Baghel Institute

INTRODUCTION OF INTERNET and WWW

INTRODUCTION OF INTERNET AND WWW

- Computer Networks.
- Types Of Networking
- Introduction To Network
- Transmission Media
- History Of Internet
- Internet
- WWW
- Types Of Network
- Topology.
- Protocols
- IP Address
- Network Switching.
- Miscellaneous

Computer networks.

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.

Types of networking

Based on Transmission media:

- Guided (wired)
- Unguided (wireless)

Based on Network size:

- LAN
- MAN
- WAN

Based on Management method:

- Peer-to-peer
- Client/Server

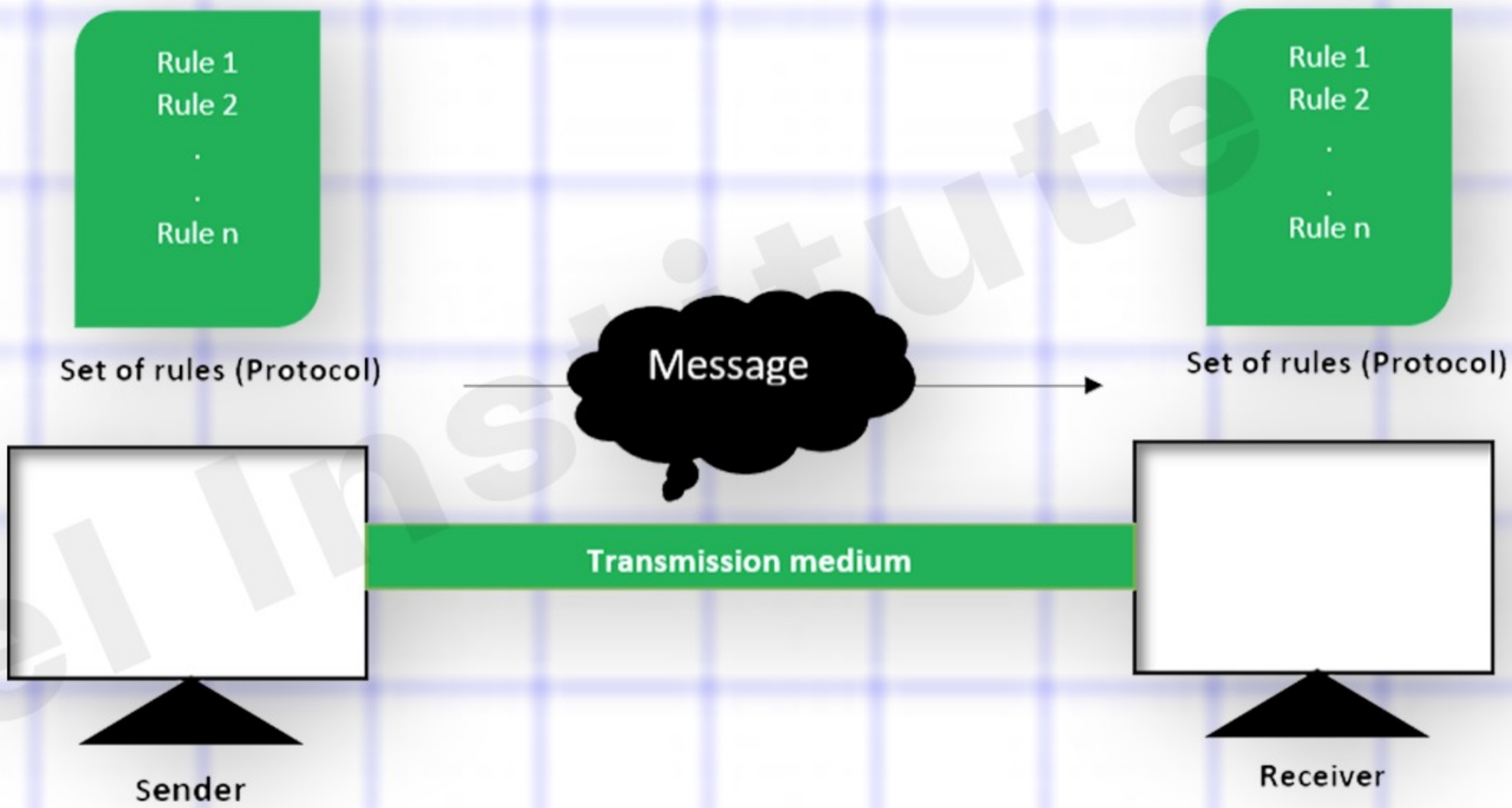
Based on Topology (connectivity):

- Bus
- Star
- Ring
- Tree
- Mesh

Introduction to network.

A network is a collection of five different components.

1. Message
2. Sender
3. Receiver
4. Transmission Medium
5. Set of rules (Protocol)



In computer network we use protocol as a rules and regulation media for data transmission and computer as a sender and receiver.

Any computer network achieve these advantages,

- Make Communication
- Resource Utilization,
- Saving Cost And
- Time Saving.

Transmission media

This is actually physical involvement by which data travel from one computer to another and it connect network devices.

It can be divided into two mainly categories.

Guided Media (wired)

Twisted pair cable. coaxial cable. Fibre optic cable.

Unguided media (Wireless)

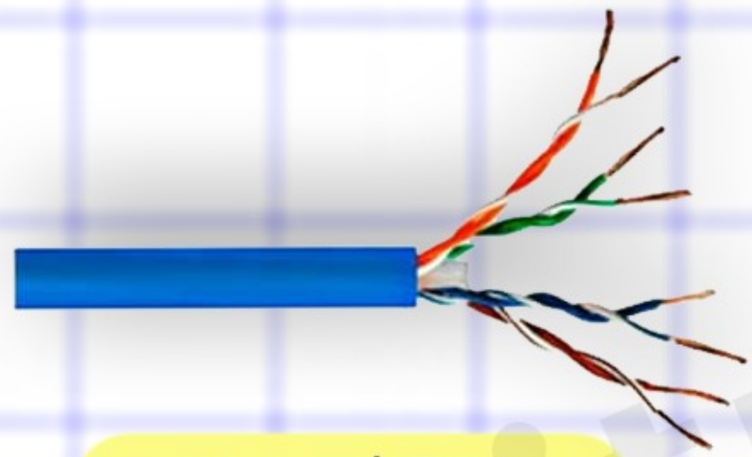
radiowave and microwave.

