Network Assignment 4
Simulation
Application 6

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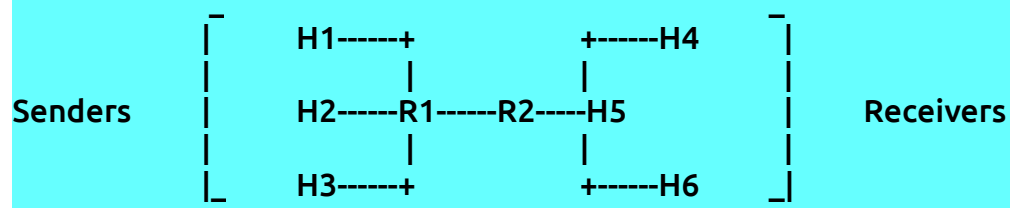
Single flow analysis with different TCP agents

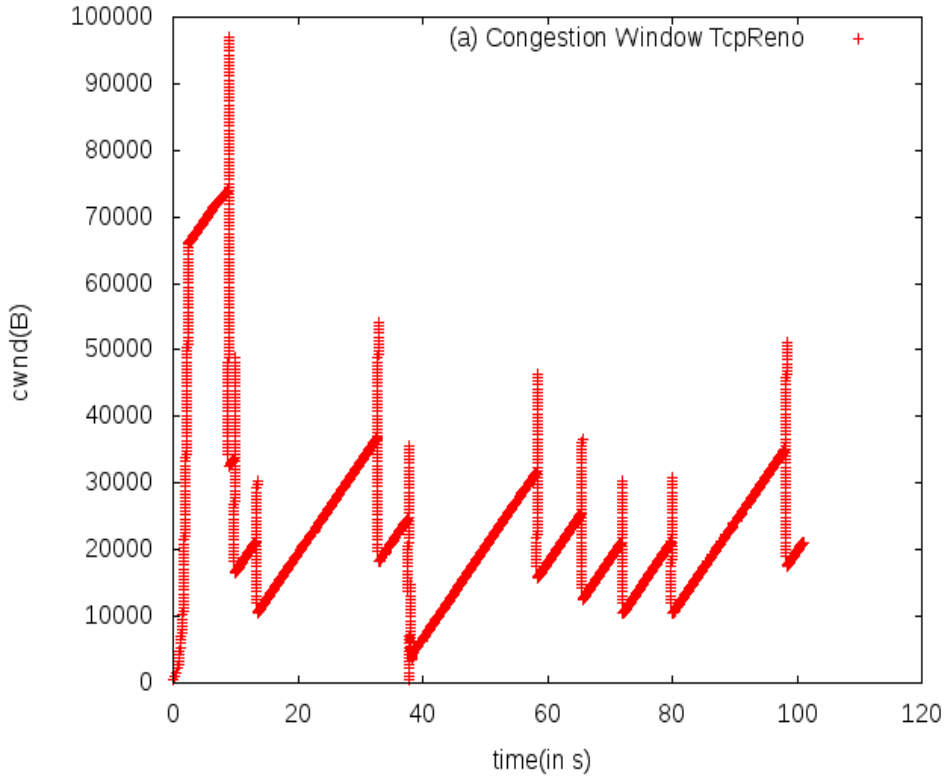
For all the simulations :
- An error model with error rate of 0.000001 was installed on the each link between host and router.
- Congestion window, throughput, goodput and congestion loss are traced using NS3 only with no other utility except for gnuplot for plotting traces.
- Congestion window, throughput and goodput are measured using TraceCallbacks and congestion loss is measured using FlowMonitor.
- Following is dumbbell topology was used:



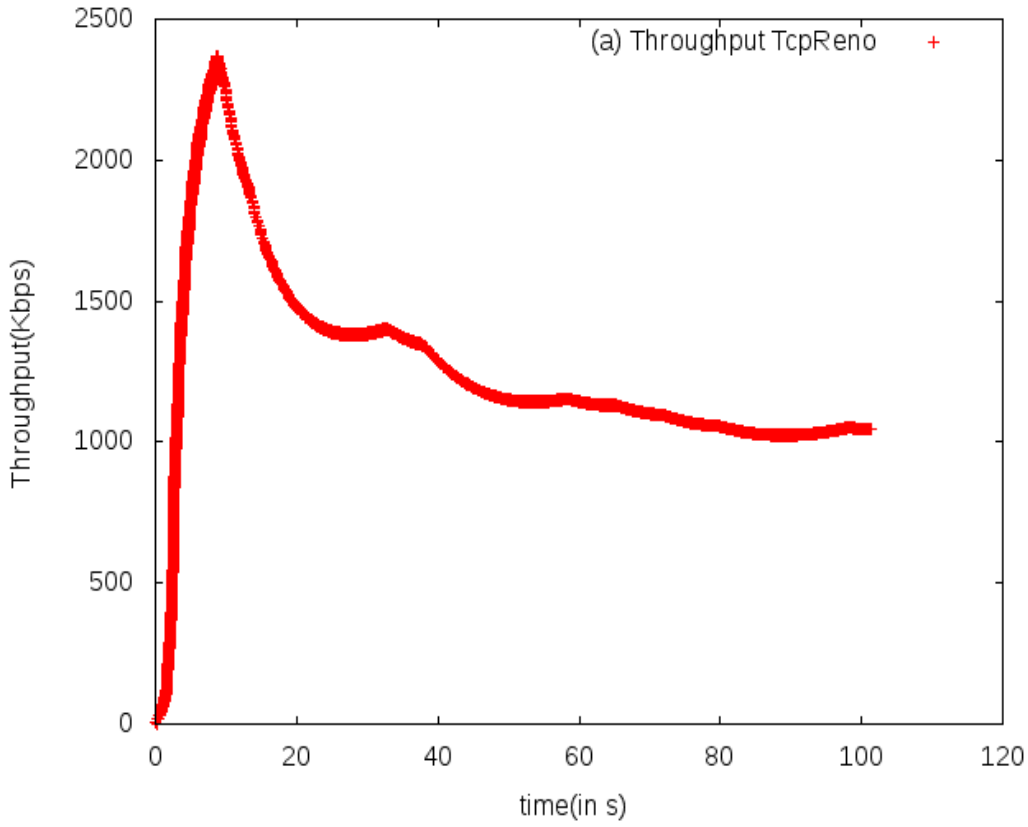
- H1 is attached with TCP Reno agent.
- H2 is attached with TCP Vegas agent.
- H3 is attached with TCP Fack agent.
- Links:
H1R1/H2R1/H3R1/H4R2/H5R2/H6R2: P2P with 100Mbps and 20ms.
R1R2: (dumbbell bridge) P2P with 10Mbps and 50ms.
- packet size: 1.2KB.
- Number of packets decided by Bandwidth delay product:
- i.e. #packets = Bandwidth*Delay(in bits)/packetsize(in bits)

