Data Communication and Computer Network
BLM3051

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Lecture Information Form - Weekly Subjects

Hafta	Tarih	Konular
1	20.02.2024	Introduction to Data Communication Standards Used on Data Communication, Architectural models
2	27.02.2024	OSI Reference Model , Layers and Their Functions, Signaling and Signal Encoding
3	05.03.2024	Parallel and Serial Transmission, Communication Media and Their Technical Specs., Multiplexing (TDM, FDM)
4	12.03.2024	Error Detection and Error Correction Techniques, Data Link Control Techniques, Flow Control
5	19.03.2024	Asynchronous and Synchronous Data Link Protocols (BSC, HDLC)
6	26.03.2024	LAN Technologies Continued, IEEE 802.4, 802.5, 802.11
7	02.04.2024	Connectionless and Connection Oriented Services, Switching
8	09.04.2024	Tatil – Ramazan Bayramı Arifesi
9	16.04.2024	1. Ara Sınav
10	23.04.2024	Tatil – 23 Nisan Ulusal Egemenlik ve Çocuk Bayramı
11	30.04.2024	Static and Dynamic Routing, Congestion in the Network Layer, Its Causes and Solutions
12	07.05.2024	IP (Internetworking Protocol), ICMP, BOOTP, DHCP
13	14.05.2024	2. Ara Sınav
14	21.05.2024	UDP (User Datagram Protocol), TCP (Transmisson Control Protocol)

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Transport Layer

- The Internet
  - UDP (User Datagram Protocol)
  - TCP (Transmission Control Protocol)

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UDP (User Datagram Protocol)

- A Connectionless Protocol

- Nothing beyond sending pack- ets between applications.
  - Letting applications build their own protocols on top

- Sending datagrams

- UDP transmits **segments** consisting of an 8-byte header

- Using only raw IP, not ports
  - So, the transport layer would not know what to do with each incoming packet.

UDP Header

| 16-bits	16-bits	16-bits	16-bits
Source Port	Destination Port	UDP length	UDP checksum

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UDP (User Datagram Protocol) (Con't)

- The IPv4 pseudoheader (in IP layer, we are in transport layer)
  - Source and destionation address is 32-bits
  - No checksum (00000000)
  - Protocol = 17
  - UDP length: 16-bits

- UDP does *not* do
  - Flow control
  - Congestion control
  - Retransmission

- UPD does do
  - Optional end-to-end error detection (with Checksum)
  - An interface to the IP protocol with the added feature of demultiplexing multiple processes using the ports

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UDP (User Datagram Protocol) (Con't)

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- DNS (Domain Name System) uses UDP
  - www.ce.yildiz.edu.tr

