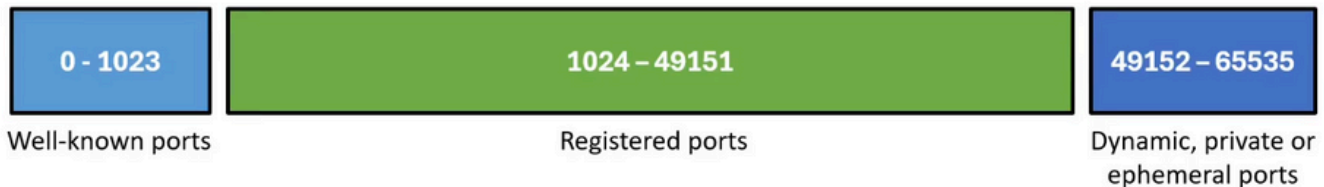


What is the transport layer?

- The transport layer is a level in the TCP/IP and OSI model responsible for facilitating communication between devices by ensuring reliable and efficient data transfer across a network.
- It manages tasks like error detection, flow control, and data segmentation.



What is Transmission Control Protocol (TCP)?

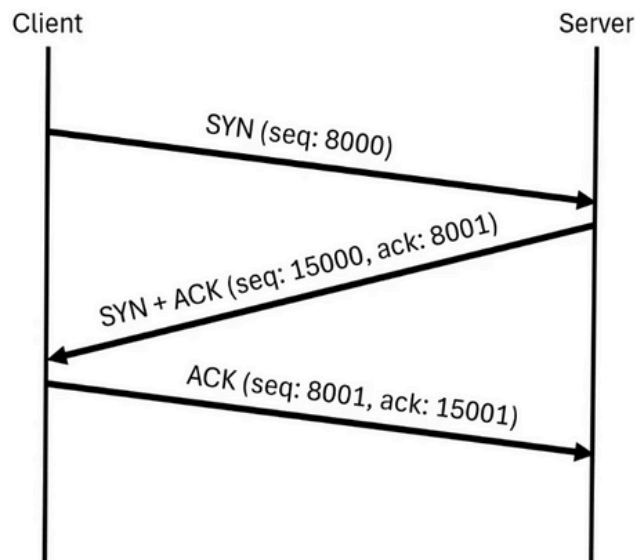
- Transmission Control Protocol (TCP) is a standard that defines how to establish and maintain a network conversation by which applications can exchange data.
 - Connection-oriented
 - Reliable
 - Flow control
 - Full duplex
 - Error checking and recovery
 - Segmentation and Reassembly

TCP segment format

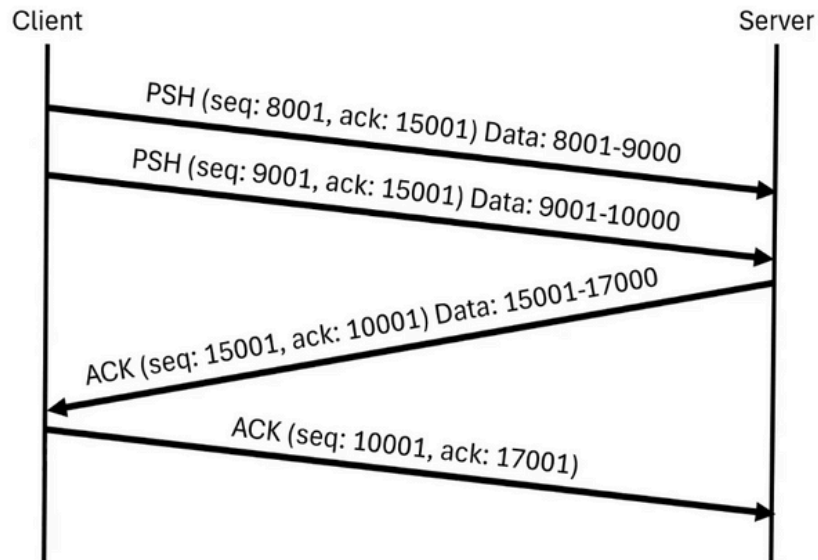
Offsets		0								1								2								3							
Octet	Bit	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7	0	1	2	3	4	5	6	7
0	0	Source port																Destination port															
4	32	Sequence number																															
8	64	Acknowledgment number (if ACK set)																															
12	96	Data offset				Reserved 0 0 0 0				C	E	U	A	P	R	S	F	Window Size															
										W	C	R	C	S	S	Y	I																
										R	E	G	K	H	T	N	N																
16	128	Checksum																Urgent pointer (if URG set)															
20	160	Options (if data offset > 5. Padded at the end with "0" bits if necessary.)																															
:	:																																
56	448																																

Source: Wikipedia from https://en.wikipedia.org/wiki/Transmission_Control_Protocol

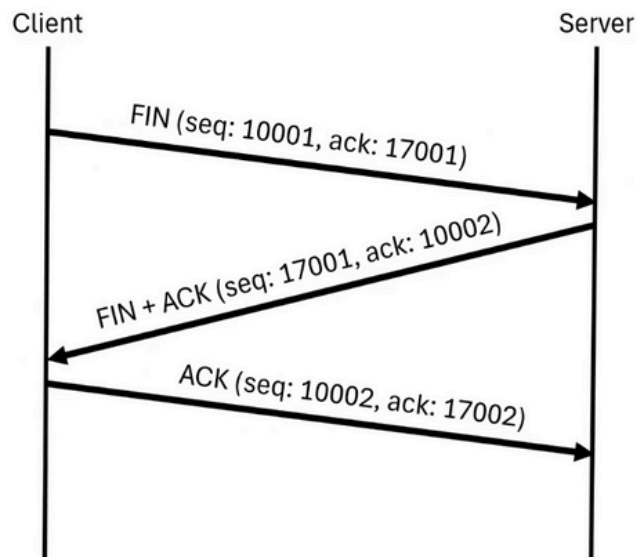
How TCP works? – Connection establishment



How TCP works? – Data transfer



How TCP works? – Connection termination



What is User Datagram Protocol (UDP)?

Feature	TCP	UDP
Connection Type	Connection-oriented	Connectionless
Reliability	Reliable - manages acknowledgment and retransmission	Unreliable - no acknowledgment or retransmission
Message Ordering	Ordered - ensures messages arrive in sequence	Not ordered - arrival sequence not guaranteed
Protocol Weight	Heavyweight - requires setup before data transmission	Lightweight - simple transport layer
Data Transmission	Stream-based - no indication of message boundaries	Datagram-based - packets have definite boundaries
Congestion Control	Handles congestion control	No built-in congestion control
Broadcast Support	Does not support broadcasting	Supports broadcasting
Multicast Support	Does not support multicast	Supports multicast

UDP datagram format

[illegible]