Analysis of single flow from H1 to H4 with TcpReno attached to H1

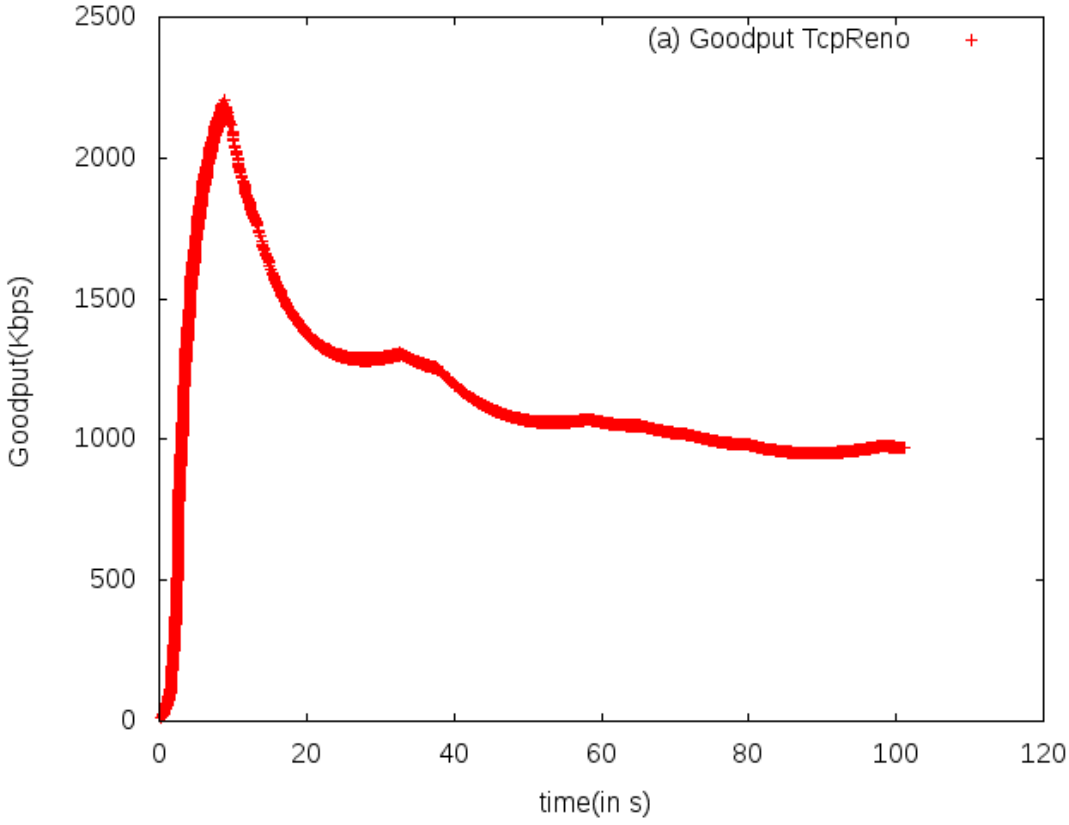
Evolution of congestion window:



Evolution of throughput:



Evolution of goodput:

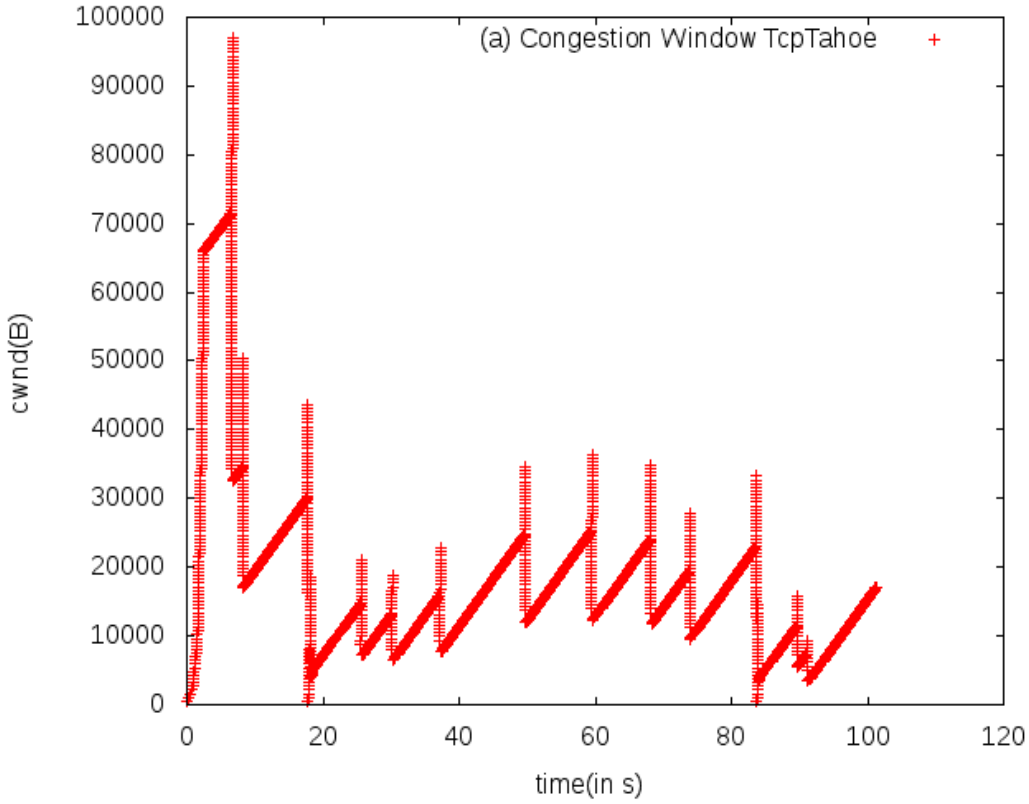


Note: *FlowMonitor provides the total number of packets lost. To get packets dropped due to buffer overflow we used tracecallback and then subtracted it from total packets to get packets lost due to congestion loss.*