Guided Media

In guided media, transmitted data travels through cabling system that has a fixed path.

Twisted Pair Cables

Twisted Pair cables are used in telephone lines to provide data and voice channels. The DSL lines make use of these cables. Local Area Networks (LAN) also make use of twisted pair cables. They can be used for both analog and digital transmission.



Twisted Pair

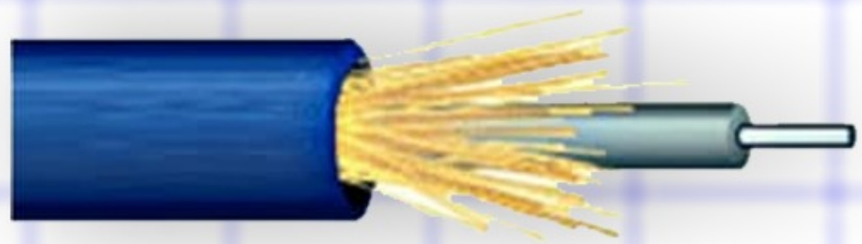
Coaxial Cables

A coaxial cable is a type of cable that consists of a central conductor surrounded by insulation, a metal shield, and an outer jacket. Coaxial cable is mostly used in cable TV.

Coaxial Cable

Fiber-Optic Cables

This carries signals in the form of fluctuating light in a glass or plastic cable.

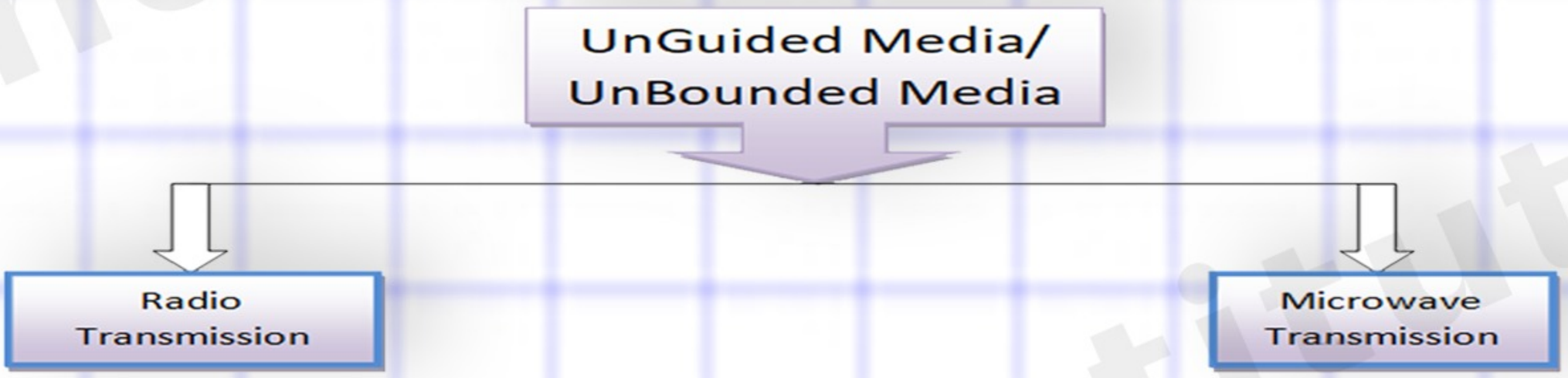


Fiber Optic

Fiber optics is used for long-distance and high-performance data networking. It is also commonly used in telecommunication services, such as internet, television and telephones.

Unguided Media

An unguided media type transmission is used to transmit electromagnetic waves without using any of the physical transmission media.



Radio transmission

It is used for communication such as broadcasting, television and radio communication and satellite transmissions. It is transmitted easily through air. They don't cause damage if observed by human body and they can be reflected to change their directions.

Microwave transmission

It is a line of sight wireless communication technology that uses high frequency beams of radio waves to provide high speed wireless connection that can send and receive voice, video and data information.

HISTORY OF INTERNET

1969

The Internet start as a U.S. government project in the year 1969 called ARPANET (Advanced Research Project Administration Network).

1980

The National Science Foundation of US founded a development of network using the Internet Protocol named NSFNET. To connect supercomputer centre in the US, many colleges and universities world connected to the Internet.

1989

World Wide Web/WWW, created in 1989 by Tim Berners Lee, it is a network of Internet sites. It is a system of interlinked hypertext document accessed via Internet. You can view web pages that may contain text, image, videos and other multimedia. It is a software program to develop to access web page.

1993

(INTERNET) four years after publishing a proposal for "an idea of linked information systems," computer scientist Tim Berners-Lee released the source code for the world's first web browser and editor.

NOTE

The first publicly available internet service in India was launched by state-owned Videsh Sanchar Nigam Limited (VSNL) on 15 August 1995.

INTERNET

- Internet is networks of network.
- The Internet is a global system of interconnected computer networks that use standard Internet Protocol. That is TCP/IP.

- That consists of millions of private ,public, academic, business and government networks.
- It includes several high bandwidth data lines that comprises the Internet backbone.
- The lines are connected to major Internet hubs that distribute data to other locations, such as web servers and ISPs.(Internet service provider).
- Every computer is the network is connected using two protocol TCP/IP (discover in 1974).

Application of Internet.

Internet service is referred as the facility you are aware through Internet like

online transaction,

video call,

searching,

online exam,

Social media,

online selling,

doctor consultancy,

weather information,

online shopping,

car control,

online movies,

appliance control,

ticket booking,

Internet banking,

online form filling,

gaming,

online education,

WWW

- It is also known as world wide Web/Web/ W3.
- The World Wide Web is the part of the Internet that contains websites and web pages.
- The documents are formatted in a markup language called Hypertext Markup Language (HTML).
- A web page contains text lines to tag that will display graphics, video, audio and download files.
- Each web page has a technique address called a uniform resource locator (URL).
- Concept of WWW discover in Switzerland at the European Particles Research Centre (CERN).
- Founder :-Tim Berners Lee.
- Created in 1989.
- It is a network of Internet sites.
- It is a system of interlinked hypertext document accessed via Internet.

