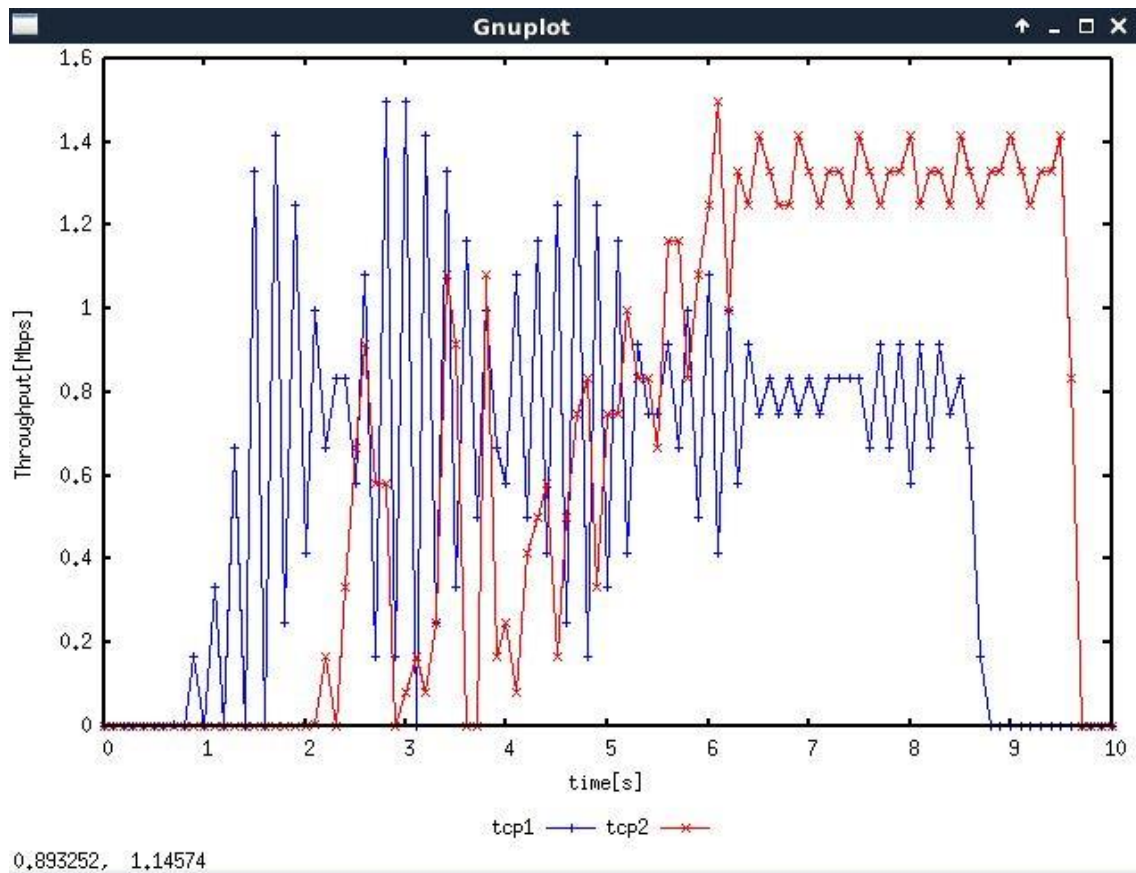


3331 Lab6

Question 1



1. There is a larger bandwidth in tcp2 from n3->n2 while it is lower from n0->n2 which means there is more data being transmitted and so at 6 seconds there is a higher throughput at tcp2.
2. The fluctuation is a result of being in the slow start phase part of the congestion control.
3. There is a slow start when node 2 drops packets from nodes 0-3 combined with the introduction of tcp2 which takes up the bandwidth, increasing the loss of packets and a lower throughput.

Question 2

1. As 2000 and 3500 are the default data sizes, the IP segments can only contain a maximum of 1480 bytes of data and any packet larger will be fragmented. The host 192.168.1.103 has fragmented the original datagram and results in 2 fragments.
2. As the reply from 8.8.8.8 echoes the input, a size of 3500 bytes will need to be fragmented into smaller IP segments.
3. The data is depicted in the table below:

ID	Length	Flag	Offset
7a7b	1514	0x2000 more fragments	0
7a7b	1514	0x2000 more fragments	185
7a7b	582	0x172	370