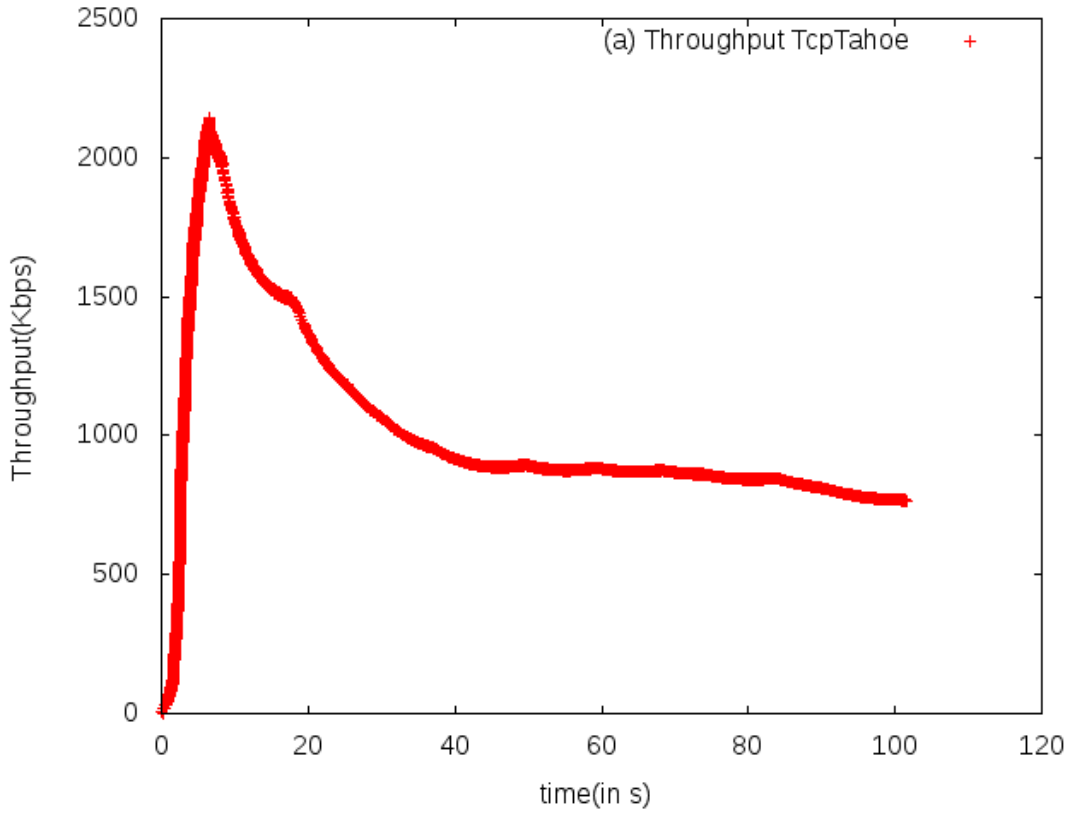
Net Packet Lost: 10
Packet Lost due to buffer overflow: 0
Packet Lost due to Congestion: 10
Max throughput: 2367.14 Kbps

Analysis of single flow from H2 to H5 with TcpTahoe attached to H2

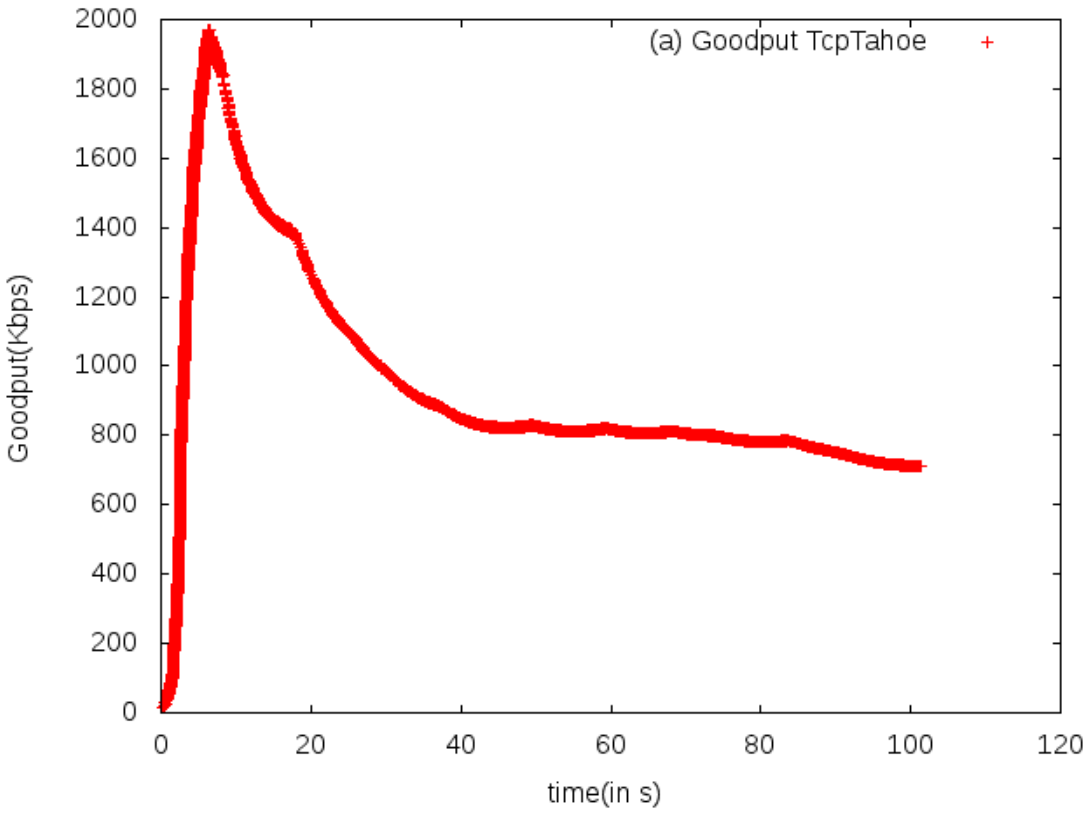
Evolution of congestion window:



Evolution of throughput:



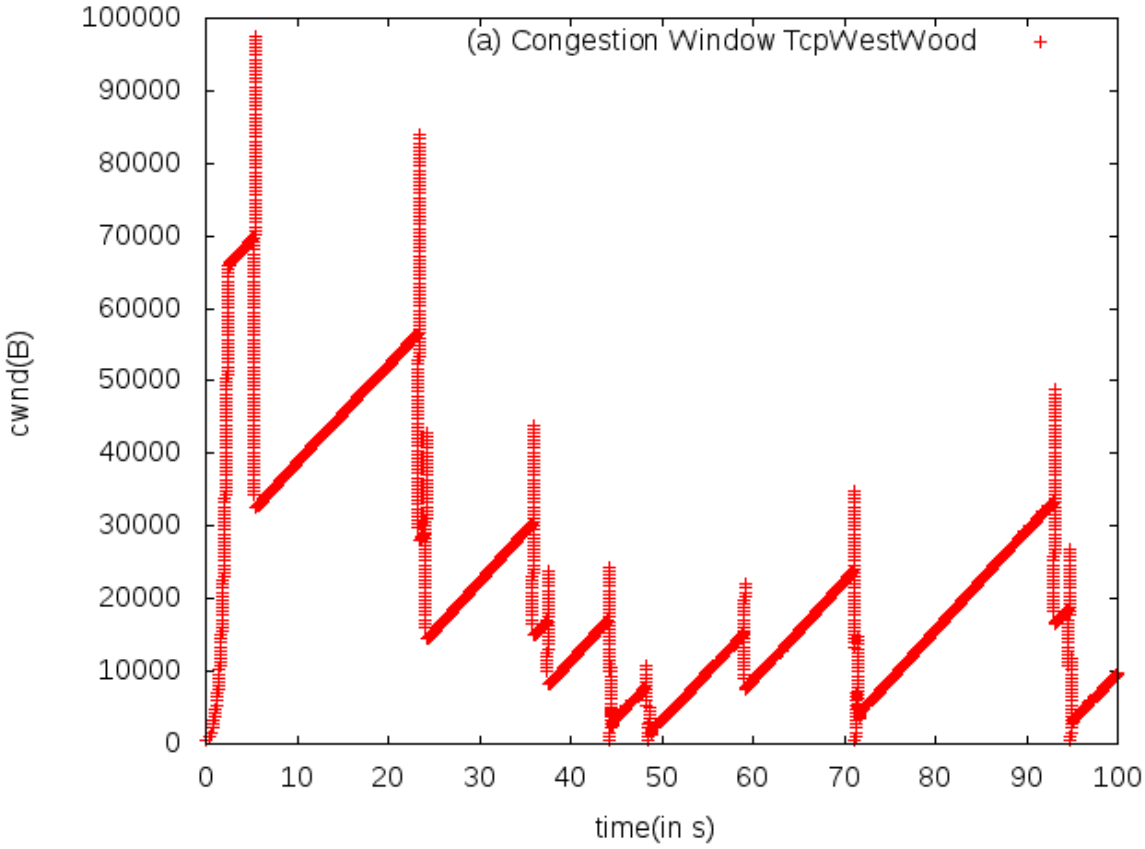
Evolution of goodput: ***(Not the scale difference)***



