COMPUTER COMMUNICATION NETWORKS

Department of Electronics and Communication Engineering

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TCP Connection

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Connection Oriented Transport : TCP

- point-to-point:
  - one sender, one receiver
- reliable, in-order byte steam:
  - no “message boundaries"
- full duplex data:
  - bi-directional data flow in same connection
  - MSS: maximum segment size
- Additional features:
  - Congestion control and flow control
- cumulative ACKs
- pipelining:
  - TCP congestion and flow control set window size
- connection-oriented:
  - handshaking (exchange of control messages) initializes sender, receiver state before data exchange
- flow controlled:
  - sender will not overwhelm receiver

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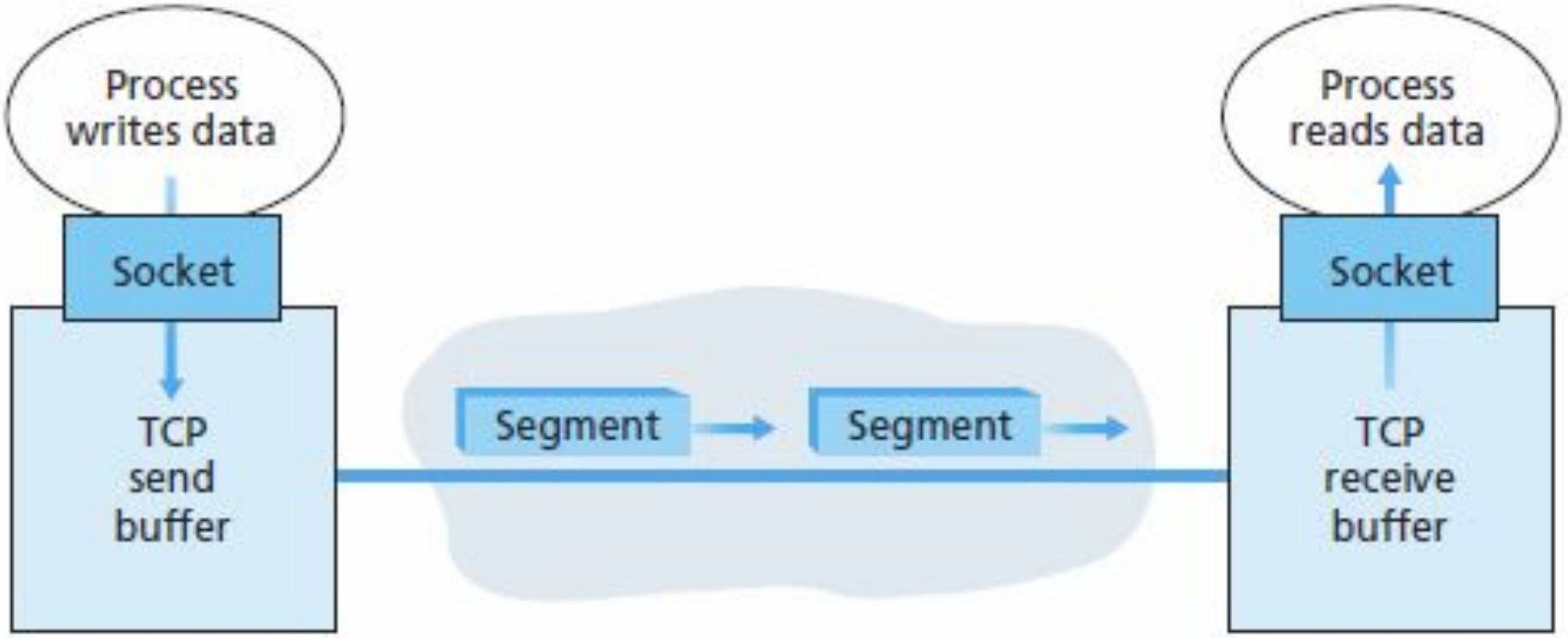
Connection Oriented Transport : TCP



TCP send and receive buffers

TCP : MSS

The maximum amount of data that can be grabbed and placed in a segment is limited by the **maximum segment size (MSS)**.

