CSE 473S – Introduction to Computer Networks Fall 2010
Lab Assignment 3

Objective: Experiment with UDP and TCP packets

Preliminaries
- You should have completed lab assignments 1 and 2
- Download configuration file *lab3.exp* from the course web page *http://www.cse.wustl.edu/~jain/cse473-10* /
(right-click on lab3.exp and save link as or save target as)
- Save the file in *.onldir* directory as lab3.exp

The configuration file sets up a network topology enabling a sender at host n1p2 to communicate with a receiver at host n2p2 as shown in Figure 1.
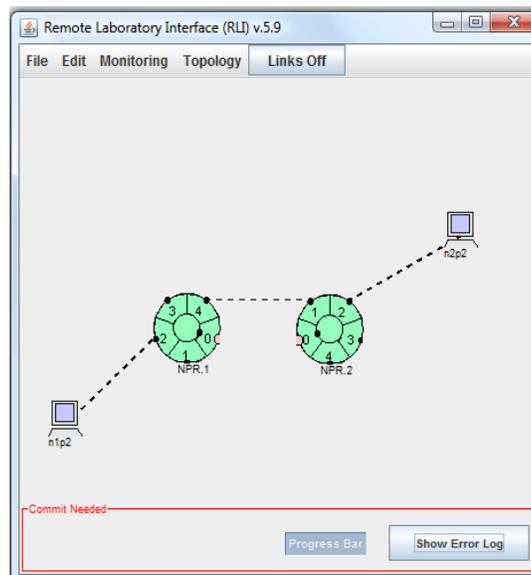

Figure 1: Network topology for lab assignment 3

Start the RLI and open the configuration file.
Four windows are supposed to appear and contain:
- Configured network topology
- Display monitoring the length of queue 64 at port 4 of NPR1
- Display monitoring ACK packets from receiver host to the sender host
- Display monitoring the traffic bandwidth from the sender to the receiver:
  - RXBYTE1.2 – traffic arriving at port 2 of NPR1
  - RXBYTE2.1 – traffic arriving at port 1 of NPR2
  - TXBYTE2.2 – traffic leaving port 2 of NPR2

The experiment will use **iperf** commands to generate UDP and TCP traffic. The commands will be clearly explained whenever they are used. Though, a summary of the iperf commands can be found at the following link:
https://onl.wustl.edu/ → *OLD-NPR Tutorial* → *Filters, Queues and Bandwidth* → *Generating Traffic with Iperf*

❖ Pre-run Analysis

1. Report the threshold (bytes) of queue 64 at port 4 of NPR1

2. Report the bottleneck capacity for the packet path from host n1p2 to host n2p2

❖ **Run-time ONL Experiment**

➢ **UDP traffic flow from host n1p2 to host n2p2**

Build an SSH tunnel to the testbed, start the RLI, open the configuration file lab3.exp, and make reservation for the hardware resources. You can make the reservation (minutes, hours, days, or even weeks) in advance. When your reservation time comes, reestablish the SSH tunnel and commit your topology.

Log into n2p2 through its control network interface name (e.g., onlusr> ssh pc1core49) and execute the command **iperf -s -u** to start the host as a UDP receiver.

Log into n1p2 through its control network interface name and start it as a UDP sender: execute the command **iperf -c n2p2 –u -b 10m -t 20.** The command sets up the sender to transmit at rate of 10 Mbps for 20 seconds. The packets will be received by host n2p2.
3. Include screenshots of the monitoring displays of bandwidth, queue length, and ACK from receiver charts.
4. Explain briefly (1-3 sentences each) the observed behavior of the three charts (Why each chart is the way it is?)

Log into n1p2 through its control network interface name and start it as a UDP sender: execute the command **iperf -c n2p2 –u -b 15m -t 20.** The command sets up the sender to transmit at rate of 15 Mbps for 20 seconds. The packets will be received by host n2p2.
5. Include screenshot(s) of the monitoring displays of bandwidth, queue length, and ACK from receiver charts.
6. Explain briefly (1-3 sentences each) the observed behavior of the three charts (Why each chart is the way it is?)

➢ **TCP traffic flow from host n1p2 to host n2p2**

This section will use the same network topology that was used in the previous section. Note that unlike UDP, TCP periodically sends ACK packets back to the senders.

Log into n2p2 through its control network interface name (e.g., onlusr> ssh pc1core49) and execute the command **iperf -s -w 4m** to start the host as a TCP receiver with 4 MB receiver socket buffer. Note that iperf message indicates that although a TCP window size 4Mbytes was requested, a TCP window size 8Mbytes was granted.

Log into n1p2 through its control network interface name and start it as a TCP sender: execute the command **iperf -c n2p2 -w 3m -t 20.** The command sets up the sender to transmit TCP packets to host n2p2 for 20 seconds. It also requests for a TCP window size 3MB. Iperf message indicates that sender connects to receiver at TCP port 5001 and a TCP window size 6MB is granted.
7. Report traffic size (MBytes) and bandwidth (Mbits/sec) transmitted by host n1p2 as reported by the iperf message.
8. Include screenshot(s) of the monitoring displays of bandwidth, queue length, and ACK from receiver charts.
9. Explain briefly (1-3 sentences each) the observed behavior of the three charts (Why each chart is the way it is?)

Log into n1p2 through its control network interface name and start it as a TCP sender: execute the command **iperf -c n2p2 -w 10m -t 20.** The command sets up the sender to transmit TCP packets to host n2p2 for 20 seconds. It also requests for a TCP window size 10MB. Iperf message indicates that sender connects to receiver at TCP port 5001 and a TCP window size 20MB is granted.
10. Report traffic size (MBytes) and bandwidth (Mbits/sec) transmitted by host n1p2 as reported by the iperf message.
11. Include screenshot(s) of the monitoring displays of bandwidth, queue length, and ACK from receiver charts.
12. Explain briefly (1-3 sentences each) the observed behavior of the three charts (Why each chart is the way it is?)