

Transport-Layer Protocols

Unit-IV

Lecture -1

Session Objectives

Transport- Layer Protocols

Unit-IV

Introduction

User Datagram Protocol

- Introduces the three transport-layer protocols
- Learning about UDP,

Session Outcomes

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User Datagram Protocol

At the end of this session, participants will be able to

- Discuss the transport-layer protocols and UDP

Agenda

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User Datagram Protocol

1 Introduction

2 User Datagram Protocol

Presentation Outline

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User
Datagram
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1 Introduction

2 User Datagram Protocol

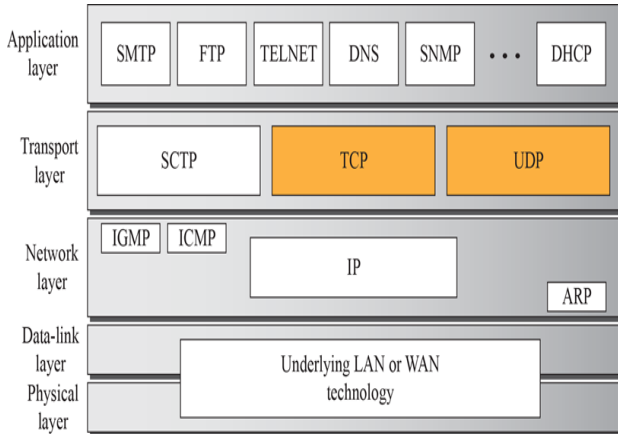
Position of transport-layer protocols in the TCP/IP protocol suite

Transport-Layer Protocols

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Services

Transport- Layer Protocols

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Introduction

User Datagram Protocol

- **UDP:** UDP is an unreliable connectionless transport-layer protocol used for its simplicity and efficiency in applications where error control can be provided by the application-layer process.
- **TCP:** TCP is a reliable connection-oriented protocol that can be used in any application where reliability is important.
- **SCTP:** SCTP is a new transport-layer protocol that combines the features of UDP and TCP.

Port Numbers

A transport-layer protocol need to create a process-to-process communication

- Port numbers provide end-to-end addresses at the transport layer and allow multiplexing and demultiplexing at this layer

Port	Protocol	UDP	TCP	Description
7	Echo	√		Echoes back a received datagram
9	Discard	√		Discards any datagram that is received
11	Users	√	√	Active users
13	Daytime	√	√	Returns the date and the time
17	Quote	√	√	Returns a quote of the day
19	Chargen	√	√	Returns a string of characters
20, 21	FTP		√	File Transfer Protocol
23	TELNET		√	Terminal Network
25	SMTP		√	Simple Mail Transfer Protocol
53	DNS	√	√	Domain Name Service
67	DHCP	√	√	Dynamic Host Configuration Protocol
69	TFTP	√		Trivial File Transfer Protocol
80	HTTP		√	Hypertext Transfer Protocol
111	RPC	√	√	Remote Procedure Call
123	NTP	√	√	Network Time Protocol
161, 162	SNMP		√	Simple Network Management Protocol

Presentation Outline

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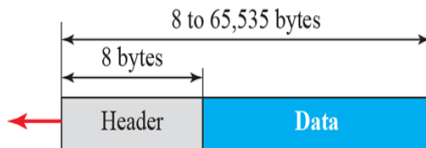
User Datagram Protocol

1 Introduction

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User Datagram Protocol

- A connectionless, unreliable transport protocol.
- UDP packets, called **user datagrams**, have a fixed-size **header of 8 bytes** made of **four fields, each of 2 bytes** (16 bits).



a. UDP user datagram



b. Header format

Example

The following is the contents of a UDP header in hexadecimal format

CB84000D001C001C

- What is the source port number?
- What is the destination port number?
- What is the total length of the user datagram?
- What is the length of the data?
- Is the packet directed from a client to a server or vice versa?

- The source port number is the first four hexadecimal digits ($CB84$)₁₆ or 52100
- The destination port number is the second four hexadecimal digits ($000D$)₁₆ or 13.
- The third four hexadecimal digits ($001C$)₁₆ define the length of the whole UDP packet as 28 bytes.
- The length of the data is the length of the whole packet minus the length of the header, or $28 - 8 = 20$ bytes.
- Since the destination port number is 13 (well-known port), the packet is from the client to the server.
- The client process is the Daytime

UDP Services

- **Process-to-Process Communication** : using socket addresses, a combination of IP addresses and port numbers.
- **Connectionless Services**: user datagram sent by UDP is an independent datagram, not numbered
- **No Flow Control, no error control** except for the checksum, calculation includes : a pseudoheader, the UDP header, and data from application layer.
- No Congestion Control
- Encapsulation and Decapsulation, Queuing: queues are associated with ports
- Multiplexing and Demultiplexing

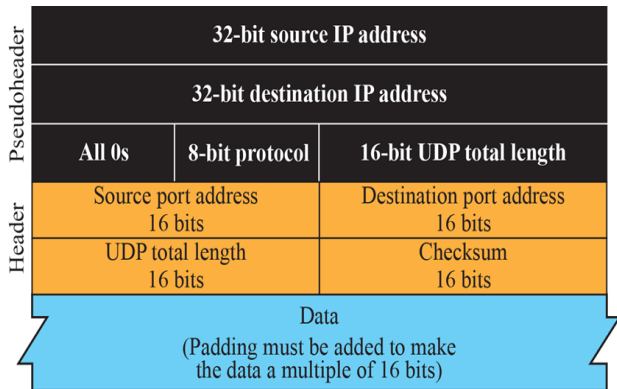
Pseudoheader for checksum calculation

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UDP Applications

- Suitable for **simple request-response** communication , not usually used for a process such as FTP that needs to send bulk data
- Suitable for a process with internal flow- and error-control mechanisms. For example, the **Trivial File Transfer Protocol** (TFTP) process includes flow and error control. It can easily use UDP.
- **Suitable transport protocol for multicasting.** Multicasting capability is embedded in the UDP software but not in the TCP software.
- Used for **management processes** such as SNMP
- Used for some **route updating protocols** such as Routing Information Protocol (RIP)
- Used for **interactive real-time applications** that cannot tolerate uneven delay between sections of a received message

Summary

Transport- Layer Protocols

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Introduction

User Datagram Protocol

- Discussed three transport-layer protocols
- Learnt about UDP

Test Your Understanding

Transport- Layer Protocols

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User Datagram Protocol

- In UDP, datagram follows ————— (same or different) path
- Header size of UDP is ————— bytes
- List any two services of UDP