Difference between Internet and WWW

Point Of Difference	Internet	WWW
Estimated year of origin.	Discovered in 1969 Commercially in 1988.	Discovered in 1993.
Comprise.	Network of computer, copper wire, fibre optic cable and wireless network.	Files, folders and document stored in various computer.
Protocol.	TCP /IP.	HTTP.
Dependency.	This is the best independent of the WWW.	It depends on Internet to work.
Nature.	It is hardware.	It is software.

Difference between Internet and intranet

Point Of Difference	Internet	Intranet
Usage	public	private
User Type	Any user can access	Organization employs an internal company department.
Security	Low	high
Coverage	Wide area	Within organisation
Access	What we are normally using is Internet.	wipro using internal network for its business operation.
Example	Unlimited user	Limited user
Owner	It is owned by no one.	It is owned by single organization.

Types of network

Basically, three types of network

LAN WAN MAN

Local Area Network (LAN)

- LAN is a group of Computers located in the same room on the same floor or in the same building that are connected to from a single computer network.

- Local area networks are sometimes called a single location network.
- The speed of local area networks is 10 to 100 mbps.

- LAN Work in restricted geographical area like 1 kilometer.
- They use mainly bus,ring and star topology.
- In LAN you can run the multiple devices to share a transmission medium.
- LAN supports a variety of communication transmission medium such as Ethernet cable, thin Cable , thick cable ,twisted pair ,fiber optics cable and wireless transmissions.

Advantages of LAN

- Does not cost too much
- Private ownership
- All the user work can be stored in a central place hub
- It is easy to set up a security protocol to protect the LAN user from hackers
- It is easy to control and it is easy to manage the entire LAN
- It provides a cost-effective multi-user computer environment
- Increased security and data security on the internet
- Data transfer rate is higher

Disadvantages of LAN

- It covers a small geographical area
- A virus can be spread more easily
- High degree of maintenance
- Level of maintenance continues to grow
- It is difficult to set up LAN architecture
- A limited number of a system can only be connected

Metropolitan Area Network, (MAN)

- A network that connect two or more LAN networks.
- LAN together but does not extend beyond the boundaries of the immediate town, city or metropolitan area.

- Multiple router, switches and hubs are connected to create a MAN.

Advantages of MAN

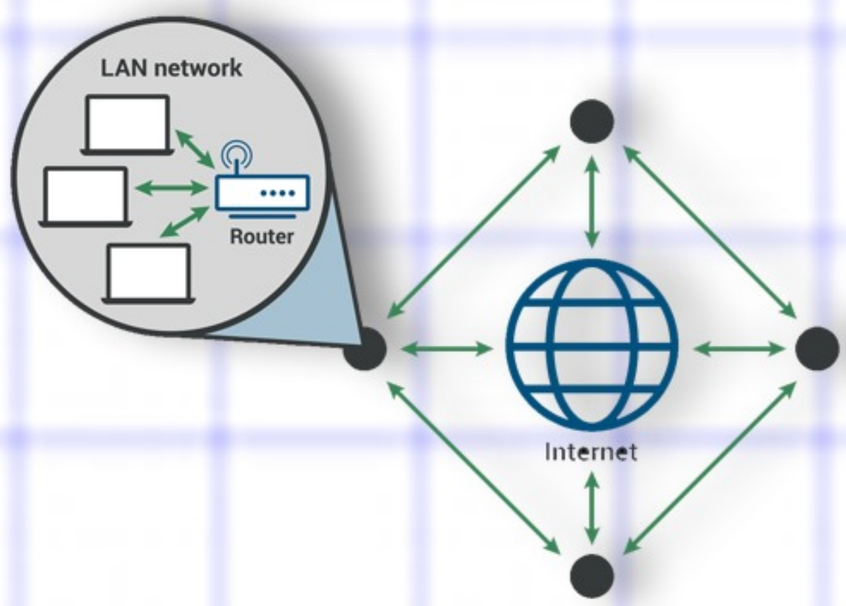
- It is less expensive to attach MAN with WAN network.
- MAN gives you good efficiency of data.
- High speed than WAN
- The installation of MAN's users can share their Internet connections. In this way, multiple users can get the same high speed Internet.
- Conversion of LAN to MAN is easy.
- MAN has a high security level then WAN

Disadvantages of MAN

- It is very difficult to manage if the size of number of LAN are increases.
- Internet speed is different as copper wire affect the speed of MAN. So high cost is needed for fiber optics.
- Chances of hackers attack.
- Technical staff required to set-up.
- In MAN more than LAN network cables require.

Wide Area Network (WAN)

- A WAN is a data communications network that cover a relatively broad geographical area.



- This network allow multiple users to access a variety of host computers simultaneously through the same physical medium while separating each user session. So that no user is aware of another on the network.
- MAN are typically created using spatially conditioned telephone lines, microwave communications or satellite data transmissions.

Advantages of WAN

- WAN covers a larger geographical area, so computers at longer distance can easily communicate.
- It allows sharing of resources and application software programs among distributed workstations.
- Easy of communication.

- Large network cover.
- Share information over the large area.
- Message can be sent very quickly to anyone else on the network.
- It supports the global market and global business.
- Centralized IT infrastructure.

Disadvantages of WAN

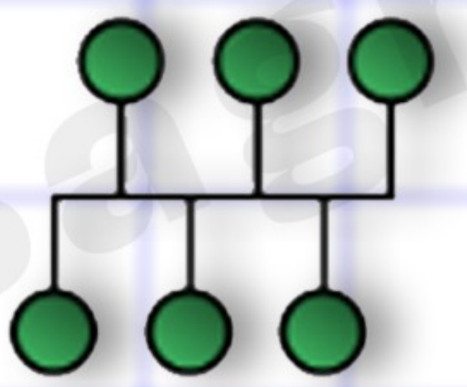
- Investment costs are higher.
- It is difficult to maintain network.
- It required technician and network administrator.
- It has low security compared to LAN&M AN coverages.

