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Lab 02: Ethernet Cable wiring and TCP packet Tracing

CS3263 : Embedded computer networks

A. The 3 way handshake

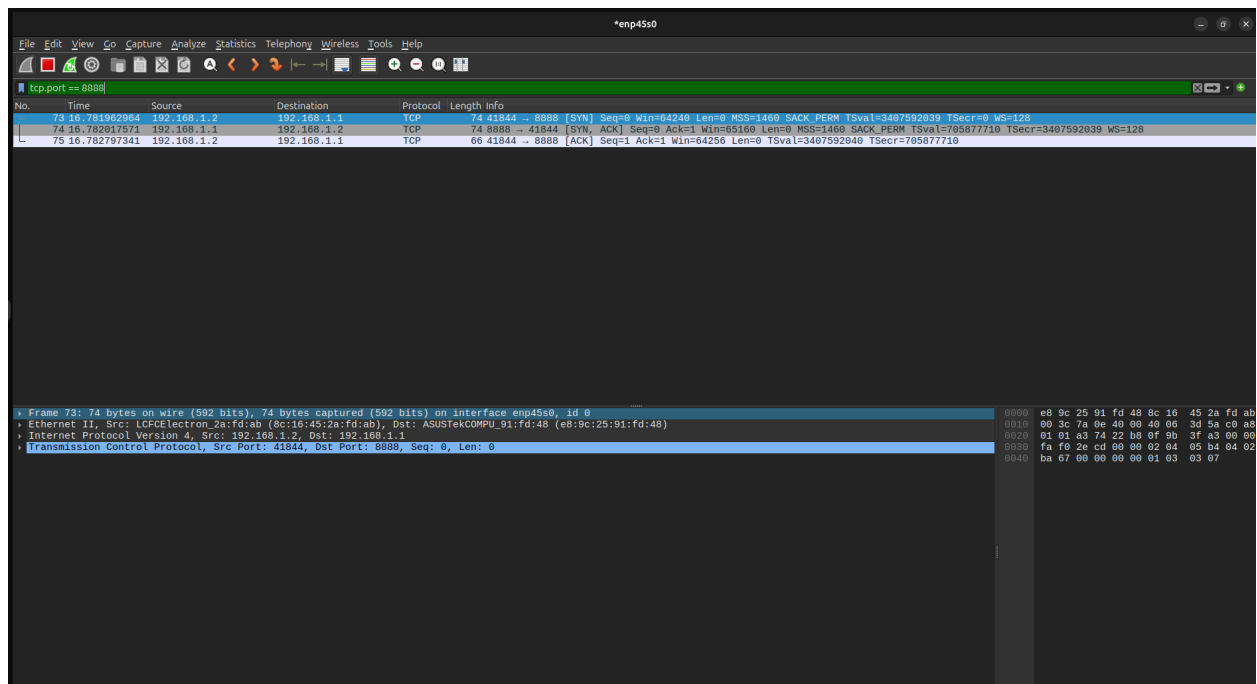


Fig01: connection establishment with 3 way handshake

The TCP-3 way handshake is a foundational process used to establish a reliable, full duplex, connection oriented session between a client and a server before data transfer.

Three packets involve:

1. SYN - synchronize
2. SYN-ACK - synchorinize - Acknowledgement
3. ACK - Acknowledgement

Flow:

Firstly, the client sends a tcp segment with the SYN flag set to the server, indicating a desire to start communication and establishing an initial sequence number.

Then the server responds with a SYN-ACK packet which acknowledges the client segment(ACK) and synchronizes its own sequence number.

Last, ACK, the client sends an ACK packet back to the server, conforming receipt of the server's SYN-ACK.

