

Components of Network -

1) End Devices -
An end device or host is any device that sends or receives data in a network. These devices generate and consume data acting as the primary user interface to the internet.
Eg - PCs, smartphones and smart TVs.

08.00 ii) Intermediary Devices -

- These devices facilitate data flow b/w end devices and networks. They handle packet forwarding, direct data using network addresses and manage traffic to improve performance.

Eg:- Routers, switches, modems, hubs broadcast a message across a network.

11.00 iii) NICs (Network Interface Card) -

- A NIC is a hardware component that enables a device to connect to a network. It provides the physical interface for sending and receiving data. Each NIC has a unique MAC address for device identification and communication at the data link layer. NICs support wired and wireless connection.

Eg:- A desktop may have a wired NIC with an Ethernet cable, while a laptop connects via a wireless NIC using Wi-Fi.

iv) Routers -

- A router is an intermediary device that forwards data packets b/w networks and directs internet traffic. Operating at layer 3 of the OSI model, it reads network addresses to determine packet destinations.
- Notes: Routers use routing tables and protocols like OSPF and BGP to find the most efficient paths. They enable communication b/w different networks, manage traffic to prevent congestion, and exchange security with firewalls and access control lists.

v) Switches -

A switch connects multiple devices within a LAN and operates at layer 2 of the OSI model. It uses MAC addresses to forward data only to the intended recipient, reducing network congestion and improving performance. Switches enable direct communication b/w devices like computers, printers and servers.

In offices they facilitate file sharing and access to shared resources.

vi) Hubs -

A hub is a basic networking device that connects multiple devices in a network segment and broadcasts data to all connected ports. Operating at layer 1 of the OSI model, it lacks traffic management, leading to inefficiencies and collisions.

Hubs were used in early network but are now replaced by switches for better performance and efficiency.

Network Communication Components -

i) MAC Addresses -

A MAC (Media Access Control) address is a unique 48 bits identifier assigned to a device's network interface card (NIC) for recognition on a local network. Operating at layer 2 of the OSI model, it ensures data reaches the correct device.

05

September

Organizationally Unique Identifier (OUI)

TUESDAY

248-117
37TH WEEK '23

JULY 2023

Sun	30	2	9	16	23
Mon	31	3	10	17	24
Tue		4	11	18	25
Wed		5	12	19	26
Thu		6	13	20	27
Fri		7	14	21	28
Sat	1	8	15	22	29

Sun	6	13	20
Mon		7	14
Tue	1	8	15
Wed	2	9	16
Thu	3	10	17
Fri	4	11	18
Sat	5	12	19

- 08.00 • MAC Addresses are represented in hexadecimal format (e.g.: 00:1A:2B:3C:4D:5E). The first 12 bits indicate the manufacturer (OUI), while the remaining 24 bits are unique to the device, ensuring global uniqueness.
- 09.00 10.00 continuing summarizing information from previous notes
- How MAC Addresses are Used in Network Communication
MAC addresses are used in local networks (LANs) to send data to the correct physical device. When a device sends data, it puts the destination MAC address in a data frame. Network switches read this MAC and forward the frame to the correct port.
- If a device only knows the IP address of the other device, it uses ARP (Address Resolution Protocol) to find out the corresponding MAC address. ARP helps map our IP address to their MAC address; connecting logical IP addressing with physical hardware addressing.
- 11.00 12.00 13.00 14.00 15.00 16.00 17.00 18.00 Notes
- g) another LAN or two greater places in between even colts
ii) summing up everything noted off earlier

ii) IP Address -

- An IP (Internet Protocol) address is a number assigned to every device connected to a network that uses IP for communication. It helps devices locate and talk to each other across different networks. IP addresses work at the Network layer (Layer 3) of the OSI reference model. At a lower level, mitigation of errors at a lower level is done by TCP (Transmission Control Protocol).

- There are two versions of IP addresses —
 - IPv4 — Uses a 32-bit address space written as four decimal numbers separated by dots like 192.168.1.1
 - IPv6 — Uses a 128-bit address space, written as eight groups of four hexadecimal digits like 2001:0db8:85a3:0000:0000:0000:0000:0000
Base: 0370:7334

IPv6 was developed because IPv4 addresses were running out.

Port Numbers —

- A port is a number used to identify specific processes or services on a device, helping direct network traffic correctly.
- Ports work at the Transport layer (Layer 4) of the OSI model and are used with TCP and UDP Protocols.
- They allow multiple services to run on the same IP address by separating traffic for different applications.
- When a client (like a web browser) sends a request, it includes the destination port number that matches the service it wants. The server, listening on that port, responds to the request. The operating system uses the port number to deliver traffic to the correct application.

- Notes Example:
- A user visits a website. The browser connects to port 80 on the server for HTTP.
 - for a secure website, the browser connects to port 443 for HTTPS.

07

netstat -ano -p tcp
September To check active ports

THURSDAY

250-115
37TH WEEK '23

JULY 2023							AUGUST 2023						
Sun	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Mon	Tue	Wed	Thu	Fri	Sat
30	1	2	3	4	5	6	6	7	8	9	10	11	12
16	17	18	19	20	21	22	13	14	15	16	17	18	19
23	24	25	26	27	28	29	20	21	22	23	24	25	26
21	22	23	24	25	26	27	21	22	23	24	25	26	27
28	29	30	31	1	2	3	28	29	30	31	1	2	3

08.00 Port numbers range from 0 to 65535, and they are divided into 3 categories, each with specific uses.

09.00

1. Well Known Ports —

These ports range from 0 to 1023, and are used for common, standard services and protocols. These ports are managed by IANA (Internet Assigned Numbers Authority).

2. Registered Ports —

Registered Ports range from 1024 to 49151. They are not tightly controlled as well-known ports, but are still registered with IANA for specific services.

- These ports are often used by external or user installed services. For example Microsoft SQL server uses port 1433.

3. Dynamic Ports —

Dynamic or Private Ports range from 49152 to 65535 and are also called Ephemeral ports. They are mainly used by client applications (like web browser) to send and receive data from servers.

- These ports are not fixed & the operating system randomly assigns them for each session. They are used for temporary communication and the ports usually close when the session ends.
- Dynamic ports can also be used by custom servers applications to handle short term connections.

Notes