Topology

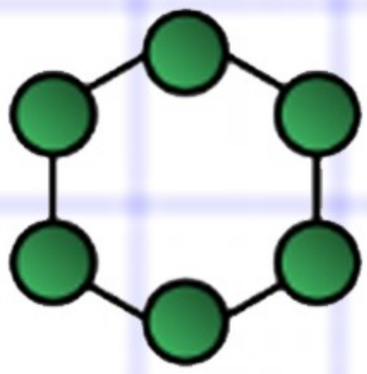
Network topology is the arrangement of the various elements of a computer network.

Topology is defined as the physical layout of the hardware, like computer, server, workstation and cable etc. Of the computer network.

There are various type of topology which is given below:-

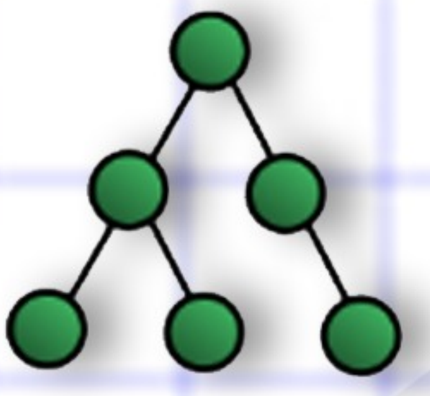


BUS Topology

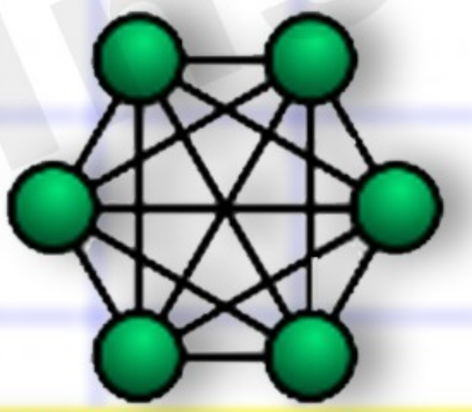


RING Topology

STAR Topology

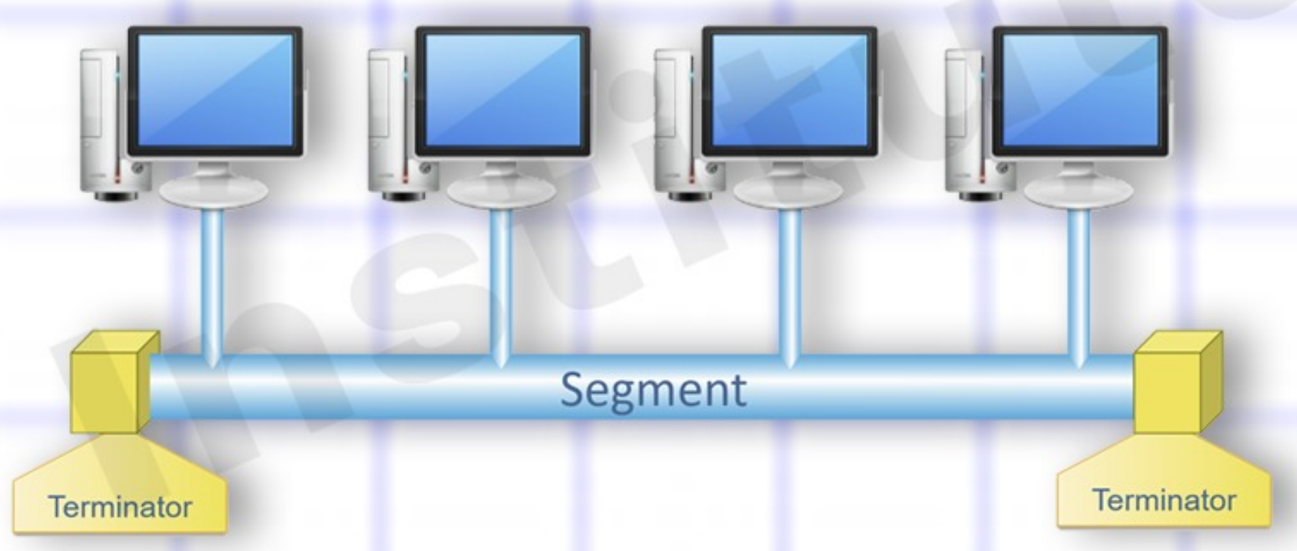


TREE Topology



MESH Topology

Bus topology



- Bus topology is a network type in which every computer and network devices is connected to single cable.
- When it has exactly two end point then it is called linear bus topology.
- Network devices are connected to single cable which is also known as backbone bus topology.
- Proper termination is required to dump signals. Use of Terminator is must.

Advantages of bus topology

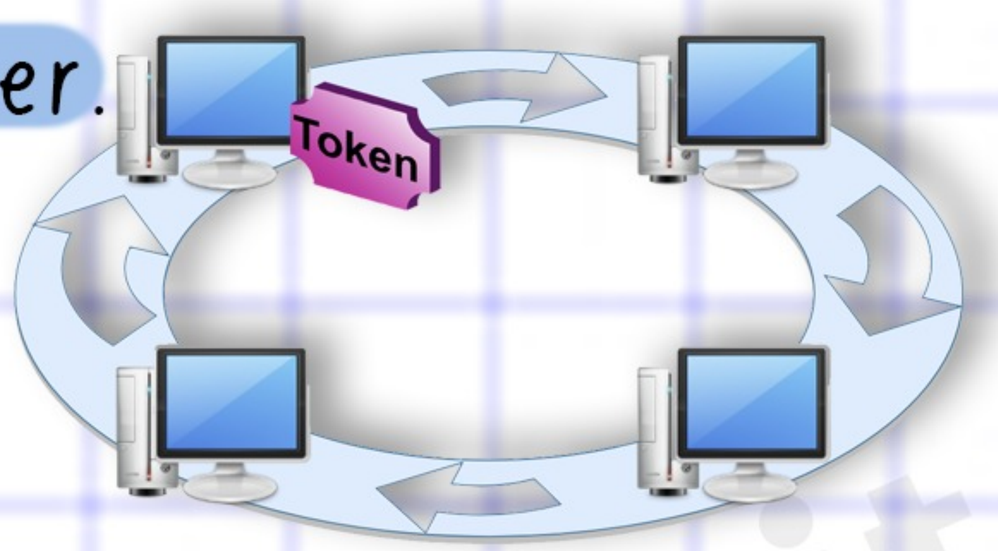
- Bus topology cost is very low.
- Require less cable length.
- Easy to connect computer or peripheral to a linear bus.
- It works well for small network.

