CS447 – Computer Networks

Project Test Report

A comparison between UDP and TCP

1. **Introduction**

Socket library, base64 library pyhton 3.9

udp için buffersize’a göre datayı chunklara böylen, o chunk’ları gönderdik. Server kod

TCP and UDP (Acronyms for Transmission Control Protocol and User Datagram Protocol respectively.) are both transport layer protocols used for transporting application layer messages through computer networks. They are the most prominent protocols in current use besides the IP protocol. (Which will not be in the scope of this report)

The purpose of this report will be to analyze and investigate these two protocols and observe these two protocols work in practice. We will be conducting a set of tests to see how differing transmission sizes will affect both protocols and how UDP and TCP differ from each other in practice.

1. **Setup**

To conduct these tests, and observe UDP and TCP we have created two pairs of Python code. One pair for UDP and one pair for TCP. We have used latest Python library, *Python 3.9.0* to make these classes of code. To further create network interfaces for these codes we have also used the *socket.py* interface in both pairs. Purpose of this is to create and work with network sockets.

One additional interface we have used for the UDP pair is the *base64.py* interface. The purpose of this interface is to turn the test data into a format that UDP can transmit across.

The class pairs, for both protocols, are consisting of one client and one server class. Upon correct execution of a pair a given text file will be transmitted between the ports created by these classes. The exact relationship between pairs of UDP and TCP classes are not the same due to the implementation of the python code by the project group members, but these small differences does not hinder our experiments.

Fuhrer explanation for the workings of these pairs of classes are given in the testing segment of this report. But for a brief explanation of this difference between UDP and TCP pairs is that while TCP server class sends the given data text file to the client, UDP client send the given data to the server by splitting the data into small ‘chunks’ that can fit the buffer and then sending them.

To observe these classes working and sending each other this data we will be using latest available version of the Wireshark software. Which enables us to track the data packets coming and going from the sockets and the addresses.

1. **Testing**

TCP pair works as follows: In order the tester executes server class and the client class. Server, once executed will create a port and begin listening for the client to be executed, and reach out to Server itself. When this TCP connection is established then server will start to transmit given data to the client side. Once the data is finished the connection between server and the client will be closed.

UDP pair works different from the TCP pair. Order of the execution of the classes is the same, first the server class then the client class. Once ran, server will listen for client. The differences begin with how client works. Instead of making a connection to UDP server instead client will send the data transmission to server’s hard coded port number. To send the data client will divide it according to the buffer size, then begin transmitting.

To observe how these two procedures, react to a varying data size, we will be testing both of them with tree different data to be transmitted. Ranging from smallest to largest, tests A, B and C are using 2KB, 156KB and 1.790KB .txt files to use in transmission respectively. This range of variance in data size should be enough to highlight any differences of how UDP and TCP scale with transmission size.

To observe these tests, we will be using Wireshark packet sniffer. Which will be able to show us the packets send to the specific ports. It’s I/O graphs will be of use to show packet sending rates for the procedures. And for ITP we will be able to analyze throughput, window size scaling and other useful data.

**3.1 Expectations**

What we are expecting to see from these tests are the foretold properties of the both protocols. We expect UDP to be less reliable than TCP with a number of packets lost during their transportation to various circumstances of the network they are transmitted through. For TCP we are also expecting both client and the server to establish a dedicated ‘handshake’. Also we expect its transfer window size to be changing with time.

1. **Test Results**
2. **Conclusion**