NETWORKING

❖ MANAGING NETWORK:

- A network is defined as a group of two or more computer systems linked together.
- Types of networks are: LAN, WAN, MAN

    LAN : Local Area Network
    WAN : Wide Area Network
    MAN : Metropolitan Area Network

- Computers on a network are sometimes called nodes. Computers and devices that allocate resources for a network are called servers.
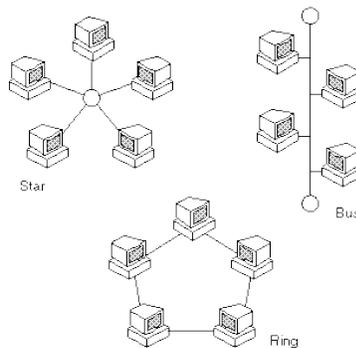
NETWORKING:
- Computer networking refers to interconnected computing devices that can exchange data and share resources with each other.
- These networked devices use a system of rules, called communications protocols, to transmit information over physical or wireless technologies.

INTERNET:
- The internet is defined as a global network of linked computers, servers, phones, and smart appliances that communicate with each other using the **transmission control protocol (TCP)** standard to enable the fast exchange of information and files, along with other types of services.

INTRANET:
- An intranet is a private network contained within an enterprise that is used to securely share company information and computing resources among employees.
- An intranet can also be used for working in groups and teleconferences.

➢ TCP AND UDP:

- TCP (Transmission Control Protocol) and UDP (User Datagram Protocol) are both transport protocols used to transmit data over the internet:

TCP:

- A connection-based protocol that's more reliable but slower than UDP. TCP is used to send and receive web pages, images, and data files. It's reliable because it has built-in error-checking systems that retransmit and reorder lost packets. However, TCP uses more bandwidth.

UDP:

- A connectionless protocol that's less reliable but faster than TCP. UDP is used for real-time communications like streaming video, voice over IP, and gaming. It's lightweight and doesn't have overhead for opening, maintaining, or terminating a connection. However, UDP doesn't retransmit lost packets and doesn't guarantee data delivery.

➢ OSI MODEL (7 LAYERS):

- The complexity of modern computer networks has given rise to several conceptual models for explaining how networks work.
- One of the most common of these models is the International Standards Organization's Open Systems Interconnection (OSI) Reference Model, also referred to as the OSI seven-layer model.
- Levels 1 through 3 are network-specific, Levels 4 through 7 comprise network-independent, higher-level functions. Each layer describes a particular function that occurs in data communications.

Layer	Description
Application	• End User layer • HTTP, FTP, IRC, SSH, DNS
Presentation	• Syntax layer • SSL, SSH, IMAP, FTP, MPEG, JPEG
Session	• Synch & send to port • API's, Sockets, WinSock
Transport	• End-to-end connections • TCP, UDP
Network	• Packets • IP, ICMP, IPSec, IGMP
Data Link	• Frames • Ethernet, PPP, Switch, Bridge
Physical	• Physical structure • Coax, Fiber, Wireless, Hubs, Repeaters

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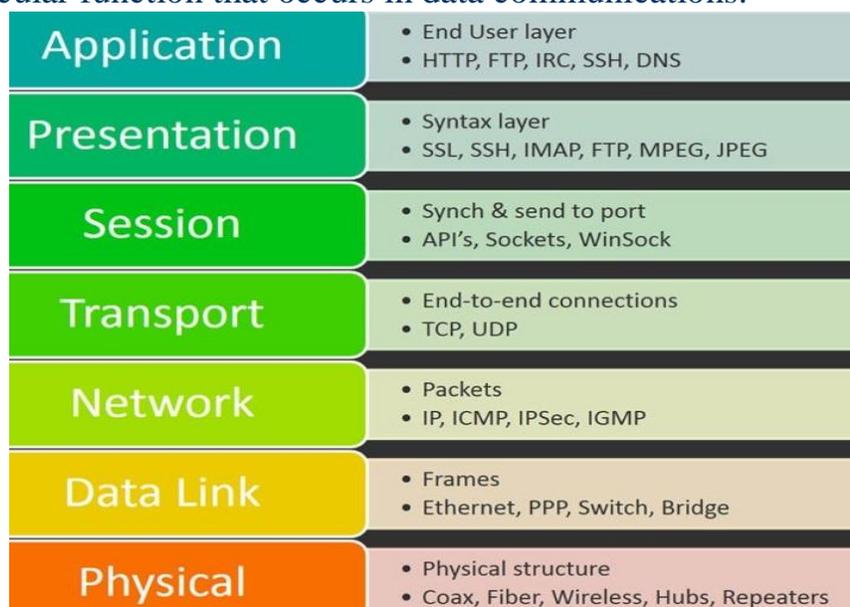
IP-ADDRESS:

- An **Internet Protocol (IP)** address is a numerical label assigned to each device connected to a computer network that uses the internet protocol for communication.
- The **Internet Assigned Numbers Authority (IANA)** reserves the following IP address blocks for use as Private and Public IP addresses.
- Types of IPs are**:**

INTERNET PROTOCOL VERSION4 (IPV4):
- **IPV4** has **32-bit** address length. It supports Manual and DHCP address configuration.
- **IPv4** uses **four 1-byte decimal numbers**, separated by a dot (**i.e.192.168.1.1**).

