

COMP 4985

Assignment 2

Technical Report

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# Introduction

It is commonly known that UDP is fast, but not stable because it doesn't have an error detection feature, on the other hand TCP is relatively slow, but stable with the presence of ACK. The report introduces the experiment where TCP and UDP will be compared in various conditions to observe if that presumption is correct and to improve our understanding of the of TCP and UDP using our program 'TCP UDP Analyzer'.

The 2 variables are going to be used for this experiment.

- Packetsize (1KB, 4KB, 20KB, 60KB)
- The number of packets to send (10, 100)

And here are several factors to check.

- Transmission delays(on each of client and server side)
- Packet loss

To conduct this experiment, two tools are used.

- Wireshark
- TCP UDP Analyzer

Wire shark is an open source packet analyzer that captures data packets that are received and sent on a certain interface. By using this tool, it can be observed that what data packets actually arrived and departed from our network card with the accurate timestamp.

On the other hand, TCP UDP Analyzer, is the tool to be used to send and receive data packets between two machines. This program can be either of Client or Server providing the option to choose the protocol. On client side, user can choose the size of the packet and the number of the packets to send. It can also choose to send whether data packet is stuffed with a random character or a text file. On server side, user can set up the expected size of the packet to change the buffer size for receiving and expected number of incoming packets. Server side also can store incoming data into a text file.

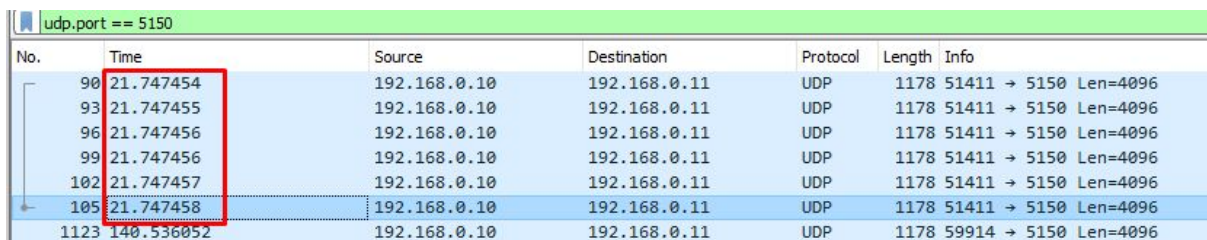
The result of the experiment will be shown as a bar graph to help noticing the difference between those two protocols.

# Analysis

## Transmitting time (Wired LAN)

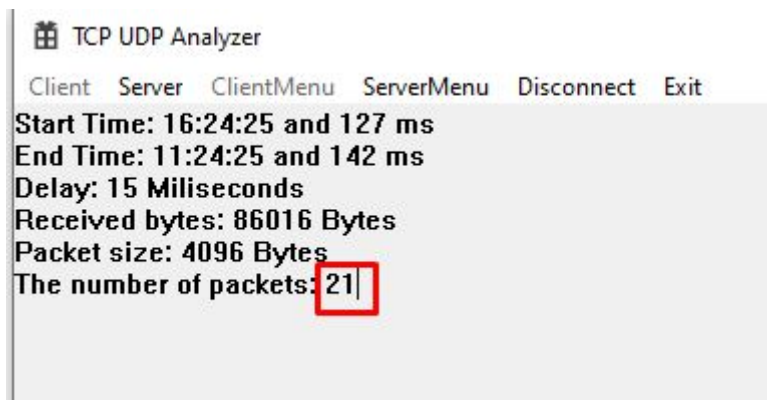
In this section, the methods to measure the specification will be explained, and the result will be displayed with explanation.

The time that takes for the all packets sent arrive to server is measured through Wireshark by subtracting the time when first packet arrived from the time when last packet arrived as the following screenshot.



No.	Time	Source	Destination	Protocol	Length	Info
90	21.747454	192.168.0.10	192.168.0.11	UDP	1178	51411 → 5150 Len=4096
93	21.747455	192.168.0.10	192.168.0.11	UDP	1178	51411 → 5150 Len=4096
96	21.747456	192.168.0.10	192.168.0.11	UDP	1178	51411 → 5150 Len=4096
99	21.747456	192.168.0.10	192.168.0.11	UDP	1178	51411 → 5150 Len=4096
102	21.747457	192.168.0.10	192.168.0.11	UDP	1178	51411 → 5150 Len=4096
105	21.747458	192.168.0.10	192.168.0.11	UDP	1178	51411 → 5150 Len=4096
1123	140.536052	192.168.0.10	192.168.0.11	UDP	1178	59914 → 5150 Len=4096

