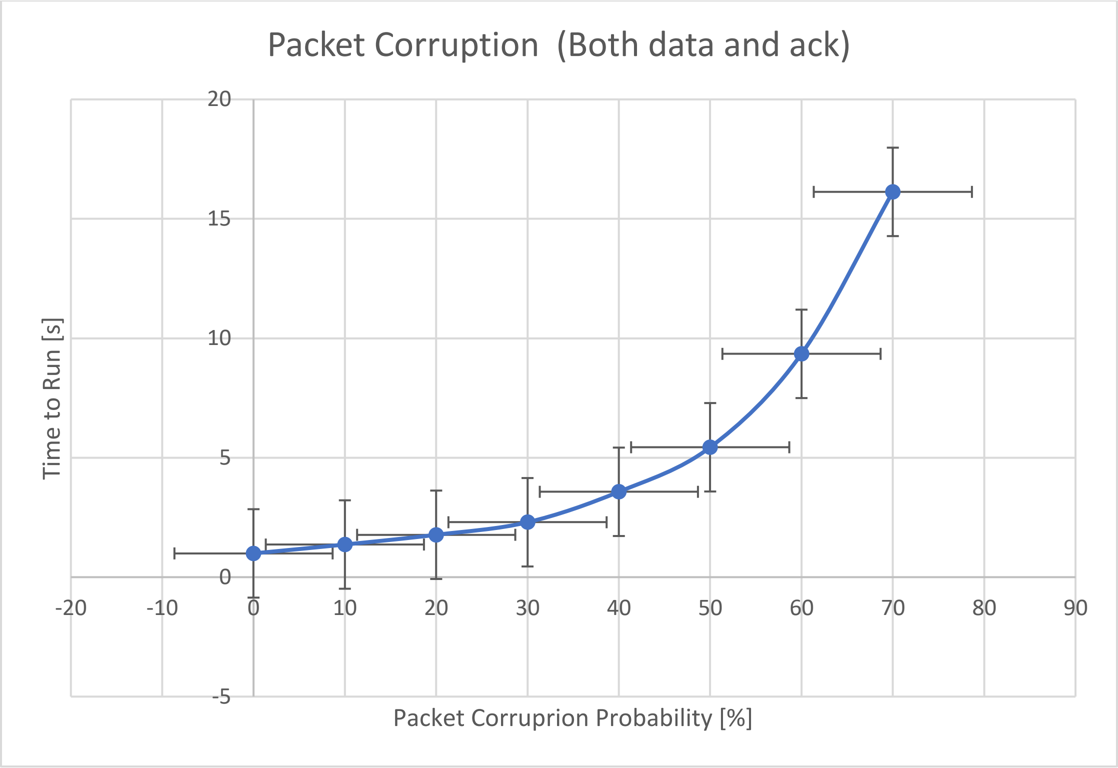
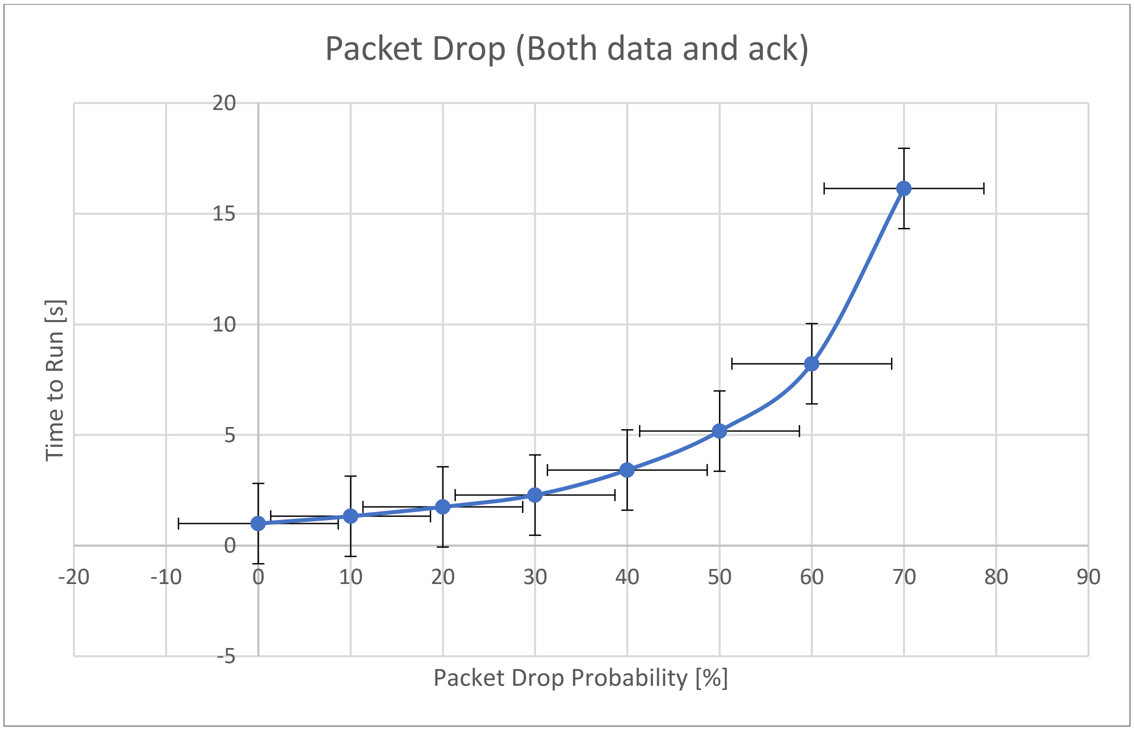
Phase 6: TCP Performance Figures and Discussion

