SNS COLLEGE OF ENGINEERING

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Department of Information Technology

Course Name – 19IT401 Computer Networks

II Year / IV Semester

Unit 4 – Transport Layer

Topic 1 – Services, UDP

Services

Services

UDP – User Datagram Protocol
* 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 – Transfer Control Protocol
* TCP is a reliable connection-oriented protocol that can be used in any application where reliability is important.

SCTP – Stream Control Transmission Protocol
* SCTP is a new transport-layer protocol that combines the features of UDP and TCP.

* Process to Process Communication – Port Numbering

* Error Control

* Flow Control

UDP

- UDP is connectionless, unreliable transport protocol.

- It does not add anything to the services of IP except for providing process-to-process communication instead of host-to-host communication.

- UDP does not implement flow control or reliable/ordered delivery.

- UDP ensures correctness of the message by the use of a checksum.

- If a process wants to send a small message and does not require reliability, UDP is used.

UDP

User Datagram

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

- The first two fields define the source and destination port numbers.

- The third field defines the total length of the user datagram, header plus data.

- The 16 bits can define a total length of 0 to 65,535 bytes

- The last field can carry the optional checksum
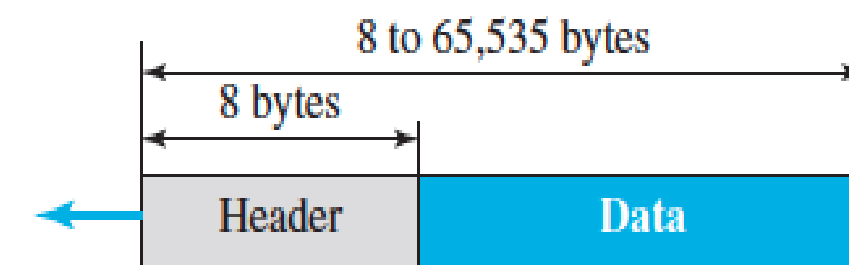
a. UDP user datagram
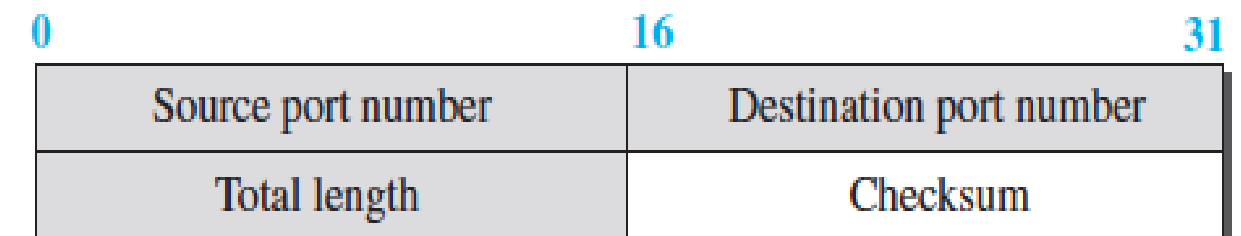
b. Header format

UDP - Services

Process-to-Process Communication

UDP provides process-to-process communication using socket addresses, a combination of IP addresses and port number.

Connectionless Services

- This means that each user datagram sent by UDP is an independent datagram.

- There is no relationship between the different user datagrams even if they are coming from the same source process and going to the same destination program.

- The user datagrams are not numbered.

- Only those processes sending short messages, messages less than 65,507 bytes (65,535 minus 8 bytes for the UDP header and minus 20 bytes for the IP header), can use UDP.

UDP - Services

Flow Control

UDP is a very simple protocol. There is no flow control, and hence no window mechanism. The receiver may overflow with incoming messages.

Error Control

There is no error control mechanism in UDP except for the checksum.
This means that the sender does not know if a message has been lost or duplicated.
When the receiver detects an error through the checksum, the user datagram is silently discarded.

Checksum

UDP checksum calculation includes three sections: a pseudoheader, the UDP header, and the data coming from the application layer.

Congestion Control

Since UDP is a connectionless protocol, it does not provide congestion control.

UDP - Services

Queuing

In UDP, queues are associated with ports.

