

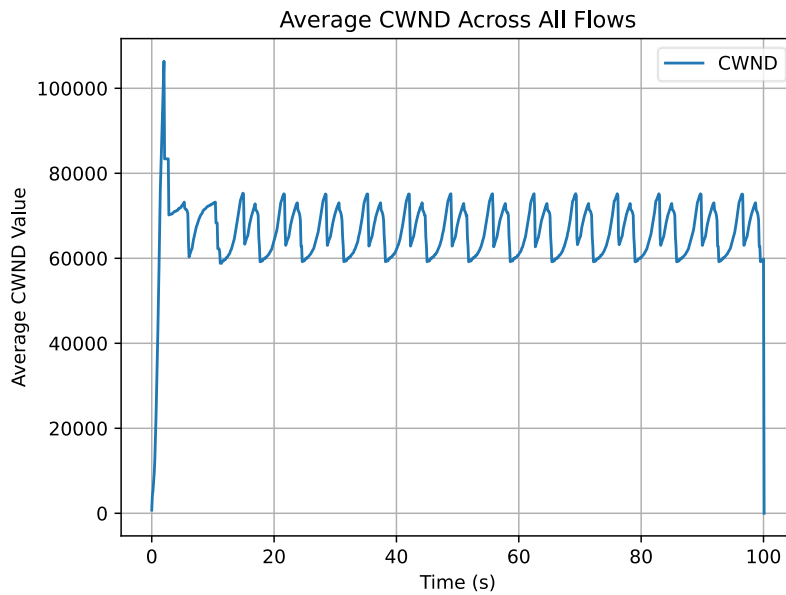
# **Bangladesh University of Engineering and Technology**

**Name:** Kowshik Saha Kabya

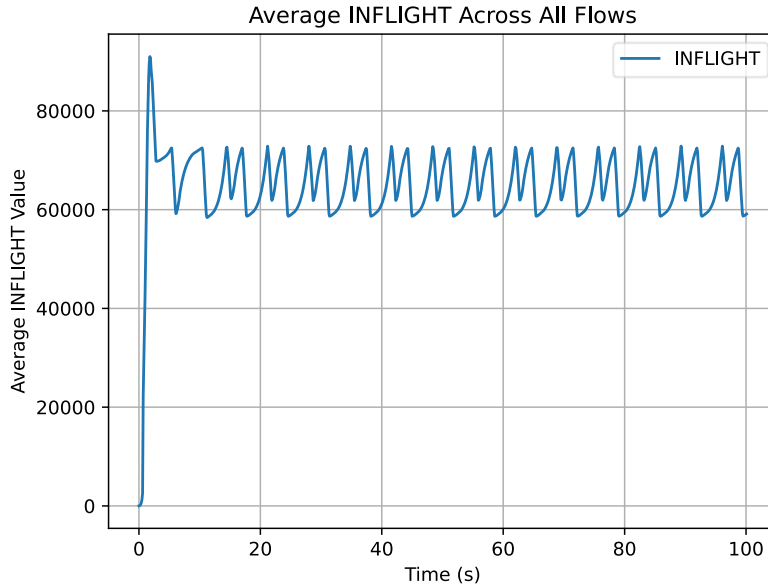
**Student ID:** 2005006

**Course:** CSE 322

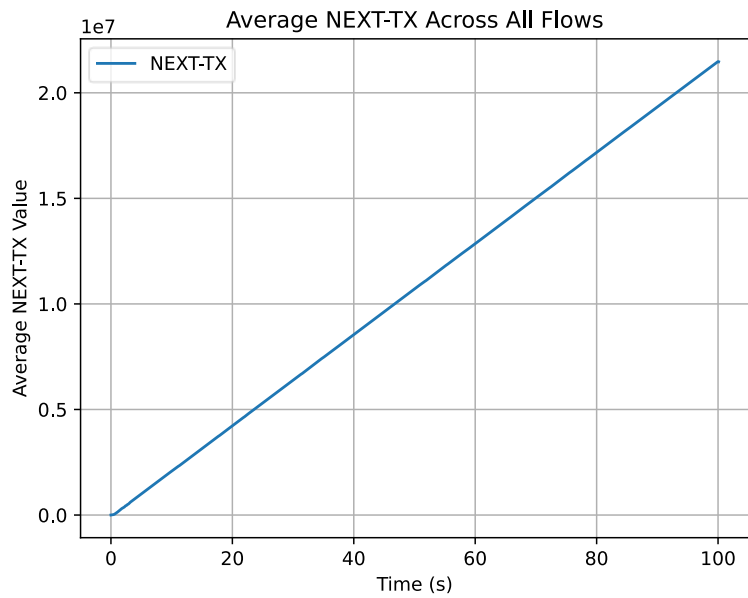
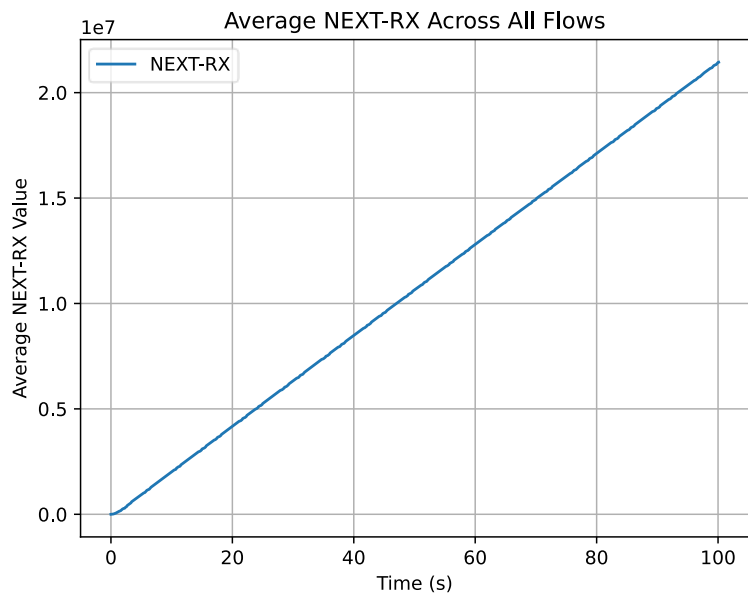
TCP BIC



