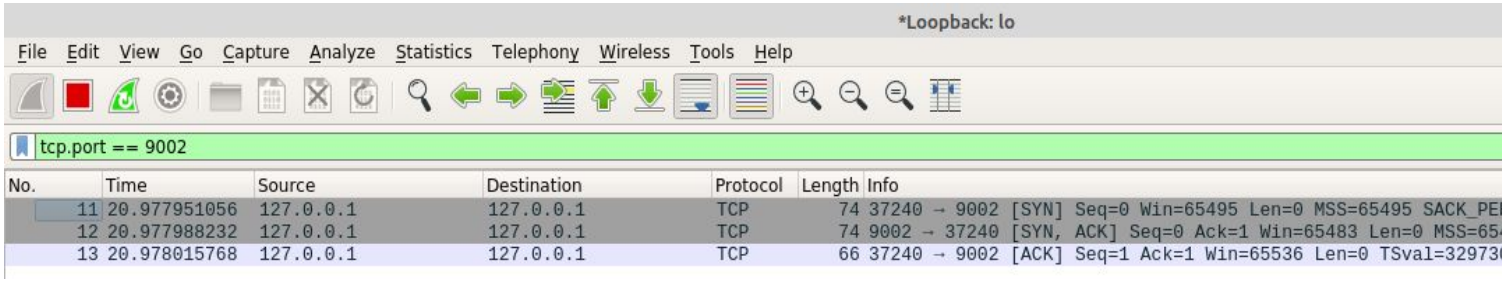
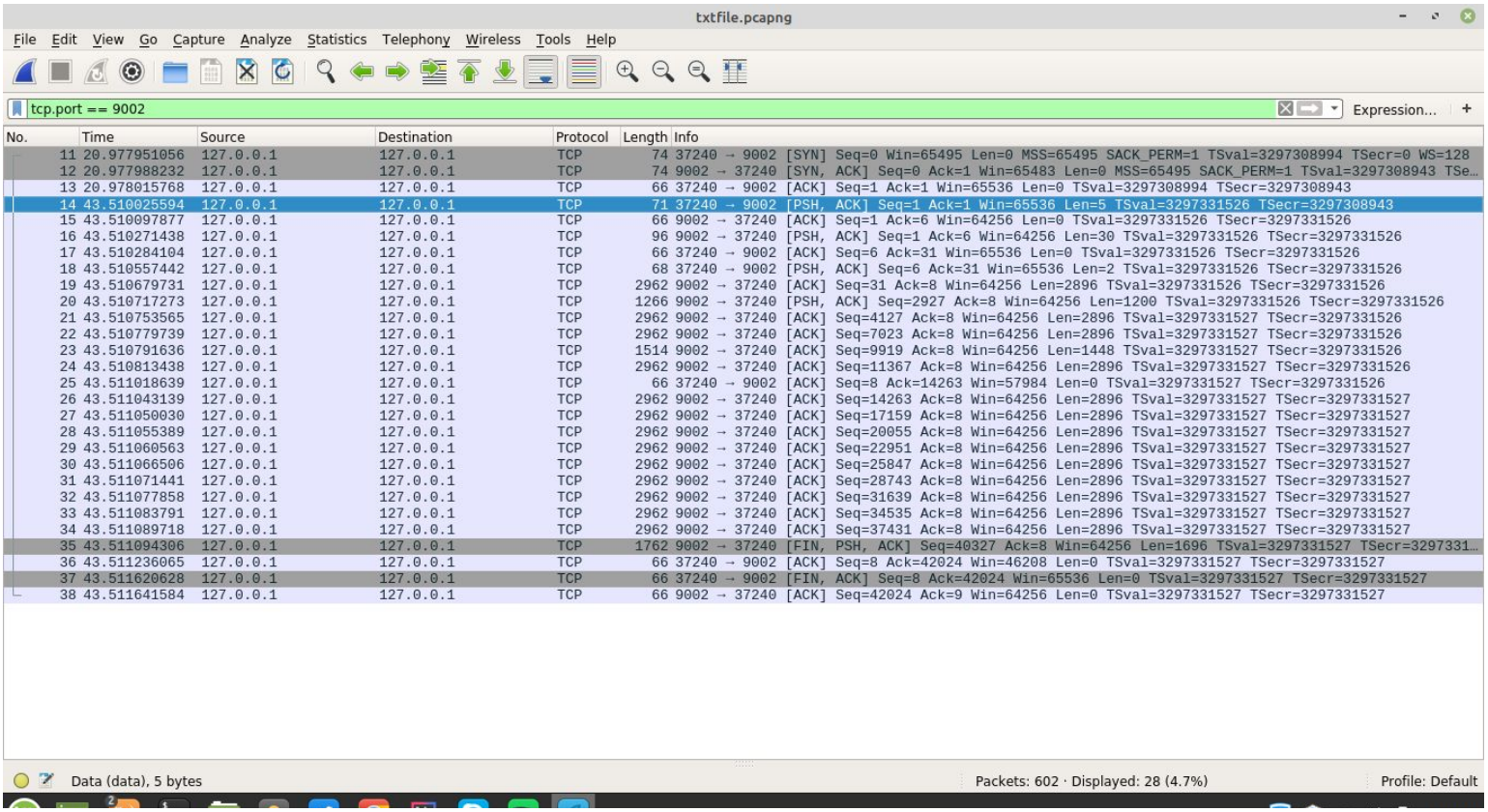
Assignment 1

Q1. Please find attached code files in their respective folders.

