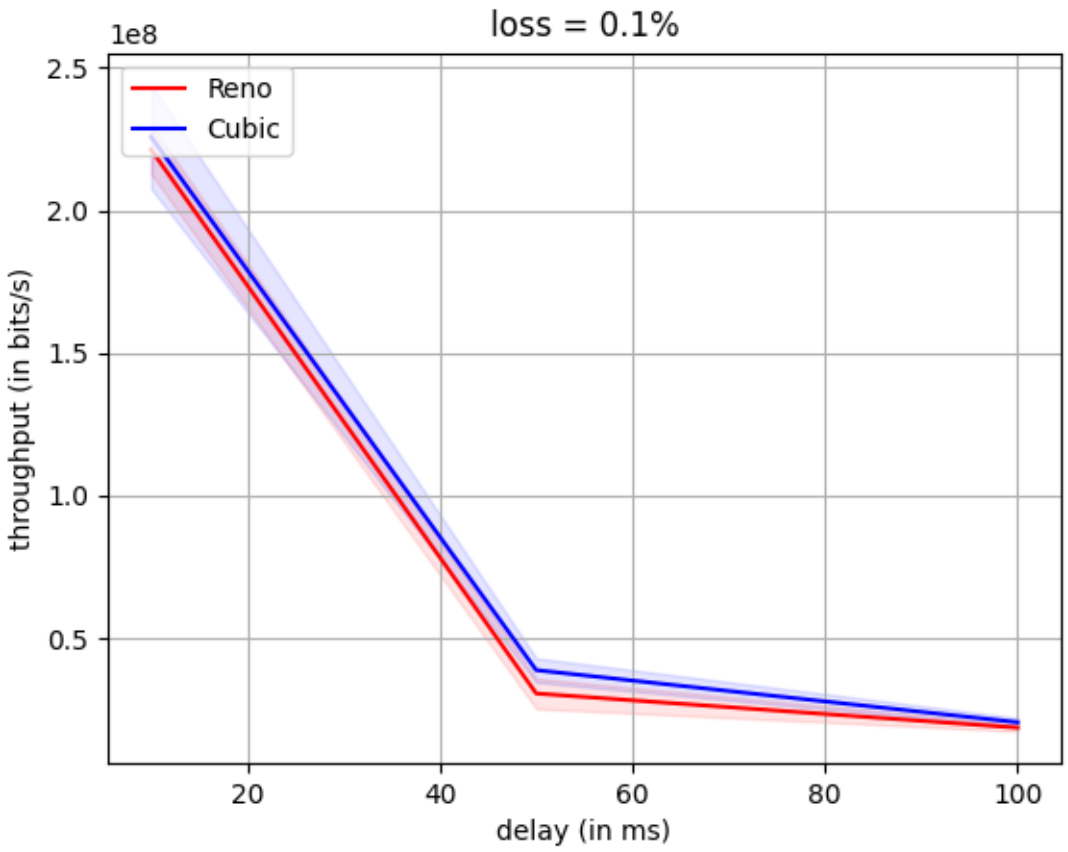
CS 252 Lab 6 Report

Aman Yadav, Akash Cherukuri, Amit Rajaraman

190050013, 190050009, 190050015

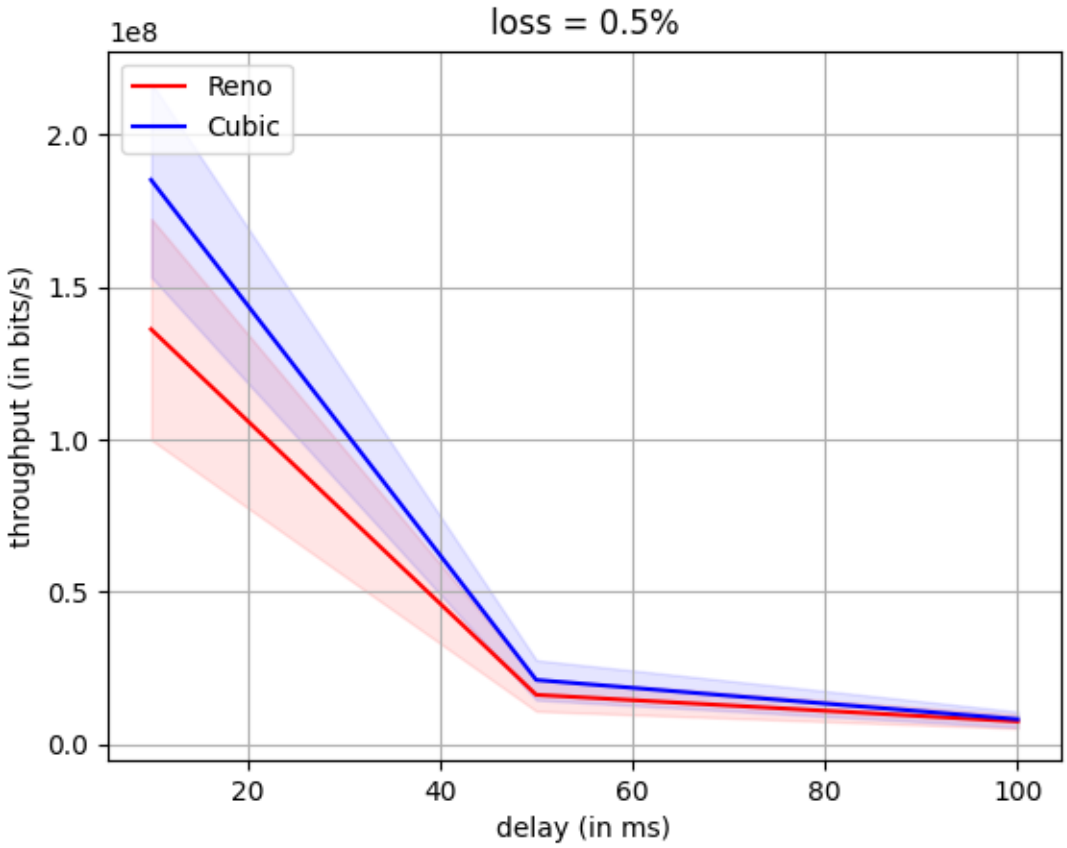
Graphs with Confidence Intervals

1. Throughput vs Delay for Loss = 0.1%



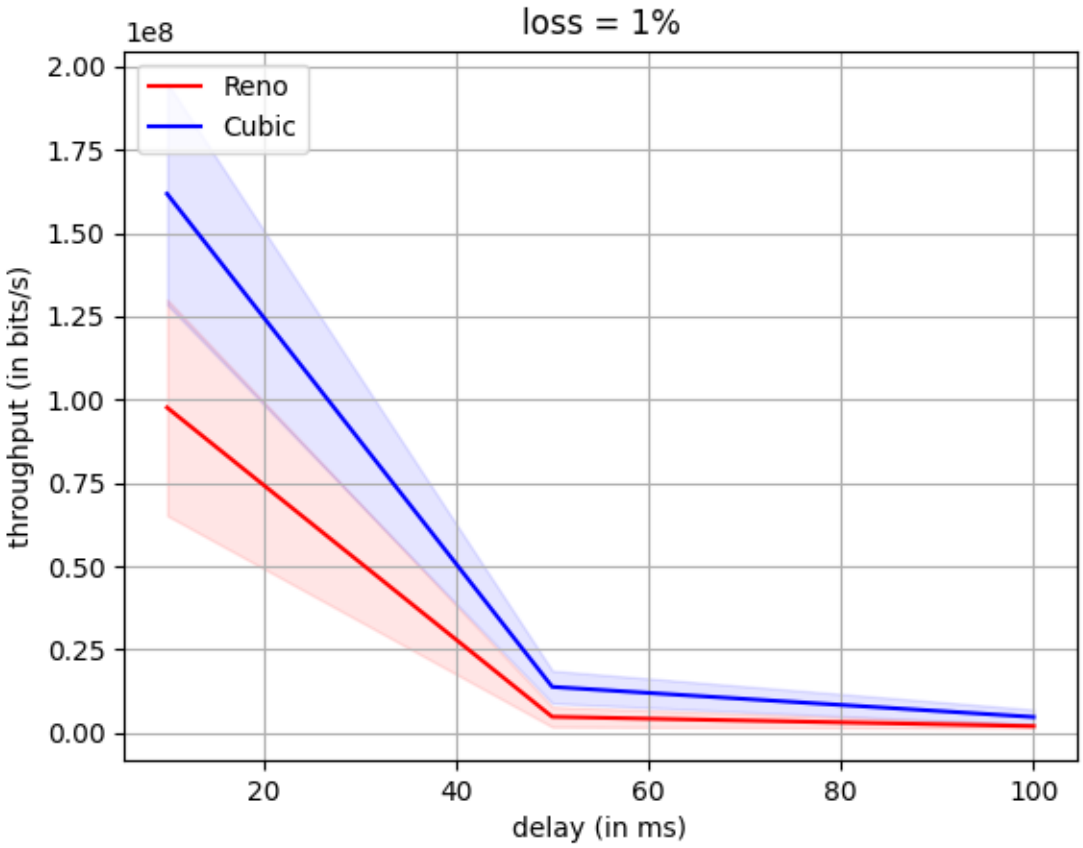
The throughput of cubic is larger than reno for all three delay instances, although they tend to become nearly equal for delay of 100ms. The throughputs obviously decrease as delay increases, as the file size remains the same but the time taken to transfer the file increases. It can also be observed that the confidence interval narrows as the delay increases.