- Remote Procedure Call
  - Not traditional function call
  - Client – Server relationship
    - The calling procedure is known as the client
    - The called procedure is known as the server
  - **Client stub:** represents the server procedure in the client's address space.
    - Packing the parameters is called **marshaling**.
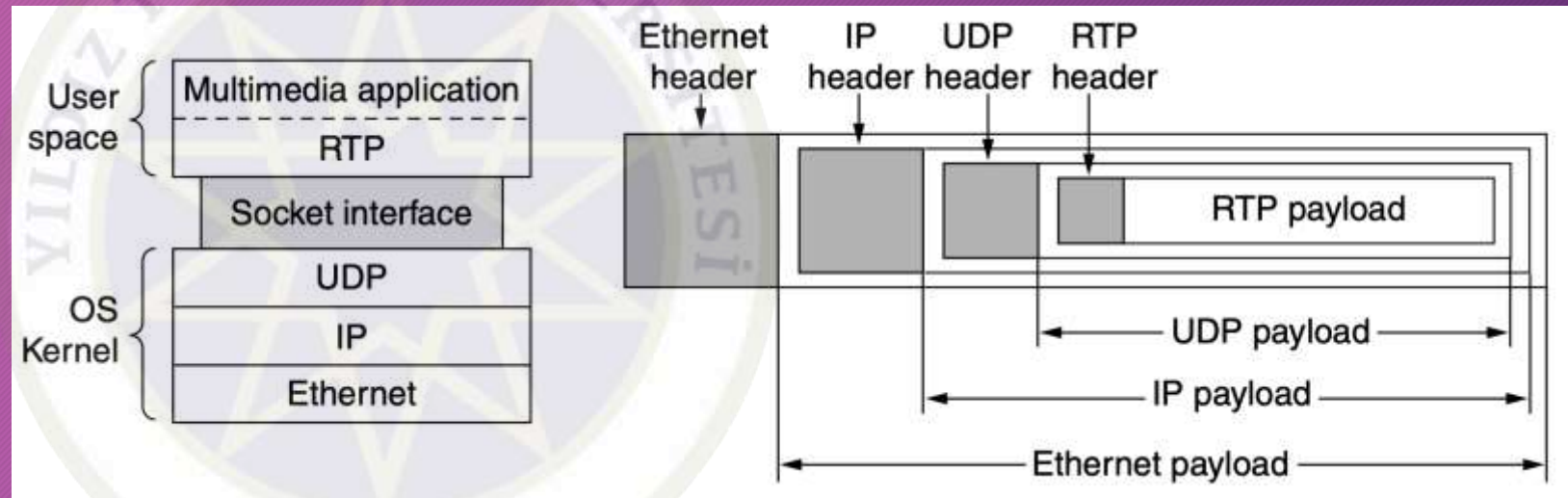 - Similarly, the server is bound with a procedure called the server stub.
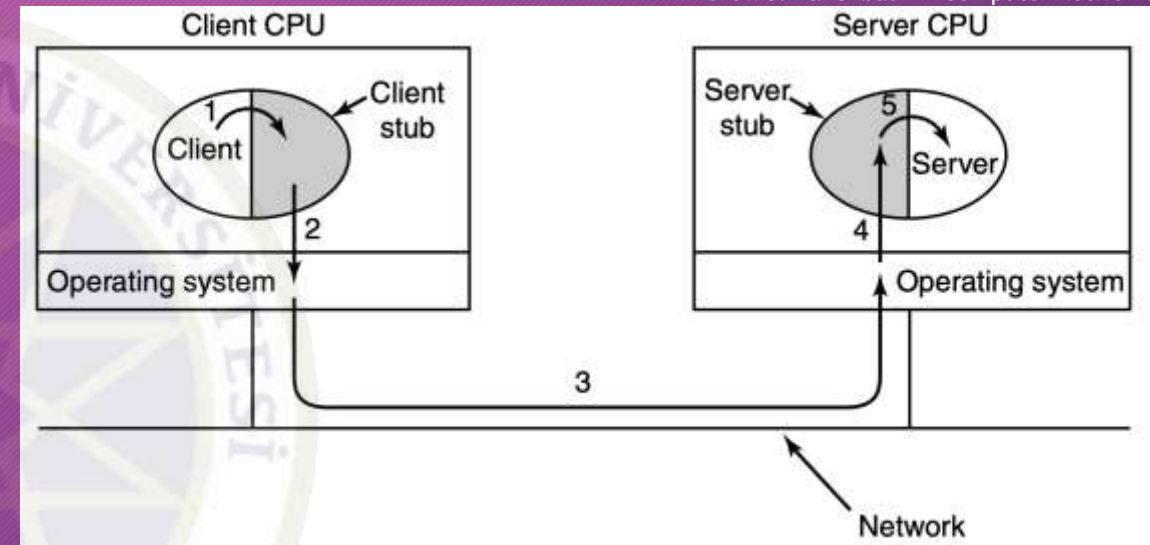
UDP (User Datagram Protocol) (Con't)

- **Real-Time Transport Protocols**
  - For real-time multimedia applications.