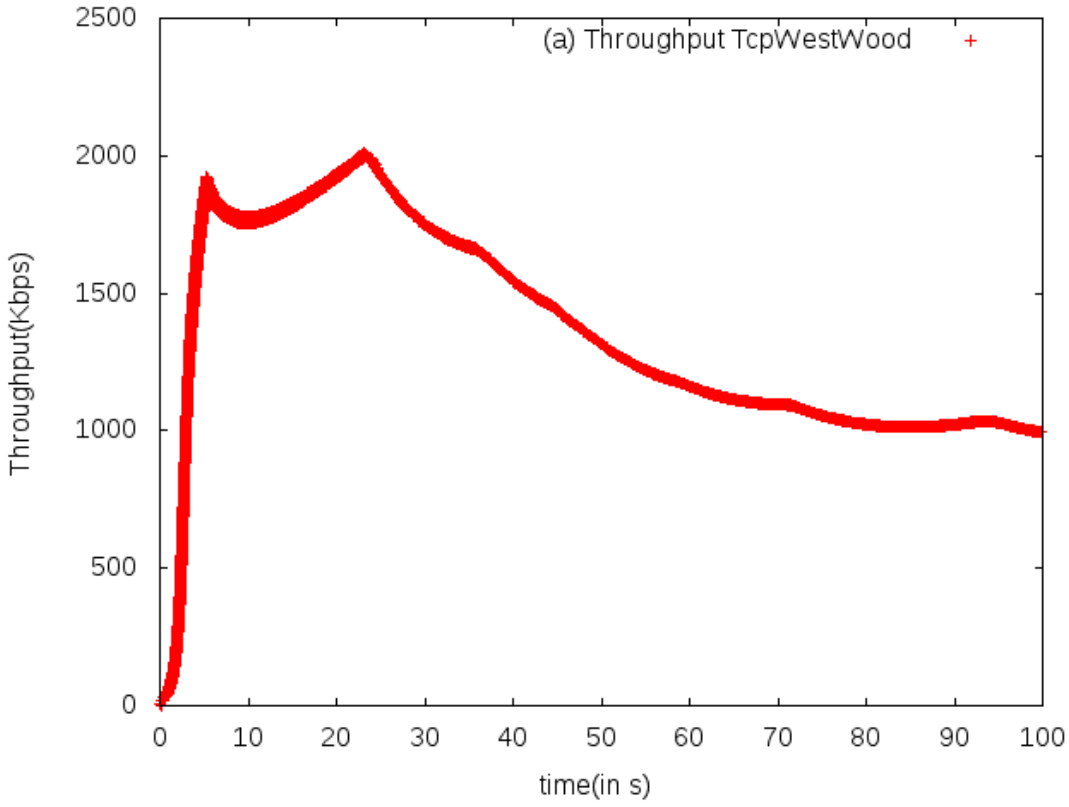
Net Packet Lost: 13
Packet Lost due to buffer overflow: 0
Packet Lost due to Congestion: 13
Max throughput: 2141.84 Kbps

Analysis of single flow from H3 to H6 with TcpWestWood attached to H3

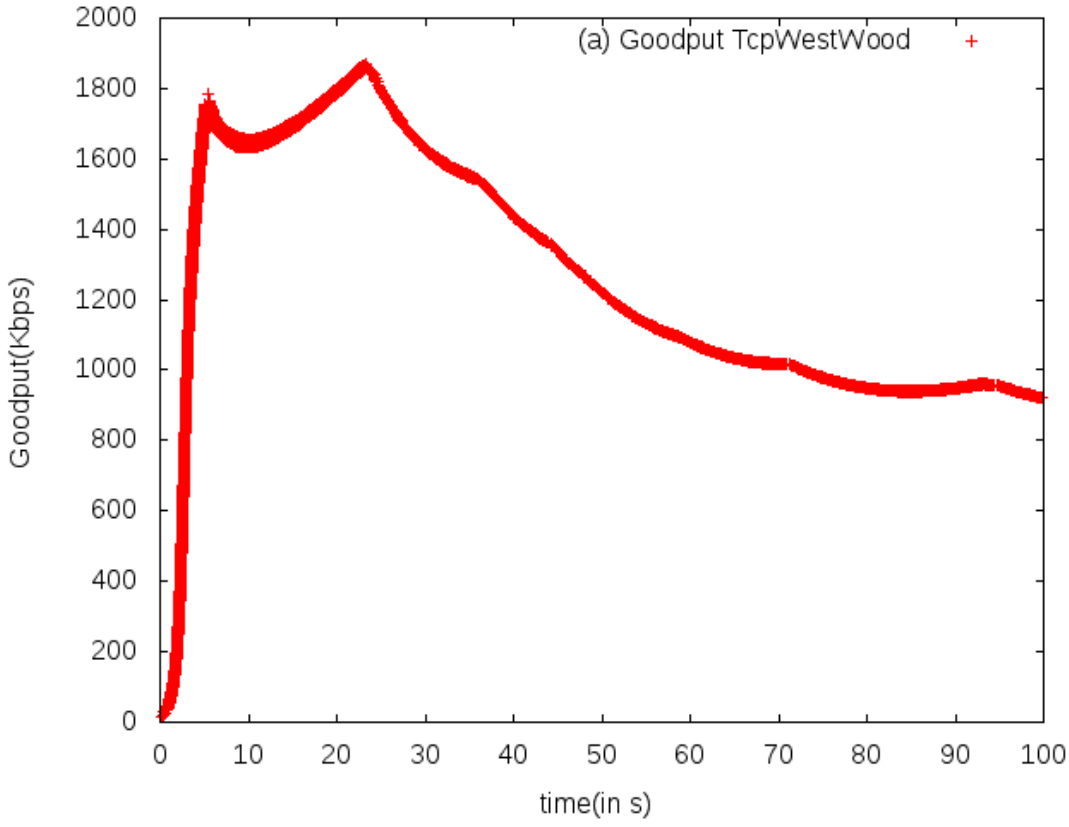
Evolution of congestion window:



