Other TCP Connection Establishment Methods

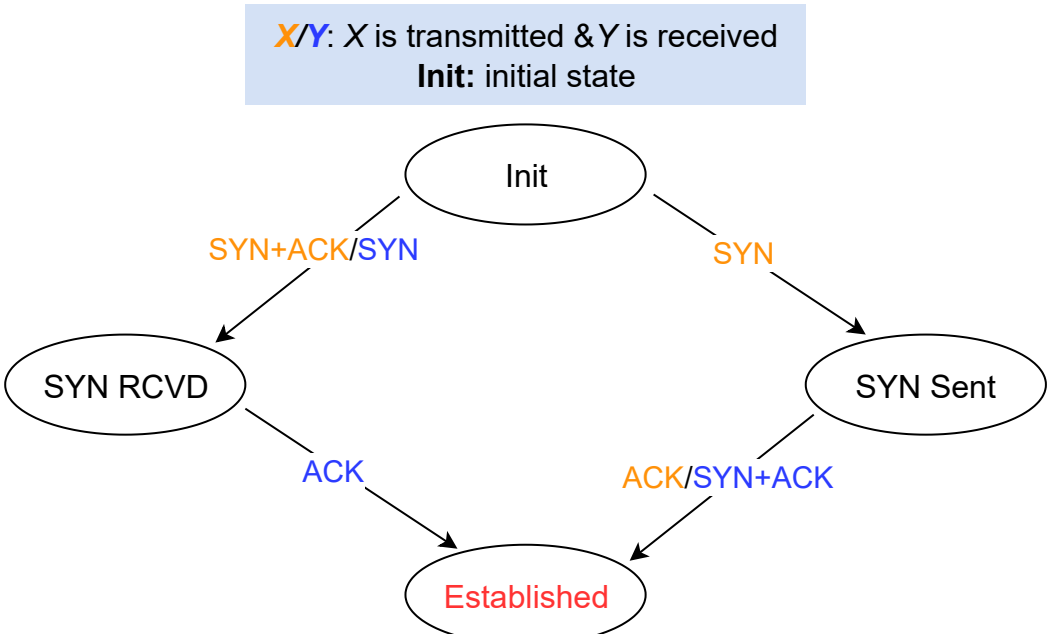
In this lesson, we'll look at some unconventional ways that connection establishment may occur.

We'll cover the following

In the last lesson, we looked at the most common way that TCP connection establishment could occur. Now, let's look at some other ways it can successfully occur.

A TCP Three-way Handshake FSM

TCP connection establishment can be described with a four-state Finite State Machine (FSM) as shown below. In this FSM, X/Y indicates that segment X was transmitted and segment Y was received. *Init* is the initial state



TCP FSM for connection establishment

Client-Side

Let's carve out the paths in this FSM. Here's the three-way handshake path.

1. A client host starts in the **Init** state.
2. It then sends a *SYN* segment and enters the **SYN Sent** state where it waits for a *SYN+ACK* segment.
3. When a *SYN+ACK* is recieved in the **SYN SENT** state, it replies with an *ACK* segment and enters the **Established** state where data can be exchanged.

