

IP → Internetworking ³Protocols - The network layer ① is designed to send data across network. This layer is responsible for host-to-host delivery & for host-to-host delivery & for routing the packet through the routers or switches.

IP is the transmission mechanism used by the TCP/IP protocols. It is an unreliable & connectionless protocol. IP does not do error checking or error tracking. IP does its best to get a transmission through to its destination but with no guarantee. IP transport data in packets called datagram, each of which is transported separately. Datagram can travel along different routes and can arrive out of sequence or be duplicated. IP does not keep track of the routes and has no facility for reordering datagram once they arrive at their destination.

A Datagram is a variable length packet consisting of two parts:- header and data. Header is 20-60 bytes in length and contains information essential to routing & delivery, while Data is may be

20-65,536 bytes long.

TCP/IP uses IPv4 (Internet protocol version 4) to deliver msgs.

But IPv4 has some deficiency like

- No encryption & authentication is provided by IPv4.
- Little support for audio/video transmission.

To overcome these deficiencies IPv6 was proposed.

It provides:-

- Large address space → An IPv6 address is 128 Bits long.

- ③ better header format
- ③ support for more security
- ④ support for resource allocation
- ⑤ Allowance for extension.
- ⑥ new option can be added when required

② ARP Protocol (Address Resolution Protocol) →

It is used to associate a logical address with a physical address. On a LAN, each device on a link is identified by a physical or node (station) address, it is present on NIC (Network interface card). ARP is used to find the physical address of the node when its internet address is known.

③ RARP → Reverse Address Resolution Protocol - It allows a host to discover its internet address when it knows only its physical address. It is used when a computer is connected to network for the first time. When a new computer is connected to the net it discovers its IP address first. When it receives its IP address then it looks for its MAC address which is provided by RARP.

④ ICMP :- Internet Control Message Protocol :- It provides an unreliable & connectionless datagram delivery. But has no error reporting or error correcting mechanism. And it does not support for host and management queries. ICMP is designed to compensate above deficiencies.

It is companion of IP protocol.

ICMP messages are divided into two broad categories

① Error Reporting messages: → They report problem that a router or a host (destination) may encounter when it processes an IP packet.

② Query messages: - It occurs in pairs, helps a host or a network manager get specific information from a router or another host.

Second important task of ICMP is the Error Reporting. ICMP uses the source IP address to send the error message to the source of the datagram.

⑤ IGMP (Internet Group message Protocol) - It is used to facilitate the simultaneous transmission of a message to a group of recipients.

Some processes sometimes need to send the same message to a large number of receivers simultaneously. This is called multicasting, which is one to many communication. IGMP is one of the necessary protocols that is involved in multicasting. IGMP is a companion to the IP protocol. This protocol manages group membership. IGMP protocol gives the multicast routers information about the membership status of the host connected to the network.

A multicast router receives thousands of multicast packets every day, if router has no knowledge of about group, it broadcast all these packets. It creates lots of traffic & consumes bandwidth. IGMP helps the router to keep a list of group in the n/w. IGMP helps the router create & update this list.

ICMP → Internet-Control Message Protocol (ICMP) is a mechanism used by the hosts and gateways to send notification of datagram problems back.

③ Transport Layer: - It is next layer above internet layer. It is represented in TCP/IP by two protocols: - UDP & TCP

① UDP → User Datagram Protocol: - It is a simple connectionless, unreliable transport protocol. It is used to provide process to process communication. If a process wants to send a small message and does not care much about reliability, it can use UDP. Sending a small message by using UDP takes much less interaction between the sender and receiver.

② TCP → Transmission Control Protocol: - It provides full transport layer services to application. TCP is a reliable stream transport protocol & connection oriented protocol. It creates a virtual connection between two TCP's to send data. TCP provides process-to-process communication using port numbers.

At the sending end of each transmission, TCP divides a stream into smaller units called segments. Each segment includes a sequence number for reordering after receipt, together with an acknowledgement number for the segment received. Segments are carried across the internet inside of IP datagrams. At the receiving end, TCP collects each datagram as it comes & reorders the transmission based

sequence number.

IP also provides flow control, error control & congestion control. (3)

(3) SCTP stream Control Transmission Protocol:- It provides support for newer applications such as voice over internet. It is a new reliable, message oriented transport layer protocol. It supports new applications like telephony signaling, media gateway control etc. SCTP combines best features of UDP and TCP. It is a reliable message oriented protocol. It preserves the message boundaries & at the same time detects lost data, duplicate data & out of order data. It has also congestion control & flow control mechanism.

(4) Application Layer:- It is top most layer of TCP/IP & is combination of session presentation & application layer in the OSI model. This layer supports following layer:-

- ① SMTP → Simple Mail Transfer Protocol
- ② FTP → File Transfer Protocol
- ③ HTTP → Hyper Text Transfer Protocol
- ④ SNMP → Simple Network Management Protocol
- ⑤ TELNET → TErminal NEtwork