Evolution of throughput:



Evolution of goodput: (Note the scale difference)



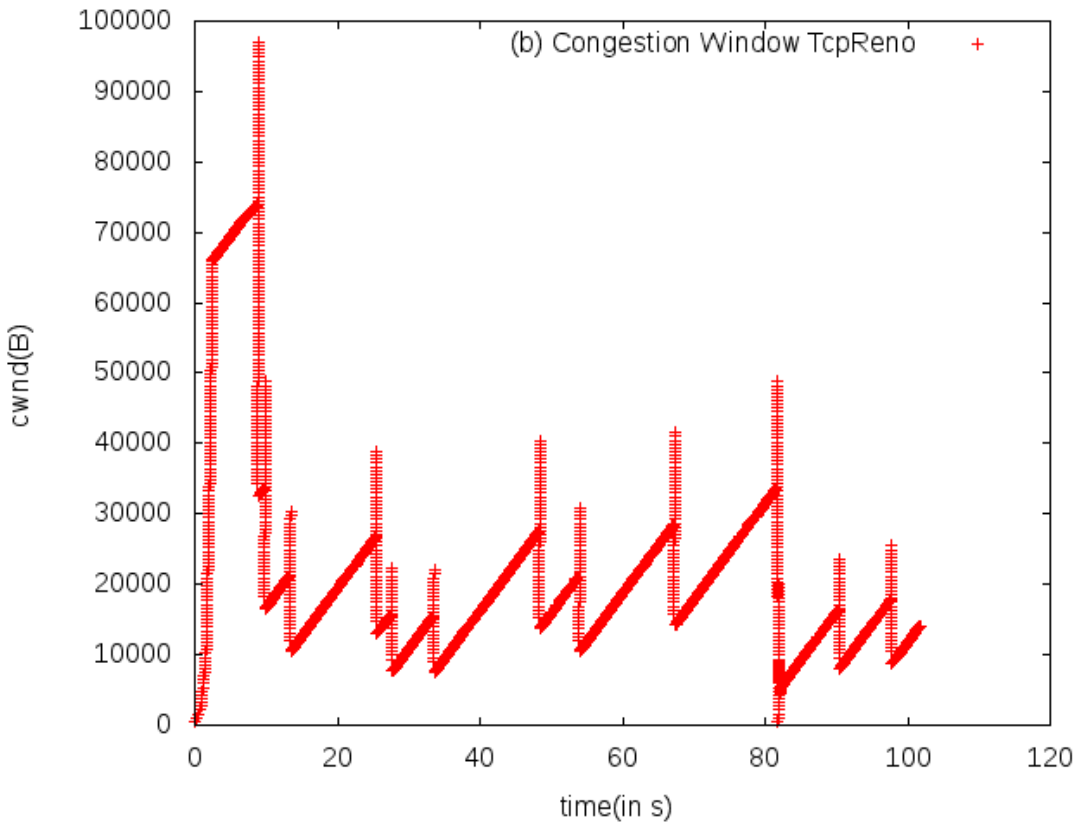
Net Packet Lost: 9
Packet Lost due to buffer overflow: 0
Packet Lost due to Congestion: 9
Max throughput: 2009.55 Kbps

Multi flow analysis with different TCP agents

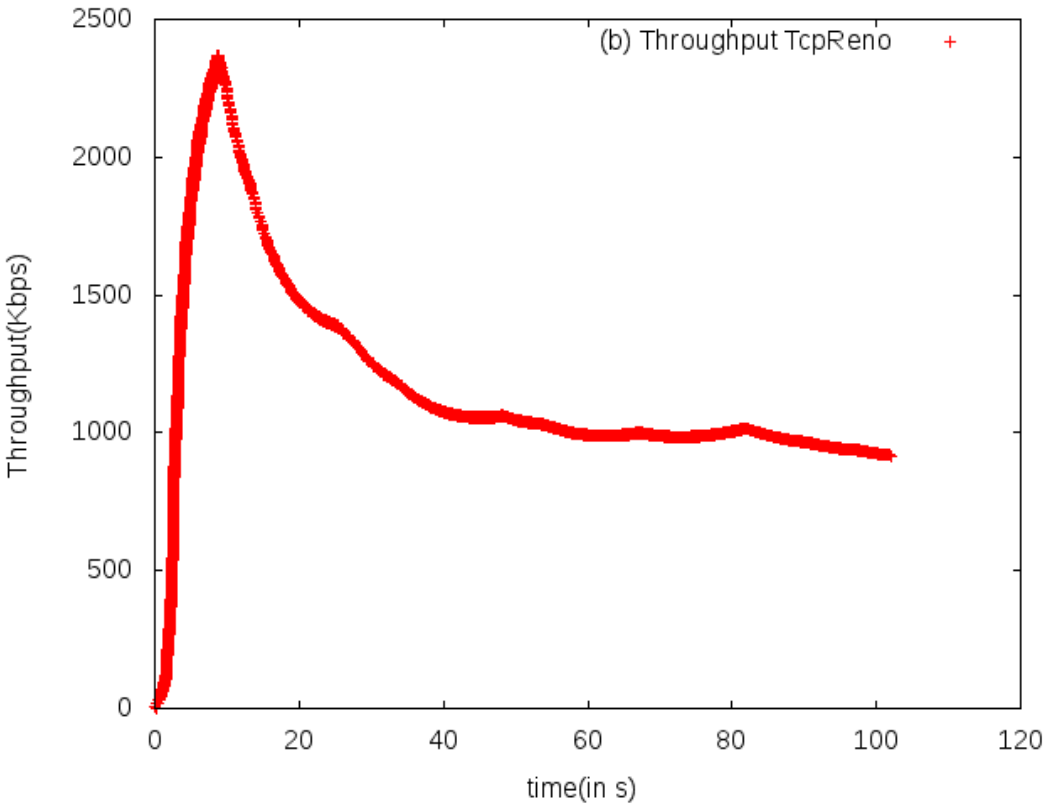
Multi flow:
A flow from H1 to H5 is started with TcpReno attached with H1 at t=0 till t=100.
At t=20 two other flows, one from H2 to H5 and other from H3 to H6 were started and the following traces were observed.

