NETWORKS LAB

ASSIGNMENT– 04

ANALYSING THROUGHPUT, GOODPUT, CONGESTION STATISTICS USING NS3

FRAMEWORK FOR NETWORK SIMULATION

MEMBERS

Harit Gupta Garvit Mehta Sanchit Dhiman

Application 1 - TCP Dumbbell topology - Yeah, Hybla, Westwood+

Host1 171.15.111.1 to 171.15.115.1 Host4 - TCP-Yeah

Host2 171.15.112.1 to 171.15.116.1 Host5 - TCP-Hybla

Host3 171.15.113.1 to 171.15.117.1 Host6 - TCP-Westwood+

Analyse and compare TCP Hybla, TCP Westwood+, and TCP YeAH-TCP performance. Select a Dumbbell topology with two routers R1 and R2 connected by a (10 Mbps, 50 ms) wired link. Each of the routers is connected to 3 hosts, i.e. H1, H2, H3 (i.e. senders) are connected to R1, and H4, H5, H6 (i.e. receivers) are connected to R2. The hosts are attached with (100 Mbps, 20 ms) links. Both the routers use drop-tail queues with queue size set according to bandwidth-delay product. Senders (i.e. H1, H2 and H3) are attached with TCP Hybla, TCP Westwood+, and TCP YeAH-TCP agents, respectively. Choose a packet size of 1.3 KB and perform the following tasks. Make appropriate assumptions wherever necessary.

Q1 1. Start only one flow and analyse the throughput over sufficiently long duration. Mention how you select

the duration. Plot the evolution of congestion window w.r.t. time. Perform this experiment with all the

flows attached to all the three sending agents.

SOln 1

Graphs of the analysis are given below-

The size of packet taken is 1.5 KB. The bandwidth between router menioned is 10 Mbps and between any host and router is 100 Mbps.

The activity has been considered for 100-120 seconds to find a more idealistic picture of the whole scenario.