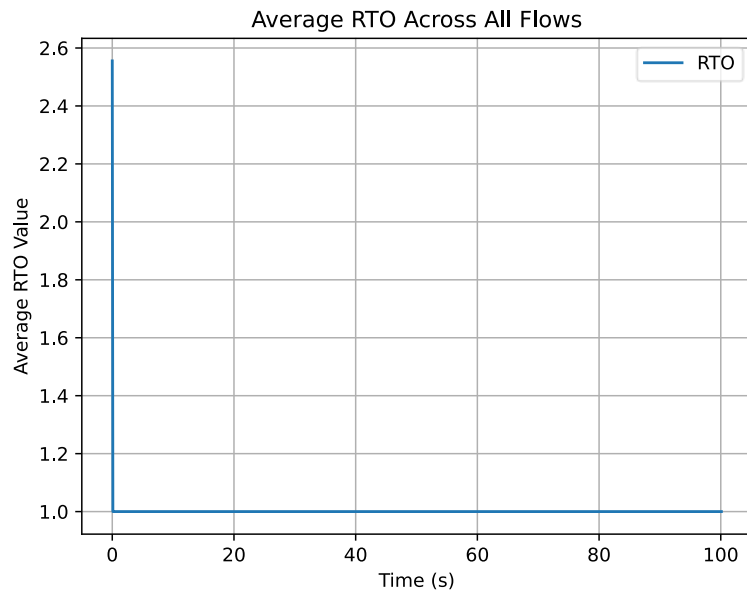
At first, the slow start threshold is set to infinity. So, the congestion window increases exponentially. Because of this the cwnd value increases up until reaching the retransmission timeout which is set to 3s by default. In TCPBIC, the sshtresh is made 80% of the window size at which congestion occurred. Here we can see another congestion after the first even after decreasing the window size. Hence, the window size is decreased again.



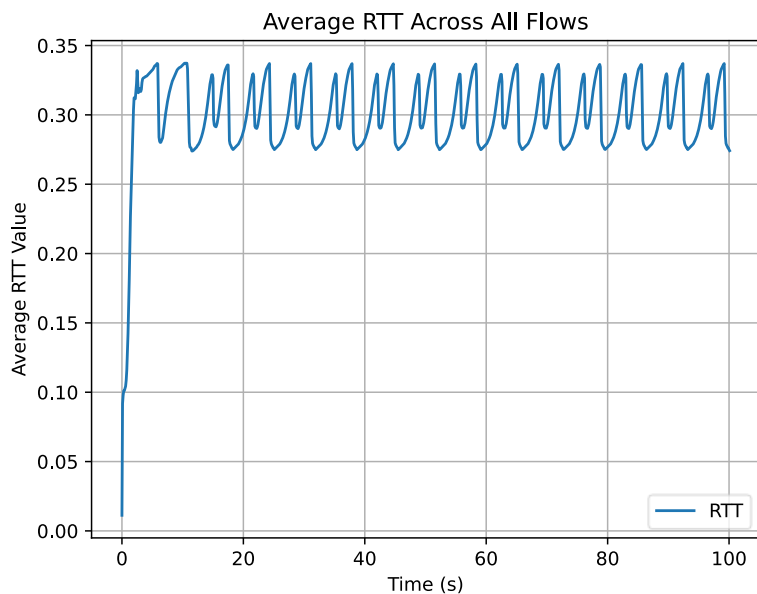
Inflight is closely related to cwnd. When the inflight value i.e. number of bytes sent but not yet acked gets higher than the cwnd, we acknowledge a congestion. Hence, inflight value follows cwnd.



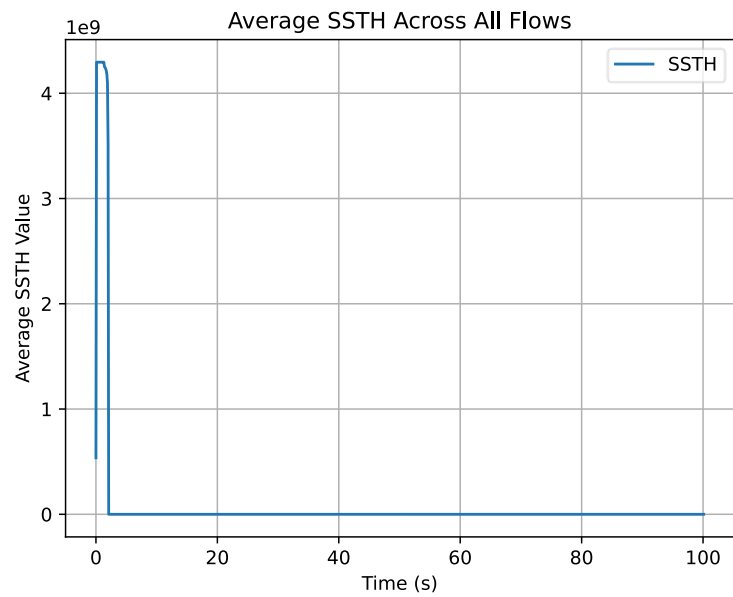
NEXT-TX refers to the sequence number of the data to be transmitted/sent next and NEXT-RX refers to the sequence number of the data to be received next. These grow linealy.