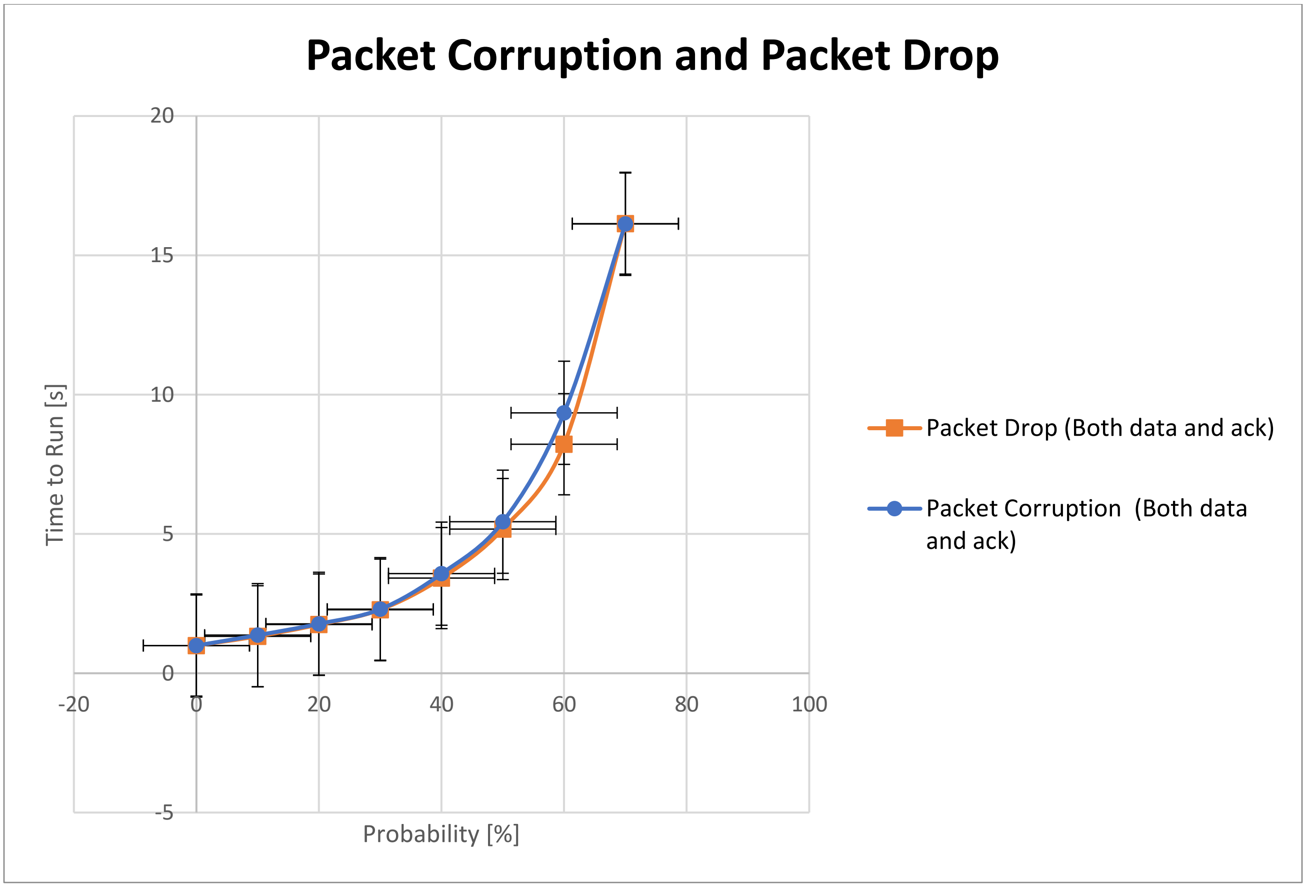
*All results are an average of 5 runs at each probability.

- As the probability of packet loss increases the time to send the packet increases exponentially rather than linearly during both packet corruption and packet drop. This is due in large part to the use of the Go Back N and Congestion control protocols that were implemented as a part of TCP. As packet loss increases timeouts become more likely, in go back n this triggers the whole current window to be resent adding to the number of repeated packets sent and received. Additionally, timeouts also trigger the congestion control mechanisms which rapidly decrease the window size. Although this reduces the number of unnecessary repeated packets sent due to go back n it also means that the channel utilization is low, and all the potential benefits are also negated.

- Although the results observed overall very similar tom each other there is a small increase in speed in some higher loss probability cases for packet drop. This is likely since in our implementation when a packet is dropped its space within the buffer is simply returned to 0 while when a packet is corrupted the memory allocation of the buffer changes dynamically as the data is extracted. Additionally, this increase in the receiver's processing time makes it more likely that a timeout will be triggered on the sender side thus increasing the number of potentially unnecessary packages in the channel. However, overall, the small increase in speed is not significant enough to skew the results consistently as seen in the last data point of each series where the time to run for both is almost identical.


Packet Corruption (Both data and ack)
Time to Run [s]
20
15
10
5
0
-5
-20
-10
0
10
20
30
40
50
60
70
80
90
Packet Corruprion Probability [%]


Packet Drop (Both data and ack)
Time to Run [s]
20
15
10
5
0
-5
-20
-10
0
10
20
30
40
50
60
70
80
90
Packet Drop Probability [%]


Packet Corruption and Packet Drop
20
15
10
5
0
-5
-20
0
20
40
60
80
100
Time to Run [s]
Probability [%]
Packet Drop (Both data and ack)
Packet Corruption (Both data and ack)