Disadvantages of bus topology

- If there is a break in the main cable, the entire network will be shut down and cable length is limited.
- If network get heavy traffic, a node performance of the network falls.
- It transmit data only in One Direction.
- The signal passes two directions with one cable that may occur collision or data collision.

Ring topology.

- It is called ring topology because it form a ring as each computer.
- It is connected in a circular fashion and the data travel in the One Direction.



- This computer is directly connected to the next computer.
- This type of network is easy to install and manage.
- All messages travel through a ring in the same direction, either clockwise or anticlockwise. A failure in any cable or devices break the loop and can take down the entire network.

Advantages of Ring topology

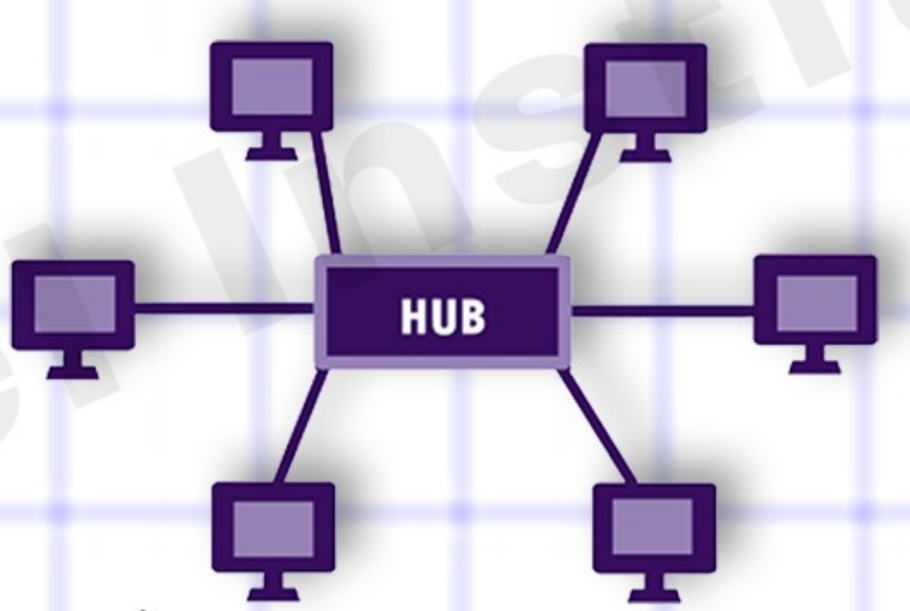
- In this data flows in one direction which reduces the chance of packet collisions.
- In this topology additional workstations can be added after without impacting performance of the network.
- Equal access to the resources.
- There is no need of server to control the connectivity among the nodes in the topology.
- It is cheap to install and expand.
- Minimum collision.
- Speed to transfer the data is very high in this type of topology.
- Easy to manage.

Disadvantages of Ring topology

- Due to the Uni-directional Ring, a data packet (token) must have to pass through all the nodes.
- If one workstation shuts down, it affects whole network or if a node goes down entire network goes down.
- It is slower in performance as compared to the bus topology
- It is Expensive.
- Addition and removal of any node during a network is difficult and may cause issue in network activity.
- In order for all the computer to communicate with each other, all computer must be turned on.

Star Topology

- Star network every host is connected to a central connection point like hub or switch.
- The connection between a node and hub devices is a point to point.



- Can be used with twisted pair, optical fiber or coaxial cable.
- The data signal is transmitted from the source computer to destination computer via the hub or switch.

Advantages of Star Topology

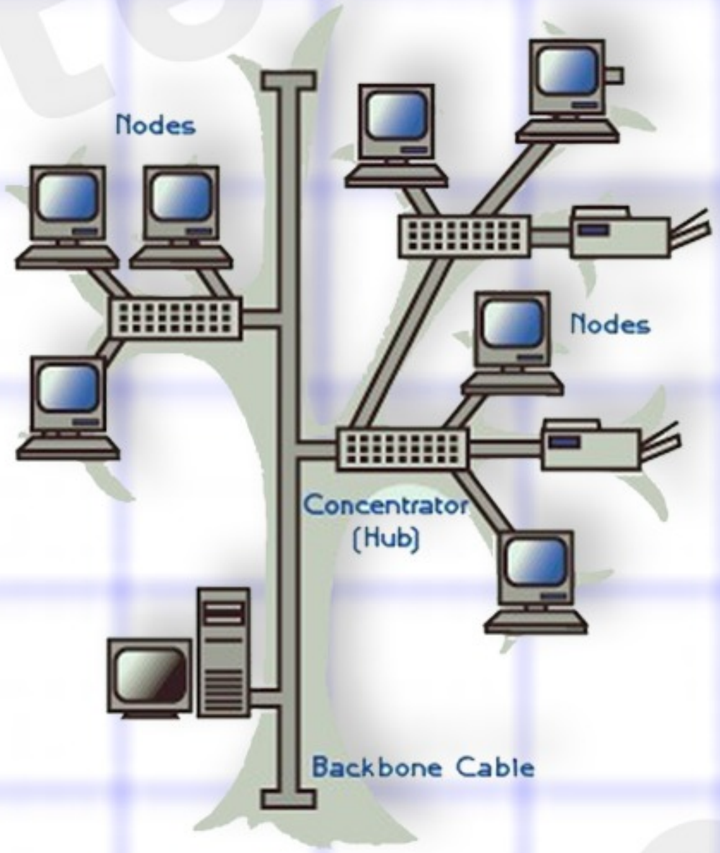
- It is very reliable - if one cable or device fails then all the others will still work
- It is high-performing as no data collisions can occur
- Less expensive because each device only need one I/O port and wishes to be connected with hub with one link.
- Easier to put in
- Easy fault detection because the link are often easily identified.
- No disruptions to the network when connecting or removing devices.
- Each device requires just one port i.e. to attach to the hub.