At first, the ssthresh is set to infinity and this the window size grows rapidly and the initial value of rto is set 3s. After the first congestion, the values of the ssthresh, last max cwnd are calculated and thus the window size does not grow without bounds like the first time, and the congestion can also be detected by comparing the bytes in flight with the current window size. Thus, congestion can be detected quite early, hence the rto decreases and remains constant.

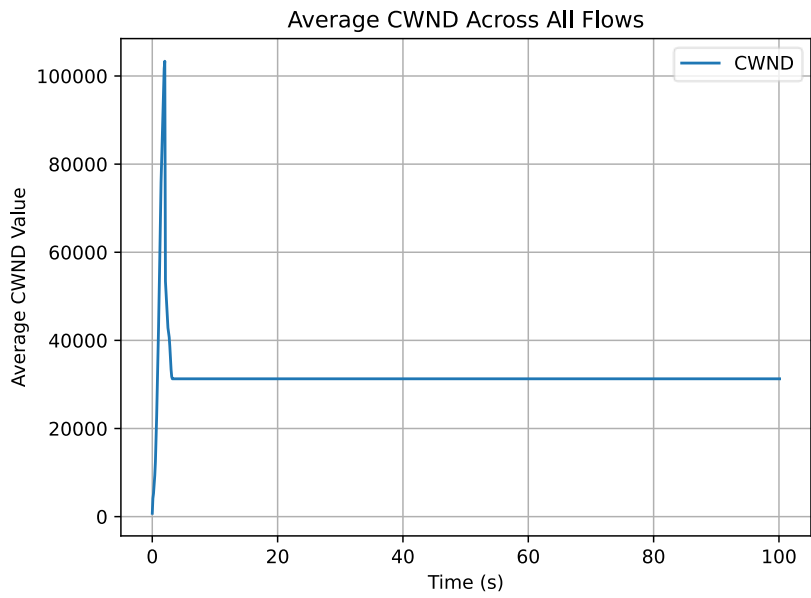


Rtt is also related to cwnd. When the cwnd size is higher, the system tolerates higher rtt time. When the cwnd is lower the tolerance of rtt time also gets lower. Hence, the change of rtt follows the pattern of change of cwnd.

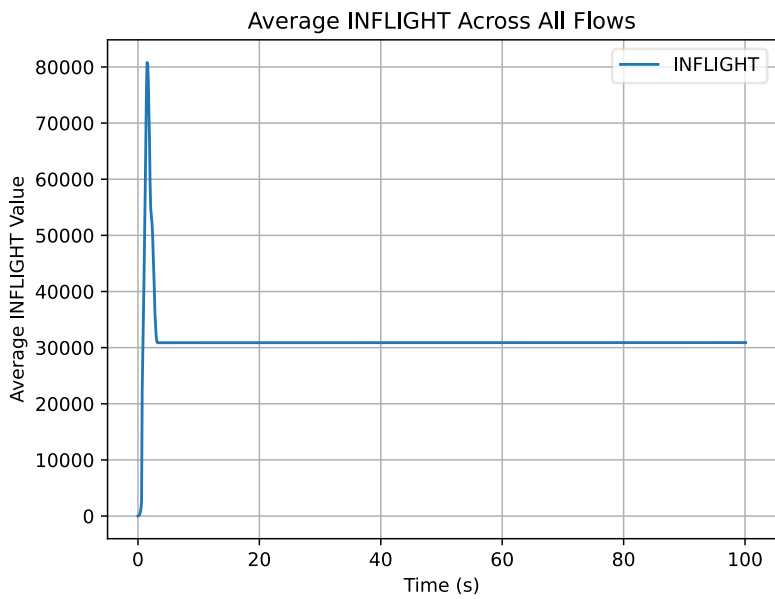


At first, the ssth value is set to infinity. Later the value is set according to the window size at which congestion occurs which is much smaller than infinity hence the change is not quite visible at that region.