2. Throughput vs Delay for Loss = 0.5%



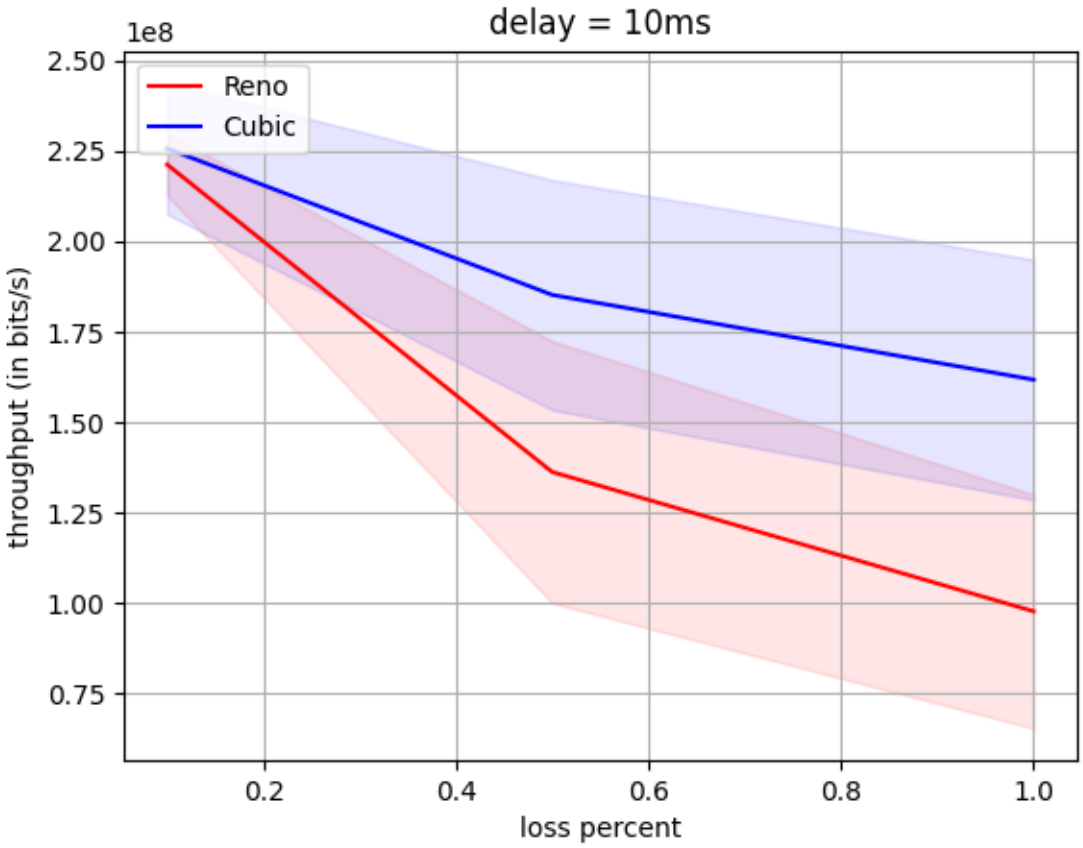
Again, we can see that the throughput of cubic is larger than reno for all three delay instances. There is a large difference in the throughputs at delay=10ms, but this difference diminishes as the delay increases. The throughputs obviously decrease as delay increases, as the file size remains the same but the time taken to transfer the file increases. It can also be observed that the confidence interval narrows as the delay increases.

