Computer Network

HW #1 Performance Analysis Report

2011-11752 Gyewon Lee

# Implementation

As written in the HW specification, I used TCP socket for transferring data from the server to client. For the client packet, I used 3 bytes for each packet. The first byte indicates the packet type (ACK, R, F) and the other two bytes are used to specify the target file and the window size. For the server packet, I used the first one byte for the indication of whether it’s the final packet or not and the rest 999 bytes for the data transmission.

# Environment

I tested the program on the cn(147.46.240.40) and cn2(147.46.240.208) server provided by SCONE Lab. I run the implemented server on cn and the client on cn2.

# Theoretical analysis

Because the client and server are both in SNU subnet (147.46.x.x), I assumed that they are connected via 1Gbps LAN. So, the time needed for transferring 1000-byte packet is 8us. Compared to the ACK delay (1, 10, 100ms), the transmission delay is very small, so almost all transmission time will be consumed while waiting for the ACK. From this, we can assume transmission time will increase linearly as ACK latency increases and average transmission speed will increase linearly as the number of windows increases.

The sizes of files are big enough compared to the packet size, so we can safely ignore the initialization cost. So, we can also think that the overall transmission time will increase, proportional to the size of the file.

# Experiment result

As written in the specification, I tested 10MB, 20MB, and 30MB file for varying ACK delay of 1, 10, 100ms and window size of 1, 2, 4, 8.

First, I investigated the relationship between file size and transmission time for diverse sizes of window. The ACK delay for this case is 1ms. Below is the result graph.

We can see that transmission time is proportional to the data size in all window sizes, as we thought earlier.

Next, I observed the average transmission speed with varying ACK latency and window size. The graph for this is below.

We can observe that transmission speed is proportional to size of window. We can also see that speed is also proportional to ACK delay.

The experiment result is not far from the result we expected earlier. However, it can be different on other environments, such as slower LAN or even harsher environments like wireless network. For 10Mbps LAN, transmission time for 8 window becomes 6.4ms, and it can become a major factor of determining the transmission speed.