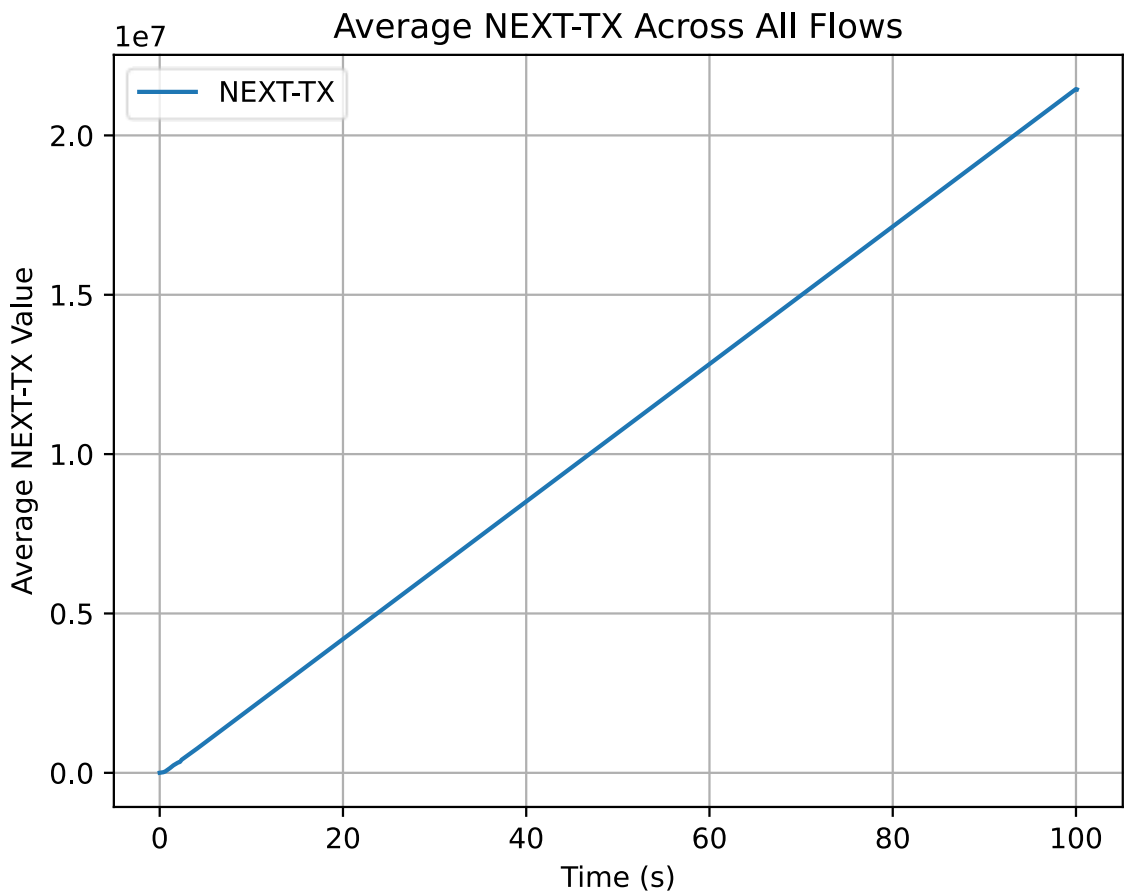
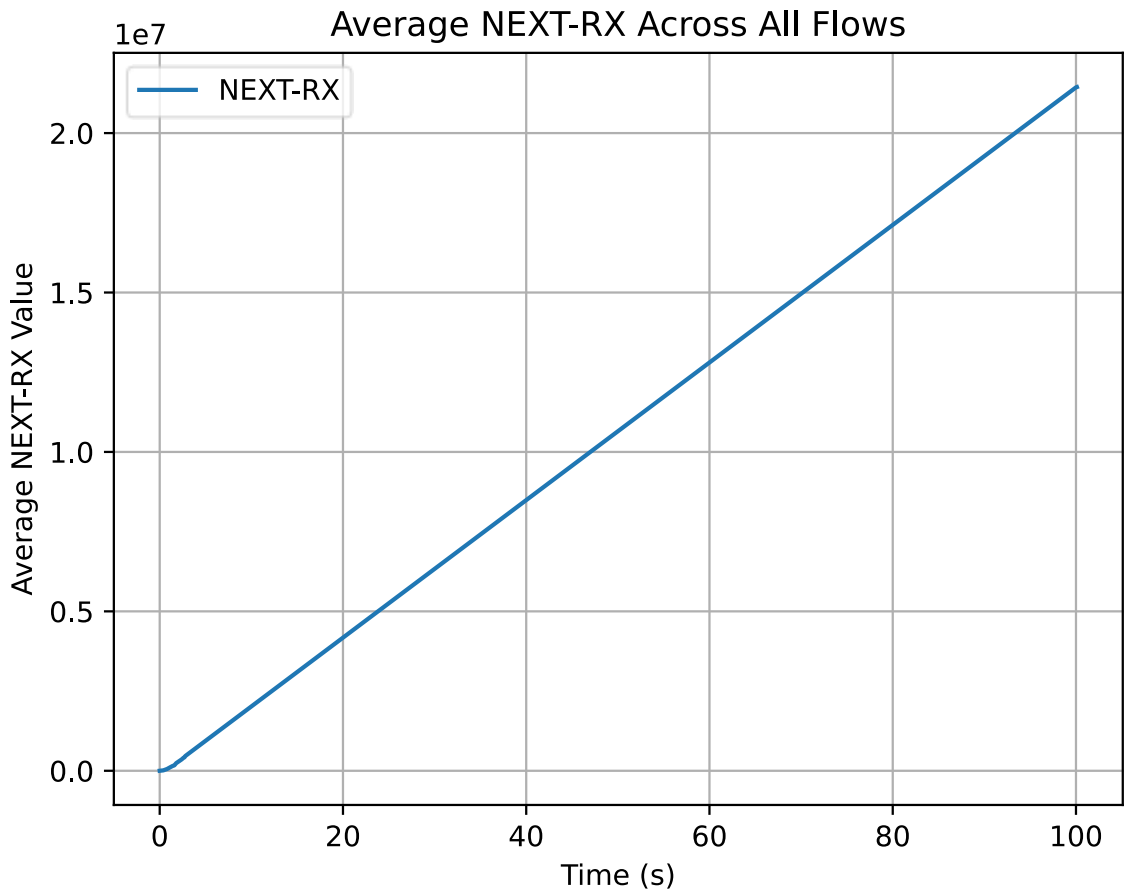
TCP LEDBAT

