

CIS 457 - Data Communications

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Images taken from Kurose and Ross book

TCP

TCP is transport protocol offering many more features than UDP

Two major factors distinguishing TCP are that it is

- connection oriented
- reliable

TCP is **connection-oriented** because TCP handshake occurs before any application data sent

Handshake allows client and server to initialize state variables and buffers that will be necessary for connection

Note that connection is *logical*, not physical

Concept of connection exists only in end hosts -- network not aware that connection between hosts exists

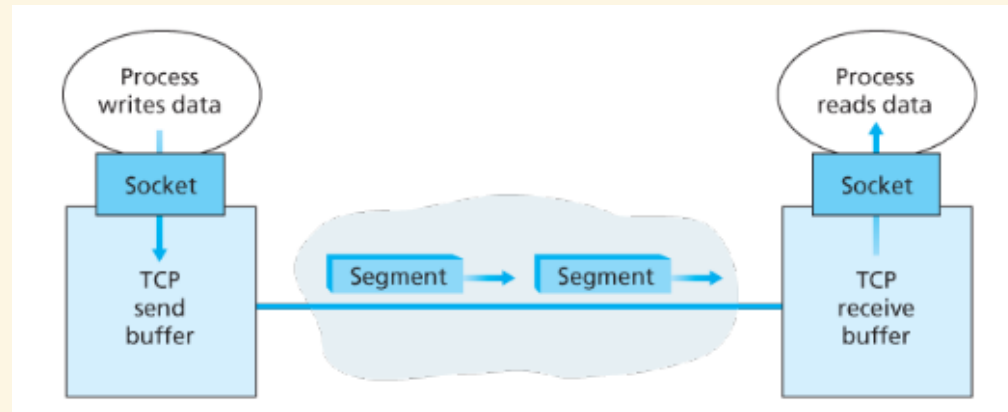
Communication via TCP connection is

- full-duplex
- point-to-point

When application sends message, data passed into **send buffer**

From there, TCP grabs chunks of data and sends them into network

Protocol does not specify when TCP must do this



As seen in figure, receiver also has buffer

Because connection is full-duplex, client and sever both have send *and* receive buffers

TCP "connection" is really collection of buffers, sockets, and state variables

Maximum size of segment limited by maximum size of link-layer frame, referred to as **maximum transmission unit (MTU)**

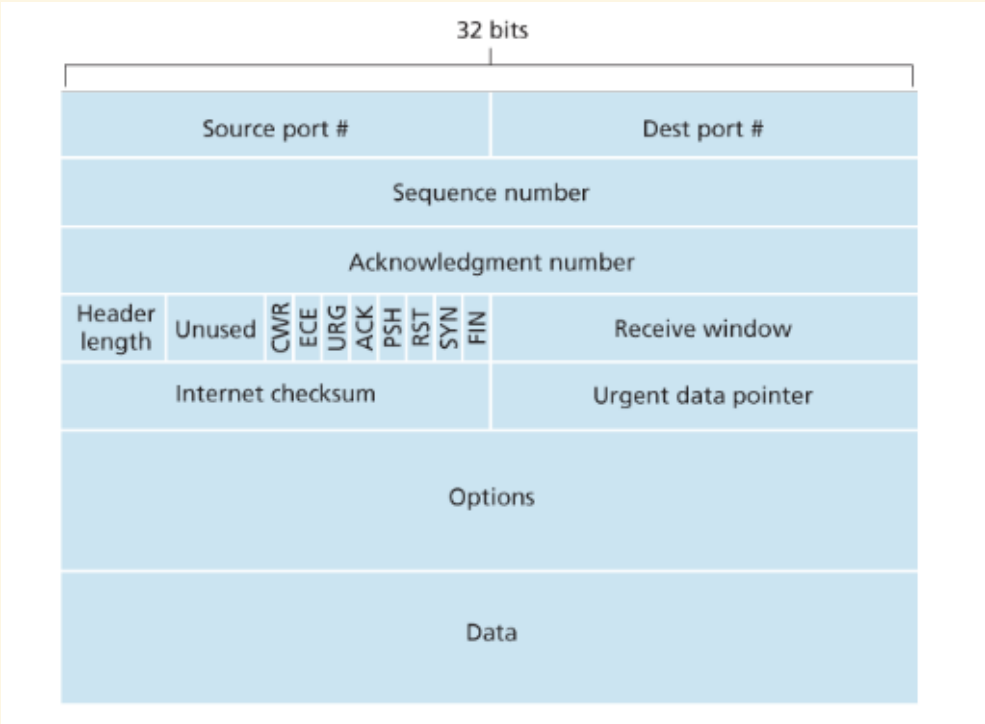
MTU is 1500 bytes for several common protocols

TCP and IP header information generally total 40 bytes

Upper bound for amount of application data in segment is then 1460 bytes

Referred to as **maximum segment size**, even though segment is actually larger because of headers

TCP segment header is larger and has more fields than
UDP to allow for more functionality



A few important fields:

- sequence and ACK numbers to enable reliable transfer
- recw (receive window) usef for flow control
- ACK flag -- segment acts as ACK

...continued...

- RST, SYN, FIN flags used for setup and teardown
- CWR, ECE flags used for congestion control