3. Throughput vs Delay for Loss = 1%



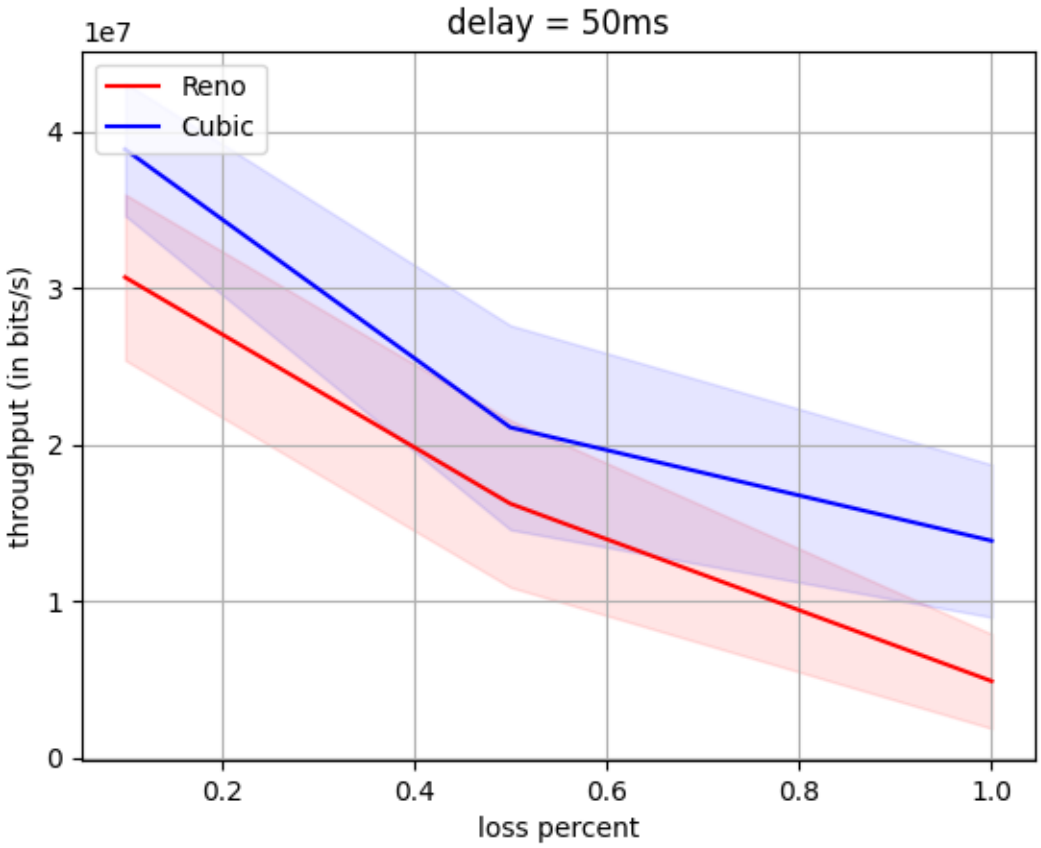
Again, we can see that the throughput of cubic is larger than reno for all three delay instances. An observation to be made from these three plots is that the difference in throughputs increases as the loss percentage increases. The throughputs obviously decrease as delay increases, as the file size remains the same but the time taken to transfer the file increases. It can also be observed that the confidence interval narrows as the delay increases.