Analysis of multi flow from H1 to H4 with TcpReno attached to H1

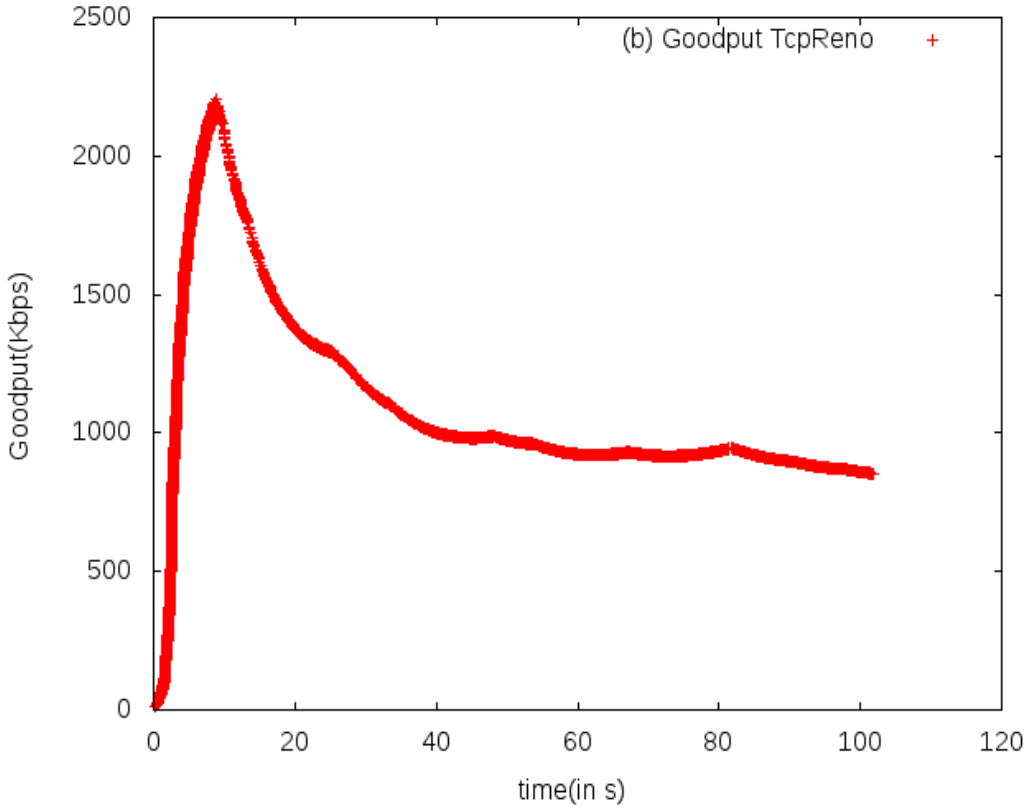
Evolution of congestion window:



Evolution of throughput:



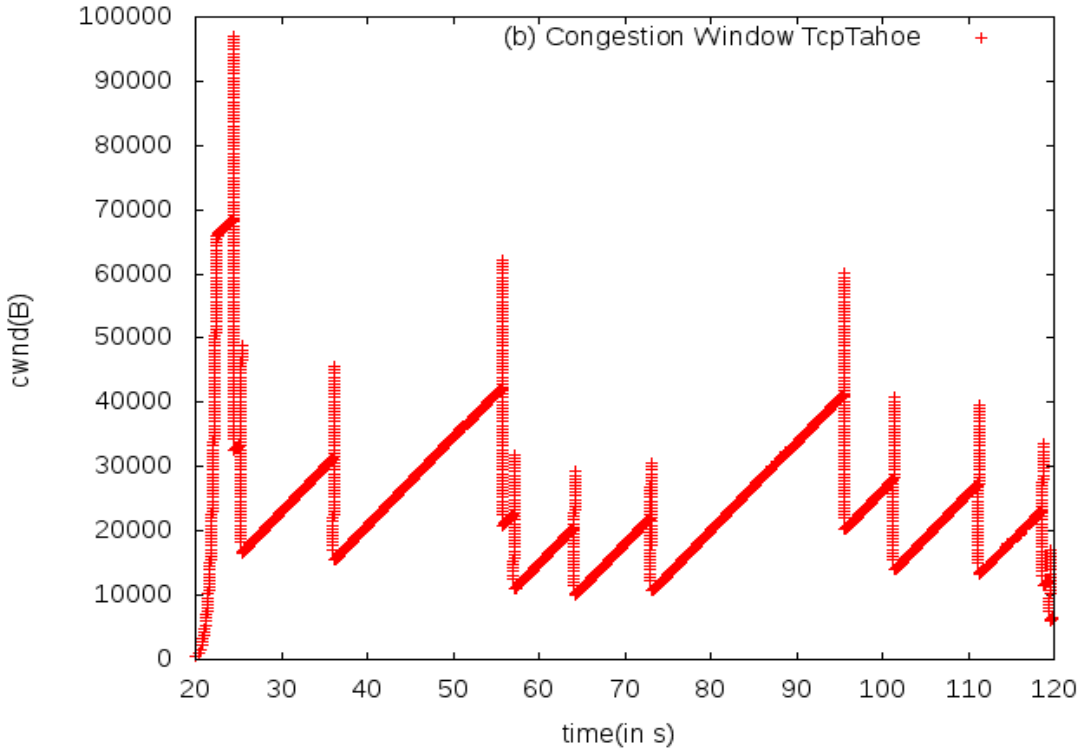
Evolution of goodput:



