

TCP & UDP

Layer4: provides transparent transfer of data between end hosts, can provide various services to applications as reliable data transfer – error recovery – data sequencing – flow control, provides layer 4 addressing (port numbers) to identify the application layer protocol and session (an exchange of data between two or more communicating devices) multiplexing.

TCP (Transmission Control Protocol) is connection oriented → hosts must establish a connection before exchanging data, provides reliable communication where destination host must acknowledge each TCP segment it received or it will be re-sent, TCP provides sequencing to allow destination hosts to put segments in the correct order even if they arrive out of order and provide flow control where dest hosts can tell source hosts to inc/dec rate of sending data.

Three way handshake to establish a connection: → syn flag, ← ack,syn flags, → ack flag.

Four way handshake to terminate a connection: → FIN, ← ACK, ← FIN, → ACK.

Sequencing /ACK: Random Seq: num → , Random Seq num, Forward Ack ← ,..... etc.

Because acknowledging every single segment is inefficient, window size field I TCP header allows more data to be sent before an ack is required and a sliding window can be used dynamically to adjust how large the window size is.

UDP: User Datagram Protocol: connection-less, doesn't provide reliable communication, segments are sent "best effort" with no guarantee they are received, no sequencing, no flow control.

TCP is preferred for apps with reliable communication as file transfer while UDP for delay sensitive apps as real time voice and video.