

# MODULE 11: The Internet Protocol Suite

## Lecture 11.2

# User Datagram Protocol (UDP)

Prepared By:

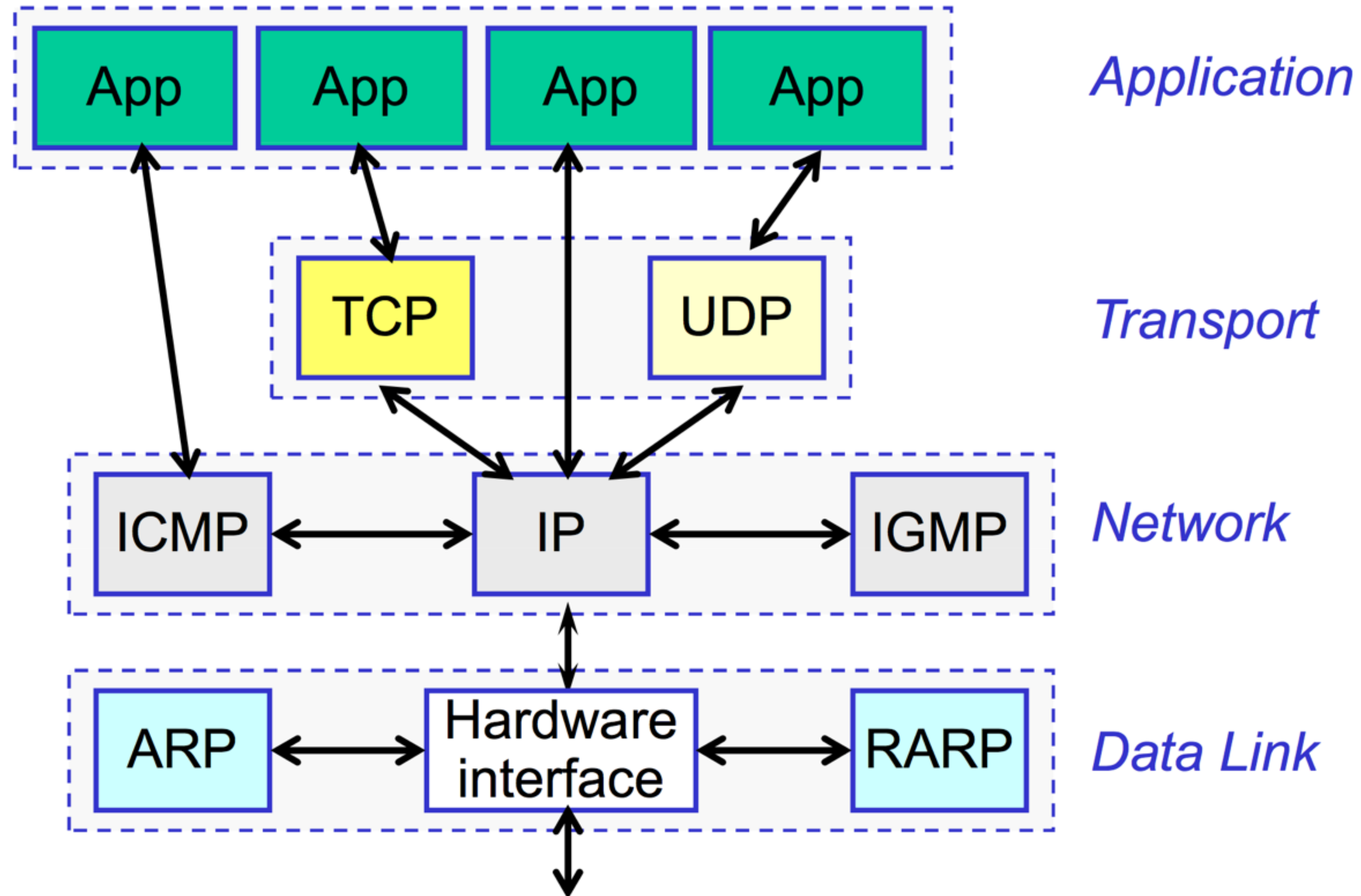
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# Lecture 11.2 Objectives

- Discuss the basic features of the User Datagram Protocol (UDP)
- Discuss the UDP segment (or datagram) format
- Discuss advantages of UDP over TCP
  - Lack of reliability is an obvious disadvantage