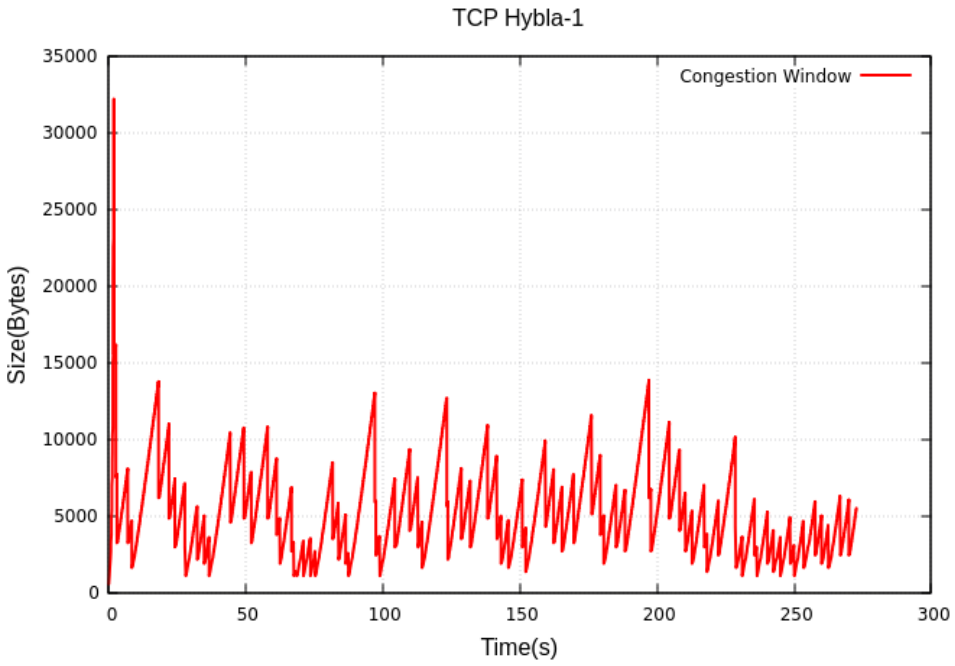
For TCP Hybla

TCP hybla flow 171.15.112.1 to 171.15.116.1

Total Packets Received = 999911

Packet Lost due to -> Buffer Overflow = 0 Congestion = 89

max ThroughPut = 456.647 kbps



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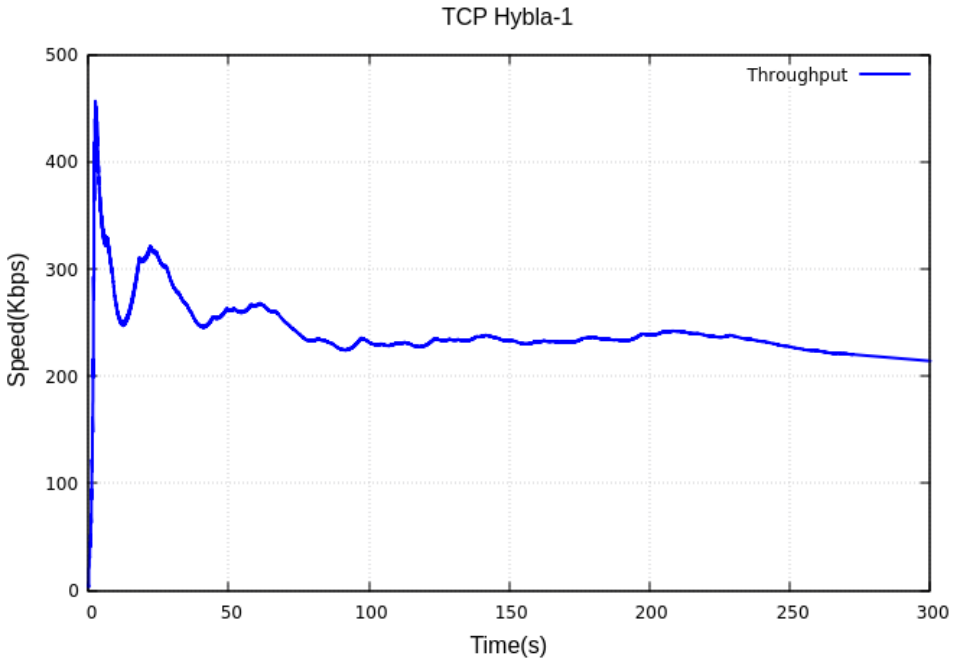
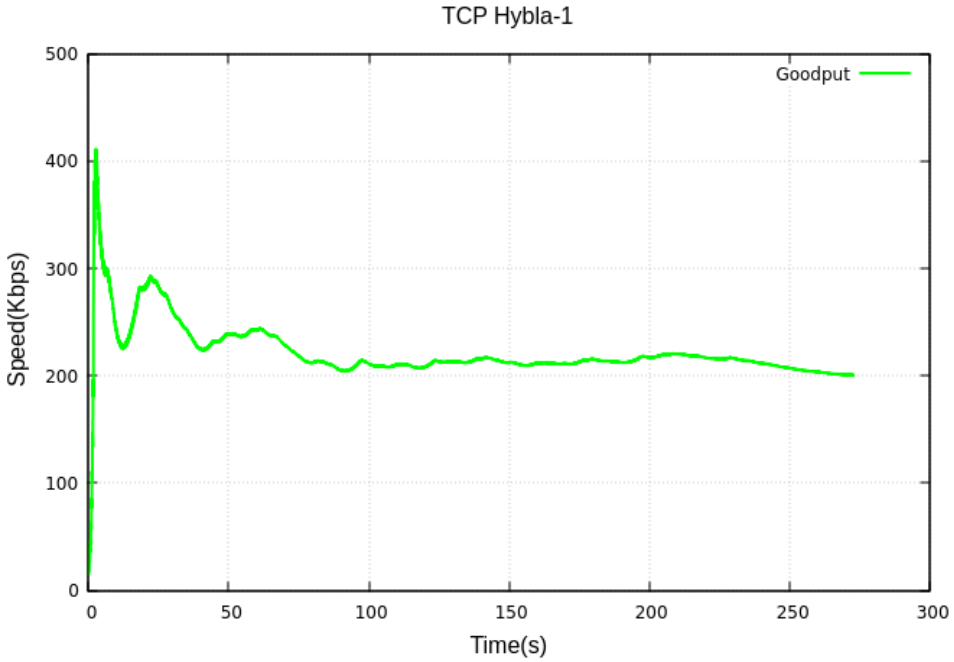




