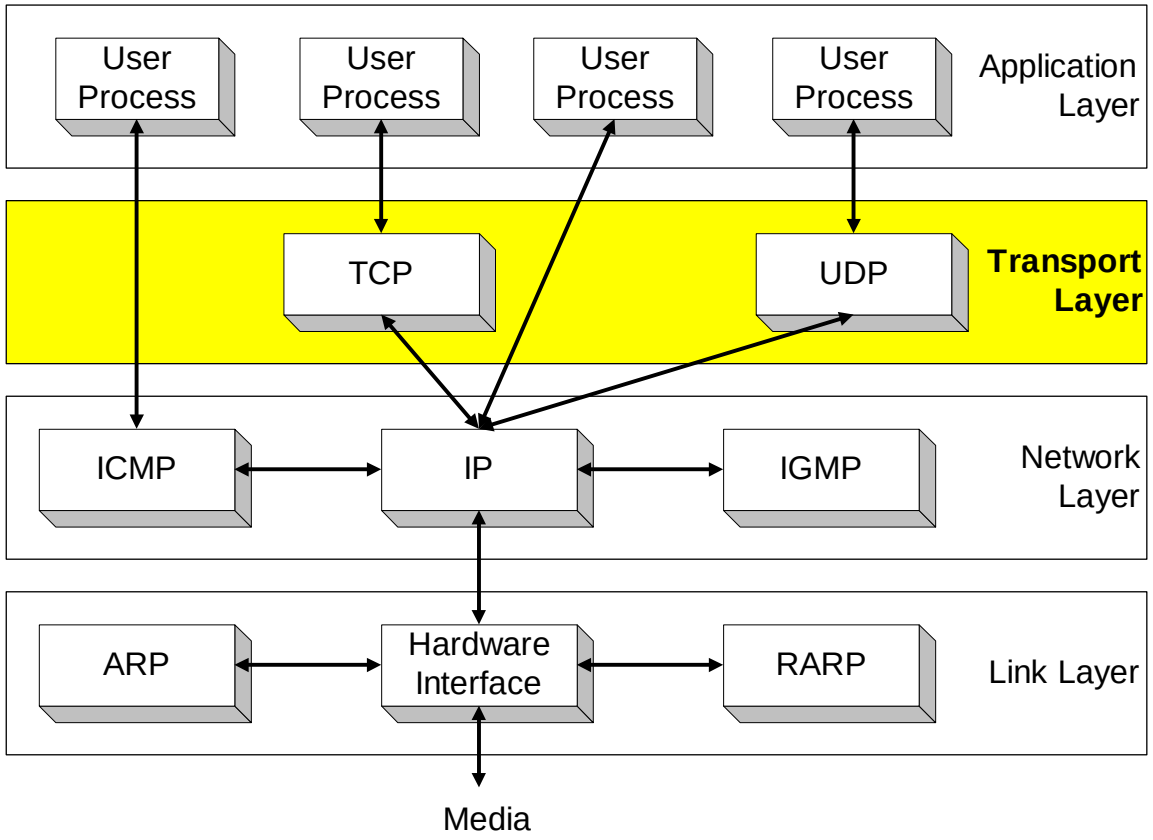
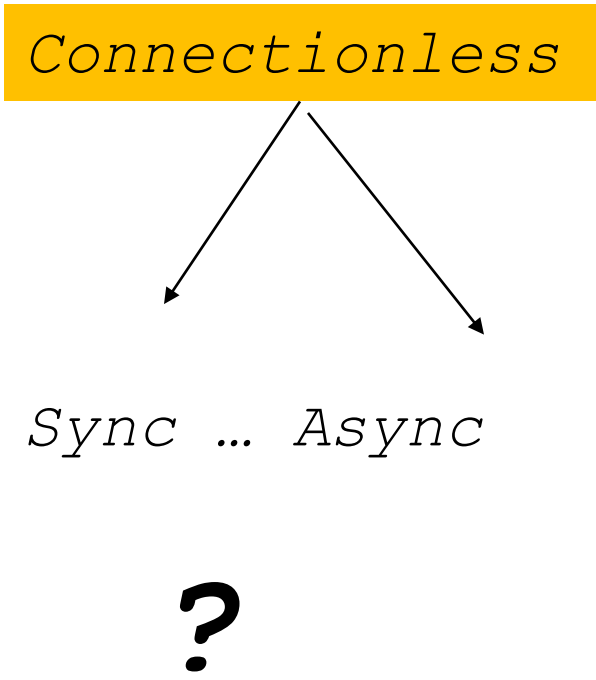
Transport Protocols

