ECE/CSC 573 Project 2

Student 1: ID:200200390

Student 2: ID:200199769

1. Record the size of the file transferred and the round-trip time (RTT) between client and server:

traceroute to 152.46.19.25 (152.46.19.25), 30 hops max, 60 byte packets

1 ec2-52-15-0-136.us-east-2.compute.amazonaws.com (52.15.0.136) 14.217 ms 14.208 ms ec2-52-15-0-130.us-east-2.compute.amazonaws.com (52.15.0.130) 20.066 ms

2 100.64.0.200 (100.64.0.200) 14.420 ms 100.64.2.12 (100.64.2.12) 23.105 ms 100.64.3.72 (100.64.3.72) 12.751 ms

3 100.66.2.102 (100.66.2.102) 12.624 ms 100.66.3.12 (100.66.3.12) 25.934 ms 100.66.3.130 (100.66.3.130) 19.220 ms

4 100.66.6.45 (100.66.6.45) 17.704 ms 100.66.7.33 (100.66.7.33) 17.181 ms 100.66.7.165 (100.66.7.165) 12.282 ms

5 100.66.4.209 (100.66.4.209) 19.817 ms 100.66.4.73 (100.66.4.73) 20.114 ms 100.66.4.231 (100.66.4.231) 19.717 ms

6 100.65.8.65 (100.65.8.65) 0.490 ms 100.65.9.33 (100.65.9.33) 0.321 ms 100.65.10.1 (100.65.10.1) 0.289 ms

7 52.95.1.37 (52.95.1.37) 1.253 ms 1.427 ms 1.415 ms

8 52.95.1.170 (52.95.1.170) 7.521 ms 52.95.1.86 (52.95.1.86) 2.581 ms 52.95.1.226 (52.95.1.226) 7.270 ms

9 52.95.1.179 (52.95.1.179) 0.786 ms 52.95.1.173 (52.95.1.173) 0.746 ms 52.95.2.1 (52.95.2.1) 0.780 ms

10 100.91.39.84 (100.91.39.84) 22.898 ms 100.91.39.36 (100.91.39.36) 16.579 ms 100.91.39.86 (100.91.39.86) 15.845 ms

11 52.93.128.183 (52.93.128.183) 11.348 ms 11.414 ms 11.414 ms

12 100.91.29.85 (100.91.29.85) 11.392 ms 100.91.29.87 (100.91.29.87) 11.123 ms 100.91.29.37 (100.91.29.37) 11.460 ms

13 52.95.62.126 (52.95.62.126) 22.854 ms 52.95.62.146 (52.95.62.146) 15.477 ms 52.95.62.60 (52.95.62.60) 13.475 ms

14 52.93.249.28 (52.93.249.28) 11.142 ms 100.91.28.198 (100.91.28.198) 10.591 ms 52.93.249.14 (52.93.249.14) 11.398 ms

15 72.21.221.81 (72.21.221.81) 11.389 ms 72.21.221.65 (72.21.221.65) 10.805 ms 72.21.221.81 (72.21.221.81) 10.822 ms

16 ae-1.4070.rtsw.chic.net.internet2.edu (64.57.28.104) 19.789 ms 19.613 ms 19.629 ms

17 ae-2.4070.rtsw.atla.net.internet2.edu (198.71.45.61) 26.829 ms 26.630 ms 26.682 ms

18 lo-0.8.rtsw.char.net.internet2.edu (64.57.20.139) 26.941 ms 26.958 ms 27.011 ms

19 198.71.47.218 (198.71.47.218) 27.701 ms 27.718 ms 27.733 ms

20 rtp-ip-asr-gw-to-hntvl-ip-asr-gw.ncren.net (128.109.9.217) 27.591 ms 27.487 ms 52.737 ms

21 mcnc-dcs-to-rtp-ip-asr-gw.ncren.net (128.109.191.98) 27.705 ms 27.571 ms 27.590 ms

22 152.46.46.18 (152.46.46.18) 27.571 ms lo-0.8.rtsw.char.net.internet2.edu (64.57.20.139) 26.847 ms 152.46.46.18 (152.46.46.18) 27.617 ms

23 bn19-25.dcs.mcnc.org (152.46.19.25) 27.577 ms 27.571 ms 27.565 ms

So, the hop-count is 23 and there is a delay of 27.5 ms between the client and server.

Based on the line chart above, we observed that as the window size increases, the average delay of transmission decreases. Yet, as the window size exceeds 16, the delay became stable. We guess that it’s because the total propagation delay of less window size is larger than the large window size, which means the processing, queueing, transmission delay isn’t the dominant delay in this scenario.

This graph represents the average delay vs the MSS size. This result, as shown in the graph is expected. The delay decreases as the MSS increases. This relationship seems to non-linear in nature. The decrease in delay with increasing MSS is expected as the number of packets is less when MSS in high and vice versa. So, the program needs to send less number of header bytes. Also, the window size is fixed, so if the MSS is bigger, a single window would be able to send more data and hence the program can finish early.

3.

Explanation:

This graph represents the average delay vs the loss probability. This result, as shown in the graph is expected. The delay increases as the loss probability increases. This relationship seems to non-linear in nature(more likely a quadratic). The decrease in delay with increasing MSS is expected as the number of packets that needs to be resent is less when loss probability is low and vice versa. Higher loss probability means more numbers of packets are dropped and hence needs to re-transmitted.