CS 39006: Networks Lab

Assignment 2: Use Wireshark for Analyzing Network Packet Traces

Date: 24th January, 2017

Objective:

The objective of this assignment is to understand the Wireshark tool and how you can analyse network packet traces. The experiments need to be executed over the Mininet environment. The assignment statements are almost similar to what you have done in Assignment 1, but this time you have to use Wireshark for answering the questions.

Submission Instructions:

You need to preparte a report that will contain the followings.

1. Steps followed in executing the experiments.
2. Observations from the experiments.
3. Intuitive justification behind the observations.

You need to submit the report and relevant scripts (source files) in a single compressed (tar.gz) file. Rename the compressed file as Assignment_1_Roll1_Roll2.tar.gz, where Roll1 and Roll2 are the roll numbers of the two members in the group. Submit the compressed file through Moodle by the submission deadline. The submission deadline is: **January 31, 2017 02:00 PM.** Please note that this is a strict deadline and no extension will be granted.

Please note that your submission will be awarded zero marks without further consideration, if it is find to be copied. In such cases, all the submissions will be treated equally, without any discremination to figure out who has copied from whom.

Assignment Statement:

This assignment has three parts.

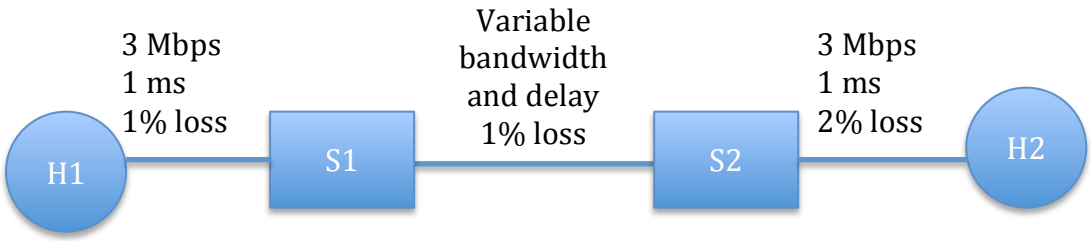
Part 1: Construct the following topology using Mininet.

The two hosts are connected via a switch. Both the links from H1 to the switch and H2 to the switch have 1 Mbps bandwidth, 1 ms of propagation delay and no channel loss.
Now run a *iperf* server at H2 and a *iperf* client at H1. Capture packet traces at H1 and H2.

(1) List the different types of packets that you observe in the packet trace.
(2) Analyse the packet trace and compute the followings,
  (a) Normalized TCP goodput between the server and the client (use default TCP parameters as provided by *iperf*). Normalized TCP goodput = total amount of data received/total amount of data sent
  (b) UDP throughput (amount of UDP data received per second) for following cases of UDP traffic generation rates (bandwidth),
    I. 64 Kbps
    II. 128 Kbps
    III. 256 Kbps
    IV. 512 Kbps
    V. 1024 Kbps
    VI. 2048 Kbps
    VII. 4096 Kbps
  (c) Compute normalized UDP throughput for the above cases. Normalized UDP throughput = UDP data received/UDP data sent
  (d) Compute number of UDP packets dropped (packet loss) for the above cases.

Plot the UDP throughput, UDP normalized throughput, and UDP packet loss, with respect to the UDP bandwidth. What is your observation from these plots.
NB: You may use the open source utility gnuplot (http://www.gnuplot.info/) to plot the graph.

Part 2: Costruct the following topology using Mininet.



In this experiment, you need to check the effect of bandwidth and delay of the link between the switches S1 and S2 (written as S1-S2) over UDP throughput and packet loss.
Run *iperf* server at H2, and from the *iperf* client at H1, execute the sequence of experiments for UDP as given in the previous part (Part 1) of the assignment. Capture packets at H1, S1, S2 and H2. Generate the graphs (UDP throughput, UDP normalized throughput and UDP packet loss) for following configurations of S1-S2 link,

(a) Bandwidth = 512 Kbps, Delay = 1 ms
(b) Bandwidth = 512 Kbps, Delay = 10 ms
(c) Bandwidth = 512 Kbps, Delay = 100 ms
(d) Bandwidth = 1 Mbps, Delay = 1 ms
(e) Bandwidth = 1 Mbps, Delay = 10 ms
(f) Bandwidth = 1 Mbps, Delay = 100 ms
(g) Bandwidth = 2 Mbps, Delay = 1 ms
(h) Bandwidth = 2 Mbps, Delay = 10 ms
(i) Bandwidth = 2 Mbps, Delay = 100 ms

In each of the cases, find out UDP normalized throughput and UDP packet loss. From the packet traces at S1, S2 and H2, compute what fractions of packets have been lost at each of S1, S2 and H2.