4. Throughput vs Loss for Delay = 10ms



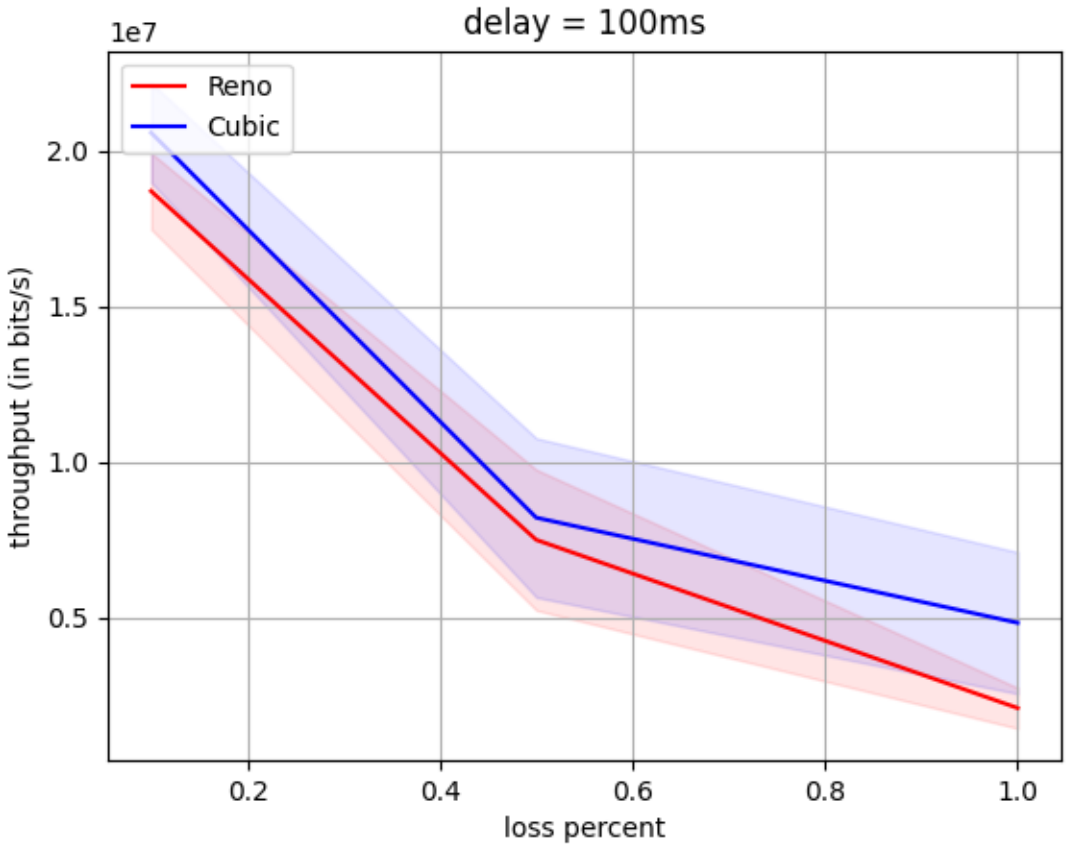
Again, we can see that the throughput of cubic is larger than reno for all three loss percent instances. The size of the confidence interval seems to increase with an increase in loss percent. The difference in the throughputs increases with an increase in the loss percent. The throughput as a whole decreases with an increase in loss percent (due to obvious reasons).

5. Throughput vs Loss for Delay = 50ms



Again, we can see that the throughput of cubic is larger than reno for all three loss percent instances. It is difficult to comment on the behaviour of the confidence interval from the graph alone. The difference in the throughputs decreases going from a loss percent of 0.1% to 0.5%, but it again increases on further increment in loss percent. The throughput as a whole decreases with an increase in loss percent (due to obvious reasons).

6. Throughput vs Loss for Delay = 100ms



Again, we can see that the throughput of cubic is larger than reno for all three loss percent instances. It is difficult to comment on the behaviour of the confidence interval from the graph alone. However, the width of the interval seems to be smaller when compared to the previous graph. The difference in the throughputs decreases going from a loss percent of 0.1% to 0.5%, but it again increases on further increment in loss percent. The throughput as a whole decreases with an increase in loss percent (due to obvious reasons).