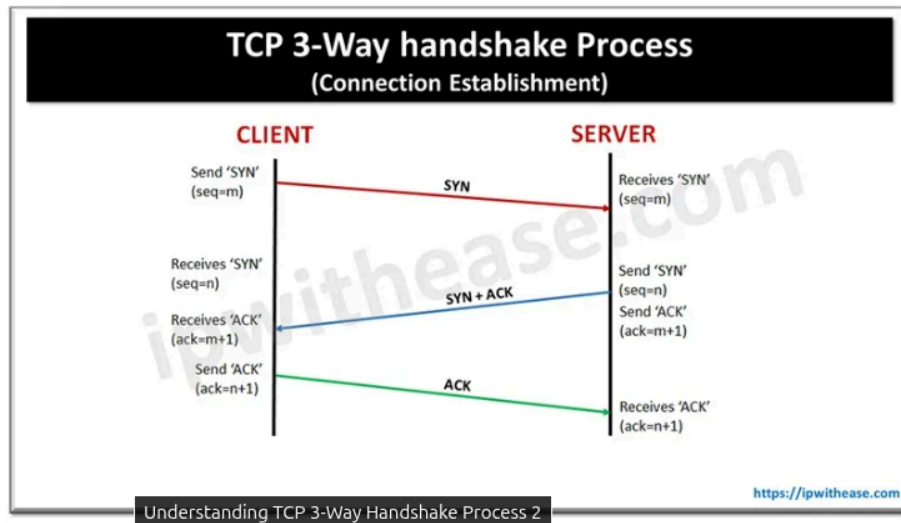


Fig02: How the 3 way handshake works

Resource : <https://ipwithease.com/understanding-tcp-3-way-handshake-process/>

B. Data Transfer

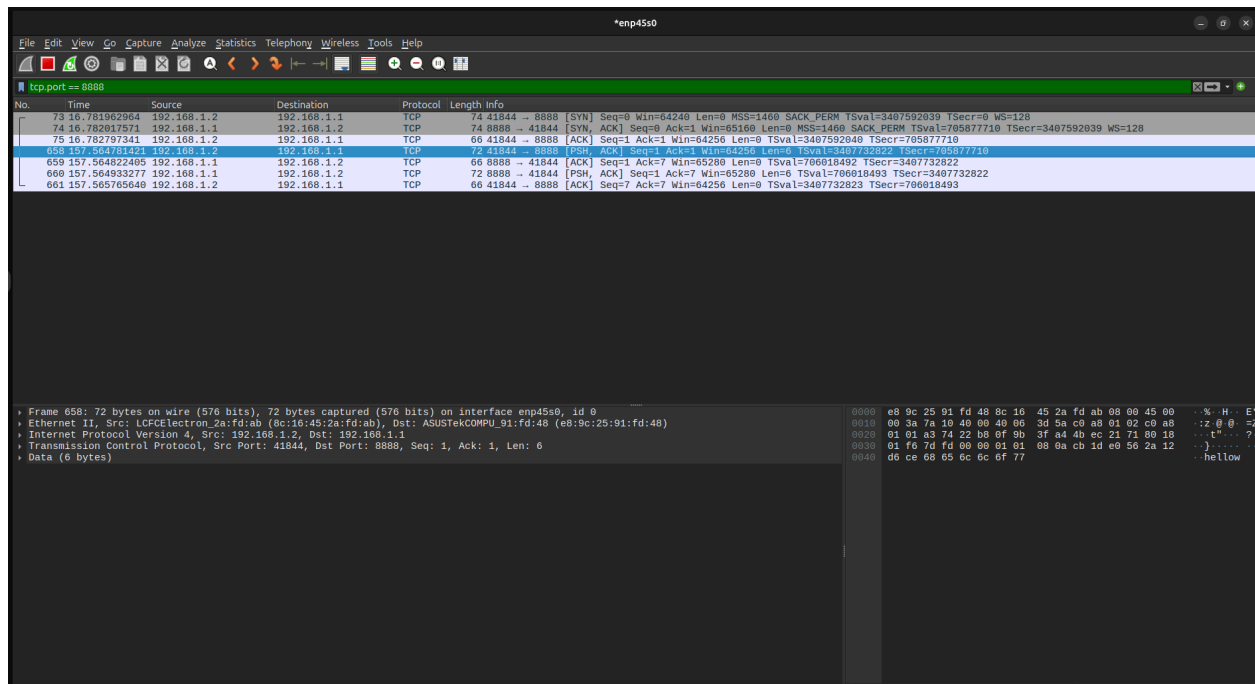


Fig03: Data Transfer capturing

The Flag PUSH-ACK: A packet has both the push flag set to deliver data immediately (by passing a buffer) and ack flag to conform receipt of previous data.

As In the Fig03 you can clearly see the push packet containing the message.

