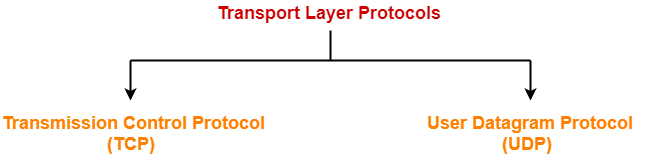
**UDP HEADER**

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**Transport Layer Protocols-**

 There are mainly two transport layer protocols that are used on the Internet-



1. Transmission Control Protocol (TCP)
2. User Datagram Protocol (UDP)

**we will discuss about User Datagram Protocol (UDP).**

**UDP Protocol**

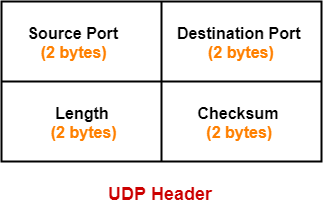
* UDP is short for **User Datagram Protocol**.
* It is the transport layer protocol.
* It has been designed to send data packets over the Internet.
* It simply takes the datagram from the network layer, attaches its header, and sends it to the user.

**Need of UDP**

* TCP proves to be an overhead for certain kinds of applications.
* The [**Connection Establishment**](https://www.gatevidyalay.com/three-way-handshake-tcp-connection-establishment/) Phase, [**Connection Termination**](https://www.gatevidyalay.com/tcp-connection-termination-tcp-protocol/) Phase etc of TCP are time consuming.
* To avoid this overhead, certain applications which require fast speed and less overhead use UDP.

**UDP HEADER**

The following diagram represents the UDP Header Format-



**1. Source Port-**

* Source Port is a 16-bit field.
* It identifies the port of the sending application.

**2. Destination Port-**

* Destination Port is a 16-bit field.
* It identifies the port of the receiving application.

**3. Length-**

* Length is a 16-bit field.
* It identifies the combined length of UDP Header and Encapsulated data.

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| Length = Length of UDP Header + Length of encapsulated data |

**4. Checksum-**

* Checksum is a 16 bit field used for error control.
* It is calculated on UDP Header, encapsulated data.
* Checksum calculation is not mandatory in UDP.

**Applications Using UDP-**

Following applications use UDP-

* Routing Protocols like RIP and OSPF use UDP because they have very small amount of data to be transmitted.
* Broadcasting and multicasting applications use UDP.
* Streaming applications like multimedia, video conferencing etc use UDP since they require speed over reliability.
* Real time applications like chatting and online games use UDP.

**Important Notes-**

**Note-01:**

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| Size of UDP Header= 8 bytes |

* Unlike TCP header, the size of UDP header is fixed.
* This is because in UDP header, all the fields are of definite size.
* Size of UDP Header = Sum of the size of all the fields = 8 bytes.

**Note-02:**

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| UDP is an unreliable protocol. |

This is because-

* UDP does not guarantee the delivery of datagram to its respective user (application).
* The lost datagrams are not retransmitted by UDP because there is no acknowledgement sent by receiver

**Note-03:**

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| Checksum calculation is not mandatory in UDP. |

This is because-

* Time is saved and transmission becomes faster by avoiding to calculate it.

It may be noted-

* To disable the checksum, the field value is set to all 0’s.
* If the computed checksum is zero, the field value is set to all 1’s.

**Note-04:**

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| UDP does not guarantee in order delivery. |

This is because-

* UDP allows out of order delivery to ensure better performance.
* If some data is lost on the way, it does not call for retransmission.

**Advantages of UDP**

* Higher speed than TCP for specific applications.
* UDP is a connectionless protocol.
* Useful for applications that do not require reliable, ordered delivery of messages.
* Relatively simple compared to TCP.

**Difference between TCP and UDP**

| **Basis** | **Transmission control protocol (TCP)** | **User datagram protocol (UDP)** |
| --- | --- | --- |
| **Reliability** | TCP is reliable as it guarantees the delivery of data to the destination router. | The delivery of data to the destination cannot be guaranteed in UDP. |
| **Error checking mechanism** | TCP provides extensive error-checking mechanisms. It is because it provides flow control and acknowledgment of data. | UDP has only the basic error checking mechanism using checksums. |
| **Acknowledgment** | An acknowledgment segment is present. | No acknowledgment segment. |
| **Sequence** | Sequencing of data is a feature of Transmission Control Protocol (TCP). this means that packets arrive in order at the receiver. | There is no sequencing of data in UDP. If the order is required, it has to be managed by the application layer. |
| **Speed** | TCP is comparatively slower than UDP. | UDP is faster, simpler, and more efficient than TCP. |
| **Retransmission** | Retransmission of lost packets is possible in TCP, but not in UDP. | There is no retransmission of lost packets in the User Datagram Protocol (UDP). |
| **Header Length** | TCP has a (20-60) bytes variable length header. | UDP has an 8 bytes fixed-length header. |
| **Handshaking Techniques** | Uses handshakes such as SYN, ACK, SYN-ACK | It’s a connectionless protocol i.e. No handshake |
| **Broadcasting** | TCP doesn’t support Broadcasting. | UDP supports Broadcasting. |
| **Applications** | TCP is used in sending mails, online shopping etc. | UDP is used in live streaming, online gaming etc. |
| **Protocols** | TCP is used by [HTTP, HTTPs](https://www.geeksforgeeks.org/difference-between-http-and-https-2/),[FTP](https://www.geeksforgeeks.org/file-transfer-protocol-ftp/), [SMTP](https://www.geeksforgeeks.org/simple-mail-transfer-protocol-smtp/) and [Telnet](https://www.geeksforgeeks.org/introduction-to-telnet/). | UDP is used by [DNS](https://www.geeksforgeeks.org/details-on-dns/), [DHCP](https://www.geeksforgeeks.org/dynamic-host-configuration-protocol-dhcp/), TFTP, [SNMP](https://www.geeksforgeeks.org/simple-network-management-protocol-snmp/), [RIP](https://www.geeksforgeeks.org/routing-information-protocol-rip/), and [VoIP](https://www.geeksforgeeks.org/voice-over-internet-protocol-voip/). |