INTERNET PROTOCOL VERSION6 (IPV6):
- **IPv6** has **128-bit** address length. It supports Auto and renumbering address configuration.
- **IPv6** uses **Hexadecimal numbers** that are separated by colons (i.e.fe80::d4a8:6435:d2d8:d9f3b1).

IPADDRESS-CLASSES:

- The 32-bit IP address is divided into five sub-classes. These are:

Address Class	RANGE	Default Subnet Mask
A	1.0.0.0 to 126.255.255.255	255.0.0.0
B	128.0.0.0 to 191.255.255.255	255.255.0.0
C	192.0.0.0 to 223.255.255.255	255.255.255.0
D	224.0.0.0 to 239.255.255.255	Reserved for Multicasting
E	240.0.0.0 to 254.255.255.255	Experimental

Note: Class A addresses 127.0.0.0 to 127.255.255.255 cannot be used and is reserved for loopback testing.

➤ **PRIVATE-IP Vs PUBLIC-IP:**

PRIVATE IP-ADDRESS:

• The Private IP address is used for internal communication between hosts within the same network
• Private IP addresses are free of cost and works only in LAN.
• Private IP-Address ranges are:
  Class A: 10.0.0.0   To   10.255.255.255
  Class B: 172.16.0.0   To   172.31.255.255
  Class C: 192.168.0.0   To   192.168.255.255

PUBLIC IP-ADDRESS:

• A Public IP address is used to communicate outside the network. (Open internet access)
• Public IP address is basically assigned by the ISP (Internet Service Provider).

Private IP	Public IP
Used with LAN or Network	Used on Public Network
Not recognized over Internet	Recognized over Internet
Assigned by LAN administrator	Assigned by Service provider / IANA
Unique only in LAN	Unique Globally
Free of charge	Cost associated with using Public IP

Range –
Class A -10.0.0.0 to 10.255.255.255
Class B – 172.16.0.0 to 172.31.255.255
Class C – 192.168.0.0 – 192.168.255.255
	Range –
	Class A -1.0.0.0 to 9.255.255.255
	        11.0.0.0 – 126.255.255.255
	Class B -128.0.0.0 to 172.15.255.255
	        172.32.0.0 to 191.255.255.255
	Class C -192.0.0.0 – 192.167.255.255
	        192.169.0.0 to 223.255.255.255

➤ **IPV4 ADDRESS PARTS:**
• The class of IP address is used to determine the bits used for **NETWORK ID** & **HOST ID** and the number of total networks and hosts possible in that particular class.
• Each ISP or network administrator assigns IP address to each device that is connected to its network.

➢ SUBNET:

- A subnet, or subnetwork, is a network **inside a network.** Subnets make networks **more efficient.**
- Organizations will use a subnet to **subdivide large networks** into smaller.
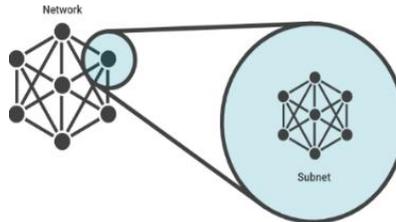
➢ SUBNET MASK:

- A subnet mask is a **32-bit number** created by setting **host bits to all 0s** and setting **network bits to all 1s.**
- In this way, the subnet mask separates the IP address into **the host** and **network** addresses.
- The **broadcast address** is always assigned to **"255",** and the **network address** is always assigned to **"0".**
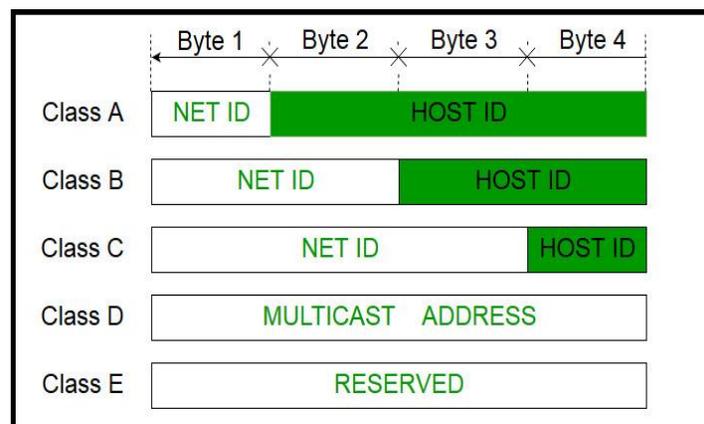
➢ ROUTER:

- A router is a device that connects two or more packet-switched networks or subnetworks.
- A router receives and sends data on computer networks.

Router