

Reliable Connection Establishment and Termination (1/5)

1

- TCP requires that sender and receiver agree on the connection to be established – therefore any duplicate segments from earlier connections can be ignored
- If the communication partners want to end the connection, TCP makes sure before terminating the connection that all segments, which were sent but have not yet arrived, are delivered
- For setting up or terminating TCP connections three (or four) messages are exchanged
→ **three-way handshake**

The **three-way handshake** ensures that both sides are ready to receive data and that the essential sequence numbers to identify the connection are exchanged

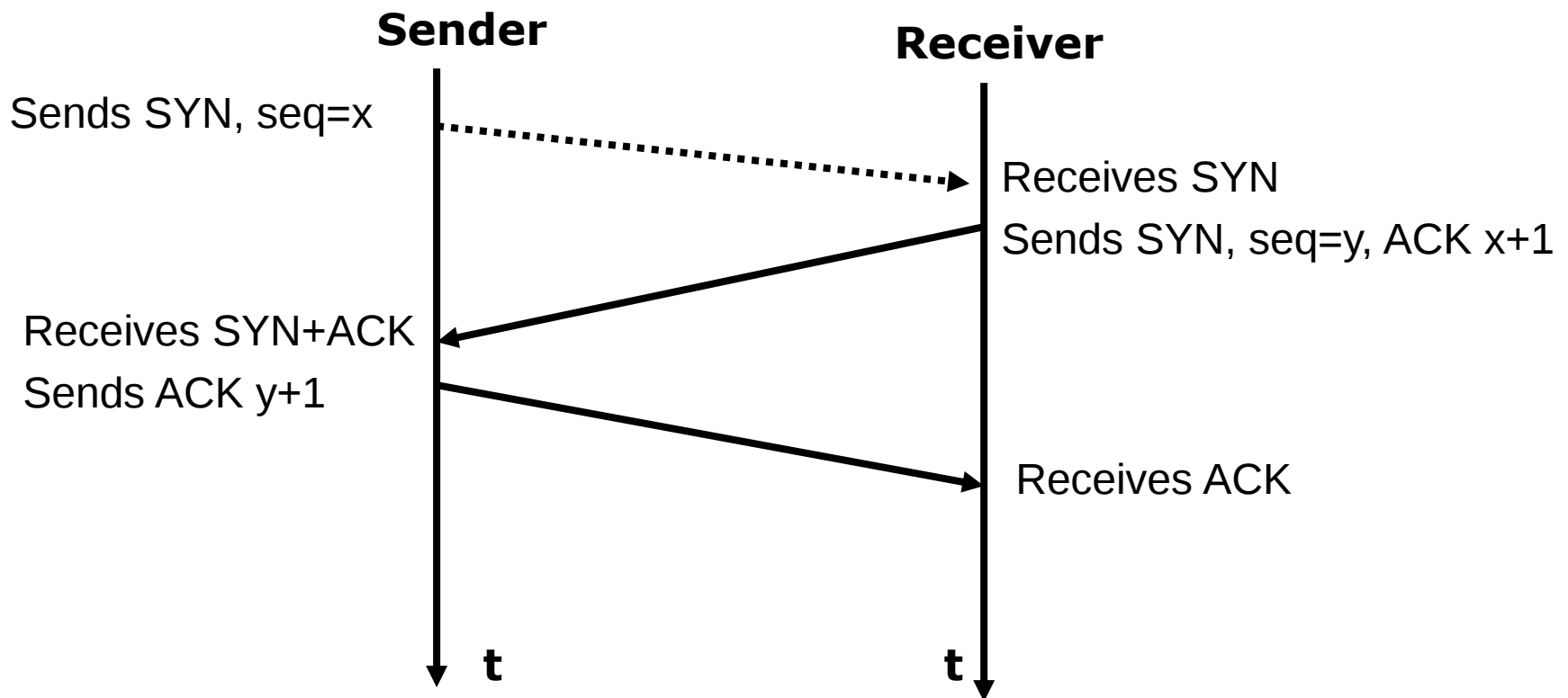
Three-way handshake for connection establishment:

- Initiator sends special segment – SYN segment –, which contains a sequence number x - and whose synchronicity bit is set to 1
- Receiver of the SYN segment acknowledges the sequence number x in the SYN segment, keeps the synchronicity bit set and sends its own sequence number y
- Initiator confirms receipt of synchronization response with the sequence number y

Reliable Connection Establishment and Termination (3/5)

3

Connection establishment with the three-way handshake:



For a reliable, bilateral termination of the connection, a **modified three-way handshake** (actually a four-way handshake) is carried out

Three-way-handshake for connection termination (1/2):

- Initiator (sender) sends special end segment – FIN segment, whose FIN bit is set to 1 and which contains an end sequence number x
- End sequence numbers are confirmed by both sides and no further segments are taken for this connection. TCP instance informs local application of connection termination
- ...

Three-way handshake for connection termination (2/2):

- ...
- The informed application in turn begins connection termination by sending a FIN segment with its own end sequence number y and a revalidation of the last received sequence number
- Sender confirms receipt as well as the transmitted end sequence number