The MSS is typically set by first determining the length of the largest link-layer frame that can be sent by the local sending host (the so-called **maximum transmission unit**, **MTU**), and then setting the MSS to ensure that a TCP segment **(when encapsulated in an IP datagram) plus the TCP/IP header length (typically 40 bytes) will fit into a single link-layer frame. Both Ethernet and PPP link-layer protocols have an MTU of 1,500 bytes.**

MSS is the maximum amount of application-layer data in the segment

Connection Oriented Transport : TCP

A TCP connection consists of buffers, variables, and a socket connection corresponding to a process in one host, and another set of buffers, variables, and a socket connection corresponding to a process in another host.

No buffers or variables are allocated to the connection in the network elements (routers, switches, and repeaters) between the hosts.

TCP Connection Opening

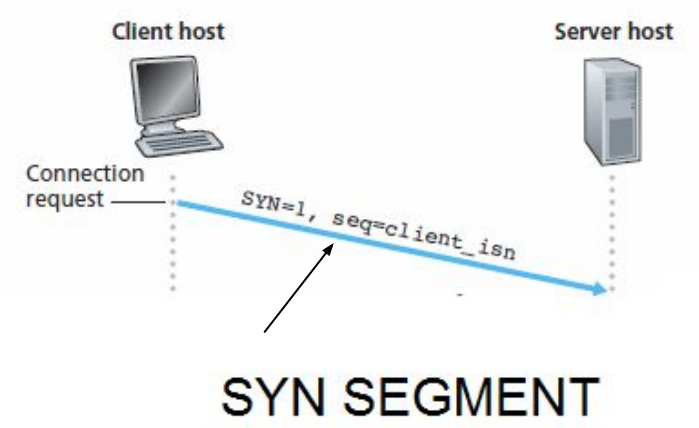
Step 1. client-side TCP sends a special TCP segment to server-side TCP.

This TCP segment is called SYN segment.

No data in the segment

SYN bit, is set to 1.

Client **randomly** chooses an initial sequence number (client_isn)



TCP Connection Opening

Step 2. On receipt, the server allocates TCP buffers and variables to the connection

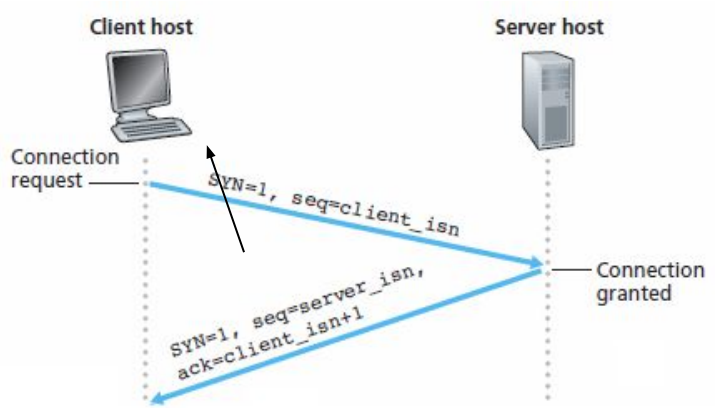
Server sends a connection-granted segment to the client TCP.

This segment has no data.

It contains three information in the header.

- SYN bit is set to 1.
- Acknowledgment field is set to client_isn+1
- Server chooses its initial seq number (server_isn)

The connection granted segment is referred to as a **SYNACK segment**



SYNACK SEGMENT

TCP Connection Opening

Step 3. Upon receiving the SYNACK segment, the client also allocates buffers and variables to the connection.

Client host sends the server SECOND segment

This segment acknowledges the server's connection-granted segment;

Client puts server_isn+1 in the acknowledgment field

SYN bit is set to zero, since the connection is established.