Server-Side

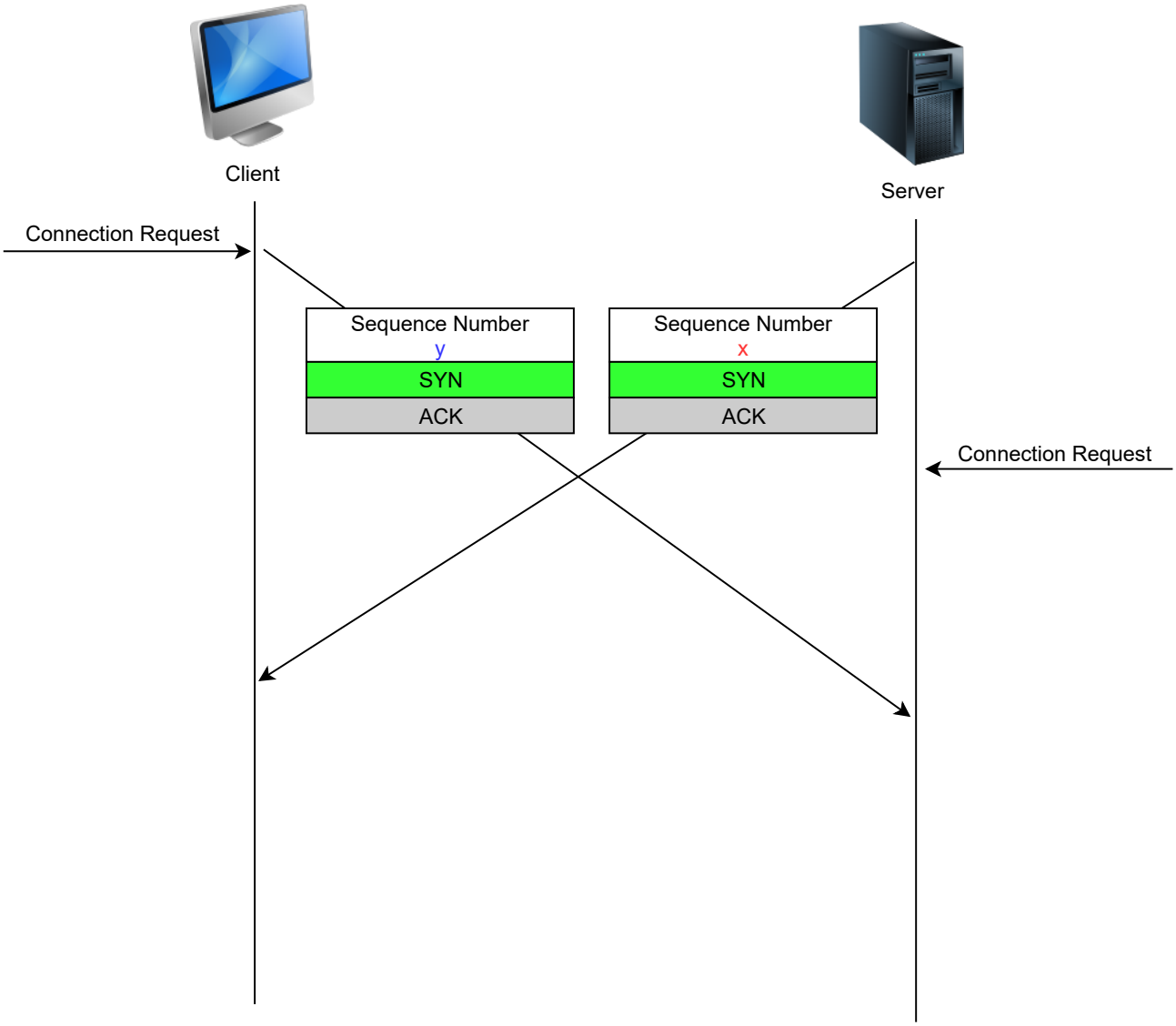
1. On the other hand, a server host starts in the **Init state**.

2. When a server process starts to listen to a destination port, the underlying TCP entity creates a TCP control block and a queue to process incoming *SYN* segments. Upon reception of a *SYN* segment, the server's TCP entity replies with a *SYN+ACK* and enters the **SYN RCVD** state.

3. It remains in this state until it receives an *ACK* segment that acknowledges its *SYN+ACK* segment, and with this it then enters the **Established** state.

Simultaneous Connection Establishment

Apart from these two paths in the TCP connection establishment, shown in the above FSM, there is a third way that a connection can be established: when both the client and the server send a *SYN* segment to open a TCP connection.



Simultaneous TCP Connection Opening

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Both sides must know the port number for each other in this case. It doesn't have to be a well-known port number or the same on both sides.

Quick Quiz!

1 Simultaneous connection may result in more segments being exchanged than a regular three-way handshake.

A) True

B) False

COMPLETED 0%

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Coming up, we'll look at a few scenarios in which connection establishment can go wrong and how TCP handles it.