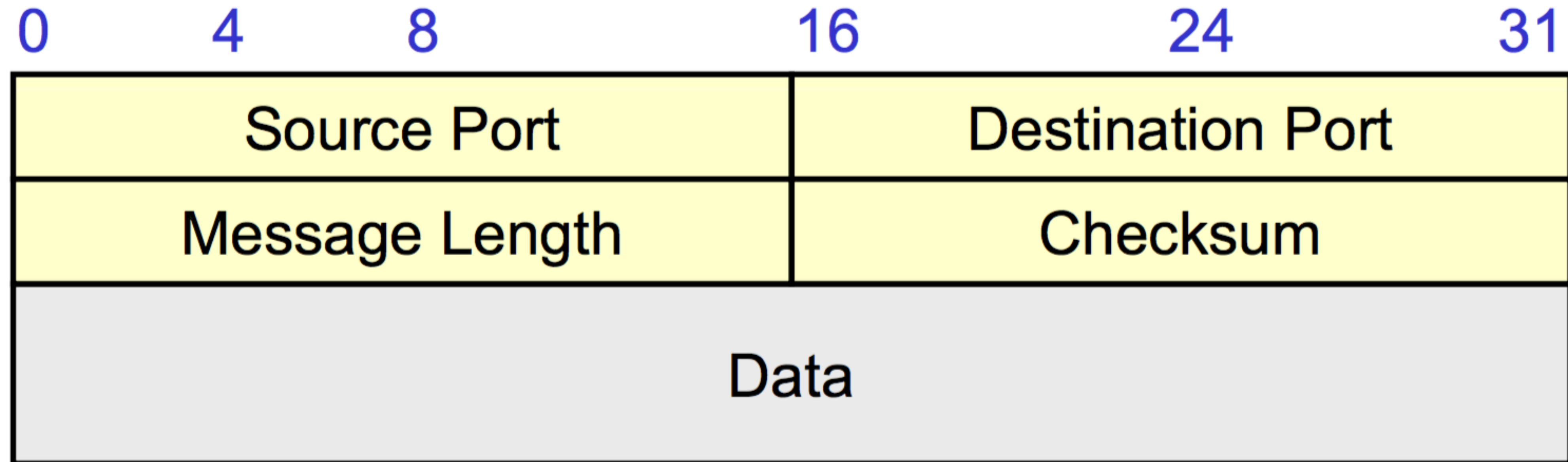
# IP Layering



# Best-effort Datagram Service

- UDP offers “best-effort” service
  - Packets may be lost or delivered out of order
- Users exchange datagrams (not byte streams)
- UDP is connectionless
- UDP is not buffered
  - UDP accepts data and transmits immediately
  - There is no buffering before transmission
- UDP is full duplex
  - Concurrent transfers can take place in both directions

# UDP Segment Format



- UDP has a simple (low overhead) 8-byte header
- Of course, UDP's service is also simple

# UDP: Header Fields

- UDP Destination Port: identifies destination process
- UDP Source Port (optional): identifies source process for replies, or zero
- Message Length: length of datagram in bytes, including header and data
- Checksum (optional): 16-bit checksum over header and data, or zero
  - Note that many link layers also do an error check, but some may not
  - This is an end-to-end error check



# Why UDP?

- Required for IP multicast and broadcast
  - Multicast and broadcast not supported by TCP
- No connection establishment
  - No packet or delay overhead for “handshake” to establish a connection, as with TCP
  - Especially important for short transmissions
- No connection state
  - Does not add memory and processing load to the server to maintain state, as with TCP

# Why UDP? (cont'd)

- Low packet overhead
  - 8 bytes for UDP header versus 20 bytes of TCP header
  - Important when sending short units of data
- No buffering or automatic retransmissions
  - Increased application layer control over when data is sent and how many bytes are sent
  - In particular, allows low packetization delay for applications like interactive voice



# CHECK POINT

As a checkpoint of your understanding, please pause the video and make sure you can do the following:

- Discuss the basic features of the User Datagram Protocol (UDP)
- Discuss the UDP segment (or datagram) format
- Discuss advantages of UDP over TCP

If you have any difficulties, please review the lecture video before continuing.

# Summary

- UDP properties
  - Connectionless
  - Best-effort (unreliable)
  - Datagram delivery
- UDP is used for efficiency by applications that:
  - Can more efficiently recover from errors at the application layer
  - Can tolerate loss, often more so than delay
- UDP must also be used for broadcast (one-to-all) and multicast (one-to-many) communication

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