This segment may carry client-to-server data

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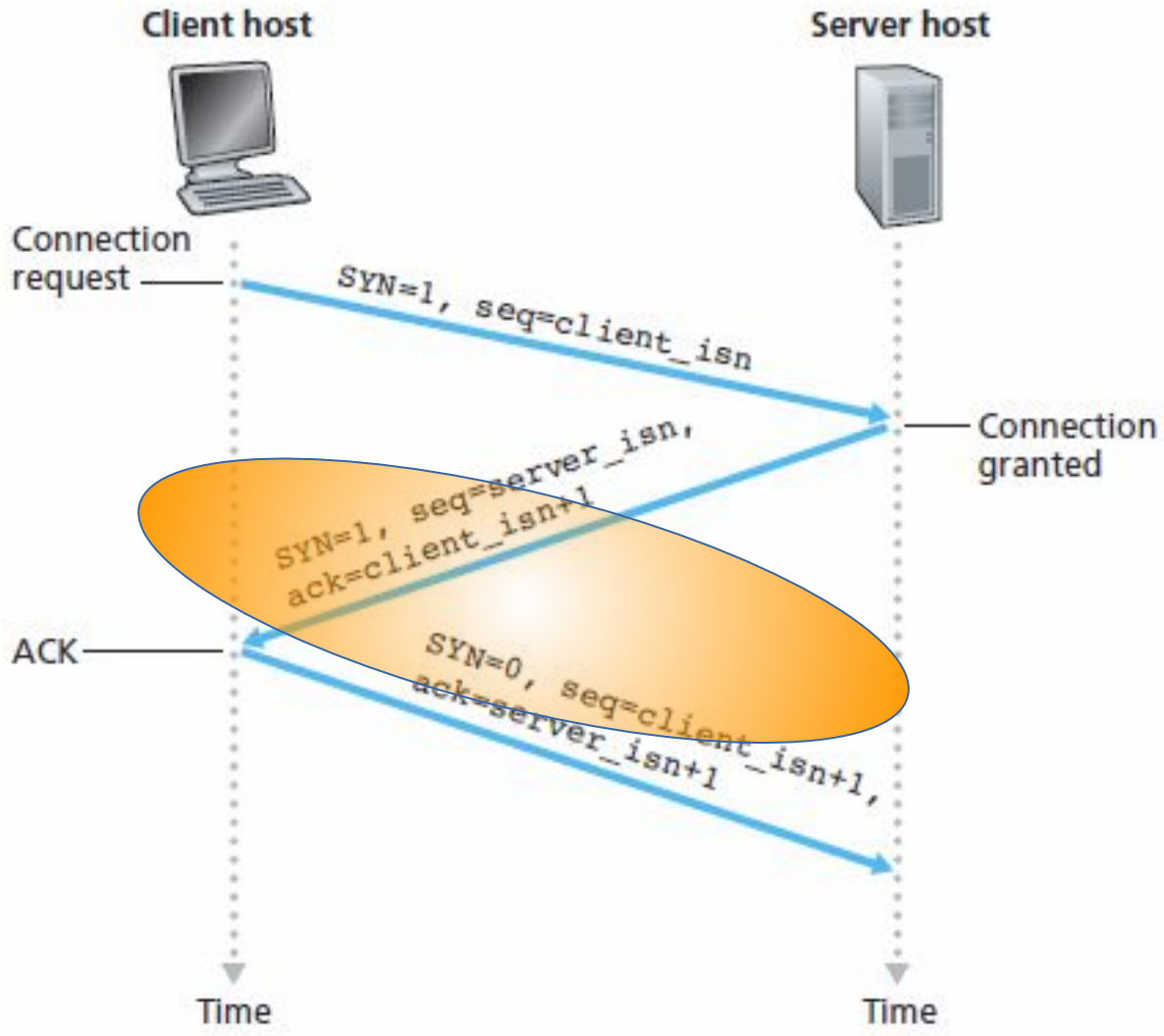
TCP three-way handshake



TCP three-way handshake: segment exchange

THANK YOU

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