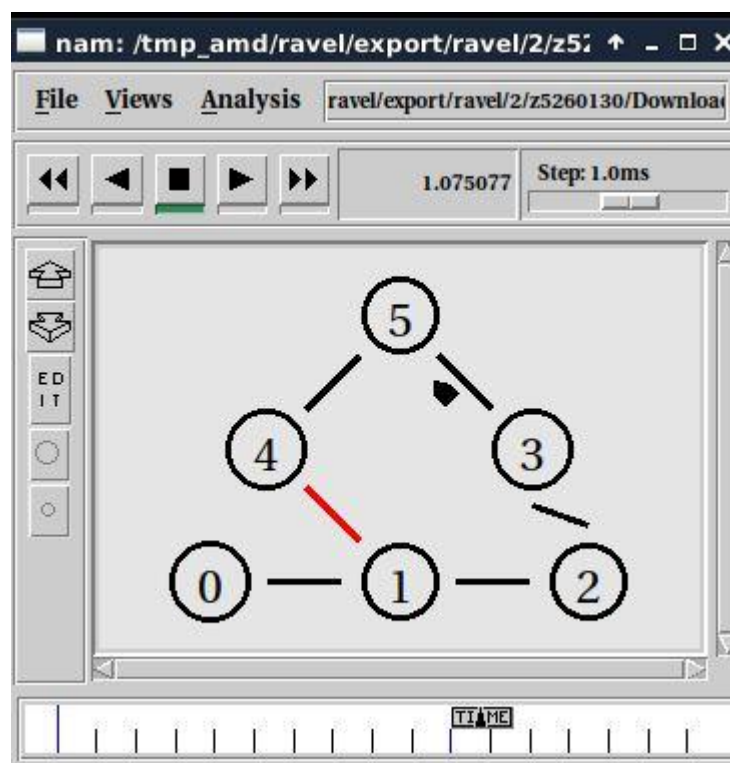
4. Fragmentation does occur when data of size 3500 bytes is used as it is larger than 2000.
5. If a fragment from the original datagram is lost, a retransmission of the tcp package would occur.

Question 3

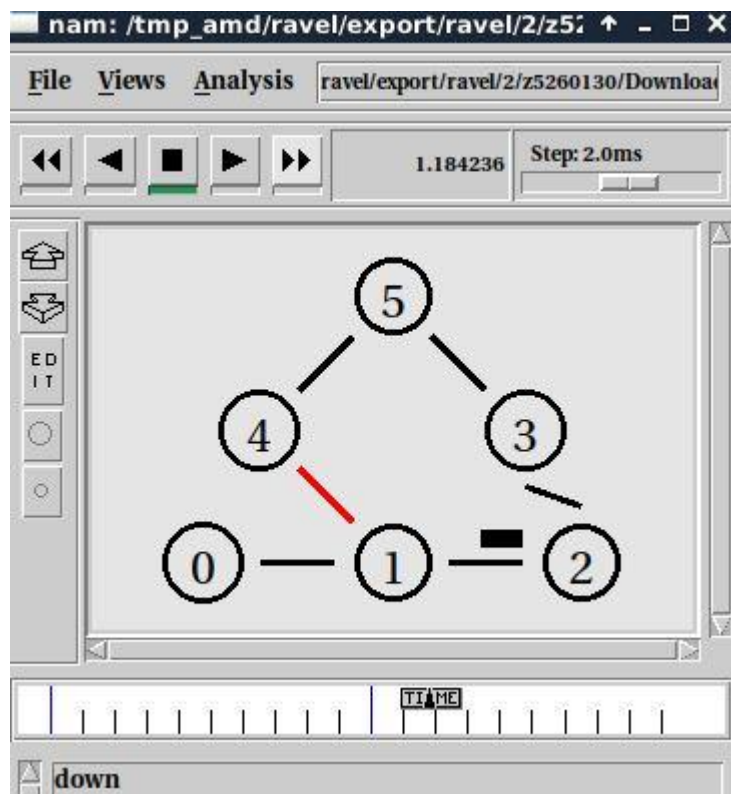
```
#Give node position (for NAM)
$ns duplex-link-op $n0 $n1 orient right
$ns duplex-link-op $n1 $n2 orient right
$ns duplex-link-op $n2 $n3 orient up
$ns duplex-link-op $n1 $n4 orient up-left
$ns duplex-link-op $n3 $n5 orient left-up
$ns duplex-link-op $n4 $n5 orient right-up
```

1. The nodes that communicate with other nodes are: n0 and n2.
 - n0 -> n1 -> n2 -> n3 -> n5
 - n1 -> n4 -> n5

The routes the packets follow does not change over time.



2. As seen in the screenshot above, the link between n1 and n4 is down which is a result in packet loss from n0. The route that the nodes communicate do not change, however.



3. As seen in the screenshot above, as the link between n1 and n4 is down, the traffic is rerouted to n2.
4. By setting the cost of n1-n4 as 3, the traversal of n1 -> n2 -> n3 -> n5 would total 3 whilst the traversal of n1 -> n4 -> n5 would increase to 4. Therefore, it would be cheaper to travel the first path. The routing is not affected.
5. After altering the cost of n1 -> n4 to 2 and n3 -> n5 to 3, the costs of the paths change. 1 -> 2 -> 3 -> 5 will cost 5, n0 -> n1 -> n4 -> n5 will cost 4 and n2 -> n1 -> n4 -> n5 will also cost 4. Hence, the paths chosen will be the last 2 paths as they have the lowest cost to reach n5.