TCP CONNECTION ESTABLISHMENT

TCP (Transmission Control Protocol) connection establishment involves a process known as the **three-way handshake**. This sequence ensures that both the client and the server are ready to communicate and agree on initial parameters. Here's a detailed breakdown:

Three-Way Handshake Process

1. **SYN (Synchronize) Packet:**
    - The client sends a SYN packet to the server to initiate a connection.
    - The packet contains an initial sequence number (ISN), which is a random number used to track the bytes in the stream.
2. **SYN-ACK (Synchronize-Acknowledge) Packet:**
    - The server receives the SYN packet, acknowledges it by sending a SYN-ACK packet back to the client.
    - The SYN-ACK packet contains the server's own sequence number (Server_ISN) and an acknowledgment number, which is the client's ISN incremented by one.
3. **ACK (Acknowledge) Packet:**
    - The client receives the SYN-ACK packet and responds with an ACK packet.
    - The ACK packet contains an acknowledgment number, which is the server's ISN incremented by one.

At this POint, the TCP connection is established, and data can be exchanged between the client and the server.

Key Points

- **Sequence Numbers:** Each side picks a random starting sequence number to ensure uniqueness and security.
- **Acknowledgments:** Each acknowledgment number confirms receipt of data and the expectation of the next byte.
- **Three-Way Handshake:** This process ensures that both sides are ready to send and receive data, preventing old or duplicate packets from interfering with the new connection.

This handshake process is crucial for ensuring a reliable connection, as it verifies that both parties are ready to communicate and agree on the parameters for the data transfer.