CSC 573 – Internet Protocols

Project #2

Go-Back-N Automatic Repeat Request Scheme (ARQ)

&

Selective Repeat ARQ Protocol

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Go-Back-N ARQ

Following are the messages used in the project:

Packet loss, sequence number <Number>: Can be observed at Server end

Timeout, sequence number <Number>: Can be observed at Client end

Specifications and files used for the transfer:

File size: 1 Mb

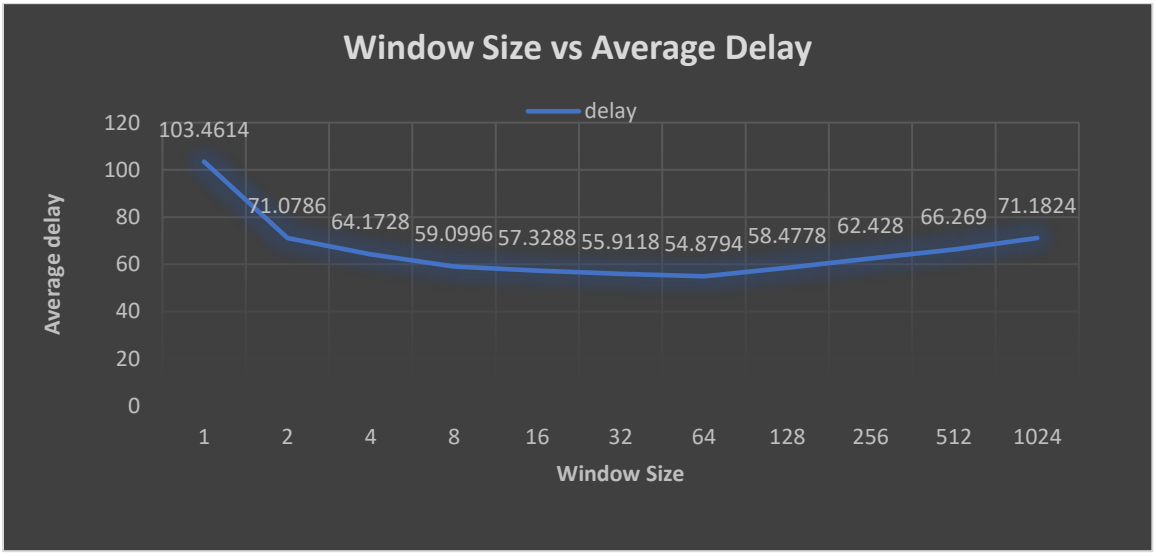
Round trip time: 500ms

Task 1: Effect of Window Size N

N: 1,2,4,8,16,32,64,128,256,1024

MSS: 500

p: 0.05



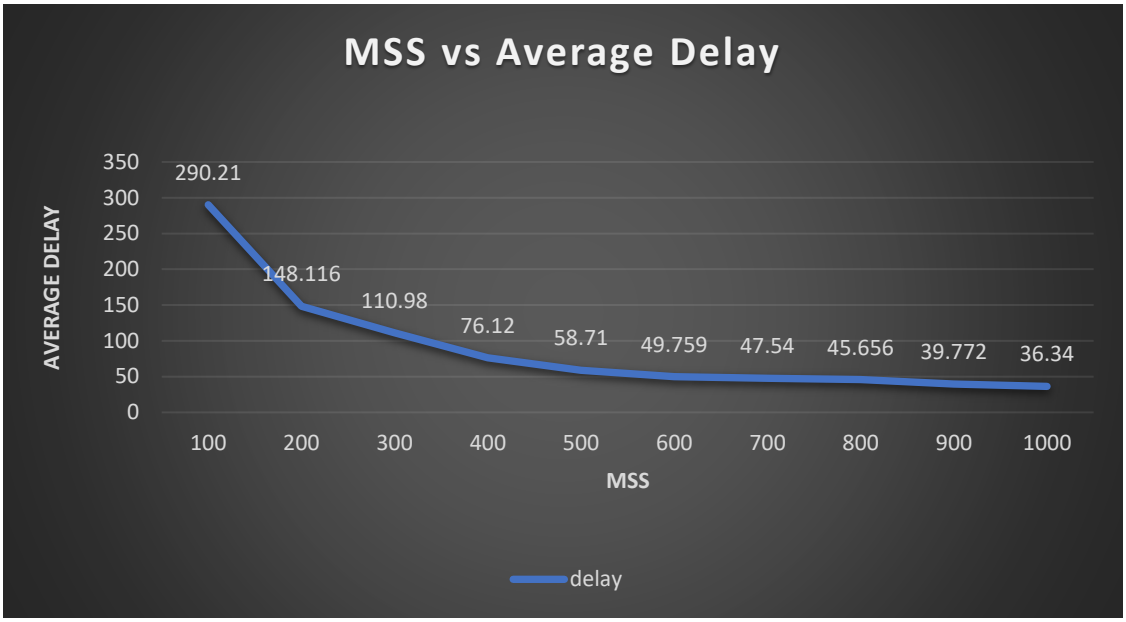
We observe that larger window sizes cause more delay, because on packet losses, greater number of retransmissions would be required. Also, we see that delay is tolerable for window sizes from 16 to 64. This is the optimal window size range. Lastly, we infer that if the window size is small then receiver will consume the packets very slowly leading to multiple timeouts at sending end since ACKs will be received very slowly at sending end.