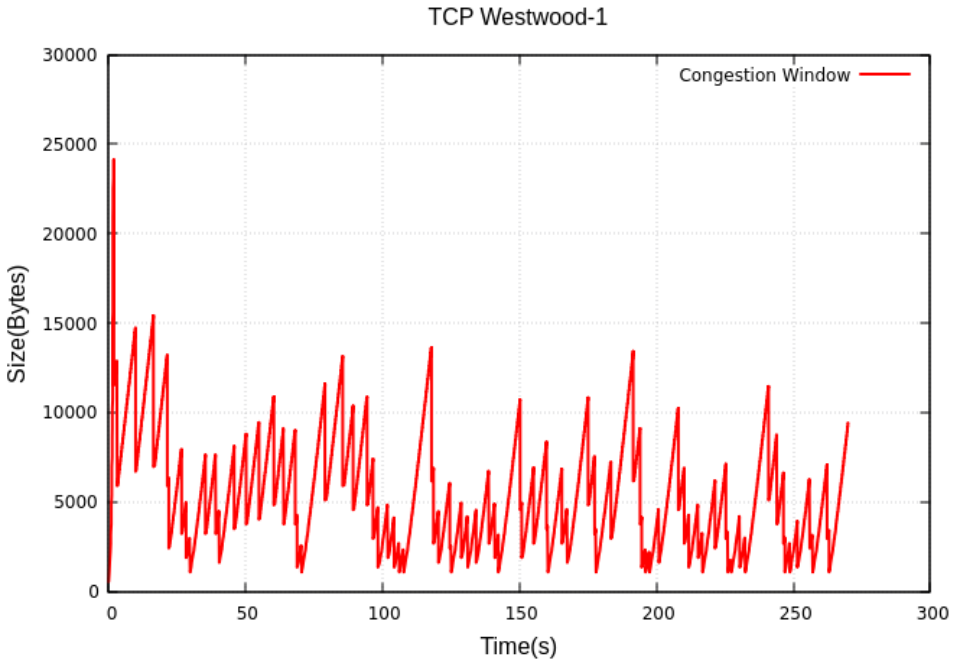
For TCP Westwood

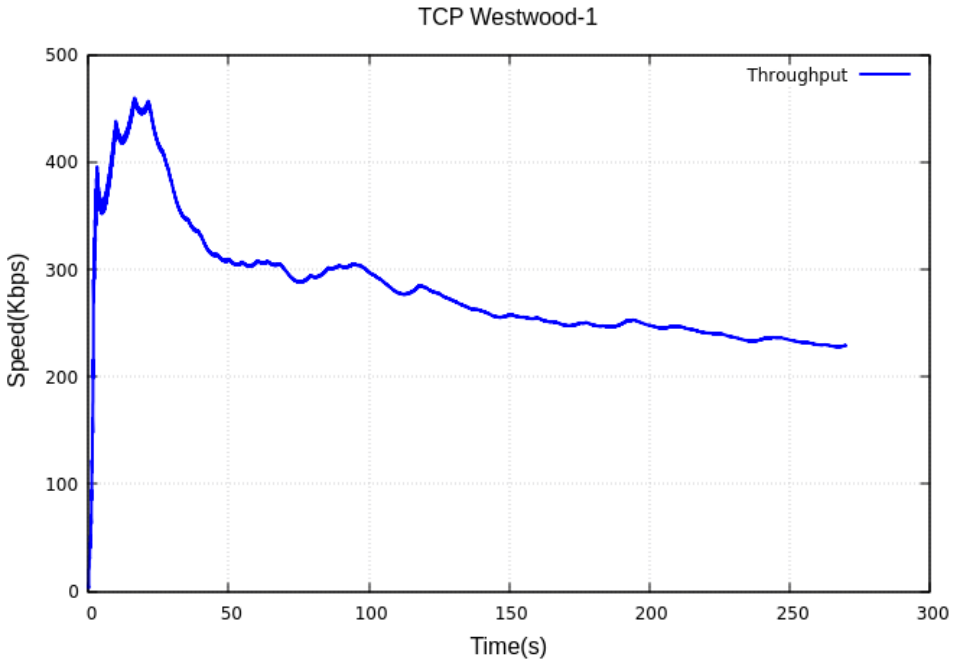
TCP westwood flow 171.15.113.1 to 171.15.117.1

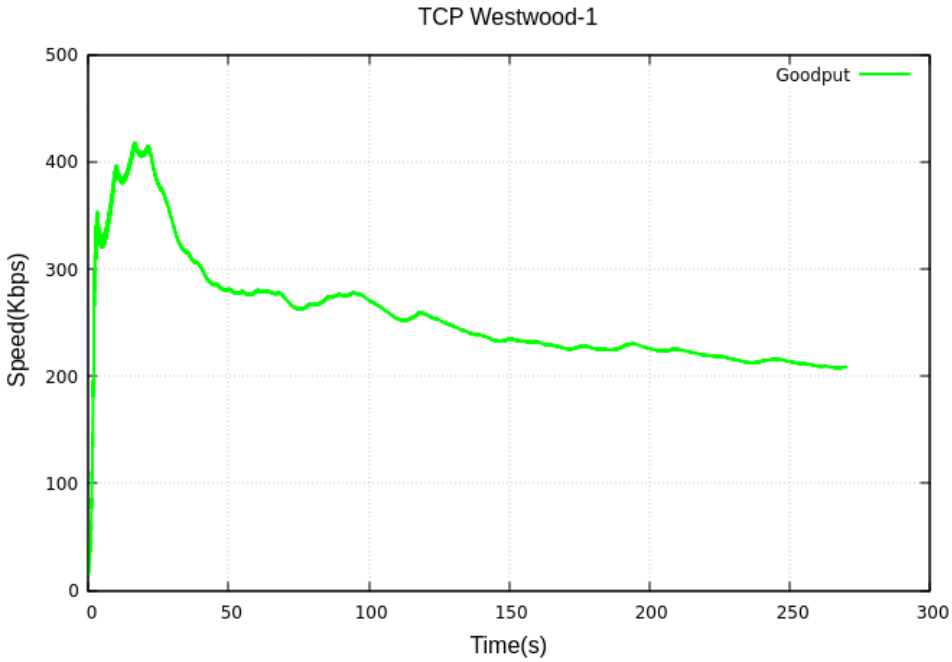
Total Packets Received = 999911

Packet Lost due to-> Buffer Overflow = 0 Congestion = 89

max ThroughPut = 459.841 kbps


TCP Westwood-1
Congestion Window
Size(Bytes)
Time(s)
0
5000
10000
15000
20000
25000
30000
0
50
100
150
200
250
300


TCP Westwood-1
Throughput
Speed(Kbps)
Time(s)
0
100
200
300
400
500
0
50
100
150
200
250
300



