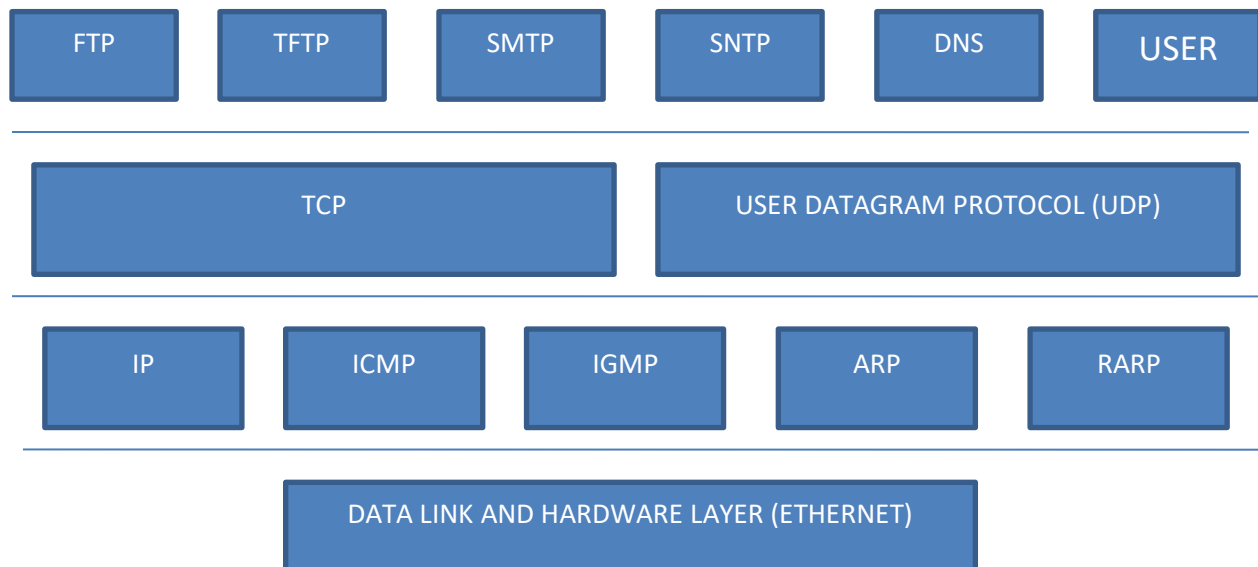# TCP-IP-PART-1

**Introduction: -**

- TCP/IP is the first set of protocols used in Internet.

- Allows computers to communicate/share resources across a network.

- Work on TCP/IP started in 1970's.

    1. Funded by US Military.

    2. ARPA

    3. Network protocols of APRANET were upgraded.

**TCP/IP family members:**

| FTP | TFTP | SMTP | SNTP | DNS | USER |
|-----|------|------|------|-----|------|

| TCP | USER DATAGRAM PROTOCOL (UDP) |
|-----|------------------------------|

| IP | ICMP | IGMP | ARP | RARP |
|----|------|------|-----|------|

| DATA LINK AND HARDWARE LAYER (ETHERNET) |
|-----------------------------------------|

- The modern Internet sits on top of the TCP/IP technology.

    1. Used as a standard.

    2. To bridge the gap between non-compatible platforms.

    3. All computers connected to the Internet understand TCP/IP.

- In 1978, ISO proposed a 7-layer reference model for network services and protocols.

    1. Known as OSI model.

    2. TCP/IP does not strictly follow this 7-layer model.

       3.   TCP/IP follows a simplified 4-layer model.

**Why Layering?**

- To provide well defined interface between adjacent layers.

    1. A change in one layer does not affect the other layers.

    2. Interface must remain the same.

- Allows a structured development of network software.