Multiplexing and Demultiplexing

In a host running a TCP/IP protocol suite, there is only one UDP but possibly several processes that may want to use the services of UDP. To handle this situation, UDP multiplexes and demultiplexes
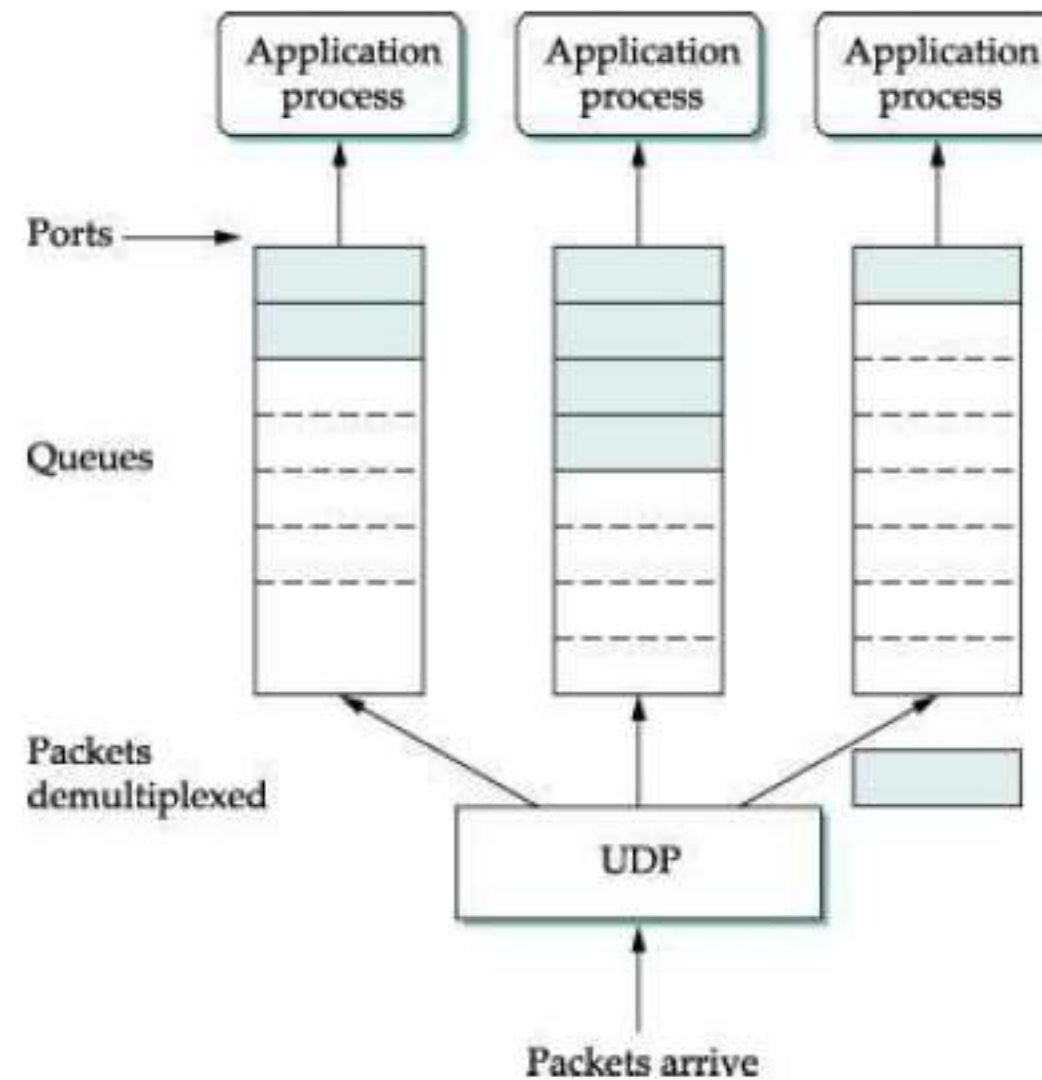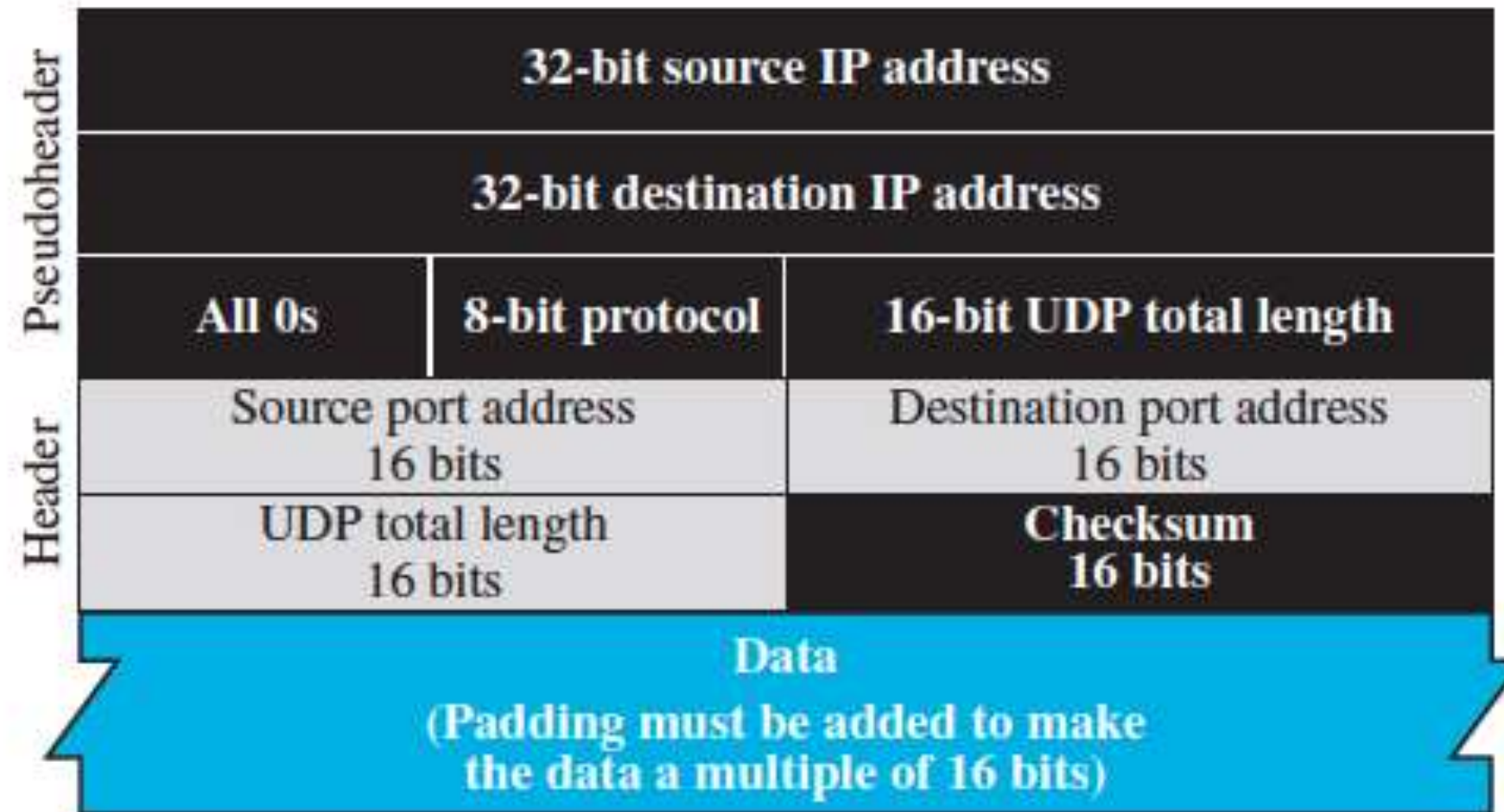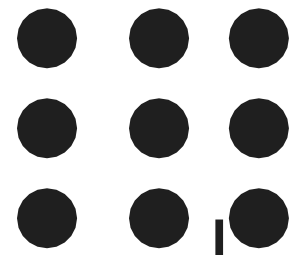
UDP - Services

Typical Applications

- UDP is suitable for a process that requires **simple request-response** communication with little concern for flow and error control. It is not usually used for a process such as FTP that needs to send bulk data.

- UDP is 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.

- UDP is a suitable transport protocol for multicasting. Multicasting capability is embedded in the UDP software but not in the TCP software.

- UDP is used for management processes such as SNMP.

- UDP is used for some route updating protocols such as Routing Information Protocol (RIP)

- UDP is normally used for interactive real-time applications that cannot tolerate uneven delay between sections of a received message

UDP - Services

Packet Format

THANK YOU