# Indian Institute of Information Technology, Allahabad.

## Course: Wireless Networks security

## Lab Assignment #3

## (IIT2018187)(ABHISHEK KUMAR GUPTA)

Objective: Learning Queues, packet drops and their effect on congestion window size.

Experiment:

As in Assignment #2, Create a simple dumbbell topology, two client Node1 and Node2 on the left side of the dumbbell and server nodes Node3 and Node4 on the right side of the dumbbell. Let Node5 and Node6 form the bridge of the dumbbell. Use point to point links.

1. Add drop tail queues of size QueueSize5 and QueueSize6 to Node5 and Node6, respectively.
2. Install a TCP socket instance on Node1 that will connect to Node3.
3. Install a TCP socket instance on Node2 that will connect to Node3.
4. Install a TCP socket instance on Node2 that will connect to Node4.
5. Start Node1--Node3 flow at time 1s, then measure its throughput. How long does it take to fill link's entire capacity?
6. Start Node2--Node3 and Node2--Node4 flows at time 15s, measure their throughput.
7. Measure packet loss and cwnd size, and plot graphs throughput/time, cwnd/time and packet loss/time for each of the flows.
8. Plot graph throughput/cwnd and packet loss/cwnd for the first flow. Is there an optimal value for cwnd?
9. Vary QueueSize5 and QueueSize6. Which one has an immediate effect on cwnd size of the first flow? Explain why.

**Question. Start Node1--Node3 flow at time 1s, then measure its throughput.**

Ans:

after starting node1-node3 at time 1s the throughput calculated as

Flow 1 (172.16.24.1:49153 -> 172.16.24.2:9000)

Tx Bytes: 10126000

Rx Bytes: 10123840

Throughput: 1.54491 Mbps

**Question : How long does it take to fill link's entire capacity?**

Ans:

TCP source data generation rate - 1.5 Mbps

Link Rate - 10Mbps

Link delay - 10 ms

it takes 10ms to fill the link's entire capacity.

## Question: Start Node2--Node3 and Node2--Node4 flows at time 15s, measure their throughput.

after starting node2-node3 and node2-node4 at time 15s the throughput calculated as

Flow 2 (172.16.24.1:49154 -> 172.16.24.2:9001)

Tx Bytes: 8102536

Rx Bytes: 8102104

Throughput: 1.54412 Mbps

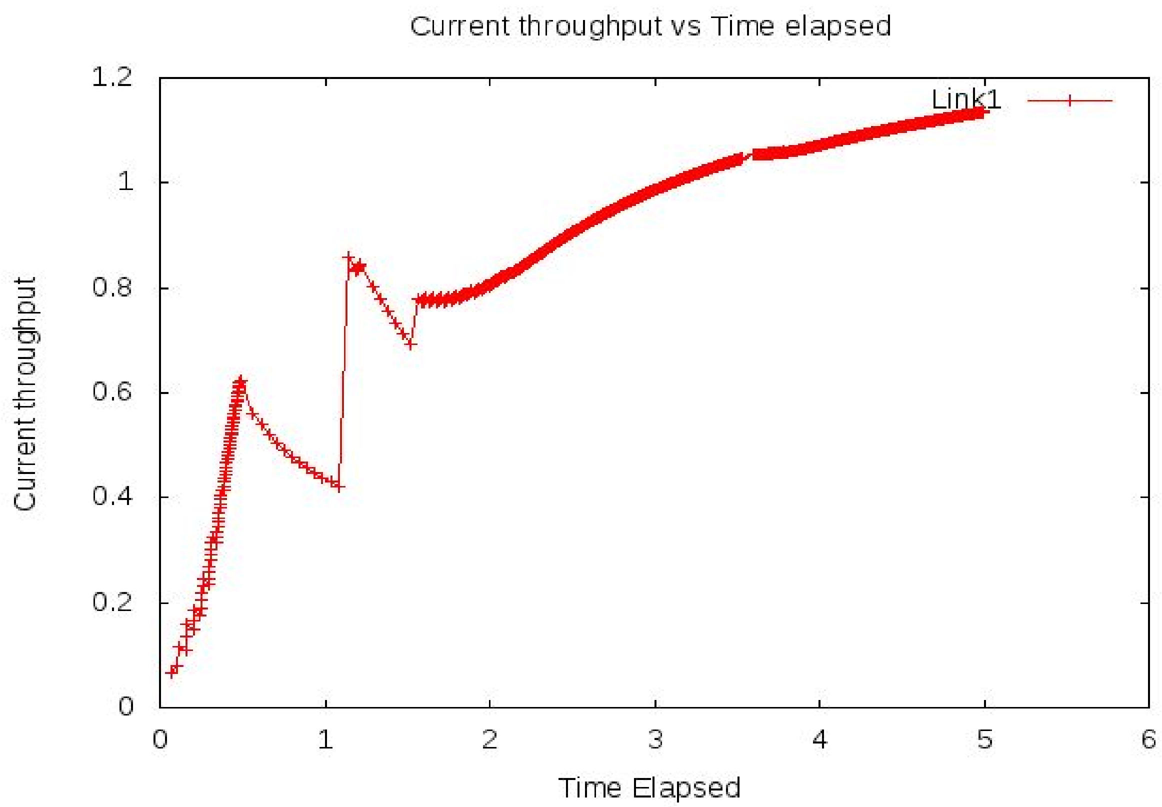
Flow 3 (172.16.24.1:49155 -> 172.16.24.2:9002)