Disadvantages of Star Topology

- Requires more cable than a linear bus .
- If the connecting network device (network switch) fails, nodes attached are disabled and can't participate in network communication.
- More expensive than linear bus topology due to the value of the connecting devices (network switches)
- If hub goes down everything goes down, none of the devices can work without hub.
- Hub requires more resources and regular maintenance because it's the central system of star .
- Extra hardware is required (hubs or switches) which adds to cost

Tree Topology

- It has root node and all other node are connected to it.
- This topology is the combination of bus and star topology.
- The top level node in tree topology is known as a root node, and all other node are hierarchy of the root node.
- It is arranged in a group of start work station connected to a linear bus backbone cable.



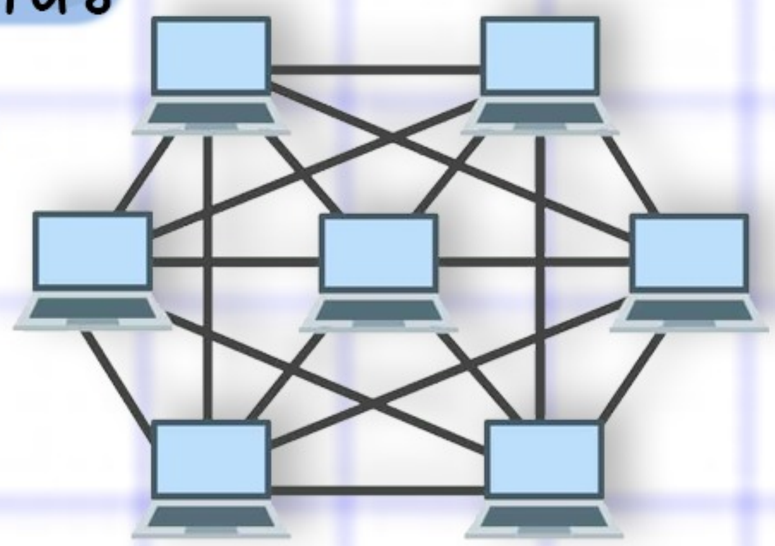
Advantages of Tree Topology

- This topology provides a hierarchical as well as central data arrangement of the nodes.
- The other nodes in a network are not affected if one of their nodes gets damaged or does not work.
- Tree topology provides easy maintenance and easy fault identification can be done.
- Point-to-point wiring for individual segments.
- Tree Topology is highly secure.
- It is used in WAN.
- Tree Topology is reliable.

Disadvantages of Tree Topology

- This network is very difficult to configure as compared to the other network topologies.
- Due to the presence of a large number of nodes, the network performance of tree topology becomes a bit slow.
- Requires a large number of cables compared to star and ring topology.
- As the data needs to travel from the central cable this creates dense network traffic.
- The Backbone appears as the failure point of the entire segment of the network.
- Treatment of the topology is pretty complex.
- The establishment cost increases as well.

Mesh Topology



- In a mesh topology, every node has point to point connection to the other node.
- All the computers are interconnected to each other in a network.
- Every node not only send its own signals, but also rely data from other nodes.
- These types of topology is very expensive.
- The Internet is an example of mesh topology.

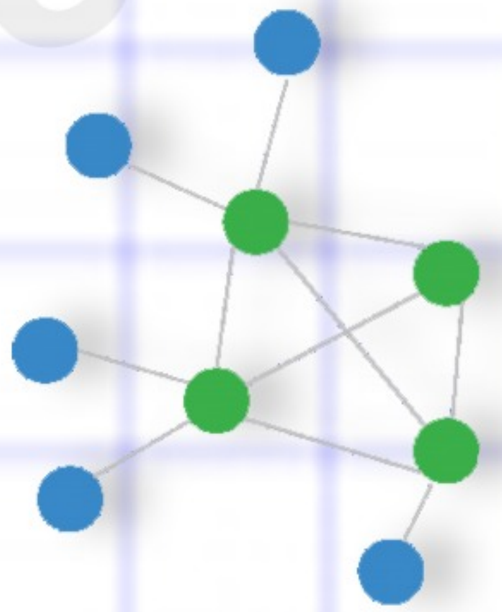
There are two types of Mesh topologies

1. Fully-connected Mesh Topology
2. Partially-connected Mesh Topology

1. Full Mesh Topology

All the nodes within the network are connected with every other. A full mesh provides an excellent deal of redundancy, but because it is prohibitively expensive to implement, it's usually reserved for network backbones.

2. Partial Mesh Topology



The partial mesh is more practical as compared to the full mesh.

In a partially connected mesh, all the nodes aren't necessary to be connected with one another during a network.