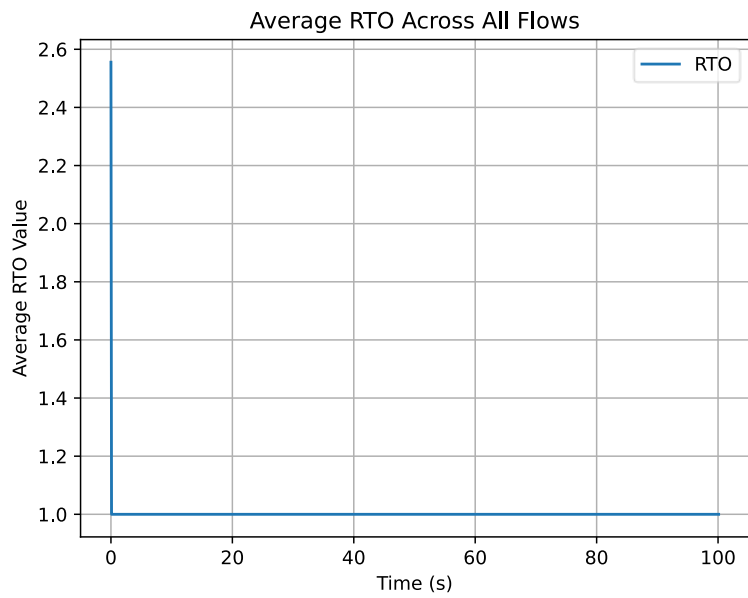


In ledbat, the window size never gets below a predefined minimum window size. And the calculation of the new window size almost always return that value or something close to it.

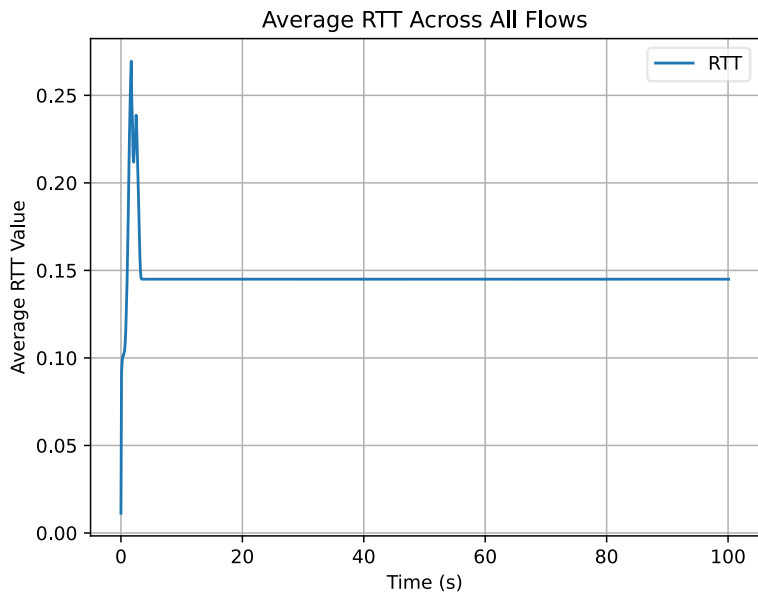




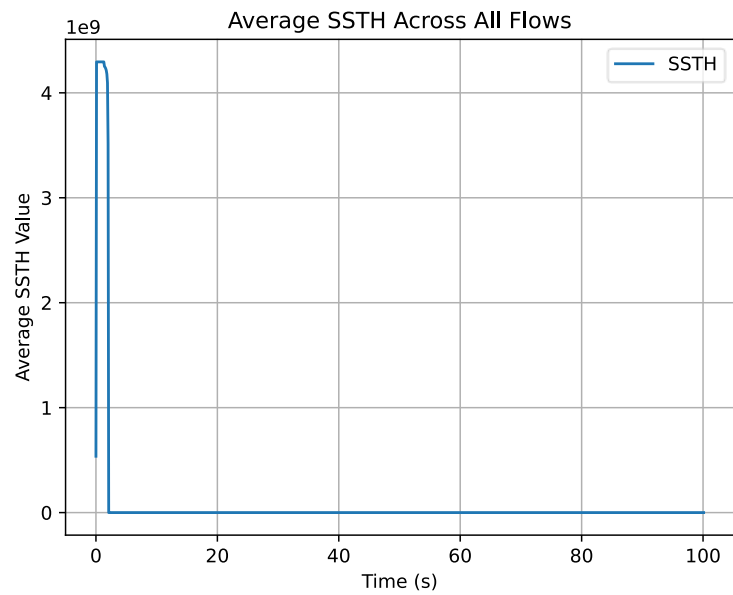




The default rto of 3s is only reached at first. After the first congestion, determining congestion requires less time and that time remains constant.