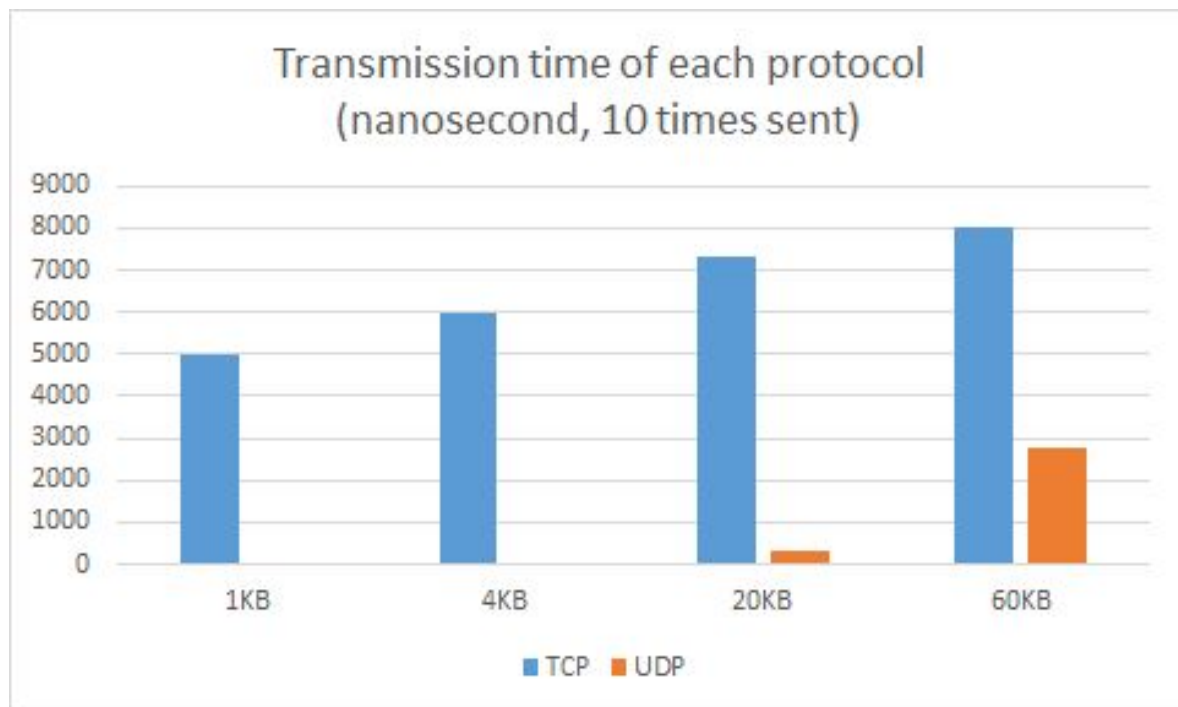
The number of packets lost is measured by TCP UDP Analyzer to count the number of the completion routine is called as the following screenshot.



The result of the test using this methods to measure is as following table and graph.