<u>**The 7 Layer OSI Model:**</u>

APPLICATION
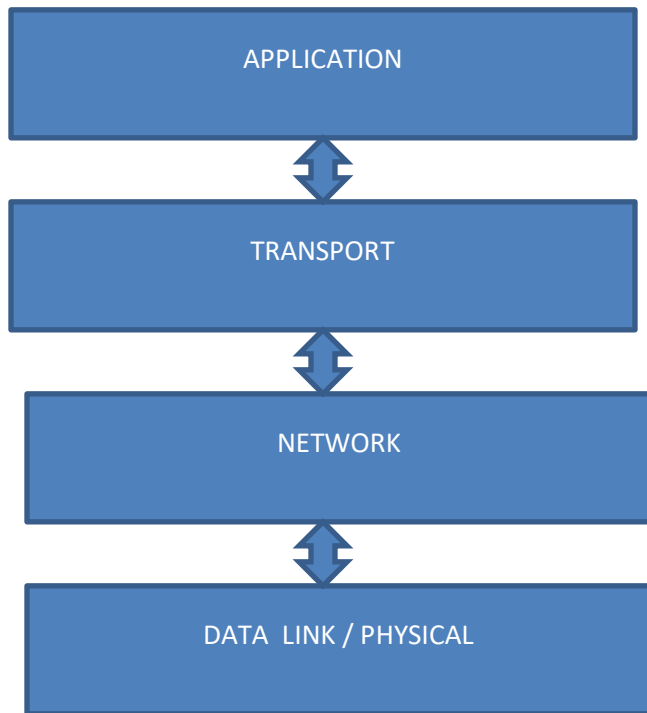
PRESENTATION

SESSION

TRANSPORT

NETWORK

DATA  LINK

PHYSICAL

HOST TO HOST

POINT TO POINT

**The Simplified 4-layer Model: -**

| APPLICATION |
|:---:|

⇕

| TRANSPORT |
|:---:|

⇕

| NETWORK |
|:---:|

⇕

| DATA  LINK / PHYSICAL |
|:---:|

NIC (Network Interface Card ) is put inside PC for internet connectivity . NIC has both the feature of DataLink and Physical layer.)

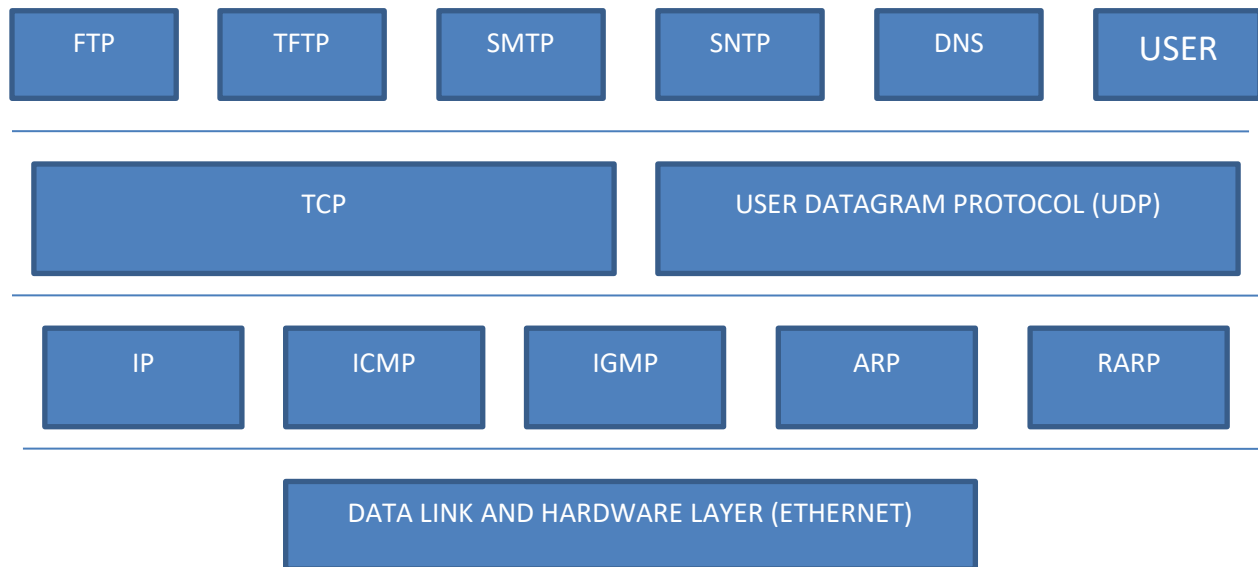**Data Flow in 4-layer Model:**

| APPLICATION | | APPLICATION |
|:---:|:---:|:---:|
| ⇕ | | ⇕ |
| TRANSPORT | | TRANSPORT |
| ⇕ | | ⇕ |
| NETWORK | NETWORK | NETWORK |
| ⇕ | ⇕ | ⇕ |
| DATA  LINK / PHYSICAL | DATA  LINK / PHYSICAL | DATA  LINK / PHYSICAL |