Task 2: The effect of varying MSS

MSS: 100 to 1000 in increments of 100

N: 64

p: 0.05



Here we see almost an exponential decrease in average delay on linear increments of MSS. This is because smaller MSS causes larger packet transfers, and hence there is a greater number of packet losses and a greater number of retransmissions. And larger MSS value leads to lesser number of retransmissions.

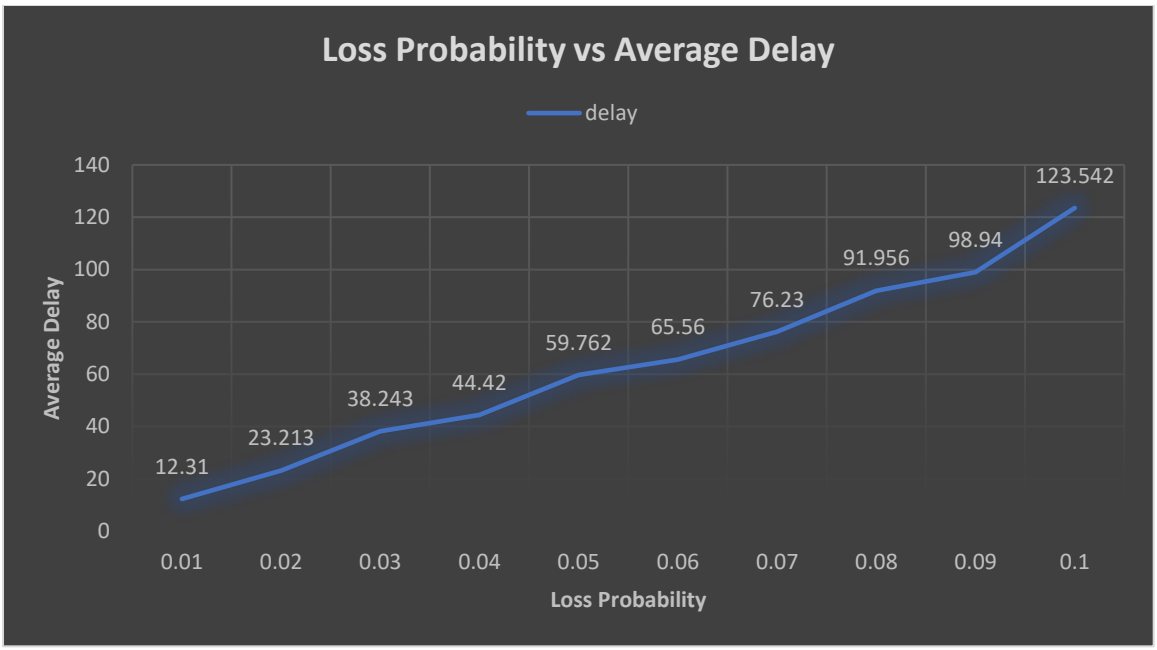
A larger MSS works best only if network bandwidth can support it efficiently. Low network bandwidth cannot handle larger size segment, also smaller segment size in a network with a large bandwidth would be an inefficient utilization of bandwidth resulting in a higher transfer time relative to a larger segment size.

