TCP 3-Way Handshake Process

Difficulty Level : Easy   ●   Last Updated : 26 Oct, 2021

This could also be seen as a way of how TCP connection is established. Before getting into the details, let us look at some basics. TCP stands for **Transmission Control Protocol** which indicates that it does something to control the transmission of the data in a reliable way.

The process of communication between devices over the internet happens according to the current **TCP/IP** suite model(stripped out version of OSI reference model). The Application layer is a top pile of a stack of TCP/IP models from where network referenced applications like web browsers on the client-side establish a connection with the server. From the application layer, the information is transferred to the transport layer where our topic comes into the picture. The two important protocols of this layer are – TCP, **UDP(User Datagram Protocol)** out of which TCP is prevalent(since it provides reliability for the connection established). However, you can find an application of UDP in querying the DNS server to get the binary equivalent of the Domain Name used for the website.
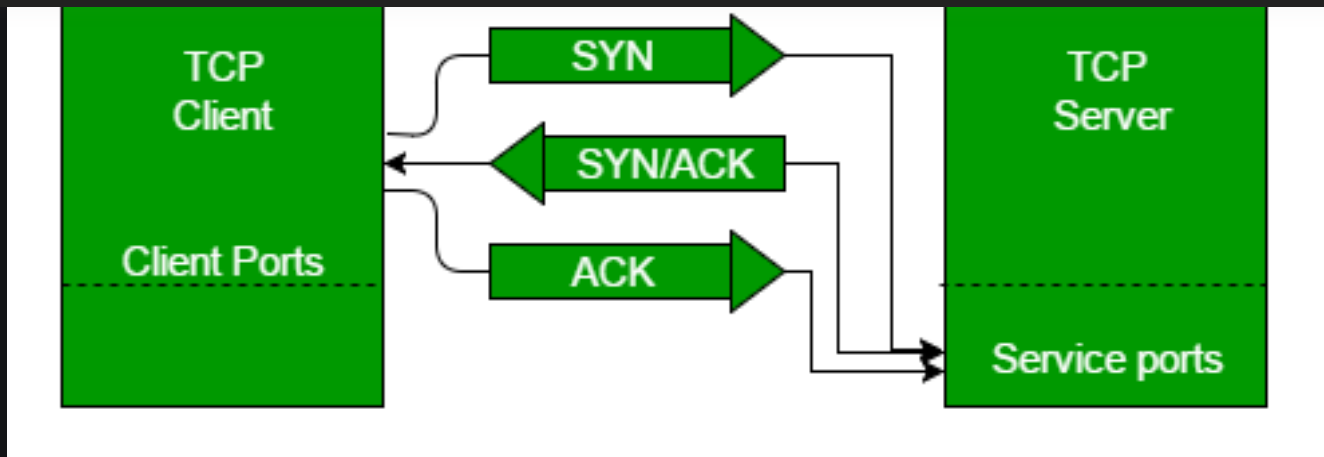
TCP provides reliable communication with something called **Positive Acknowledgement with Re-transmission(PAR)**. The Protocol Data Unit(PDU) of the transport layer is called a segment. Now a device using PAR resend the data unit until it receives an acknowledgement. If the data unit received at the receiver's end is damaged(It checks the data with checksum functionality of the transport layer that is used for Error Detection), the receiver discards the segment. So the sender has to resend the data unit for which positive acknowledgement is not received. You can realize from the above mechanism that three segments are exchanged between sender(client) and receiver(server) for a reliable TCP connection to get established. Let us delve into how this mechanism works :
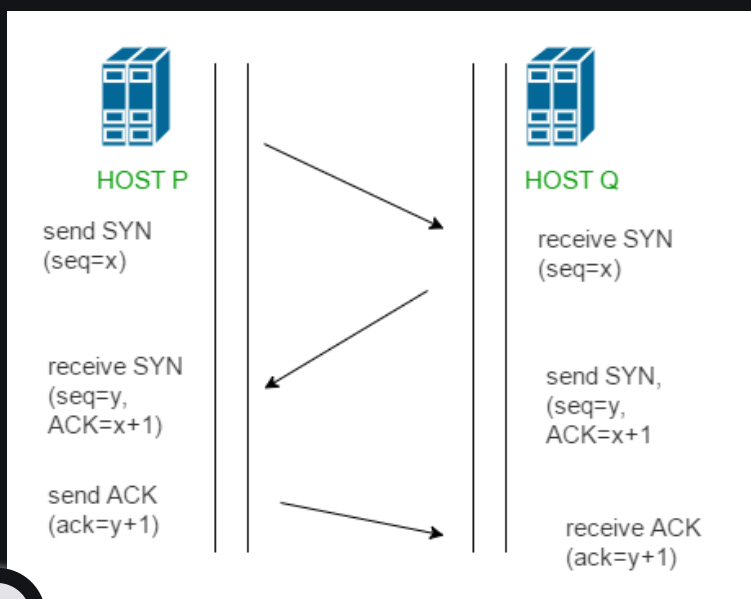
informs the server that the client is likely to start communication and with what sequence number it starts segments with

- **Step 2 (SYN + ACK):** Server responds to the client request with SYN-ACK signal bits set. Acknowledgement(ACK) signifies the response of the segment it received and SYN signifies with what sequence number it is likely to start the segments with

- **Step 3 (ACK):** In the final part client acknowledges the response of the server and they both establish a reliable connection with which they will start the actual data transfer

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