**TCP Test Run**

The following test was run using a topo file containing:

edge 0 1 lossRate 0.05 delay 200 bw 10000 bt 1000

The following commands were executed after opening three separate terminal windows:

Terminal 1 (Trawler): perl trawler.pl 8888 scripts/two.topo

Terminal 2 (Server/Receiver): perl fishnet.pl emulate localhost 8888 10000

Terminal 3 (Client/Sender): perl fishnet.pl emulate localhost 8888 10002

**Server side (Receiver’s end) output**

Node 0: started

server 21 4

Node 0: server started, port = 21

S:Node 0: time = 1385165701388 msec

Node 0: connection accepted

.:.:.:.:.:.:.:.:!:!:!:!:!:.:.:.:.:.:!:!:!:!:!:!:!:.:.:.:.:.:.:.:.:.:.:.:.:.:.:.:.:.:.:.:.:.:.:.:.:.:.:.:!:!:!:!:.:.:!:!:.:!:.:!:.:!:.:!:.:!:!:!:!:.:.:!:!:!:!:!:!:.:.:.:!:!:!:!:!:.:!:.:!:!:.:!:.:.:!:!:!:!:!:!:!:.:!:.:!:!:!:!:!:.:!:.:!:!:!:!:.:!:!:!:!:.:!:!:!:!:!:.:!:!:!:!:!:!:.:!:!:!:!:.:!:!:!:.:!:!:!:.:!:!:!:.:!:.:!:!:!:!:.:.:!:!:!:!:!:!:!:!:!:!:!:.:!:.:!:!:!:!:!:.:!:.:!:!:!:.:!:!:!:!:.:!:.:!:!:!:.:!:!:.:!:!:!:!:!:!:.:!:.:!:!:!:!:!:!:!:.:!:.:!:!:!:!:!:.:.:!:!:!:!:!:!:!:.:.:!:!:!:!:!:.:!:.:!:!:!:!:.:.:!:!:!:!:!:!:!:!:.:!:!:!:!:FFNode 0: time = 1385165726415 msec

Node 0: connection closed

Node 0: total bytes received = 10000

**Client side (Sender’s end) output**

Node 1: started

transfer 0 21 45 10000

S:Node 1: time = 1385165701232 msec

Node 1: started

Node 1: bytes to send = 10000

!!::....::::........Node 1: time = 1385165702238

Node 1: sending completed

Node 1: closing connection...

::::::!!!!!!!!!!!!!!::::::::::::!!!!!!!:::::::....::::....::::....::::....::::....!!!!::::..::::!!!:..:!!:::!!:!!::!!!!!:!!:::..!!::::!!!:..::::::::..!!!!:..:::!!!:::..!!:::::..!!:!!!!:..:!!!!!::::!!::::!!::::!!::!!!!::..!!!:..::!!:!!:::!!::::!!!!!!!!::::!!!:!!:!!::!!::::::!!::!!::!!!::!!::::!!::!!!!:!!::::..!!::!!!!::!!!!:..::::!!:::::::!!!!::..:::::!!:!!:!!!!!::..::::!!::!!:::!!:!!:!!!!!::!!::!!:::!!::!!::!!!!::..::!!!::::::!!:!!:::..:!!!:!!!!::!!::..:::!!::!!!!::..:!!::!!::!!::::..!!!!::::!!!!:..::::!::!!!:::::FNode 1: time = 1385165724257 msec

Node 1: connection closed

Node 1: total bytes sent = 10000

Node 1: time elapsed = 23025 msec

Node 1: Bps = 434.31053203040176

**Comments**

The test successfully transferred 10000 bytes (~100 data packets) from client to server with loss rate set at 5%. Due to packet losses, there were a lot of retransmissions observed in the output i.e. “!” symbol. The transmission rate for this particular test run was ~434 bytes/second.

**Congestion Control Testing**

The topology file was setup as follows for testing congestion control with three nodes (two clients and one server):

edge 0 1 lossRate 0.05 delay 200 bw 10000 bt 1000

edge 0 2 lossRate 0.05 delay 200 bw 10000 bt 1000

The server listened on node 0 while clients were set up on nodes 1 and 2.

The following is a graph showing the size of the congestion window plotted against time:

The linear increase in the chart above is the slow start phase where the window size increases quickly. The flat part of the graph is the congestion avoidance phase where the window size is supposed to increase very slowly due to the proximity to the threshold. The drop represents resetting of window size to 1 packet on occurrence of timeout.