Task 3: The effect of varying probability

p: 0.01 – 0.10 in increments of 0.01

N: 64

MSS: 500



With the increase in loss probability, time to transmit the file increases. If packets are lost at receiver, sender must resend the packets again until an ACK is received. If the packet error rate increases, then sender must retransmit more packets hence the time needed to retransmit the file increases. Hence, we infer that the delay increases with increased packet loss probability, because that in turn increases the number of retransmissions.

Selective Repeat ARQ

Specifications and files used for the transfer:

File size: 1 Mb

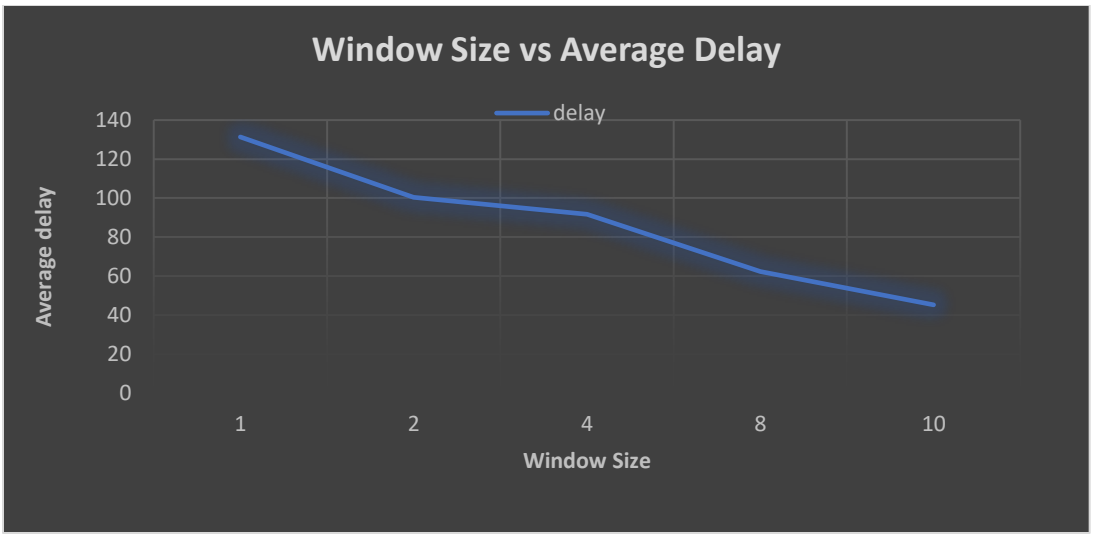
Round trip time: 500ms

Task 1: Effect of Window Size N

N: 1,2,4,8,10

MSS: 500

p: 0.05

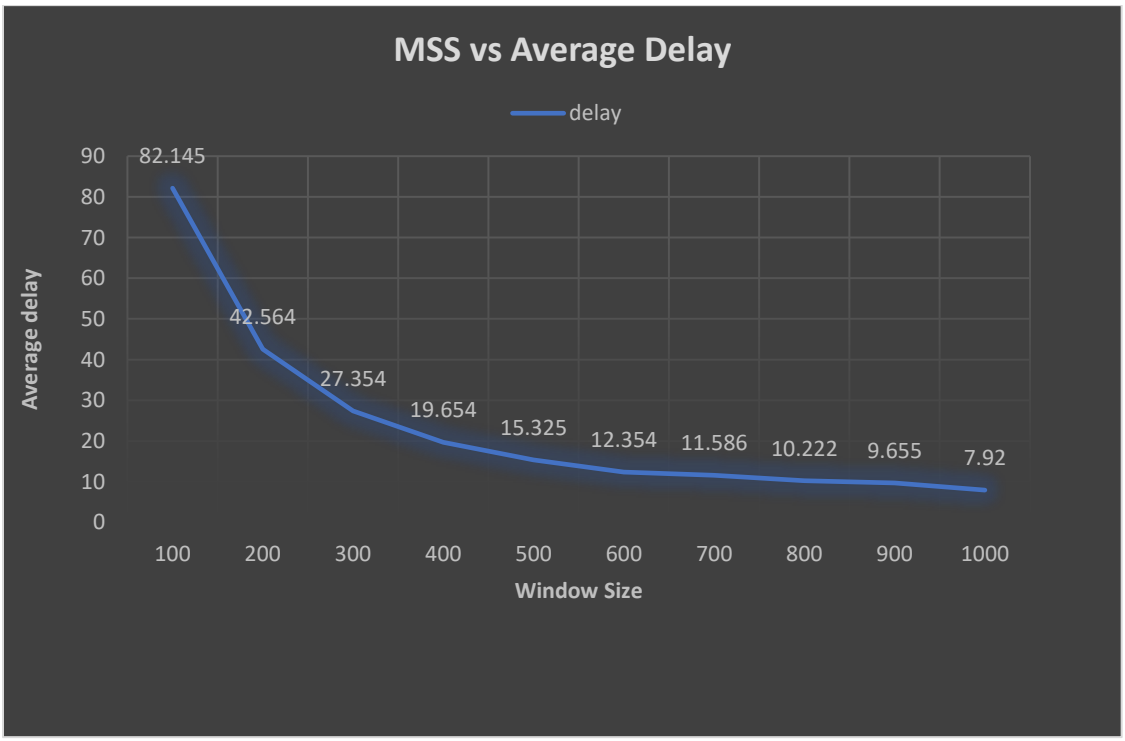


