***Computer Network***

* End systems are connected together by a network of communication links and packet switches.
* When one end system has data to send to another end system, the sending end system segments the data and adds header bytes to each segment. The resulting packages of information, known as packets in the jargon of computer networks, are then sent through the network to the destination end system, where they are reassembled into the original data.
* Transmission Control Protocol (TCP) and the Internet Protocol (IP)
* The IP protocol specifies the format of the packets that are sent and received among routers and end systems.
* The Internet’s principal protocols are collectively known as TCP/IP.
* Internet : an infrastructure that provides services to applications
* End systems attached to the Internet provide an Application Programming Interface (API) that specifies how a program running on one end system asks the Internet infrastructure to deliver data to a specific destination program running on another end system.
* host = end system. Hosts are sometimes further divided into two categories: clients and servers. Informally, clients tend to be desktop and mobile PCs, smartphones, and so on, whereas servers tend to be more powerful machines that store and distribute Web pages, stream video, relay e-mail, and so on.
* Protocols at different layers: (Top – Down approach)
* Application : HTTP, FTP, SMTP
* Transport : TCP, UDP, RTP
* Network : IPv4, IPv6, MPLS
* Data Link : Ethernet, WiFi, Bluetooth, UMTS, LTE
* Physical
* Every host has two addresses:
* Logical address (IP address) – used to find out the path towards a host
* Physical address (MAC address) - uniquely identify a host in the Internet

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1. The Layer 1 (Physical Layer) PDU is the bit or, more generally, symbol

The Layer 2 (Data Link Layer) PDU is the frame.

The Layer 3 (Network Layer) PDU is the packet.

The Layer 4 (Transport Layer) PDU is the segment

for TCP or the datagram for UDP.

The Layer 5 (Application Layer) PDU is the data or message.

2. [Simple Mail Transfer Protocol (SMTP)](https://www.geeksforgeeks.org/simple-mail-transfer-protocol-smtp/) is typically used by user clients for sending mails. Post Office Protocol (POP) is used by clients for receiving mails. Checking mails in web browser is a simple HTTP process.

3. The web browser first need to figure out IP address of site from url using DNS, then establishes a TCP connection, typically at port 80. Once the TCP connection is established, the browser sends a HTTP request using GET. Finally web server responds with HTTP response.

4. Whenever a browser opens a webpage, it makes a separate request for each object of page like image, css, javascript, etc. However if multiple resources are served from same server, then one TCP connect is sufficient.

5. HTTP may use different TCP connection for different objects of a webpage if non-persistent connections are used. FTP uses two TCP connections, one for data and another control. TELNET and FTP can only use **ONE connection** at a time.

6. stateless protocols (IP) and (HTTP)

7. stateful application layer protocols are FTP and POP3

8. IMAP(Internet Message Access Protocol) is an application level protocol that stores email messages on a mail server and allows the end user to view and customize the messages as if they are readily stored on the end user's device.

* POP3 is post office protocol Version 3.POP is a protocol which listens on port 110 and is responsible for accessing the mail service on a client machine. POP3 works in two modes such as Delete Mode and Keep Mode.
* IMAP is Internet Messaged Access Protocol which is used by email server to maintain a central repository that can be accessed from any machine.
* SMTP is simple mail transfer protocol.
* DMSP is distributed mail service protocol.

9. Active web document consists of a software program sent by a server to interact with the client and answer the query of the client.

10. A packet filtering firewall can block particular hosts from accessing the network.

* **Session Maintenance Protocol** coordinates the initiation and termination of communication sessions.
* **Real - time Streaming Protocol** designed for use in entertainment and communications systems to control streaming media servers.
* **Real - time Transport Control Protocol** works with Real-Time Protocol (RTP) to monitor data delivery on large multicast networks.
* **Session Initiation Protocol** establishes, manages and terminates multimedia sessions.

11. The size of the ‘total length’ field in IPv4 datagram is 16 bit.

12.