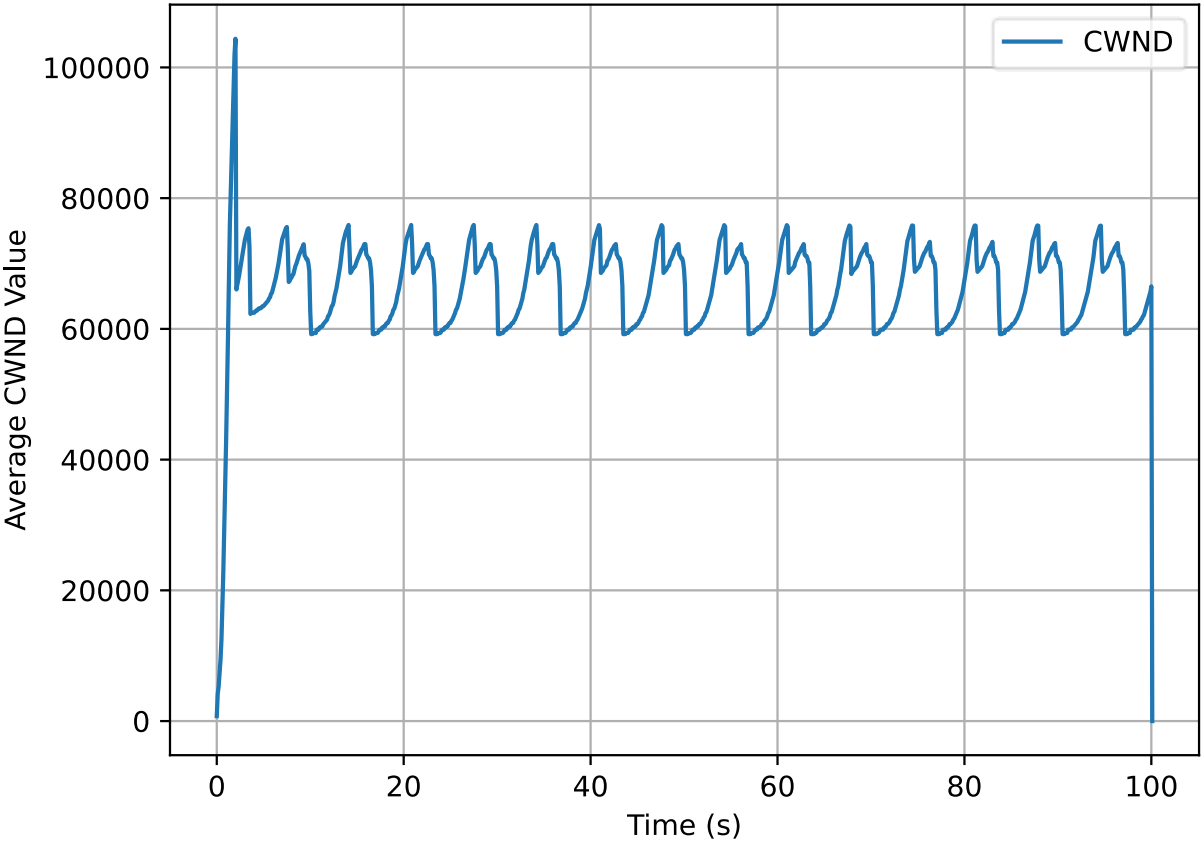
As after a point, the cwnd remains constant, the rtt also remains constant.



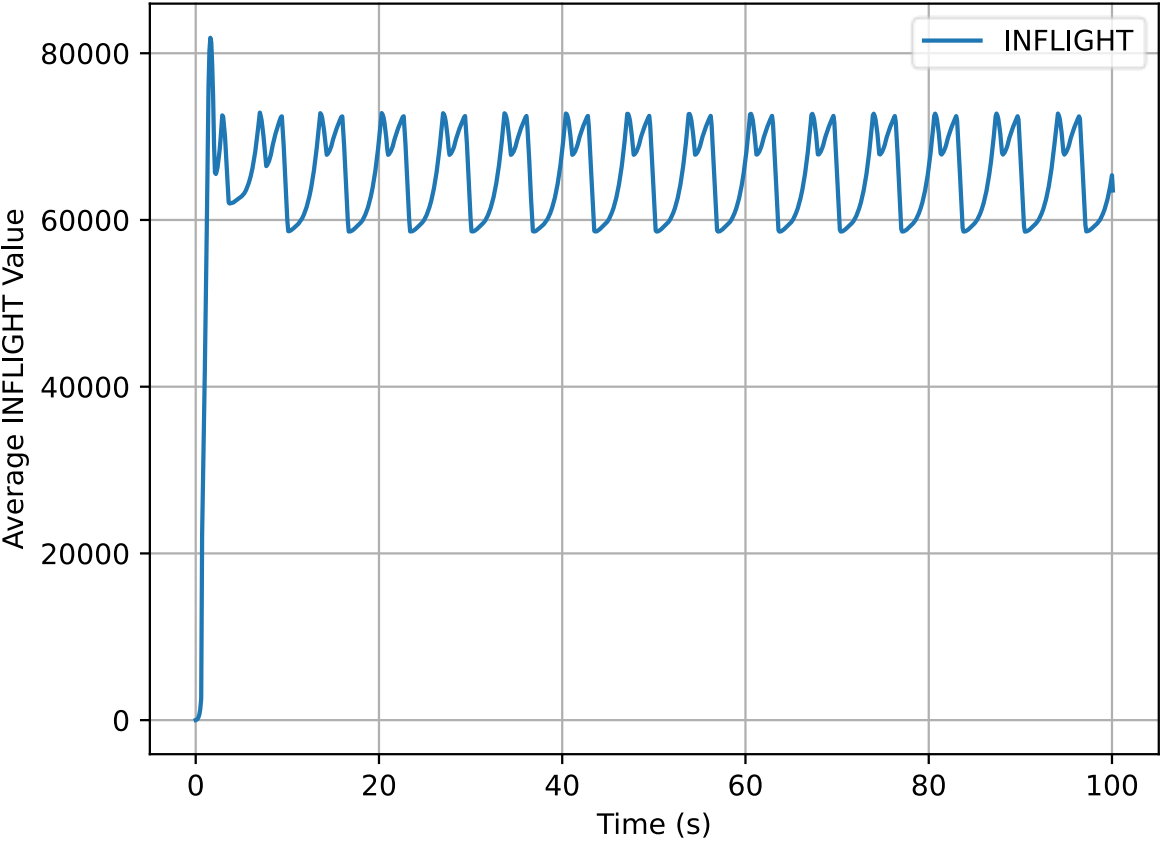
At first, the ssth value is set to infinity. Later the value is set according to the window size at which congestion occurs which is much smaller than infinity hence the change is not quite visible at that region.