Task 2: The effect of varying MSS

MSS: 100 to 1000 in increments of 100

N: 10

p: 0.05

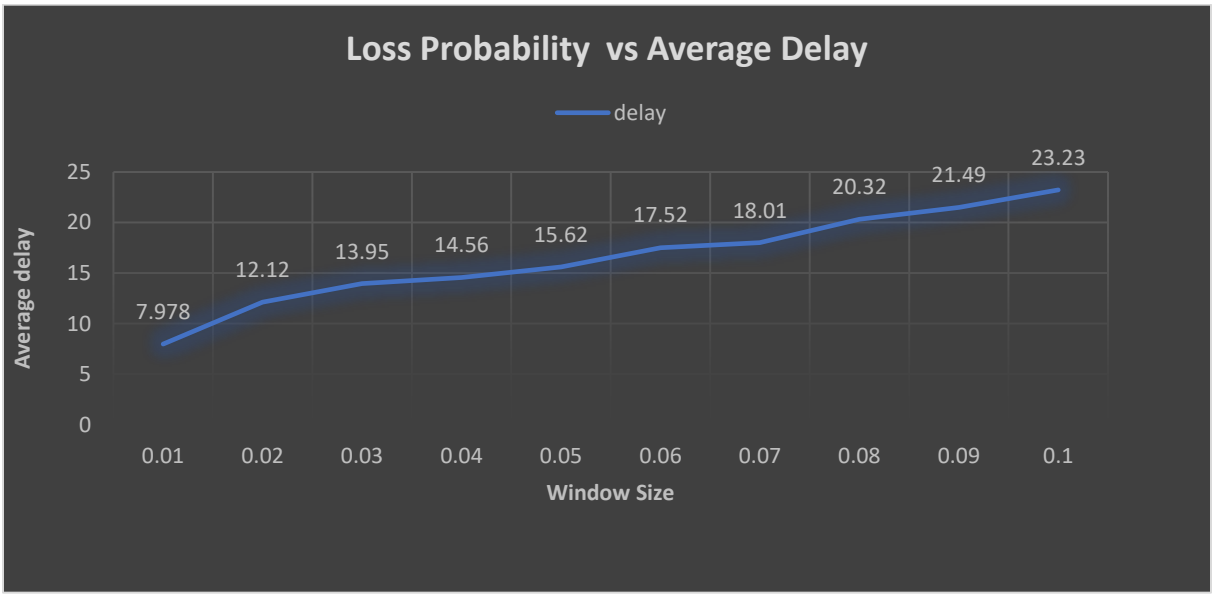


Task 3: The effect of varying probability

p: 0.01 – 0.10 in increments of 0.01

N: 10

MSS: 500



We observe that the graph trend of selective repeat ARQ matches with that of the Go-Back-N ARQ. This is because of the reasons mentioned above.

In addition to that we can also observe that Selective Repeat ARQ gives better performance overall when compared to Go-Back-N ARQ. The main reasoning for this behavior is that in Selective Repeat ARQ protocol, on any one particular packet loss, only that packet alone is resent for retransmission unlike in Go-Back-N ARQ where a set of N packets following the packet which was lost is retransmitted.