Advantages of Mesh Topology

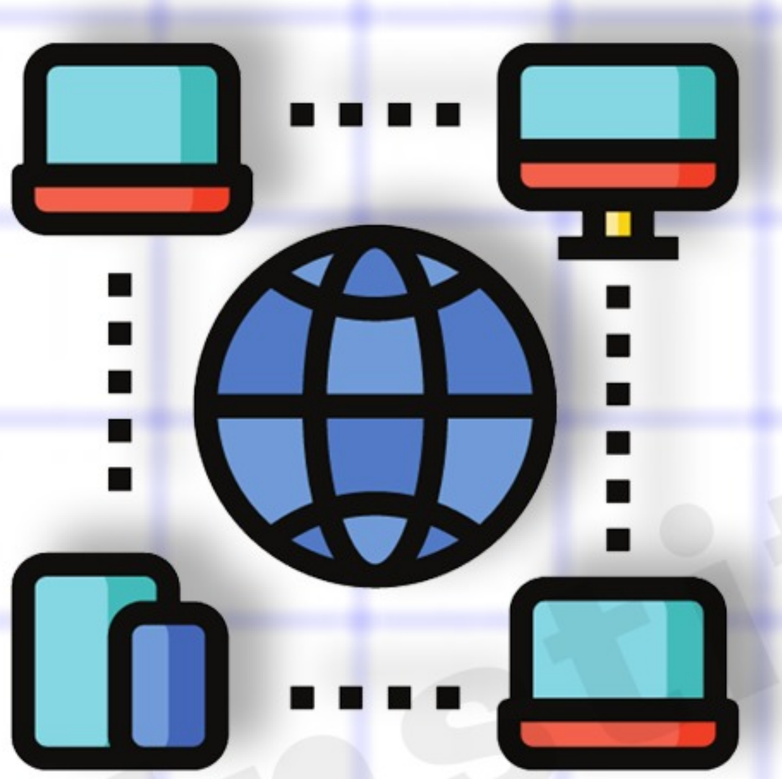
- Failure during a single device won't break the network.
- Can handle high amount of traffic.
- Each connection can carry its own data load.
- Provide security and privacy.
- Adding new devices won't disrupt data transmissions.
- This topology has robust features to beat any situation.

Disadvantages of Mesh Topology

- It's costly as compared to the opposite network topologies i.e. star, bus, point to point topology.
- Installation is extremely difficult in the mesh.
- Bulk wiring is required.
- Complex process.
- Maintenance needs are challenging with a mesh.

Protocols

- A protocol is a set of rules that governs the communication between computer on a network.
- It provide easy, reliable and secure way for data transfer.



- This exchange usually occur much like a dialogue between two computers.
- Protocol exist at several levels in a telecommunication connection in the standard model known as Open System interconnection, (OSI).

Protocol and Port Number

Port No.	Protocol
20,21	FTP
22	SSH (Secure Shell)
23	Telnet
25	SMTP
53	DNS (Domain Name System)
67,68	DHCP(Dynamic Host Transfer Protocol)
69	TFTP
80	HTTP
115	TCP,SFTP(Simple File Transfer Protocol)
119	NNTP
123	NTP (Network Time Protocol), UDP143
143	IMAP (Internet Message Access Protocol)
443	HTTPS

Common Networking Protocols

FTP (File Transfer Protocol)

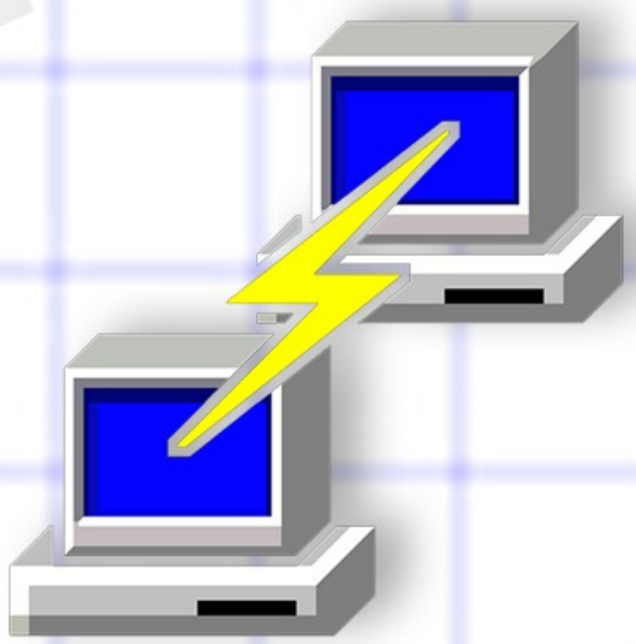
File Transfer Protocol (FTP) is a standard network protocol used to transfer files from one host to another over a TCP-based network, such as the Internet. FTP is commonly used to upload and download files to and from web servers and other remote computers.

Trivial File Transfer Protocol(TFTP)

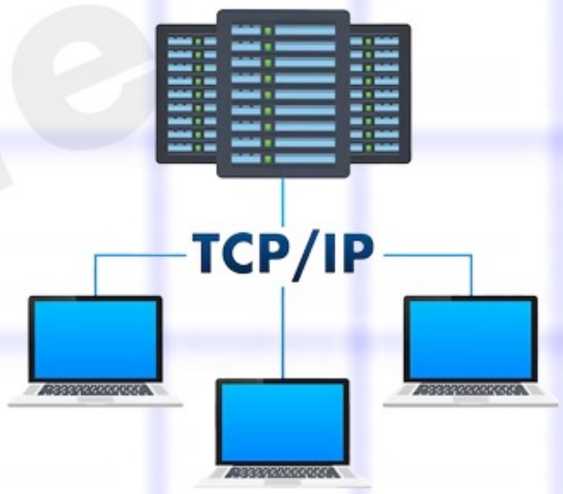
Trivial File Transfer Protocol is also used to transfer the files but it transfers the files without authentication.

Telnet

Telnet is a protocol used to log in to remote computer on the internet.



Gopher (Transmission Control Protocol /Internet Protocol)



It Organizes the text or binary files in menu structure.

HTTP (Hyper Text Transfer Protocol)

Links multimedia files like images graphics, audio and video to world wide web. HTTP is a communication protocol. It defines mechanism for communication between browser and the web server.

NNTP (Network News Transfer Protocol)

NNTP stands for Network News Transfer Protocol. It is a standard Internet protocol for transmitting news articles between news servers and clients.

SMTP(Simple Mail Transfer Protocol)

SMTP stands for Simple Mail Transfer Protocol. It is a protocol for sending electronic mail (email) messages between servers. .

POP(Post Office Protocol (POP)

It is a protocol used to retrieve email messages from a remote mail server to a local email client.

TCP (Transmission Control Protocol)

TCP stands for Transmission Control Protocol.It is one of the main protocols in the Internet protocol suite (often referred to as TCP/IP). TCP is responsible for ensuring the reliable delivery of data between applications running on different devices. It does this by breaking the data into segments, and then transmitting the segments to the recipient, where they are reassembled into the original message.

IP

The Internet protocol suite is the conceptual model and set of communications protocols used in the Internet and similar computer networks. The Internet protocol suite provides end-to-end data communication specifying how data should be packetized, addressed, transmitted, routed, and received.