Q2. I have attached the screenshots below and in the zipped file also, please also find the **pcap** file attached, in case screenshots are not clear.



The above screenshot was taken when the connection was established and the client now waits for the name of the file from the user.**(Screenshot 1)**



This screenshot was taken when the file transfer was successfully completed and the client disconnects. **(Screenshot 2)**

Answers for question 2

a. How many TCP connections are made?

One TCP connection is made between the server and the client.

b. What is the port number of the server and what is that of the client?

Port number for Server: 9002

Port number for Client: 37240

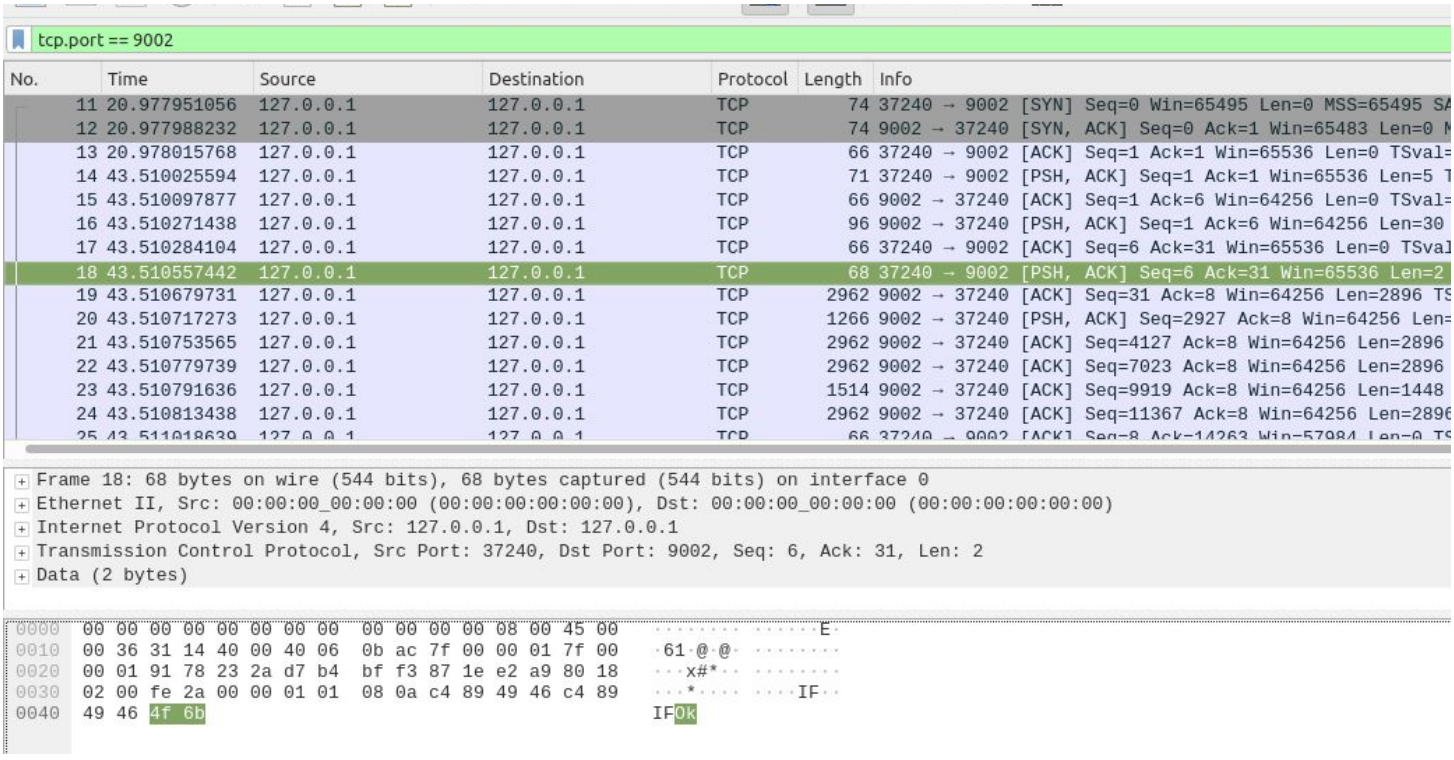
c. How many packets are exchanged between client and server?

28 packets.

You can see this on screenshot 2 at the bottom. **(Displayed: 28)**

d. How much time is needed to download the file?

I have considered that the time to download the file is the time period between sending an **acknowledgement** from **client to server**, of the **last data packet** of the text file being received successfully **and** sending the **first data packet** of the text file from the **server to the client**.



