



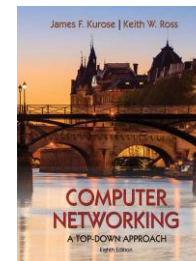
AinShams University
Faculty of Engineering

CSE 351s: Computer networks

Section 2

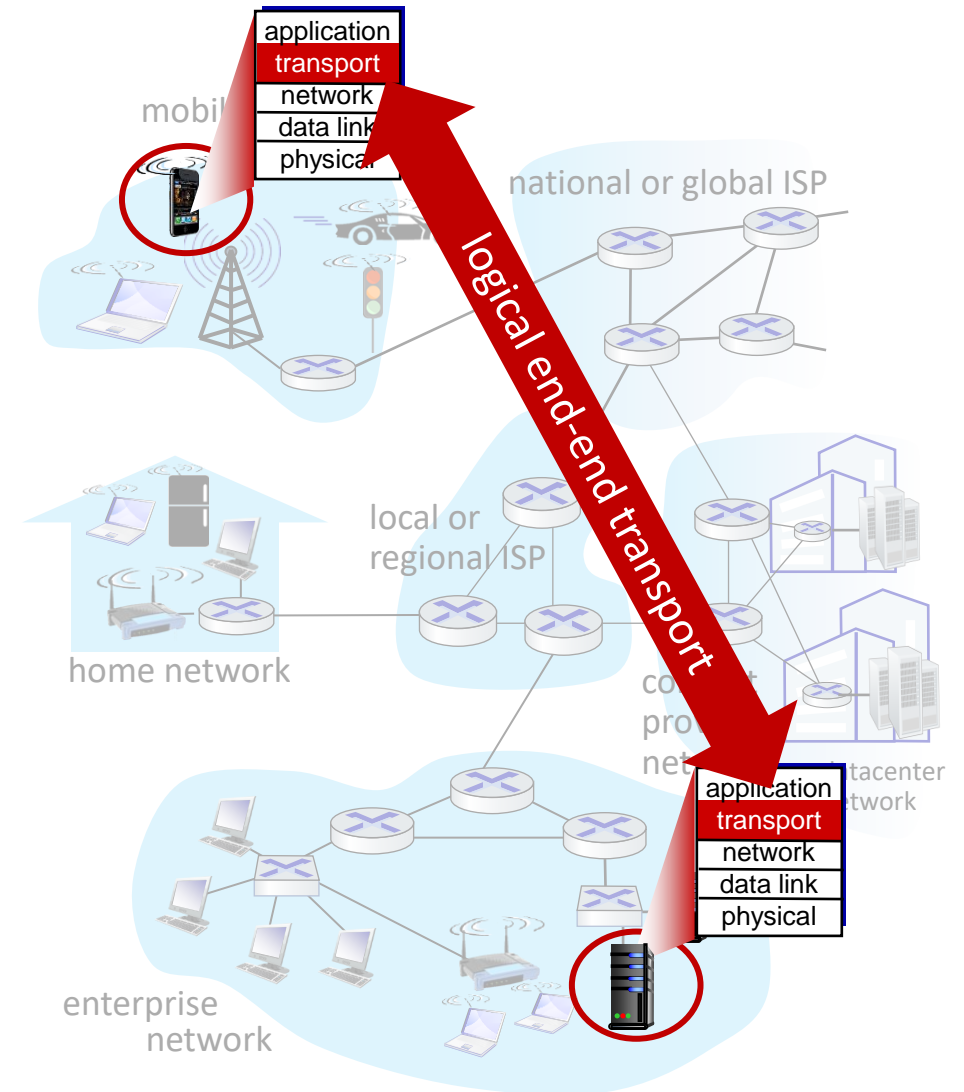
Eng. Noha Wahdan

Class textbook:
Computer Networking: A Top-Down Approach (8th ed.)
J.F. Kurose, K.W. Ross
Pearson, 2020
http://gaia.cs.umass.edu/kurose_ross



Two principal Internet transport protocols

- **TCP:** Transmission Control Protocol
 - reliable, in-order delivery
 - congestion control
 - flow control
 - connection setup
- **UDP:** User Datagram Protocol
 - unreliable, unordered delivery
 - no-frills extension of “best-effort” IP
- services not available:
 - delay guarantees
 - bandwidth guarantees



Services of transport layer protocols

	<i>TCP service</i>	<i>UDP service</i>
<i>reliable (loss-free) transport</i>	<ul style="list-style-type: none">- Reliably transfer data- Recover dropped packets	<ul style="list-style-type: none">- Unreliable transfer- <i>Best effort service</i> (but no guarantees)
<i>flow control</i>	provide	doesn't provide
<i>congestion control</i>	provide	doesn't provide
<i>Timing guarantee</i>	doesn't provide	doesn't provide
<i>Min throughput guarantee</i>	doesn't provide	doesn't provide
<i>security</i>	doesn't provide	doesn't provide

Faster and simpler

Sheet 2: Question 1

For a communication session between a pair of processes, which process is the client and which is the server?

- The process which initiates the communication is the client.
- The process that waits to be contacted is the server.

Sheet 2: Question 3

Suppose you wanted to do a transaction from a remote client to a server as fast as possible. Would you use UDP or TCP? Why?

You would use UDP.

With UDP, the transaction can be completed in one roundtrip time (RTT) - the client sends the transaction request into a UDP socket, and the server sends the reply back to the client's UDP socket.

With TCP, a minimum of two RTTs are needed - one to set-up the TCP connection, and another for the client to send the request, and for the server to send back the reply.

Sheet 2: Question 4

- Why do HTTP, SMTP, and IMAP run on top of TCP rather than on UDP?

The applications associated with those protocols require that all application data be received in the correct order and without gaps. TCP provides this service whereas UDP does not.

Sheet 4: Question 5

- Is it possible for an application to enjoy reliable data transfer even when the application runs over UDP? If so, how?

Yes. The application developer can put reliable data transfer into the application layer protocol.

However, this would require a significant amount of work and debugging.

Sheet 4: Question 3

- Describe why an application developer might choose to run an application over UDP rather than TCP

An application developer may not want its application to use TCP's congestion control, which can throttle the application sending rate at times of congestion. Often, designers of IP telephony and IP video-conference applications choose to run their applications over UDP because they want to avoid TCP's congestion control. Also, some applications do not need the reliable data transfer provided by TCP.

Sheet 4: Question 4

- Why is it that voice and video traffic is often sent over TCP rather than UDP in today's Internet?

Since most firewalls are configured to block UDP traffic, using TCP for video and voice traffic lets the traffic through the firewalls.