A ⟶ B ⟶ C
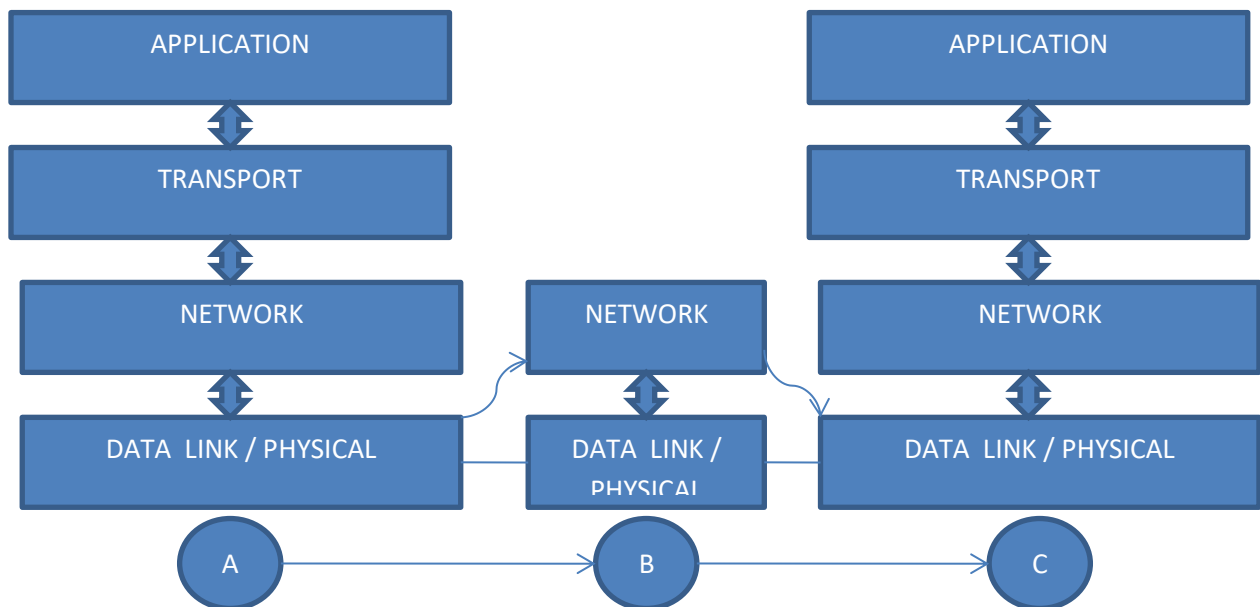
**TCP/IP Protocol Suite:**

- Refers to a family of protocol.

- The protocols are built on top of connectionless technology.

  1. Data sent from one node to another as a sequence of datagrams.

  2. Each datagram sent independently.

  3. The datagram corresponding to the same message may follow different routes.

- Variable delay, arrival out of order at destination.

**TCP/IP Family Members:**

| FTP | TFTP | SMTP | SNTP | DNS | USER |
|-----|------|------|------|-----|------|

| TCP | USER DATAGRAM PROTOCOL (UDP) |
|-----|------------------------------|

| IP | ICMP | IGMP | ARP | RARP |
|----|------|------|-----|------|

| DATA LINK AND HARDWARE LAYER (ETHERNET) |
|-----------------------------------------|

- FTP        – File Transfer Protocol

- TFTP      – Trivial File Transfer Protocol

- SMTP     - Simple Mail Transfer Protocol

- SNMP     – Simple Network Management Protocol.