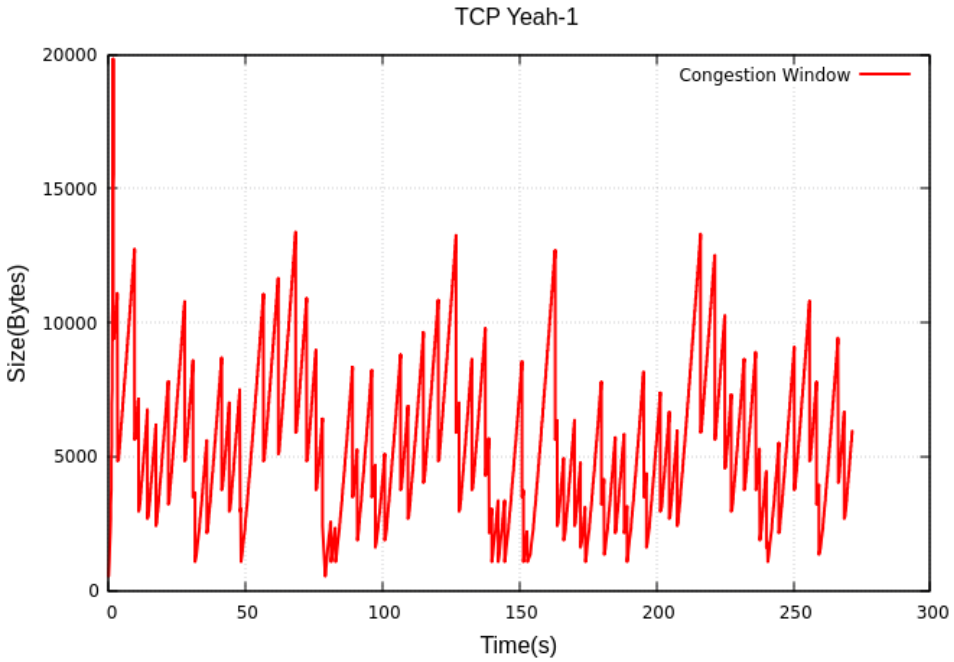
For TCP YEAH

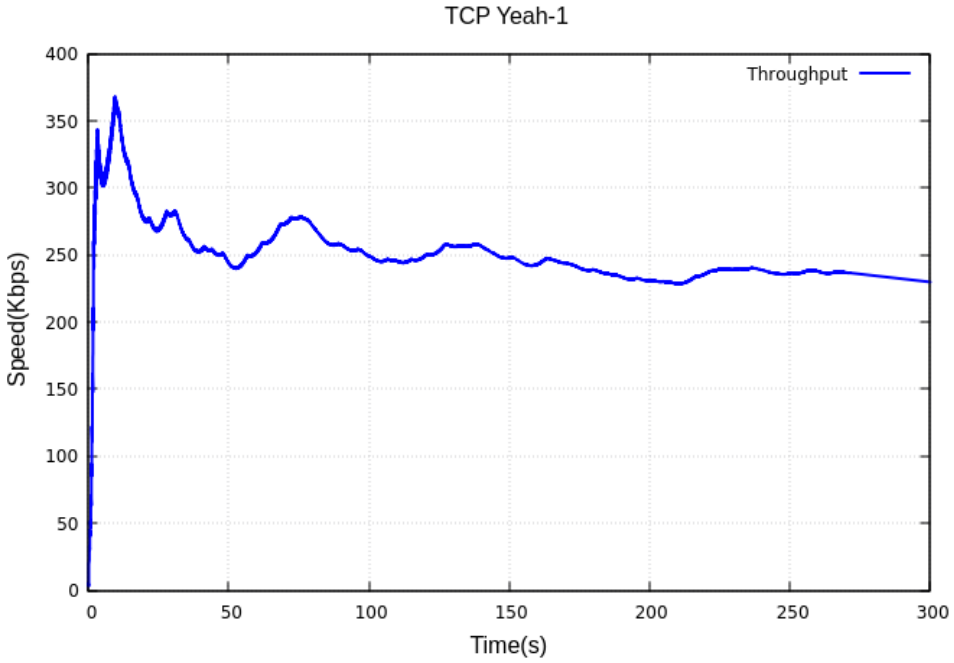
TCP Yeah flow 171.15.111.1 to 171.15.115.1

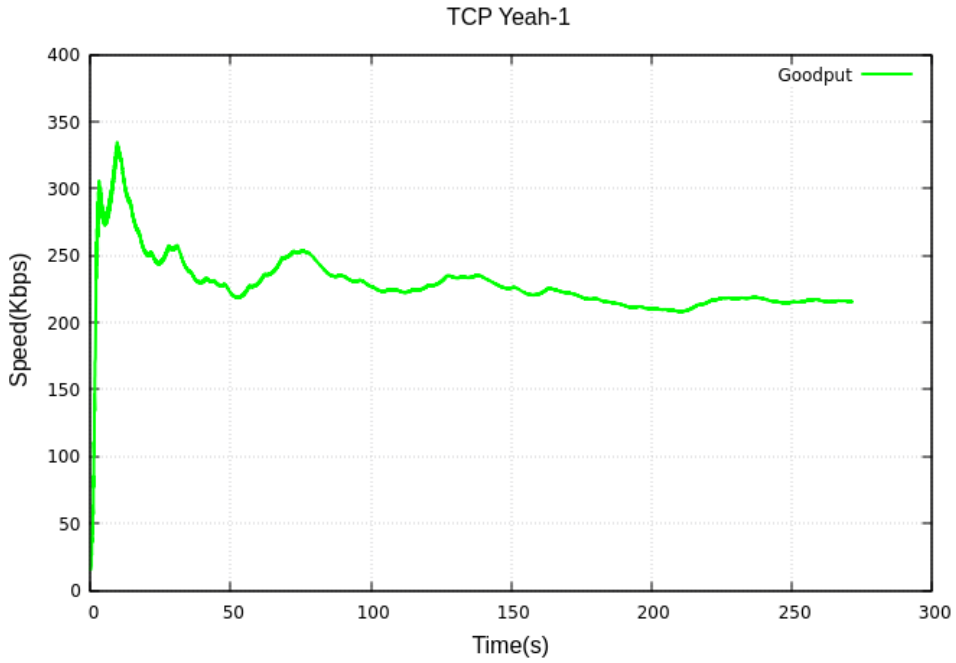
Total Packets Received = 999916

Packet Lost due to -> Buffer Overflow = 0 , due to Congestion = 84

max ThroughPut = 367.975 kbps


TCP Yeah-1
Congestion Window
Size(Bytes)
Time(s)
0
5000
10000
15000
20000
0
50
100
150
200
250
300


TCP Yeah-1
Throughput
Speed(Kbps)
Time(s)
0
50
100
150
200
250
300
350
400
0
50
100
150
200
250
300



Q2 . In the next experiment, start 2 other flows sharing the bottleneck while the first one is in progress and measure the throughput (in Kbps) of each flow. Plot the throughput and evolution of the TCP congestion window for each of the flow at a steady-state. Report the maximum throughput observed for each of the flows.