Orientation

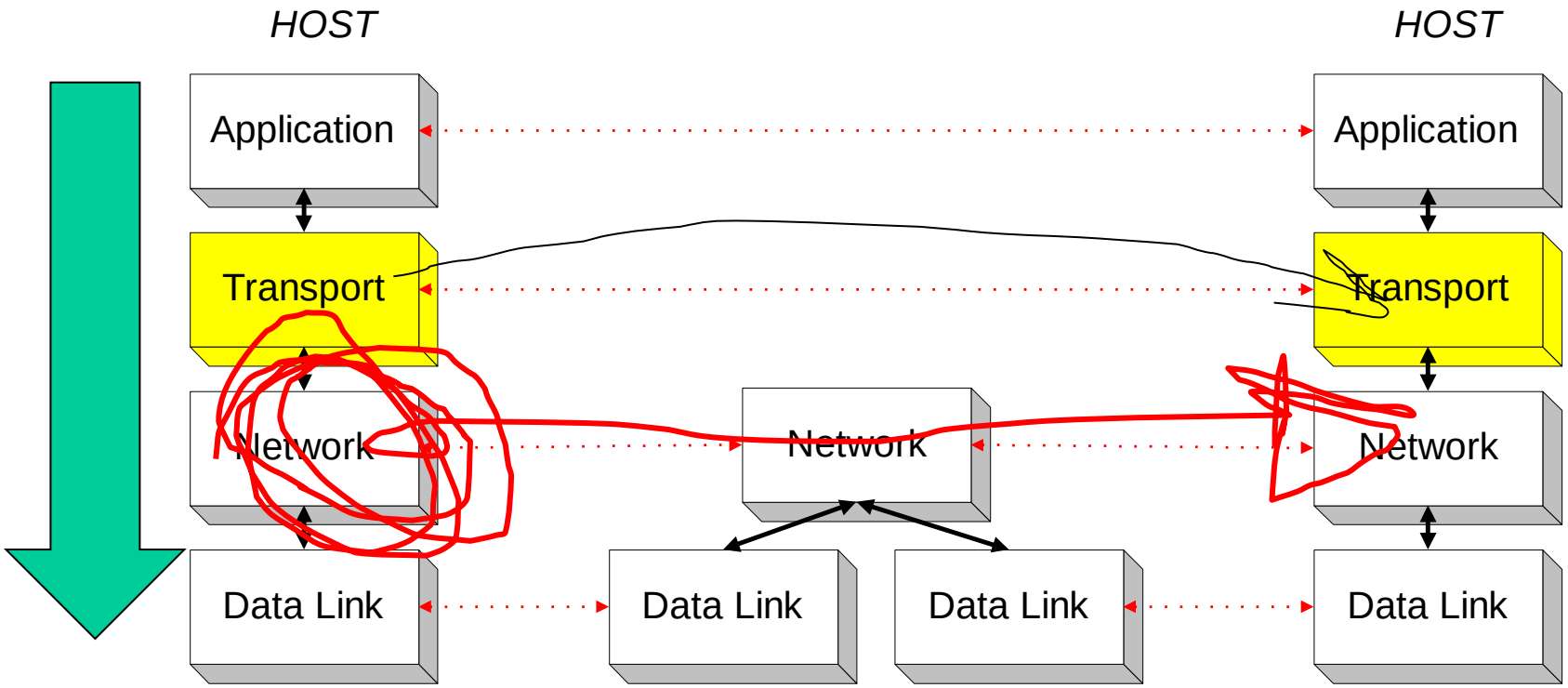
- We move one layer up and look at the transport layer.





Orientation

- Transport layer protocols are end-to-end protocols
- They are only implemented at the hosts



Transport Protocols in the Internet

- The Internet supports 2 transport protocols

UDP - User Datagram Protocol

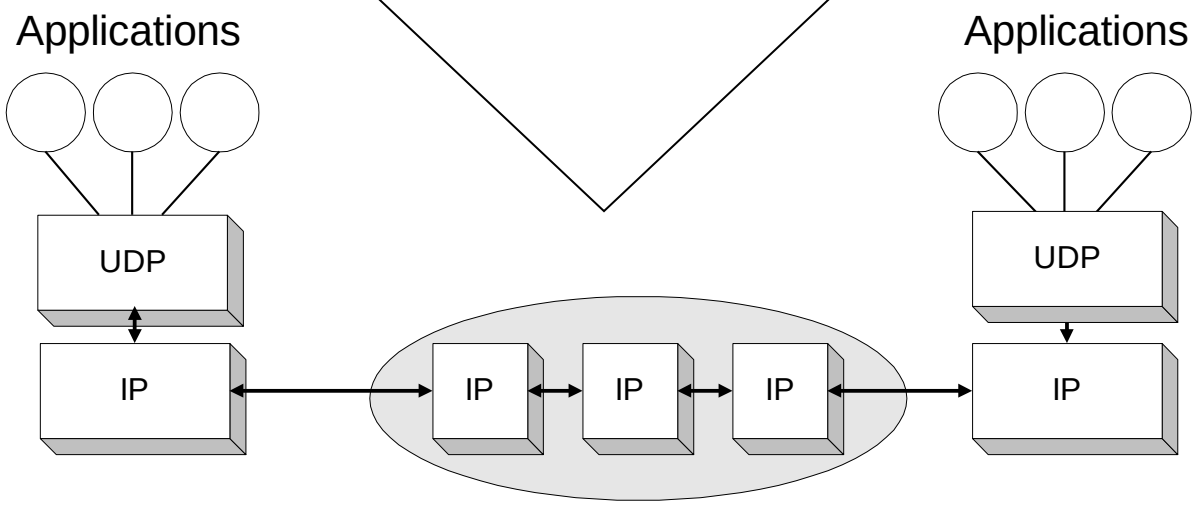
- datagram oriented
- unreliable, connectionless
- simple
- unicast and multicast
- useful only for few applications, e.g., multimedia applications
- used a lot for services
  - network management (SNMP), routing (RIP), naming (DNS), etc.

