Basic Networking

The OSI 7 Layer Model

	Layer	Description	Some Associated Protocols/Technologies	
7	Application		IMAP, POP3, SMTP, FTP, SFTP, FTPS, HTTP, HTTPS, SNMP, Telnet, SSH, DHCP, NTP	
6	Presentation	Data formats, data translation	JPEG, GIF, ASCII, HTML, encryption	
5	Session	Open, close, manage a dialog between applications	LDAP, SQL, XWindows, SCP	
4	Transport	End to end communication	TCP UDP	
3	Network	Addressing, packet forwarding, routing	IPv4 IPv6	3.5 ICMP
2	Data Link	Point to point (device to device) data transfer	Ethernet (802.3) Wi-fi (802.11)	2.5 ARP MPLS
1	Physical	How data is really physically transmitted	Twisted pair, fiber, radio signals	

Note that the Internet protocols don't really map completely well to the layers of the official OSI model as published.

IP v4 header

0 3	4 7	8 15	16 31
Version	Length	Type of Service	Total length
Identifier		Flags	Fragment offset
Time to live	Protocol	Header Checksum	
Source IP address			
Destination IP address			
Options & padding			

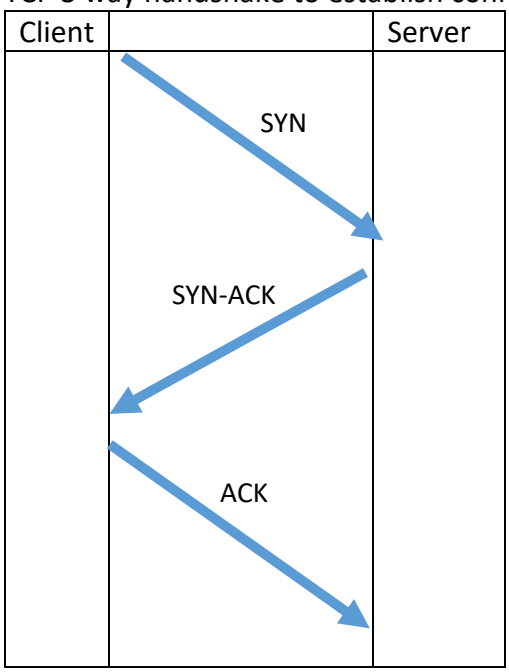
TCP header

0 3	4 7	8 15	16 31
Source port			Destination port
Sequence Number			
ACK Number			
Data offset	0 0 0 NS CWR ECE URG ACK PSH RST SYN FIN		Window size
Checksum			Urgent pointer (if URG bit set)
Options and padding			

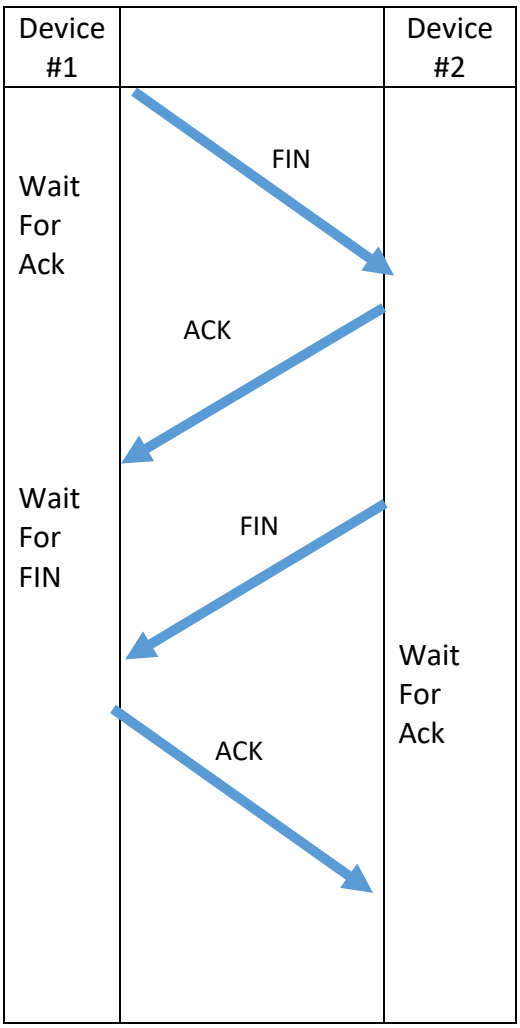
ACK—says is an ACK packet RST—reset connection

SYN—used in connection setup FIN—used to take down connection

TCP 3 way handshake to establish connection



TCP handshake to Terminate connection



In IPv4 there are some IP address ranges reserved for private networks:

- 192.168.0.0 - 192.168.255.255 (65,536 IP addresses)
- 172.16.0.0 - 172.31.255.255 (1,048,576 IP addresses)
- 10.0.0.0 - 10.255.255.255 (16,777,216 IP addresses)

You would use these IP address ranges on a network behind a router, they would not be available to the public internet.