We have first started TCP Yeah and the other two TCP flows are started 20-25 sec later.

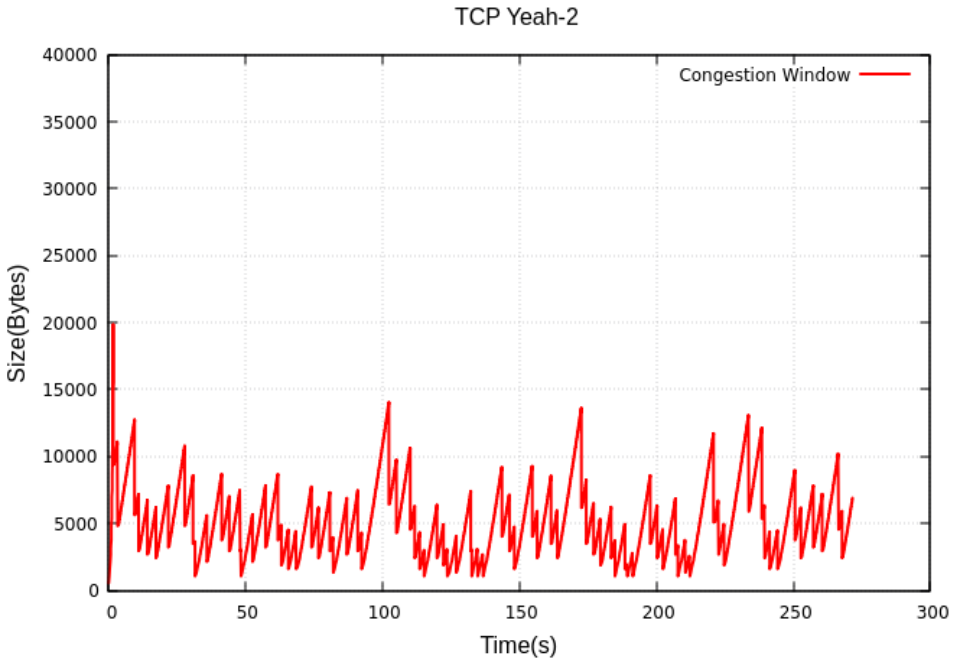
TCP YEAH

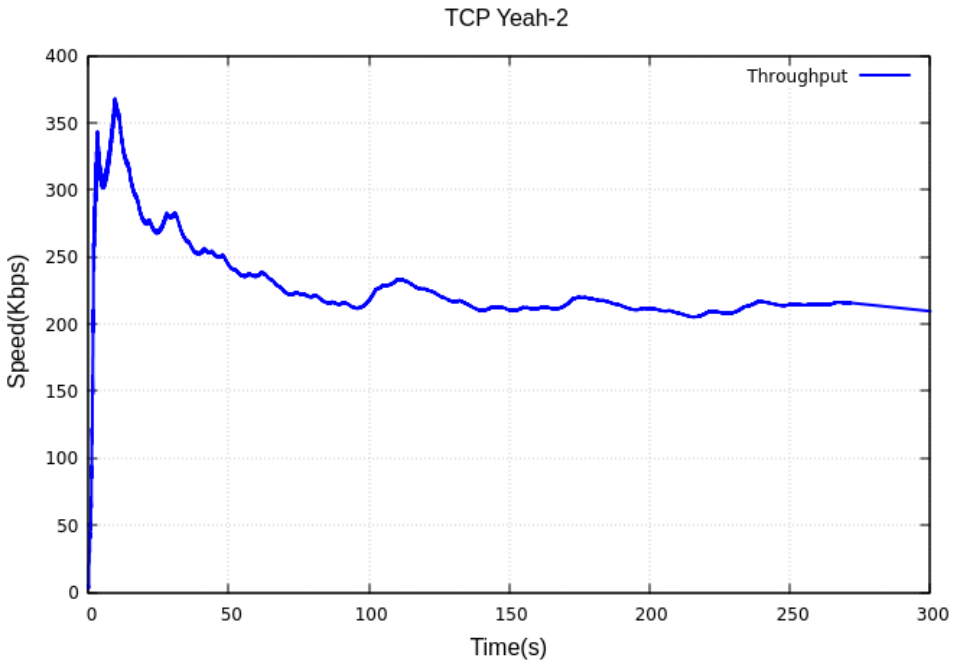
TCP Yeah flow 171.15.111.1 to 171.15.115.1