TCP - Transmission Control Protocol

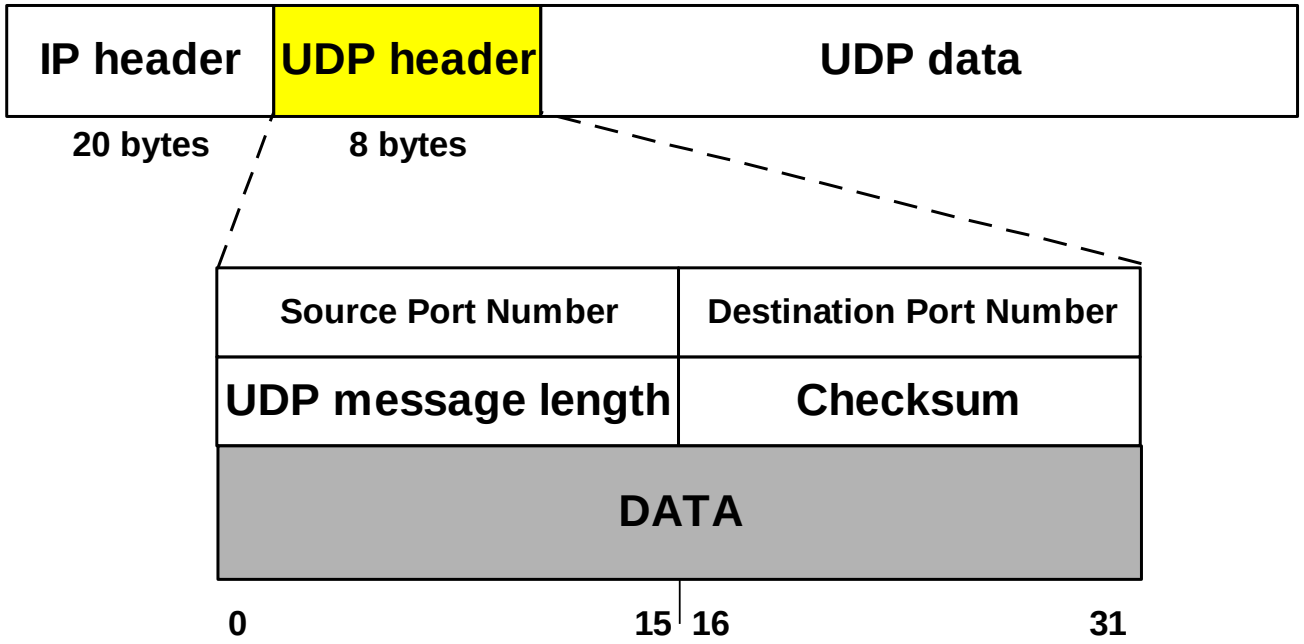
- stream oriented
- reliable, connection-oriented
- complex
- only unicast
- used for most Internet applications:
  - web (http**S**), email (smtp), file transfer (ftp), terminal (telnet), etc.

UDP - User Datagram Protocol

- UDP is supports unreliable transmissions of datagrams
- UDP merely extends يمتد فقط the host-to-to-host delivery service of IP datagram to an application-to-application service
- The only thing that UDP adds is **multiplexing** and demultiplexing



UDP Format



- **Port numbers** identify sending and receiving applications (processes). Maximum port number is 2^{16}-1= 65,535

- **Message Length** is at least 8 bytes (I.e., Data field can be empty) and at most 65,535

- **Checksum** is for header (of UDP and some of the IP header fields)

Port Numbers

- UDP (and TCP) use port numbers to **identify applications**
- A globally unique address at the transport layer (for both UDP and TCP) is a tuple **<IP address, port number>**
- **There are 65,535 UDP ports per host.**