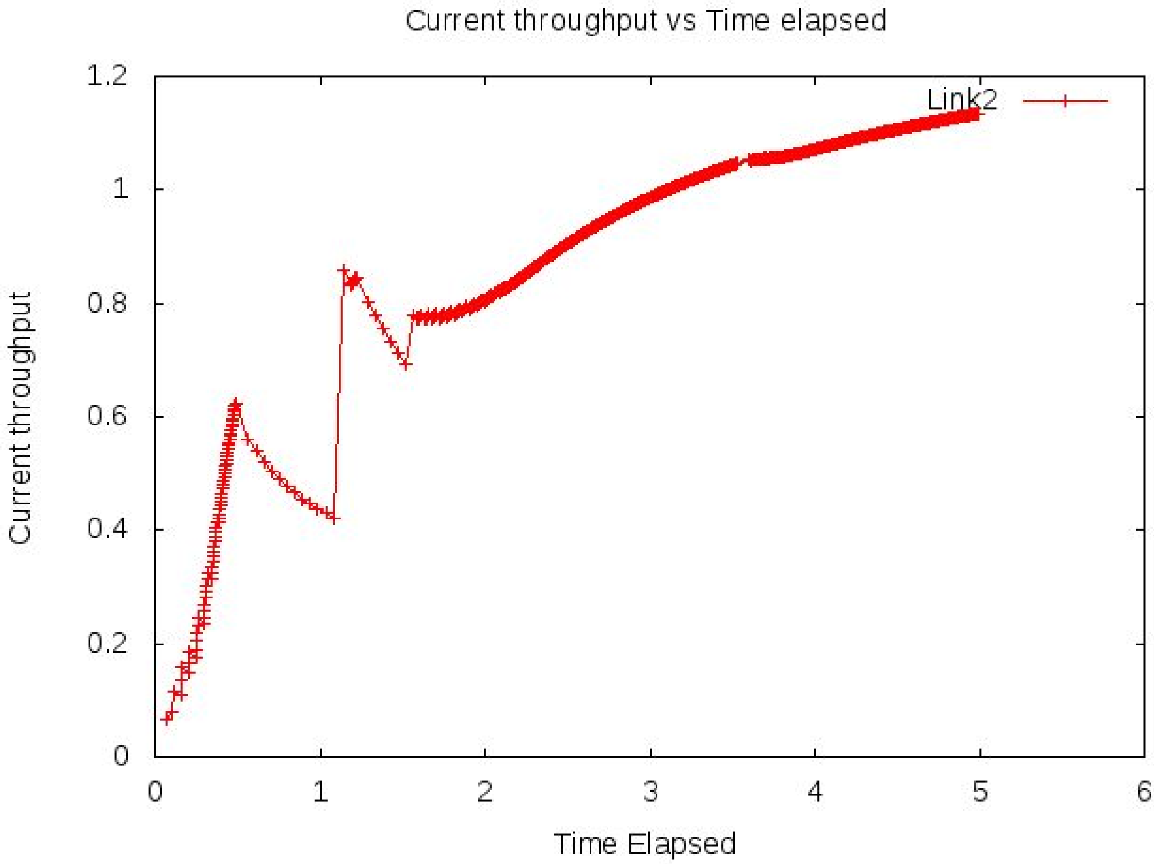
Tx Bytes: 6076952

Rx Bytes: 6076088

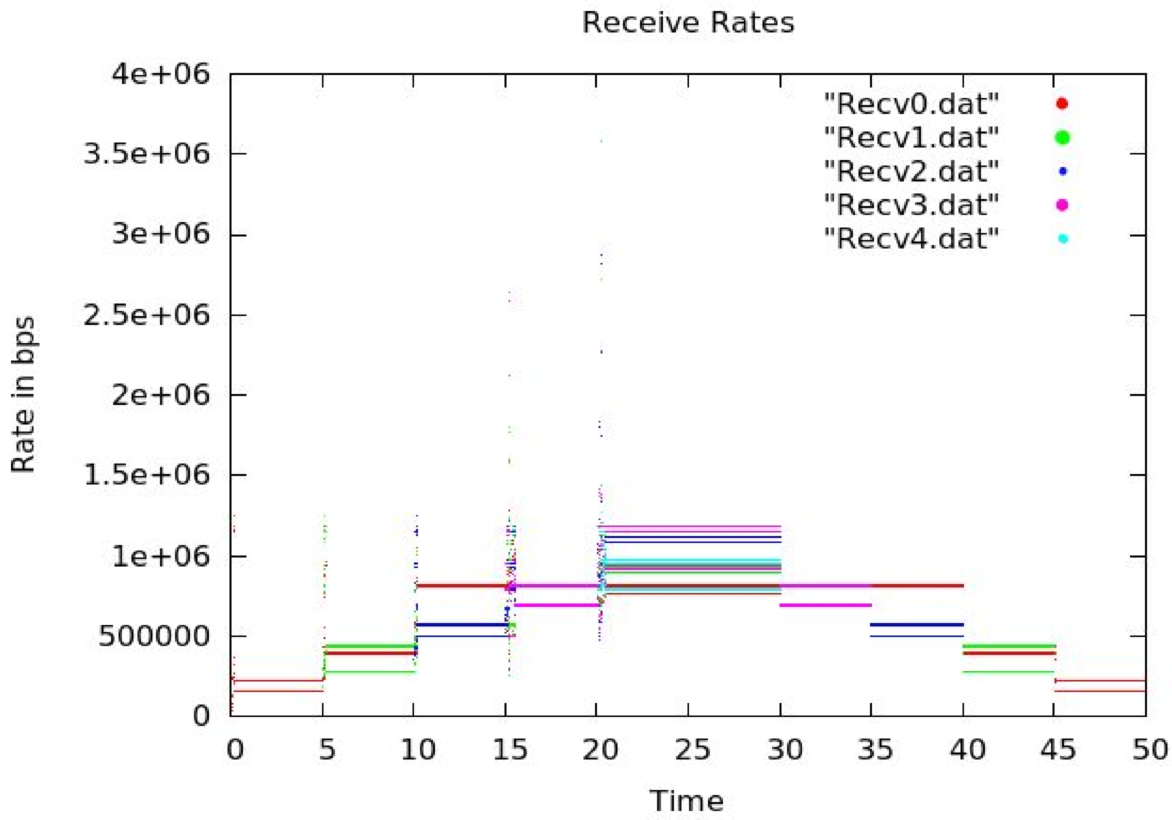
Throughput: 1.54353 Mbps

**plotting throughput vs time for every link**

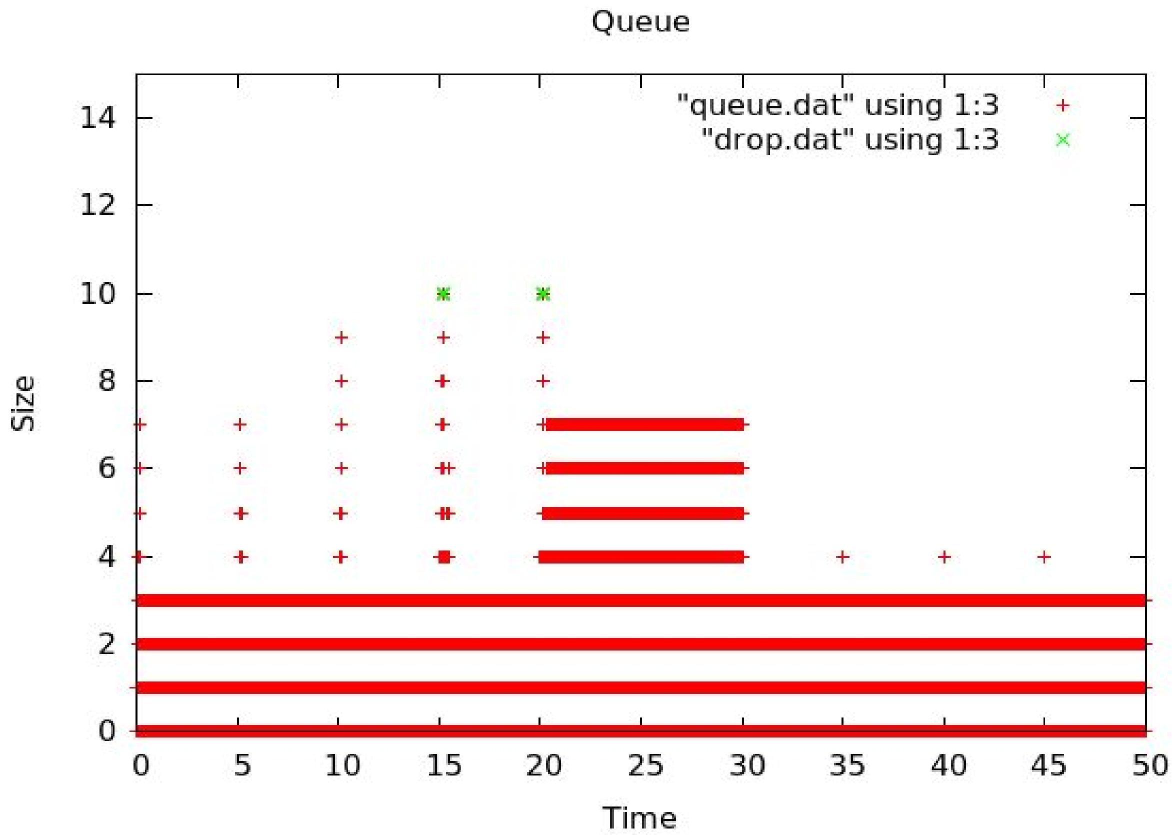




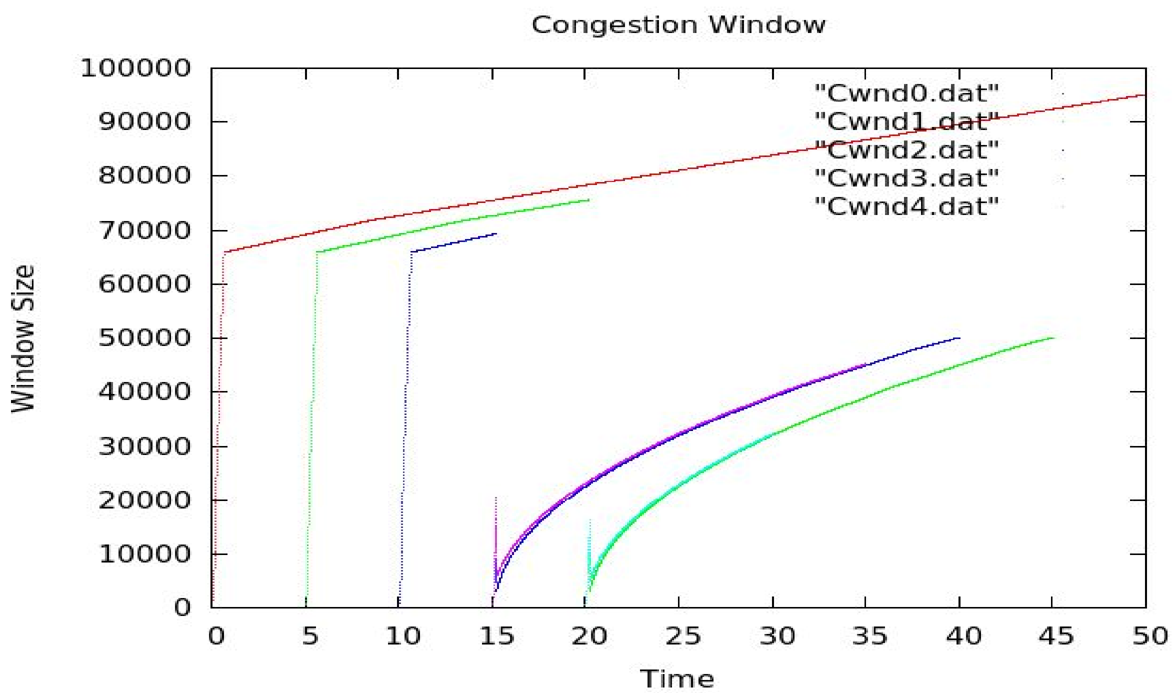

**Plotting All graph  graph1(recieve rates vs time) , graph2(queuesize vs time),graph3(cwndvstime) ,graph4(lossvstime)**

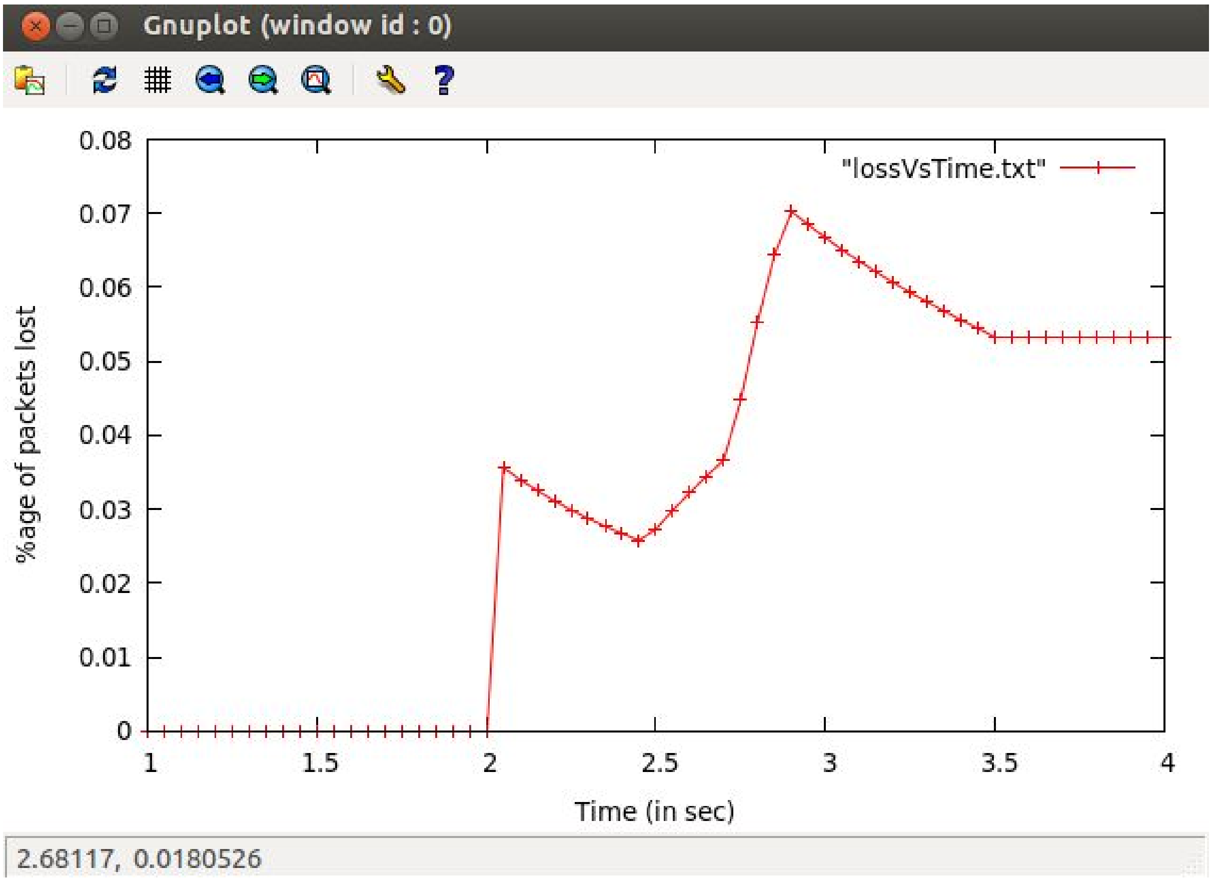



One can clearly see the slow start, fast recovery and fast retrasmit phases of New Reno TCP protocol. It also displays the fairness how previous connections windows were reduced and new connections were given a chance.




The green cross is the point where the packet was dropped from the queue. The queue size is 10






**from graph3 And garph4**

One can clearly see the slow start, fast recovery and fast retransmit phases of New Reno TCP protocol. It also displays the fairness of how previous connections windows were reduced and new connections were given a chance.

**Question: Is there an optimal value for cwnd for first flow ?**

As per graph3 it is clear that the red line describes the first flow and it starts the cwnd value from 65000 and increases with time.

**Question: Vary QueueSize5 and QueueSize6. Which one has an immediate effect on cwnd size of the first flow? Explain why.**

Queue Size mostly remains constant at a particular level which can be seen by the horizontal lines. Due to congestion, sometimes the queue size increases and when the queue becomes full, packet drop which is shown by green dots on the graph.

After varying QueueSize5 and QueueSize6. Queue5 has an immediate effect on the first flow because of less congestion on queue 5.