    - Internet radio,
    - Internet telephony,
    - Music-on-demans,
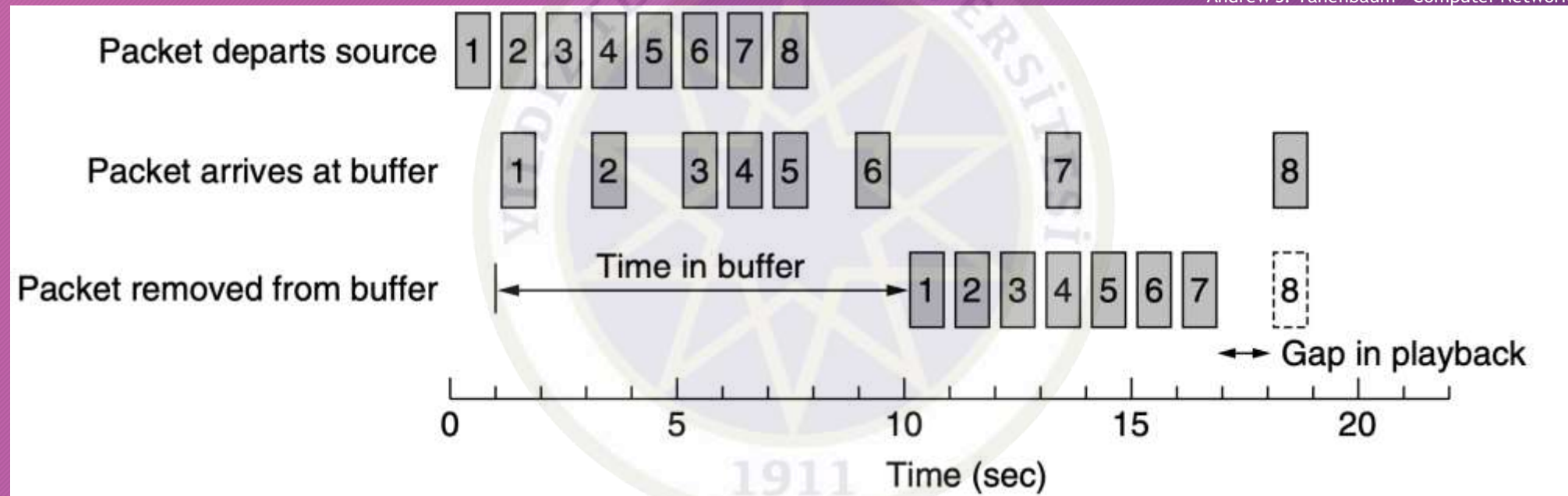   - Videoconferencing,
    - Video-on-demand.

UDP (User Datagram Protocol) (Con't)

- Jitter and Buffer relationship

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Transport Layer

- The Internet
  - ~~UDP (User Datagram Protocol)~~
  - **TCP (Transmission Control Protocol)**

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TCP (Transmission Control Protocol)

- UDP is a simple protocol
  - But for most Internet applications, reliable, sequenced delivery is needed
- TCP
  - is a reliable end-to-end byte stream over an unreliable internetwork.
  - defined in September 1981.
  - Extensions for high-performance
  - Selective acknowledgements
  - Congestion control
  - Repurposing of header fields for quality of service
  - Improved retransmission timers
  - Explicit congestion notification

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TCP (Transmission Control Protocol) (Con't)

- Well-known ports:
  - Port numbers below 1024 are reserved for standard services
    - Over 700 have been assigned.

Port	Protocol	Use
20, 21	FTP	File transfer
22	SSH	Remote login, replacement for Telnet
25	SMTP	Email
80	HTTP	World Wide Web
110	POP-3	Remote email access
143	IMAP	Remote email access
443	HTTPS	Secure Web (HTTP over SSL/TLS)
543	RTSP	Media player control
631	IPP	Printer sharing

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TCP (Transmission Control Protocol) (Con't)