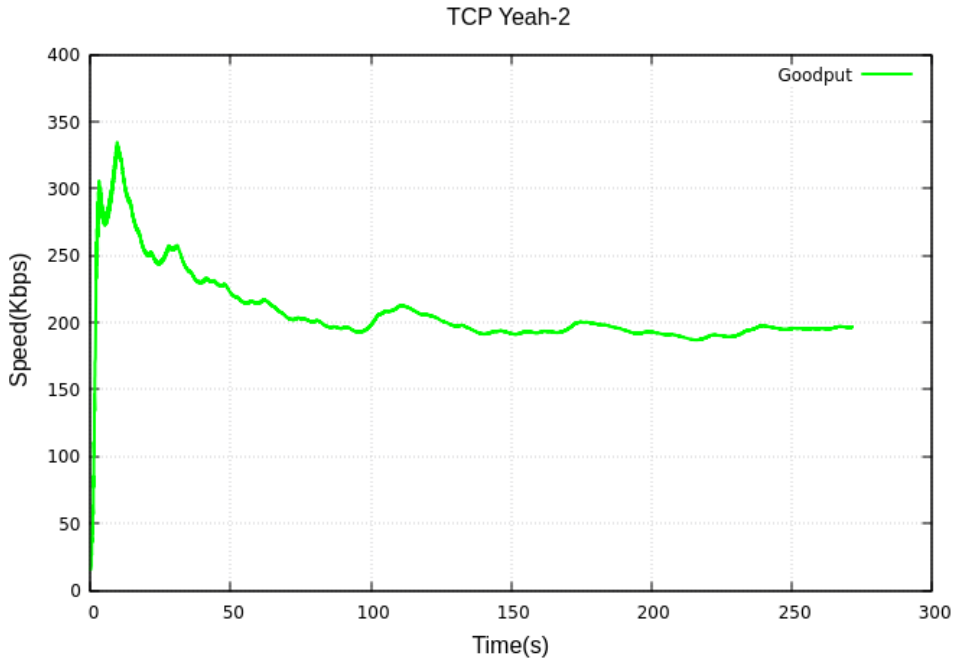
Total Packets Received = 999904

Packet Lost due to -> Buffer Overflow = 0 Congestion = 96

max ThroughPut = 367.975 kbps


TCP Yeah-2
Congestion Window
Size(Bytes)
Time(s)
0
5000
10000
15000
20000
25000
30000
35000
40000
0
50
100
150
200
250
300


TCP Yeah-2
Throughput
Speed(Kbps)
Time(s)
0
50
100
150
200
250
300
350
400
0
50
100
150
200
250
300



