

## USER DATAGRAM PROTOCOL

- The **User Datagram Protocol (UDP)** is a connectionless, unreliable transport protocol. UDP is a very simple protocol using a minimum of overhead.
- If a process wants to send a small message and does not care much about reliability, it can use UDP. Sending a small message using UDP takes much less interaction between the sender and receiver than using TCP.

### 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.

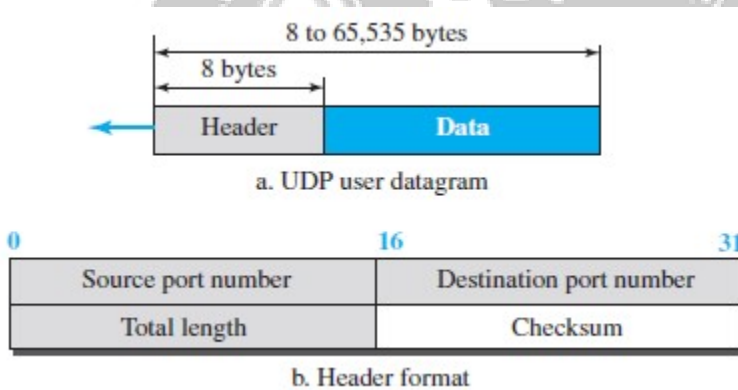


Fig: User datagram packet format

### Example:

The following is the content of a UDP header in hexadecimal format.

**CB8400D001C001C**

- 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?
- What is the client process?

### Solution

- The source port number is the first four hexadecimal digits (CB84)16, which means that the source port number is 52100.
- The destination port number is the second four hexadecimal digits (000D)16, which

means that the destination port number is 13.

c. The third four hexadecimal digits (001C)16 define the length of the whole UDP packet as 28 bytes.

d. The length of the data is the length of the whole packet minus the length of the header, or 28 – 8 = 20 bytes.

e. Since the destination port number is 13 (well-known port), the packet is from the client to the server.

f. The client process is the Daytime (see Table1).

### UDP Services:

#### **Process-to-Process Communication:**

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

#### **Connectionless Services:**

- UDP provides a *connectionless service*. 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. Also, unlike TCP, there is no connection establishment and no connection termination. This means that each user datagram can travel on a different path.

#### **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 pseudo header, the UDP header, and the data coming from the application layer. The *pseudo header* is the part of the header of the IP packet in which the user datagram is to be encapsulated with some fields filled with 0s.

- If the checksum does not include the pseudo header, a user datagram may arrive safe and sound. However, if the IP header is corrupted, it may be delivered to the wrong host.