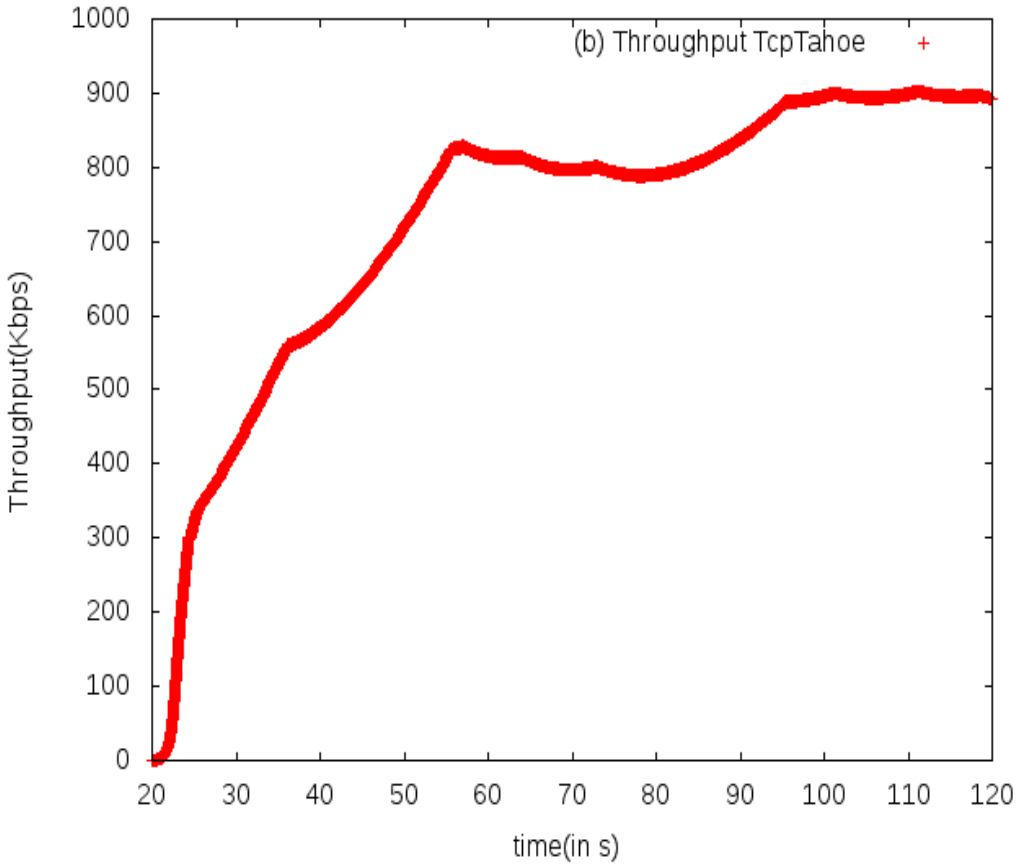
Net Packet Lost: 12
Packet Lost due to buffer overflow: 0
Packet Lost due to Congestion: 12
Max throughput: 2367.14 Kbps

Analysis of multi flow from H2 to H5 with TcpTahoe attached to H2

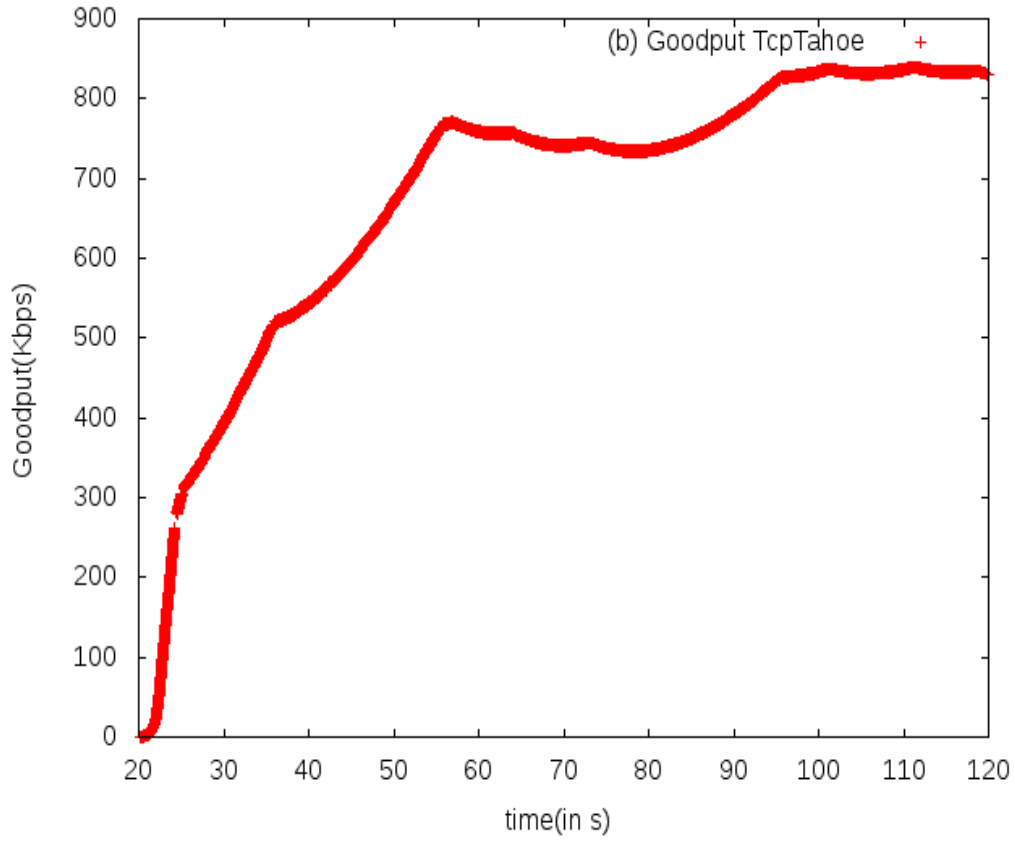
Evolution of congestion window:



Evolution of throughput:



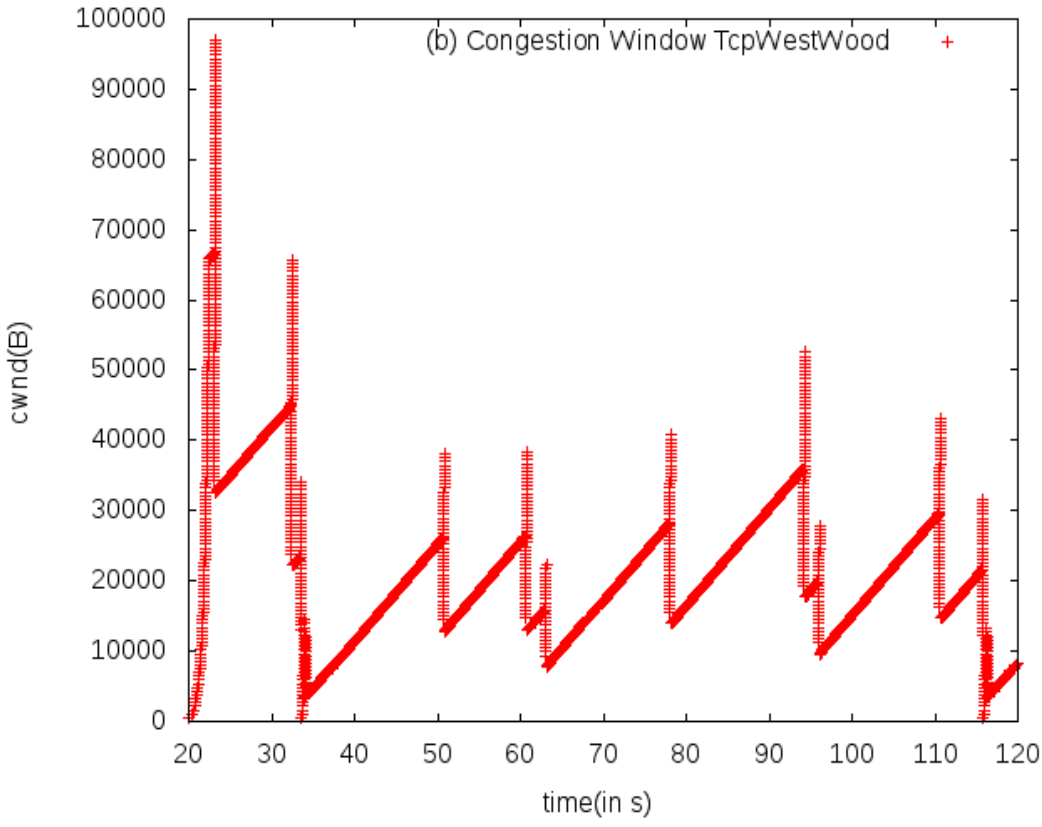
Evolution of goodput: ***(Not the scale difference)***