C. Connection Termination

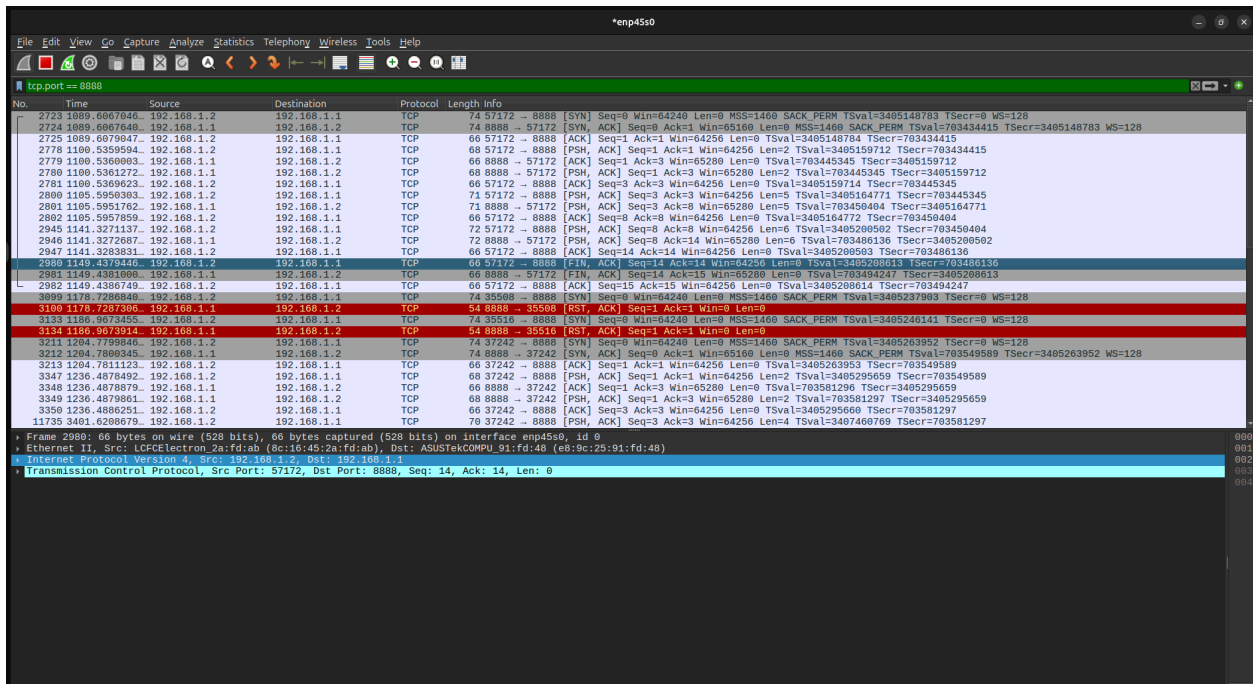


Fig04: connection Termination packet capturing

The TCP handshake termination is a 4-way handshake process using FIN(Finish) and ACK (Acknowledge) flags to ensure both sides have set all data.

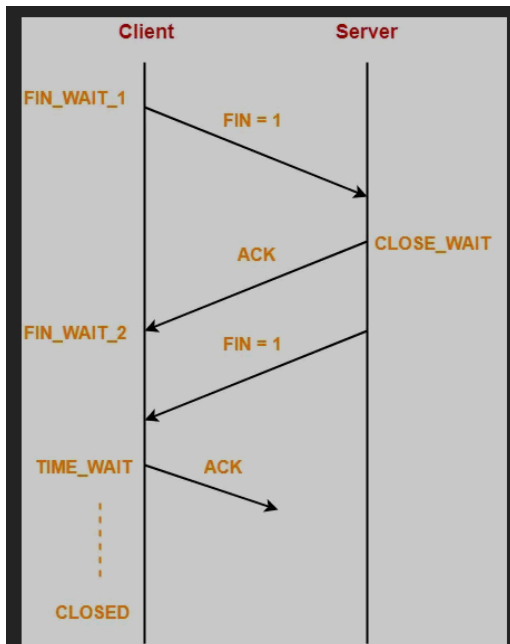


Fig05: the Flow of the termination

Flow:

Firstly the client sends a segment with FIN flag set to signal , its done sending data.

The receiver, server acknowledges the FIN with an ACK. The connection is Half closed now.

Then the server is also done sending data, it sends its own FIN segment to the Client.

Lastly, the client acknowledges the server's FIN with a final ACK and the connection is fully closed.

References : <https://ipwithease.com/tcp-connection-termination/>
<https://www.gatevidyalay.com/tcp-connection-termination-tcp-protocol/>
<https://www.geeksforgeeks.org/computer-networks/tcp-connection-termination/>

AI usage disclosure:

“ I have used AI to debug the code and to find the short, fast readable resources. ”