

**COURSE TITLE: DISTRIBUTED SYSTEMS**

**ASSIGNMENT NO: 1**

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There are various types of internet protocols that support and play a big role in communicating with different devices across the network for example Transmission Control Protocol (TCP), Internet Protocol (IP), User Datagram Protocol (UDP), Post office Protocol (POP), Simple mail transport Protocol (SMTP).

TCP (Transmission Control Protocol) is a standard that defines how to establish and maintain a network conversation through which application programs can exchange data. TCP works with the Internet Protocol ([IP](https://searchunifiedcommunications.techtarget.com/definition/Internet-Protocol)), which defines how computers send [packets](https://www.techtarget.com/searchnetworking/definition/packet) of data to each other. Together, TCP and IP are the basic rules defining the Internet. It is a [connection oriented](https://www.techtarget.com/searchnetworking/definition/connection-oriented) protocol, which means a connection is established and maintained until the application programs at each end have finished exchanging messages. Transport control protocol provides a sophisticated transport service. It is very reliable when it comes to delivery of arbitrarily long sequence of bytes via stream based programming abstraction. It is simply an end-to-end agreement to perform reliable data transmission, intermediate nodes such as routers have no knowledge of TCP. Connections and the IP packets that transfer the data in a TCP transmission do not necessarily all follow the same route. It is used for organizing data in a way that ensures the secure transmission between the server and client. TCP layer includes some additional mechanisms implemented over IP to meet the reliable guarantees. These are;

Sequencing, which allows a TCP sending processes to divide the stream into a sequence of data segments and transmits them as IP packets. A sequence number is attached to each TCP segment. These sequence numbers are used to order the received segment before placing them in the stream at the receiving process. No segments can be placed in the input stream until all the lower numbered segments have been received and placed in the stream. All segments that arrive out of order must be held in a buffer until their predecessors arrive.

Retransmission, the sender records the sequence numbers of the segments that it sends. When it receives acknowledgement it notes that the segments were successfully received and it may then delete them from its outgoing buffers. If any segment is not acknowledged within a specified timeout, the sender retransmits it.

Buffering, the incoming buffer at the receiver is used to balance the flow between the sender and the receiver. If the receiving process issues receive operations more slowly than the sender issues send operations, the quantity of data in the buffer grows. Usually it is extracted from the buffer before it becomes full, but ultimately when buffer overflows, incoming segments are dropped without recording arrival. And their arrival is not acknowledged in turn the sender retransmits them.

Checksum, each segment carries a checksum covering the header and the data in the segment. If a received segment does not match its checksum, the segment is dropped.

User datagram protocol is almost a transport level replica of IP. It is encapsulated inside an IP packet. It has a short header that includes the source and destination port numbers the corresponding host address are present in the IP header, a length field and checksum. It is less reliable and only reliable if the checksum field is used, which is optionally used. If the checksum field is non-zero, the receiving host compiles the check value from the packet contents and compares it with the received checksum, packets which are not matched are dropped. UDP is a standardized method for transferring data between two computers in a network. Compared to other protocols, UDP accomplishes this process in a simple fashion: it sends packets (units of data transmission) directly to a target computer, without establishing a connection first, indicating the order of said packets, or checking whether they arrived as intended. UDP is faster but less reliable than [TCP](https://www.cloudflare.com/learning/ddos/glossary/tcp-ip/), another common transport protocol. In a TCP communication, the two computers begin by establishing a connection via an automated process called a ‘handshake.’ Only once this handshake has been completed will one computer actually transfer data packets to the other. It only transmits messages of up to 64kbytes in size. And this size is the maximum packet size permitted by IP.

**REFERENCES**

* “[The TCP/IP Guide](http://www.amazon.com/dp/159327047X?tag=secbks-20)” by Charles Kozierok
* “[TCP/IP Illustrated, Volume I](http://www.amazon.com/dp/0201633469?tag=secbks-20)” by W. Richard Stevens.
* [www.techtarget.com/definition/TCP-IP](http://www.techtarget.com/definition/TCP-IP).
* [www.cloudflare.com/user-datagram-protocol-udp](http://www.cloudflare.com/user-datagram-protocol-udp).