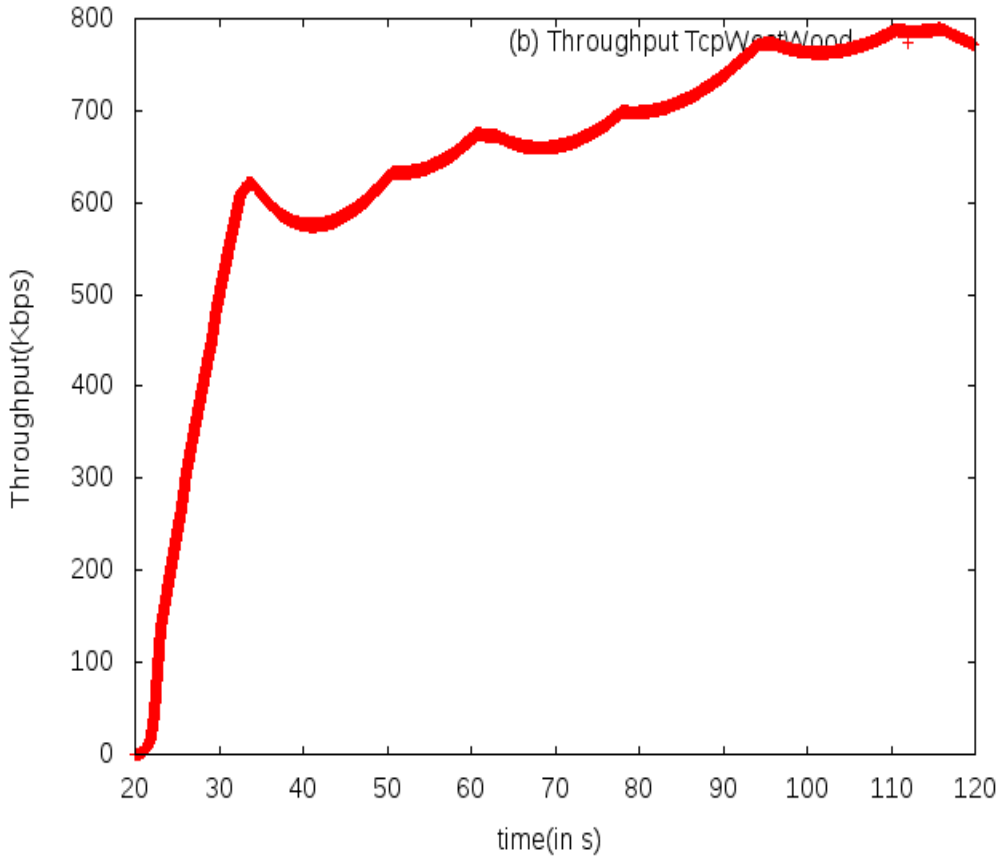
Net Packet Lost: 10
Packet Lost due to buffer overflow: 0
Packet Lost due to Congestion: 10
Max throughput: 902.82 Kbps

Analysis of multi flow from H3 to H6 with TcpWestWood attached to H3

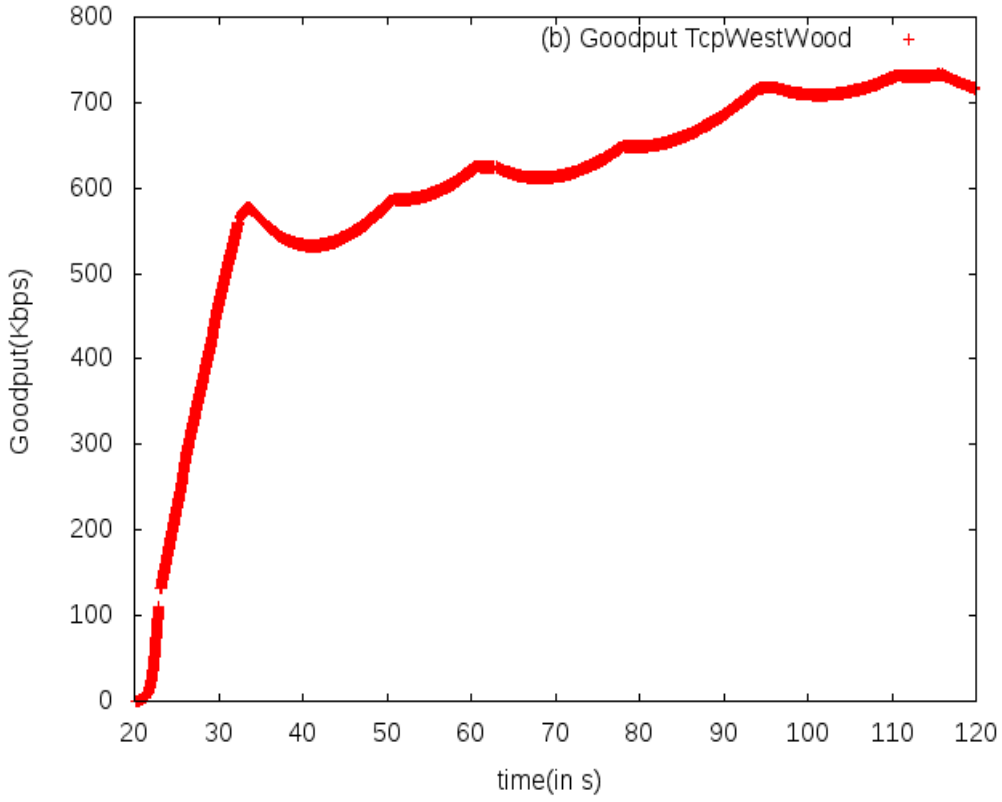
Evolution of congestion window:



Evolution of throughput:



Evolution of goodput:



Net Packet Lost: 10
Packet Lost due to buffer overflow: 0
Packet Lost due to Congestion: 10
Max throughput: 789.225 Kbps

As expected the throughput and goodput in case of multi flow went down (in steady state). For the two flows in multi flow which were started later, did suffer from the decrement in overall and max throughput while the one started first din't suffer from the decrement of max throughput (as the time of event of max throughput comes before the launch of other flows) but did suffer from decrement in overall throughput and also a decreament in throughput at the steadystate. Same is true for goodput too. Congestion loss too got increased for 2 out of 3 flows.

THANK YOU.