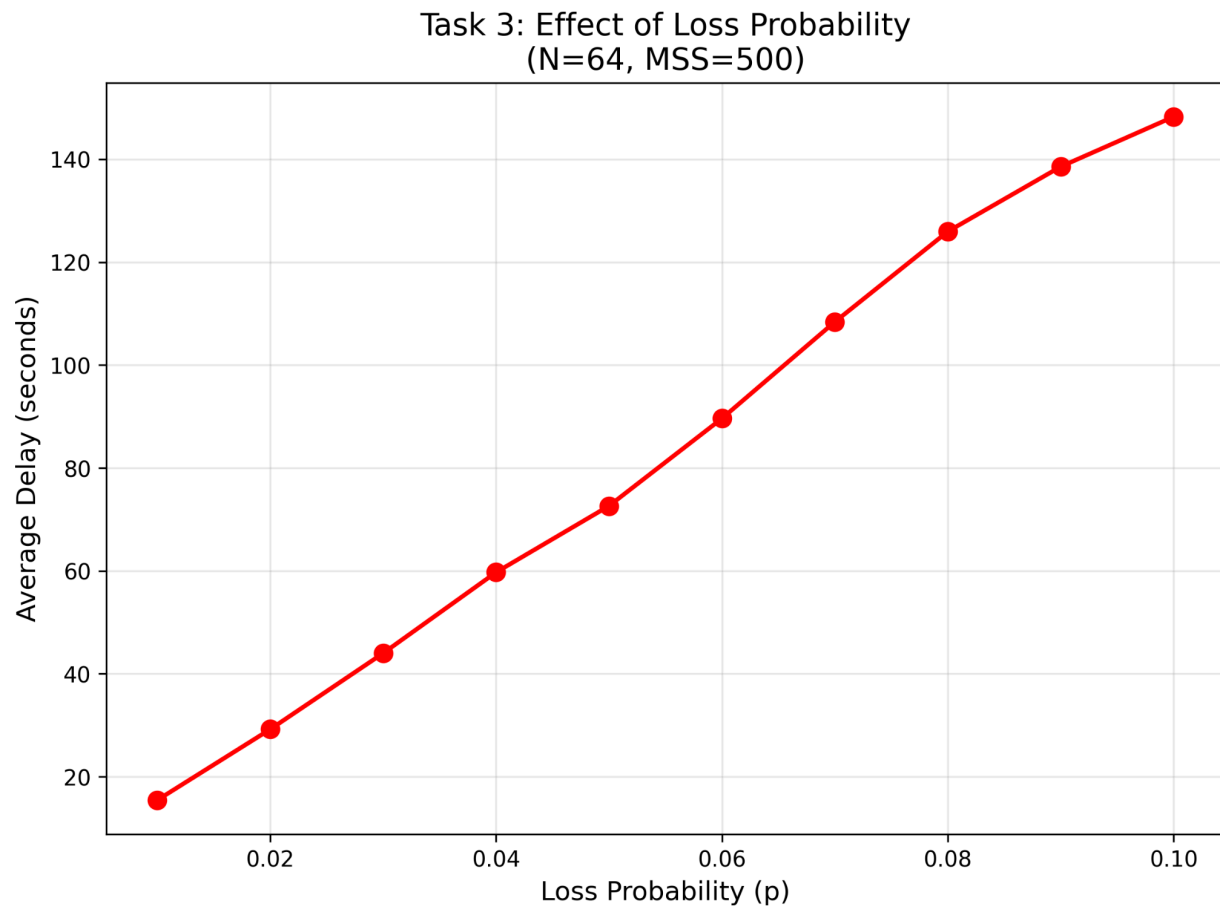


*Discuss the shape of the curve; are the results expected?*

A larger MSS decreases the amount of packets needed to be transmitted. The gains are most significant in the beginning because an increase in MSS from 100 to 200 bytes halves the number of packets needed (50% reduction) while going from an MSS of 900 to 1000 bytes only represents a reduction of about ~10%. The results are exactly as expected.

---

### Task 3 Analysis:



*Discuss and explain the results and shape of the curve.*

With Task 3, there is a positive almost-linear relationship between the loss probability and the average delay. An increase in loss probability increases the number of packets that are lost and thus need to be retransmitted, contributing to the increase in average delay.