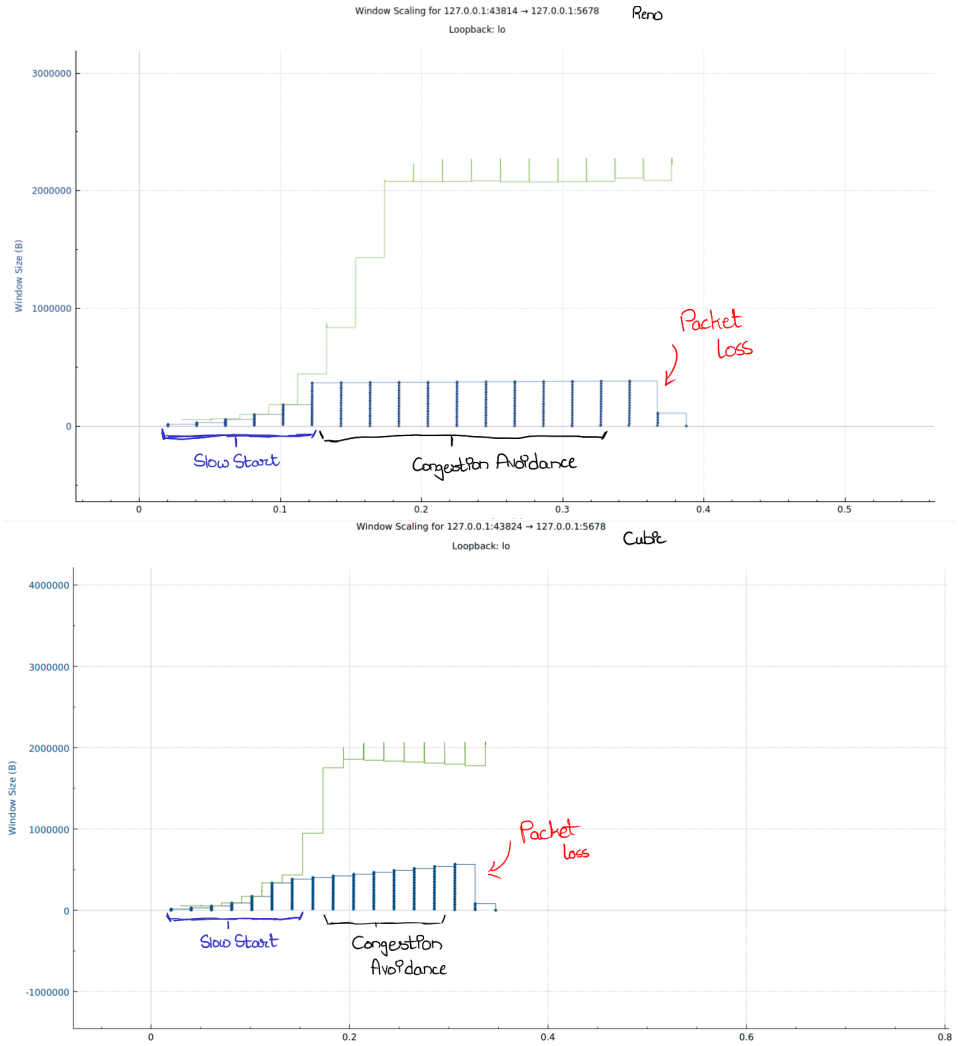
Final Comments and Conclusion

It is evident from the plots obtained that TCP-Cubic is more aggressive than TCP-Reno, due to the faster window increase during congestion avoidance. The value of throughput for TCP-Cubic is always larger than TCP-Reno, which confirm the above statement.

From plots 1-3, we observe that increasing delay would decrease the throughput, for both TCP Reno and TCP Cubic (while loss is held constant). Similarly, from plots 4-6,increasing loss would decrease the throughput for both Reno and Cubic (with delay held constant).

Annotated Window Scaling Graphs

1. `delay = 10ms`, `loss = 0.1%`



2. `delay = 100ms, loss = 1%`