- DNS        – Domain Name Server

- ICMP      - Internet Control Message Protocol (used for     error                         messages)

- IGMP      -Internet Group Message Protocol

- ARP        - Address Resolution Protocol (Translate an IP address into         Ethernet address)

- RARP      - Reserve Address Resolution Protocol

**Typical Scenario:**
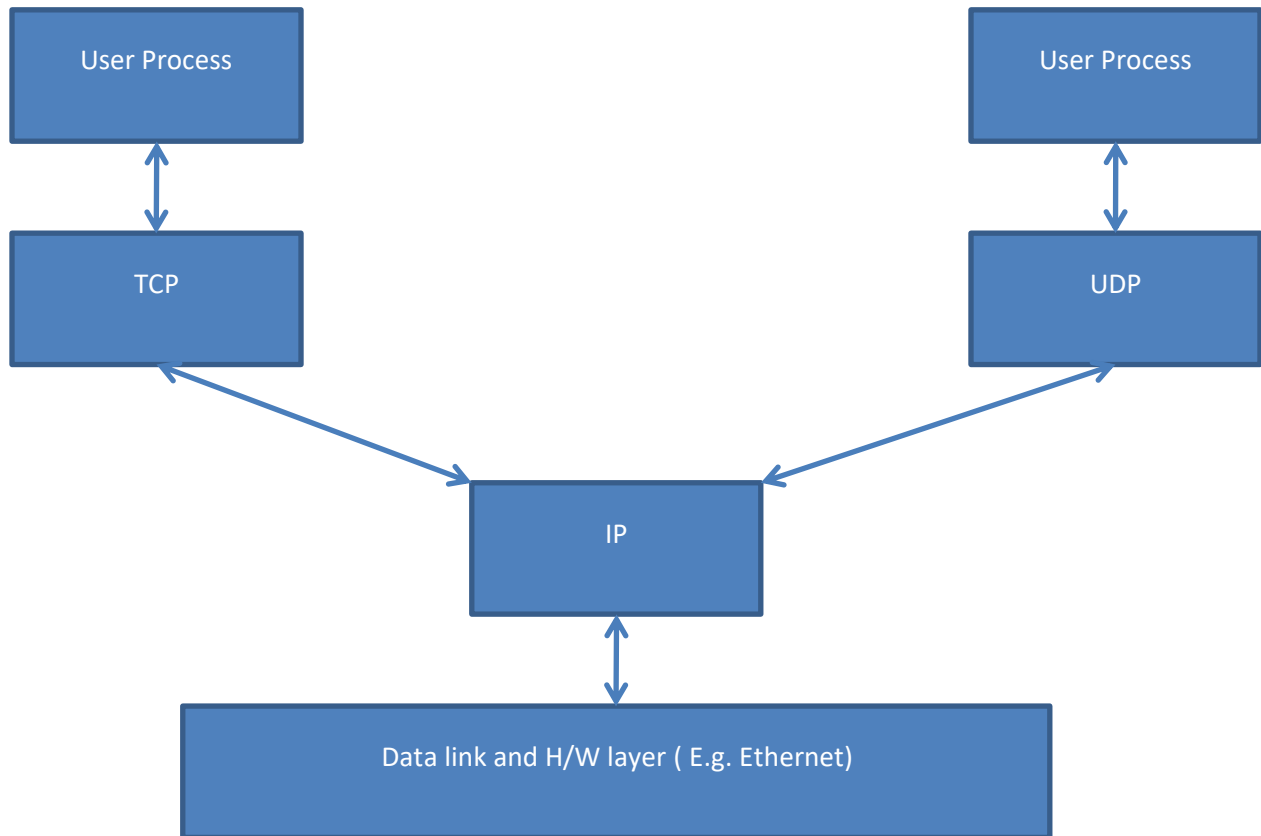


**What does IP do?:**

- IP-transports datagram (packets) from the source node                   to the destination.

    1. Responsible for routing the packets.

    2. Breaks a packet into smaller packets, if required.

    3. Unreliable service.

        ❖ A packet may be lost in transit.

        ❖ Packet may arrive out of order.

        ❖ Duplicate packet may be generated.

**What does TCP do?:**

- TCP provides a connection oriented reliable service for sending messages.

    1. Split a message into packets.

    2. Reassemble packets at destination.

3. Resend packets that were lost in transmit.

- Interface with IP: -

    1. Each packet forwarded to IP for delivery.

    2. Error control is done by TCP.

**What does UDP do?**

- UDP provides a connectionless unreliable service for sending datagram's (packets).

    1. Message small enough to fit in a packet (e.g. DNS query).

    2. Simpler and faster than TCP.

    3. Never splits data into multiple packets.

    4. Does not care about error control.

- Interface with IP:

    1. Each UDP packet sent to IP for delivery.