TCP Connection Establishment

Difficulty Level : Medium • Last Updated : 16 Jun, 2022

Prerequisite – TCP 3-Way Handshake Process

TCP is a connection-oriented protocol and every connection-oriented protocol needs to establish a connection in order to reserve resources at both the communicating ends.

Connection Establishment –

1. Sender starts the process with the following:

- **Sequence number (Seq=521):** contains the random initial sequence number generated at the sender side.
- **Syn flag (Syn=1):** request the receiver to synchronize its sequence number with the above-provided sequence number.

- **Maximum segment size (MSS=500 B):** sender tells its maximum segment size, so that receiver sends datagram which won't require any fragmentation. MSS field is present inside **Option** field in TCP header.
- **Window size (window=14600 B):** sender tells about his buffer capacity in which he has to store messages from the receiver.

2. TCP is a full-duplex protocol so both sender and receiver require a window for receiving messages from one another.

- **Sequence number (Seq=2000):** contains the random initial sequence number generated at the receiver side.
- **Syn flag (Syn=1):** request the sender to synchronize its sequence number with the above-provided sequence number.
- **Maximum segment size (MSS=500 B):** sender tells its maximum segment size, so that receiver sends datagram which won't require any fragmentation. MSS field is present inside **Option** field in TCP header.

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Therefore, receiver can send maximum of 14600/500 = 29 packets.
This is the receiver's sending window size.
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- **Window size (window=10000 B):** receiver tells about his buffer capacity in which he has to store messages from the sender.

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Therefore, sender can send a maximum of 10000/500 = 20 packets.
This is the sender's sending window size.
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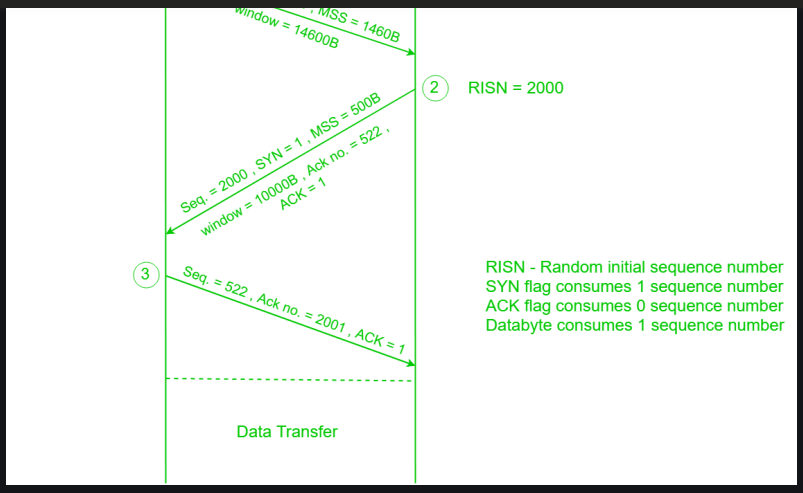
- **Acknowledgement Number (Ack no.=522):** Since sequence number 521 is received by the receiver so, it makes a request for the next sequence number with Ack no.=522 which is the next packet expected by the receiver since Syn flag consumes 1 sequence no.
- **ACK flag (ACk=1):** tells that the acknowledgement number field contains the next sequence expected by the receiver.

3. Sender makes the final reply for connection establishment in the following way:

- **Sequence number (Seq=522):** since sequence number = 521 in 1st step and SYN flag consumes one sequence number hence, the next sequence number will be 522.
- **Acknowledgement Number (Ack no.=2001):** since the sender is acknowledging SYN=1 packet from the receiver with sequence number 2000 so, the next sequence number expected is 2001.
- **ACK flag (ACK=1):** tells that the acknowledgement number field contains the next sequence expected by the sender.



Since the connection establishment phase of TCP makes use of 3 packets, it is also known as 3-way Handshaking **(SYN, SYN + ACK, ACK).**

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