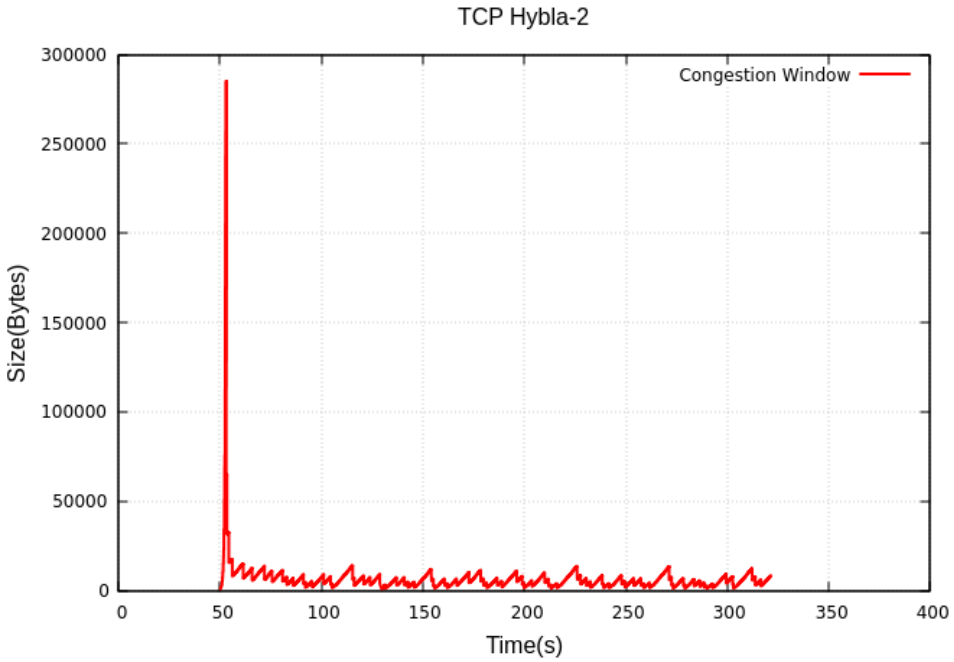
TCP HYBLA

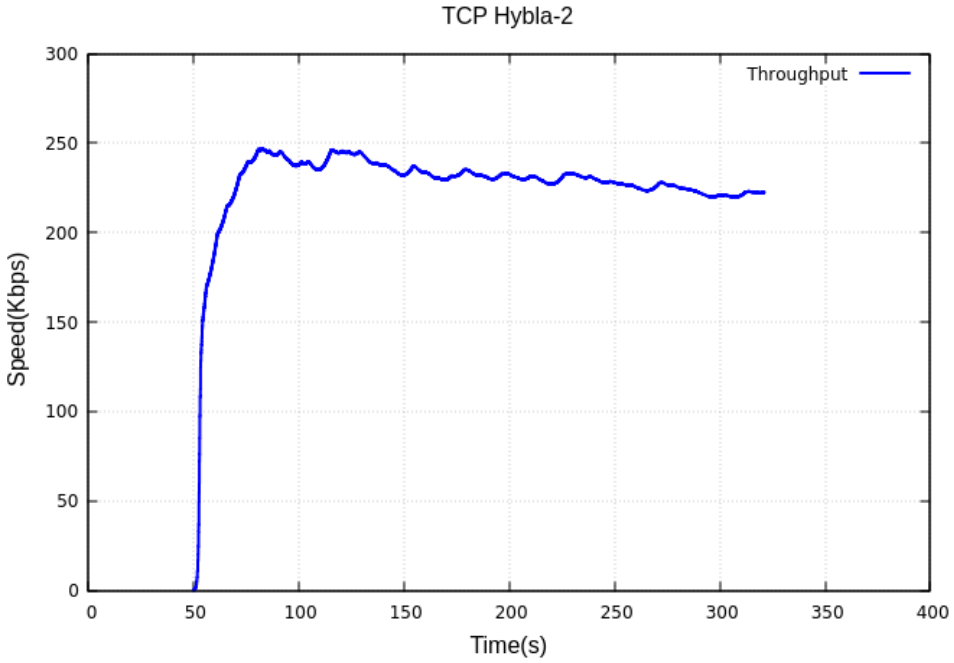
TCP hybla flow 171.15.112.1 to 171.15.116.1

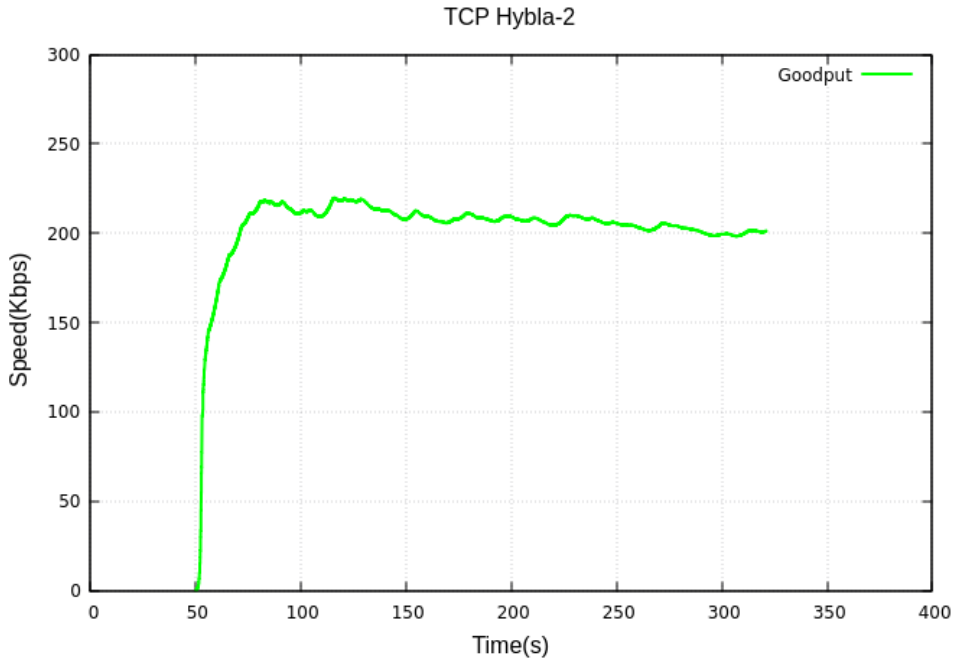
Total Packets Received = 999900

Packet Lost due to -> Buffer Overflow = 0 Congestion = 100

max ThroughPut = 247.655 kbps


TCP Hybla-2
Congestion Window
Size(Bytes)
Time(s)
300000
250000
200000
150000
100000
50000
0
0
50
100
150
200
250
300
350
400


TCP Hybla-2
Throughput
Speed(Kbps)
Time(s)
300
250
200
150
100
50
0
0
50
100
150
200
250
300
350
400