The above screenshot shows **“Ok”** message sent from **client to server** in **the packet no. 18**, I have sent this message as a **notification from the client to the serve**r that the client has created a new file pointer and is now ready to write on that file. This can be observed in the

above screenshot, below the Data section. **(Screenshot 3 / 3.png).** So the packet after this must **begin** the transfer of a file/download, which is **packet no. 19.**

For the packet number that marks the end of the file, we need to see the acknowledgement sent from client to server just before the client disconnects. This can be seen in the **packet number 36**, where we send an acknowledgement from client to server just before it disconnects (send the FIN packet).

For File size = 42Kb

The time required to download the file =

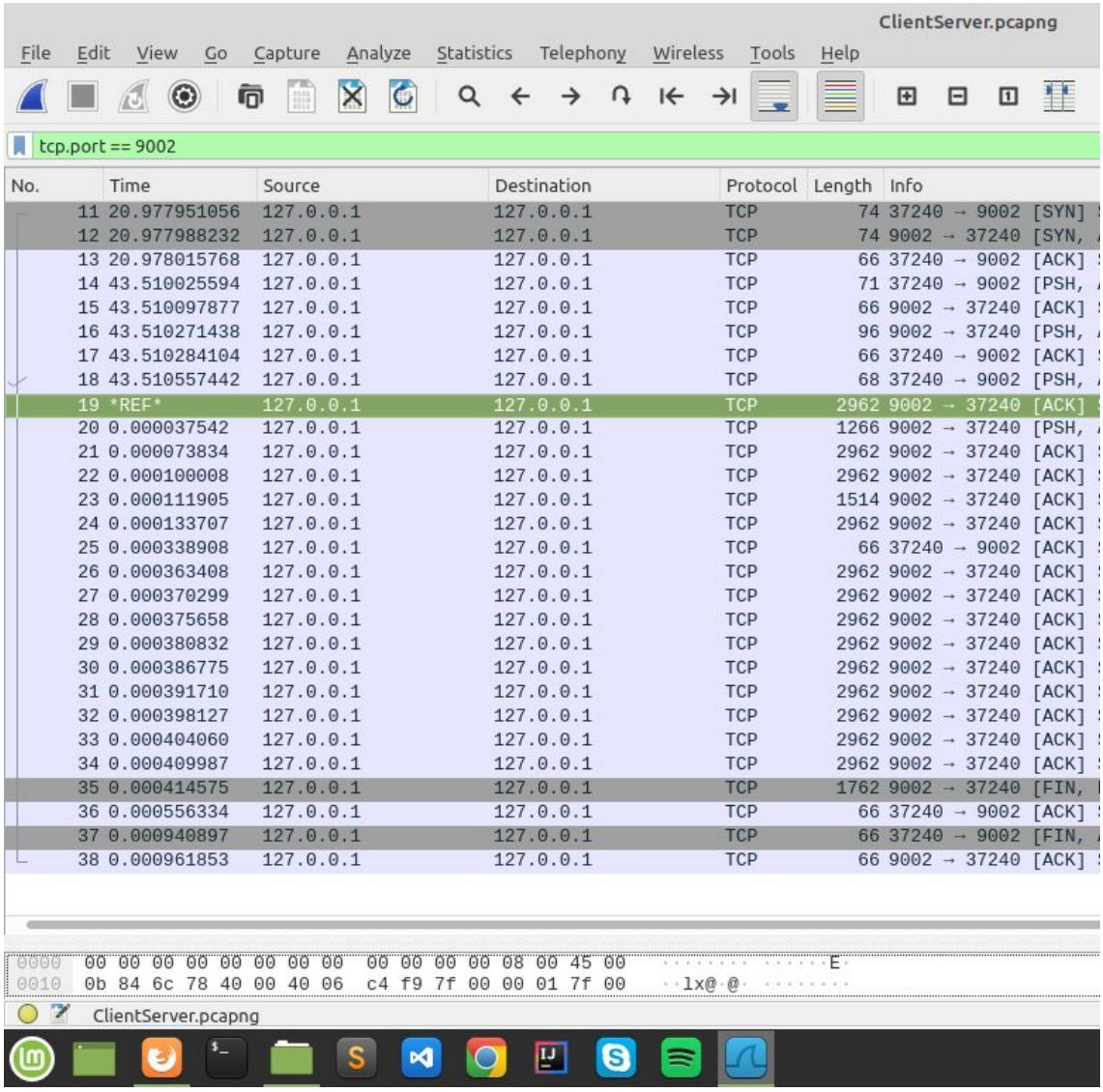
= Time of packet 36 - Time of packet 19 [Explaination mentioned above]
(Download ends) (Download starts)

= 43.511236065 seconds - 43.510679731 seconds

= 0.000556334 seconds

= 0.556334 Milliseconds

You can set the packet 19 as a reference and then you can get the time directly from Wireshark for the Packet number 36. The screenshot is attached below.



(Screenshot 4)