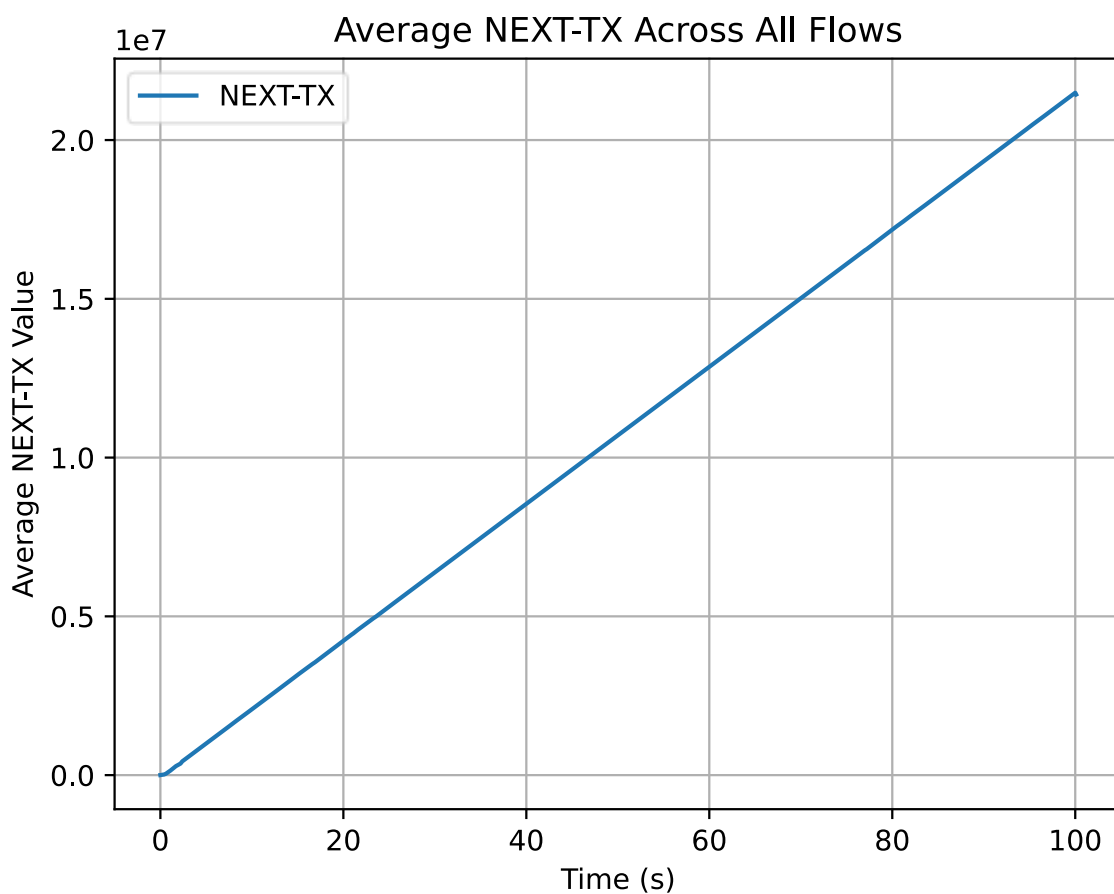
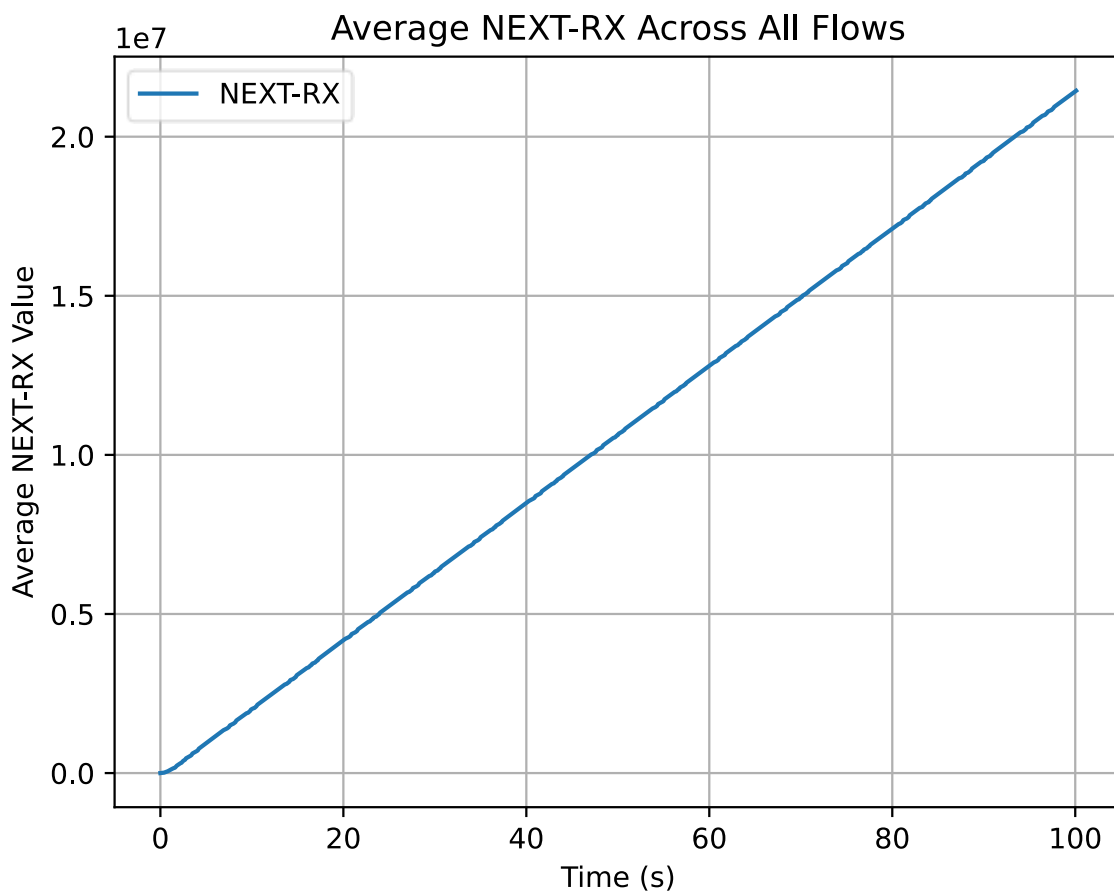
TCP BIC TWEAKED