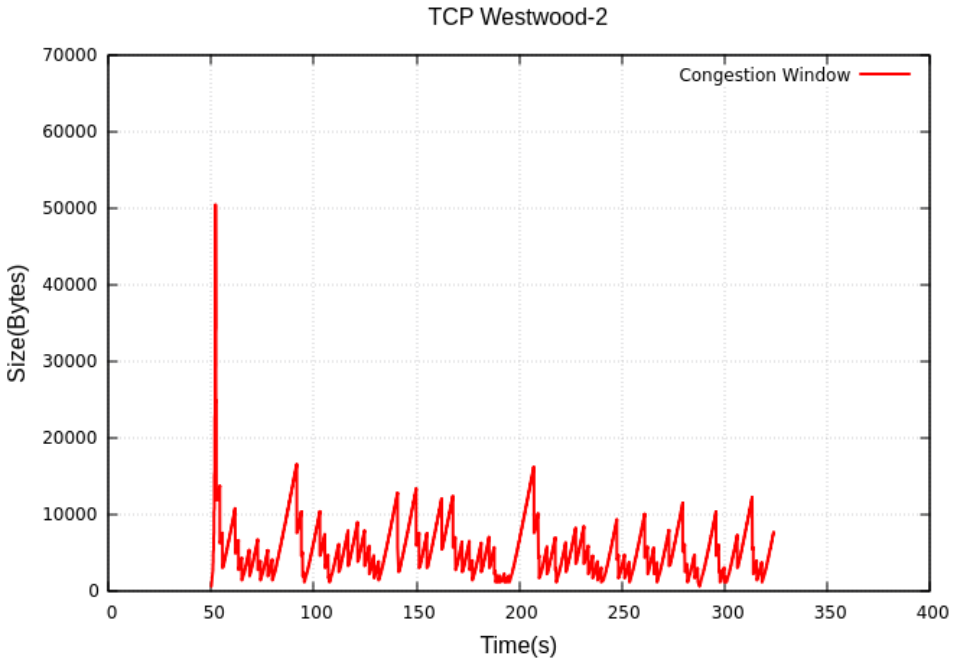
TCP westwood

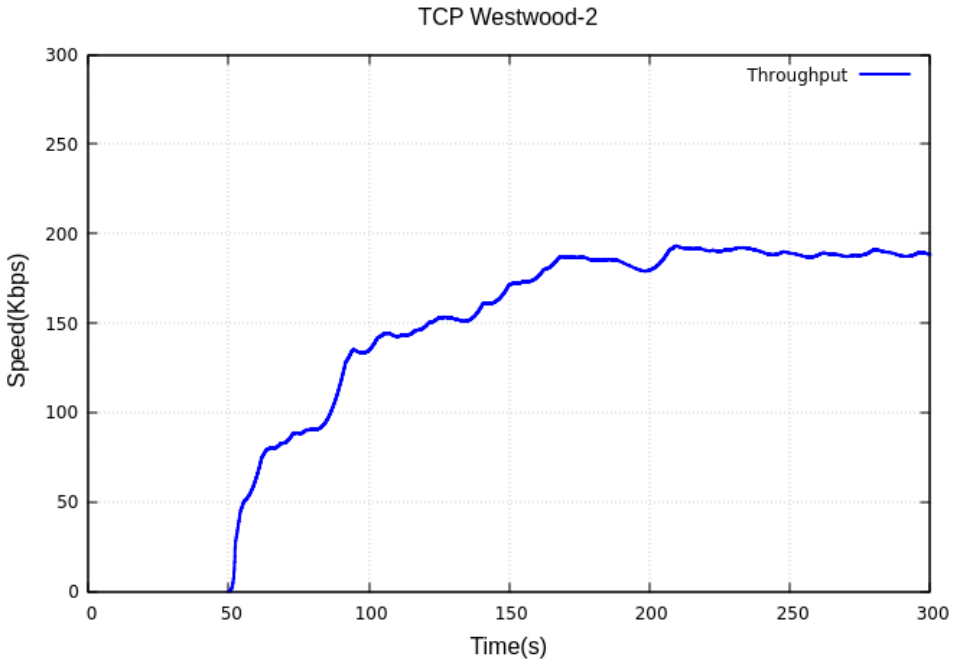
TCP westwood flow 171.15.113.1 to 171.15.117.1

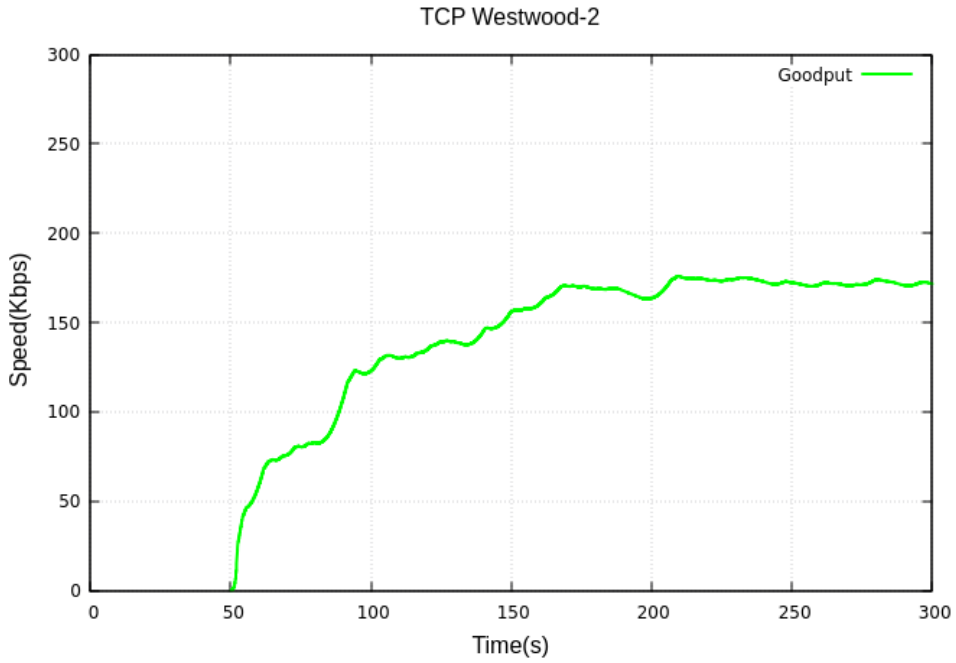
Total Packets Received = 999904

Packet Lost due to-> Buffer Overflow = 0 Congestion = 96

max ThroughPut = 192.468 kbps


TCP Westwood-2
Congestion Window
Size(Bytes)
Time(s)
0
10000
20000
30000
40000
50000
60000
70000
0
50
100
150
200
250
300
350
400


TCP Westwood-2
Throughput
Speed(Kbps)
Time(s)
0
50
100
150
200
250
300
0
50
100
150
200
250
300



Q3 Measure the congestion loss and the goodput over the duration of the experiment for each of the flows

Soln : Goodput data and Congestion Window data for each of the flows

are submitted along with the document for each of the parts.