### 10packets sent

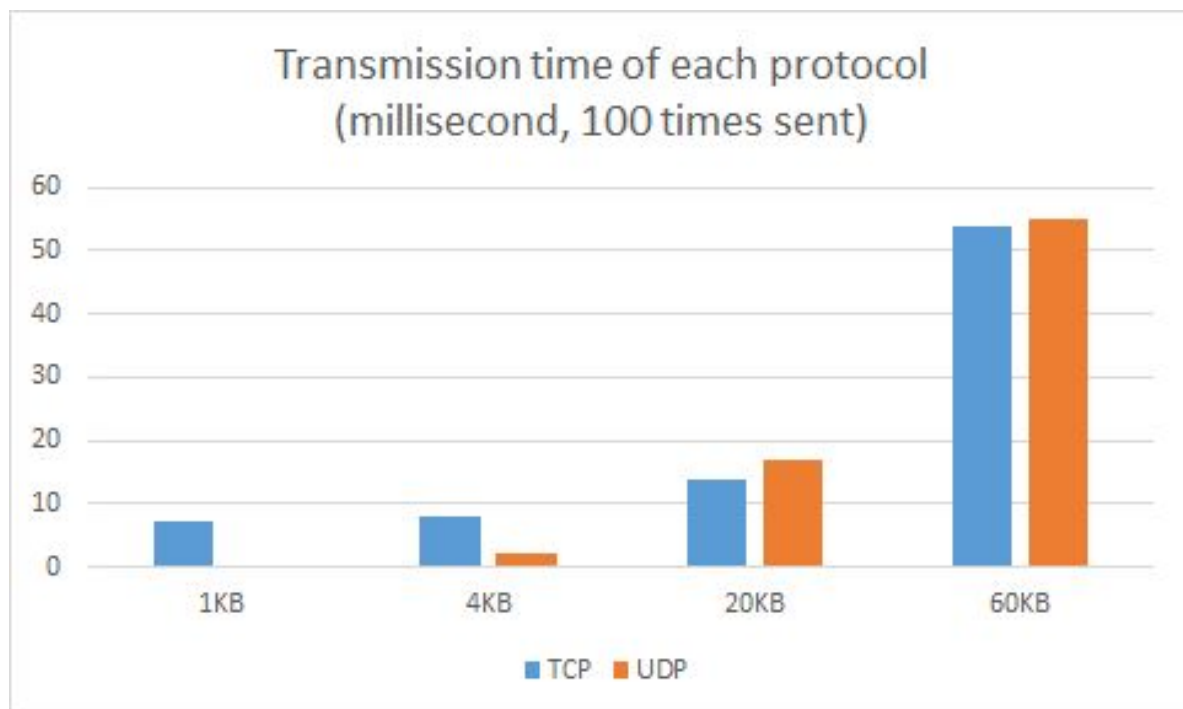
10 packets	1KB	4KB	20KB	60KB
TCP	5ms	6ms	5.5ms	8ms
UDP	5ns	5ns (4packets lost)	334ns (5packets lost)	2.8ms (3packets lost)



When small number of packets are sent, it is noticed that UDP is much faster than TCP. For 1KB size of packet, the time taken in TCP protocol is 1000times faster than the time taken in TCP.

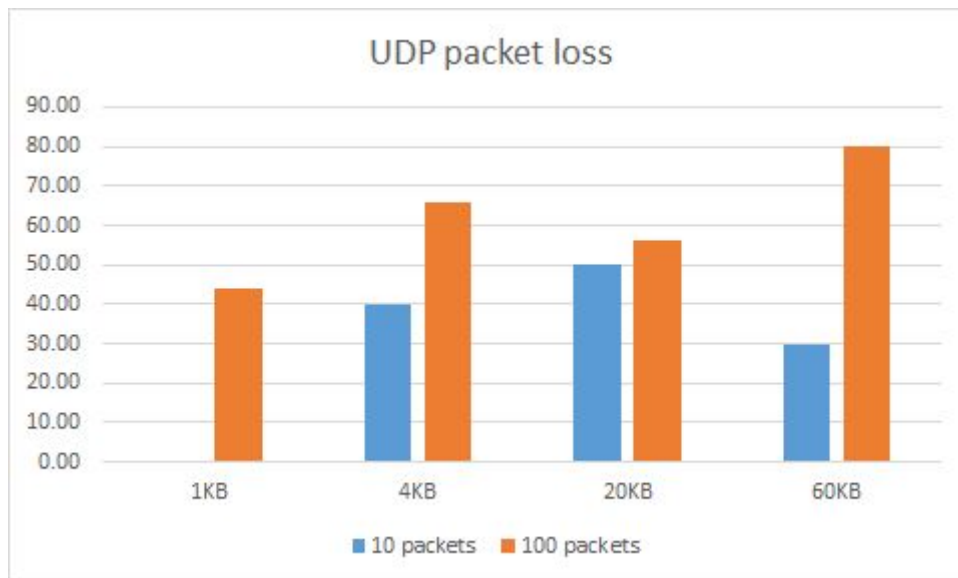
### 100packets sent

100 packets	1KB	4KB	20KB	60KB
TCP	7.4ms	8ms	14ms	54ms
UDP	5ns (44packets lost)	2ms (79packets lost)	17ms (56packets lost)	55ms



It is noticed if the number of transmission is bigger the gap between the time that takes to transmit the all packets in each protocol gets smaller. Even when the packet size is over 20KB, UDP gets slower than TCP to send the packets.

## UDP packet loss



It is noticed that if the number of packets to send is big, it tends to have a bigger chance to lose the packets in UDP.

## Conclusion

Like the common knowledge, it is observed that UDP is much faster, but it has a risk to lose the packets, but TCP is slower, but stable. However, UDP seems stable in a certain constraint, such as small packet size and less number of transmission at the same time. Therefore, depending on the purpose of the transmission or the type of the data, developers can consider to use UDP for transmitting data.