- All TCP connections are **full duplex** and **point-to-point**.
  - TCP does not support **multicasting** or **broadcasting.**
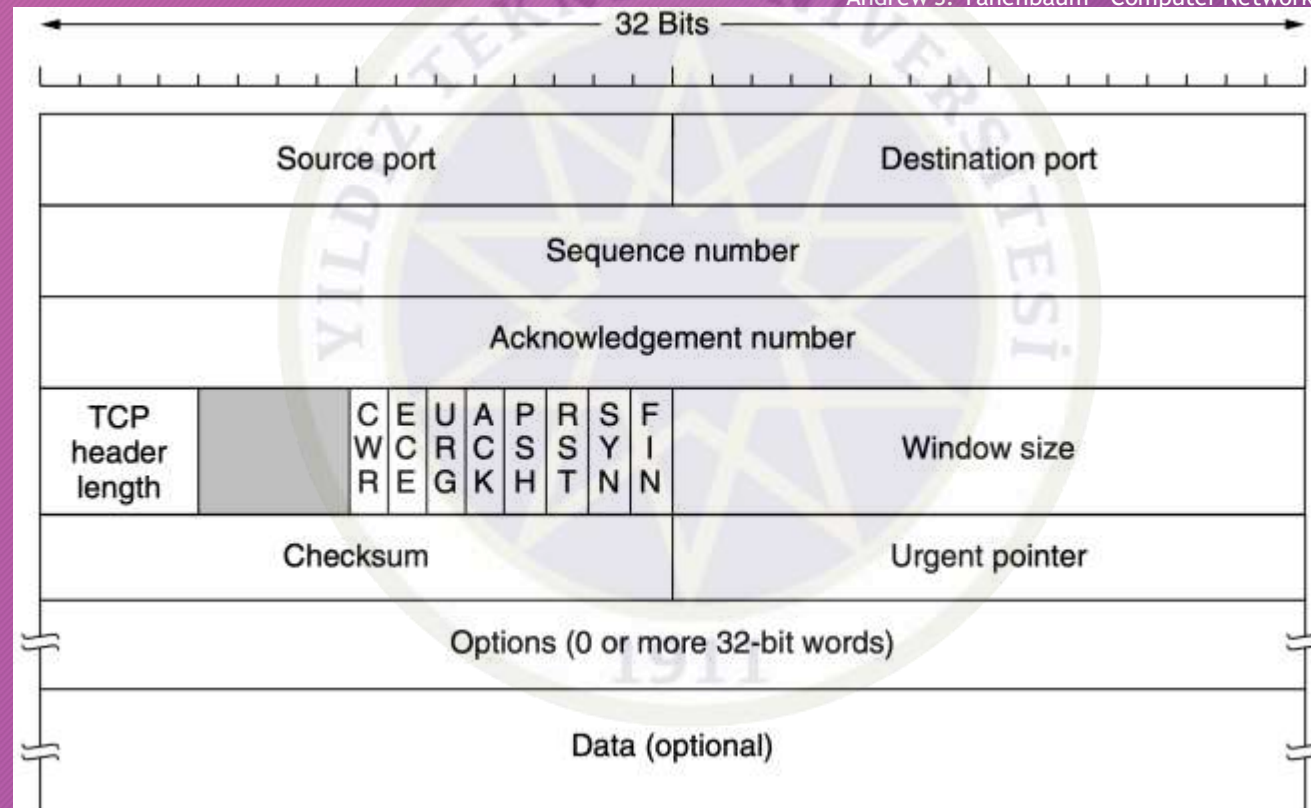- A TCP connection is **a byte stream**, **NOT a message stream**.

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TCP (Transmission Control Protocol) (Con't)

- **The TCP Segment Header**

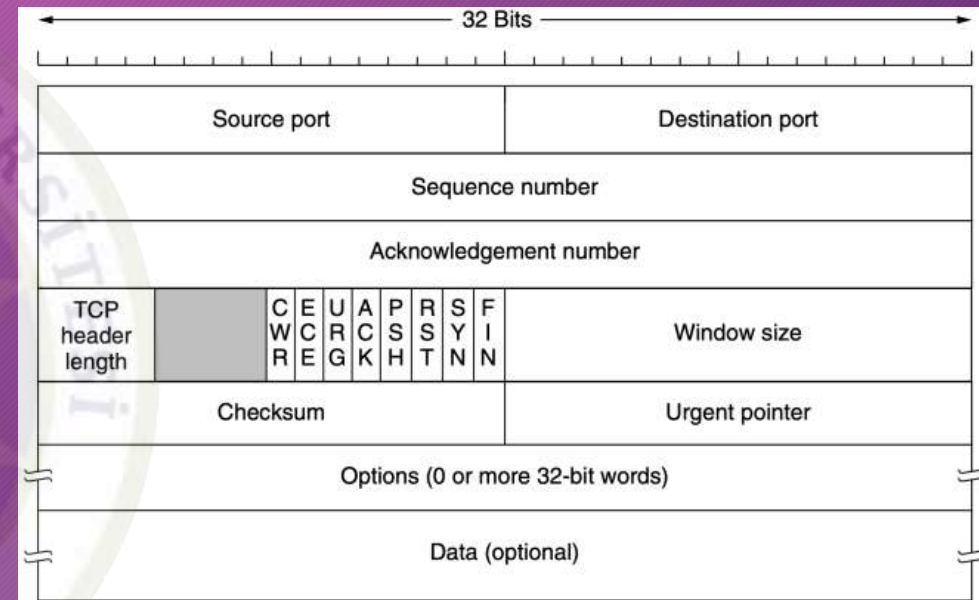*Andrew S. Tanenbaum - Computer Networks

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TCP (Transmission Control Protocol) (Con't) The TCP Segment Header

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- TCP header size is 20 bytes.

- IP header ize is 20 bytes.

- 65535-20-20 = 65,495 bytes data.

- This connection identifier is called a **5 tuple**
  - The protocol (TCP)
  - Source IP
  - Source port
  - Destination IP
  - Destination port

- TCP segments: 536 + 20 = 556 bytes

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Thank you for your listening.

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