Average CWND Across All Flows

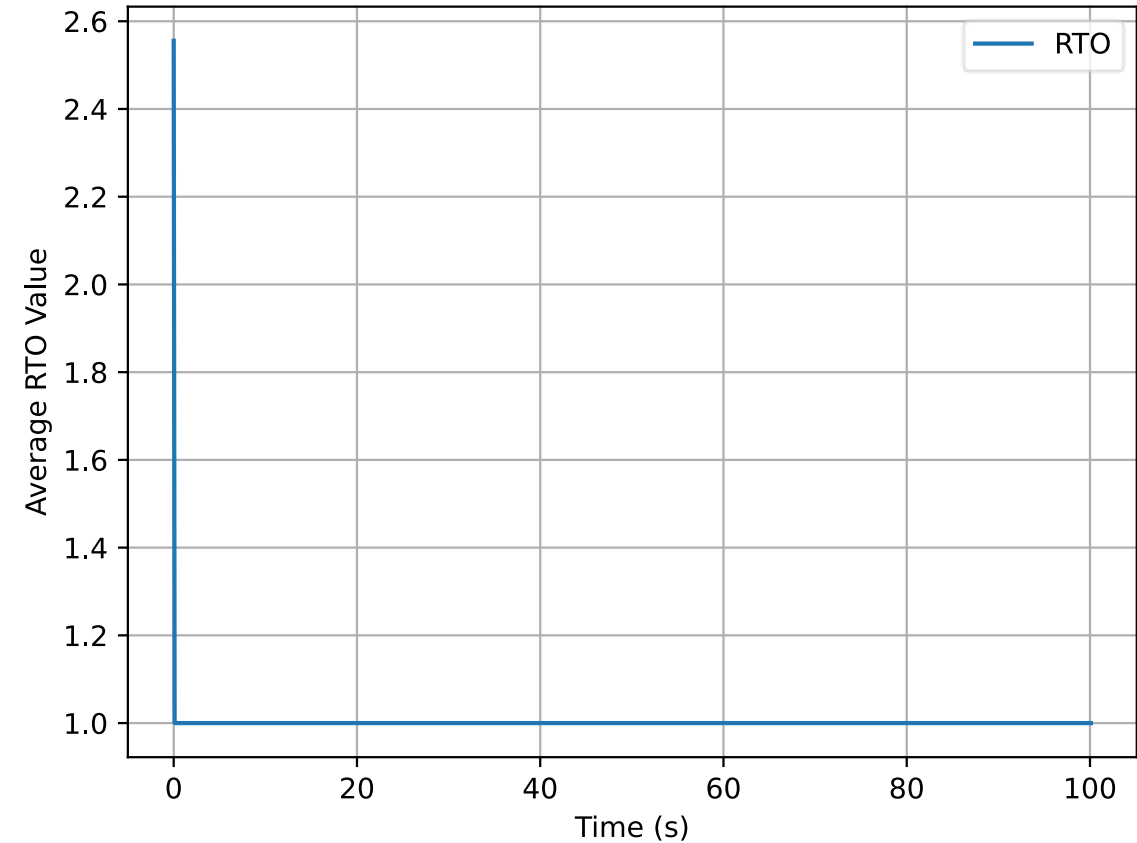


Average INFLIGHT Across All Flows





Average RTO Across All Flows



Average RTT Across All Flows