UDP

User Datagram Protocol (UDP) is a Transport Layer protocol. UDP is a part of Internet Protocol suite, referred as UDP/IP suite. Unlike TCP, it is unreliable and connectionless protocol. So, there is no need to establish connection prior to data transfer.

IP Address

- It is a unique identifier that is assigned to a computer on the Internet.
- And Internet Protocol addresses is a numerical label assigned to each device connected to a computer network that uses the Internet Protocol for communication.
- It is also known as logical address.
- There are two types of version of IP address currently running or IP version 4 (IPv4) and IP version 6 (IPv6).

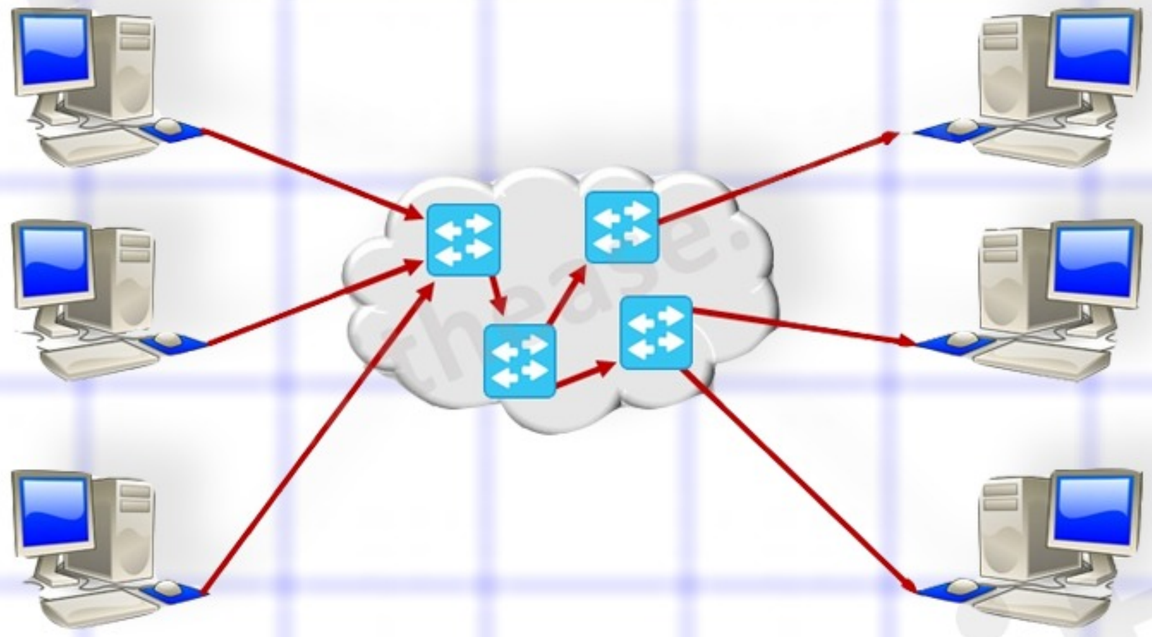
S.NO	IPv4	IPv6
1	The length of IPv4 is 32 bit.	The length of IPv6 is 128 bit.
2	In IPv4 around 4 billion unique IP addresses are generated $(2)^{32}$	In IPv6 around 340 trillion unique IP addresses are generated $(2)^{128}$
3	The range of IPv4 is 0 to 255.	The range of IPv6 address is 0 to FFFF (65535).
4	Example: 255.255.255.255.	2001:0000:3238:DFE1:0063:0000:0000:FEFB
5	It consists 4 octet, each has 8 bits.	It consists 8 octet, each has 16 bits.
6	IPv4 is a numeric address separated by (.)Dot.	IPv6 is alphanumeric number separated by colon(:)

Network switching

Network switching is a process which discusses how to packet move from sender to destination over network. There are three different categories in which we can put the all different types of switching.

- Circuit
- message
- packet.

Circuit switching

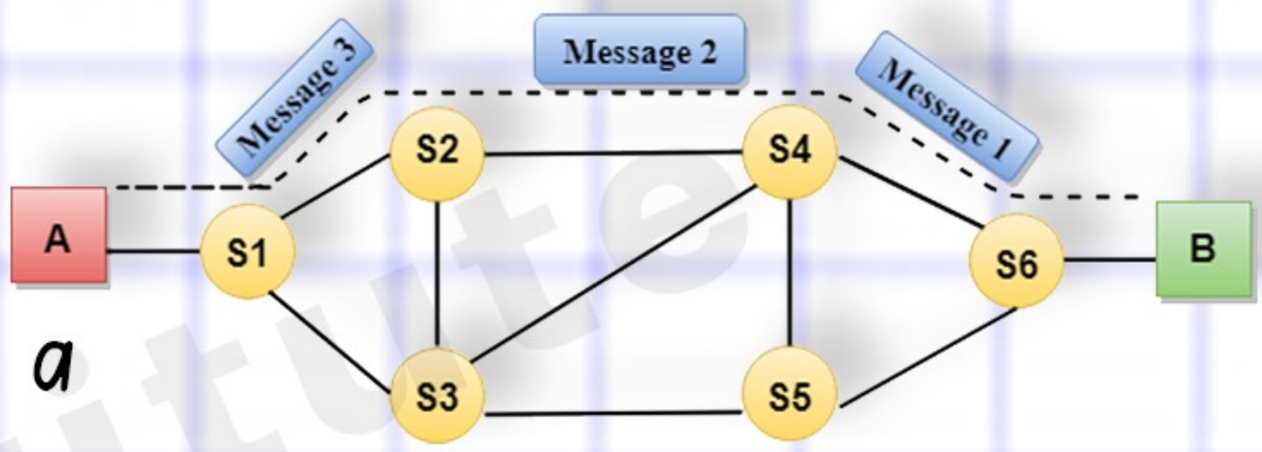


It is connection oriented. Switching it performed three tasks,

1. establish a circuit between sender and receiver,
2. transfer the data between sender and receiver,
3. disconnect the circuit.

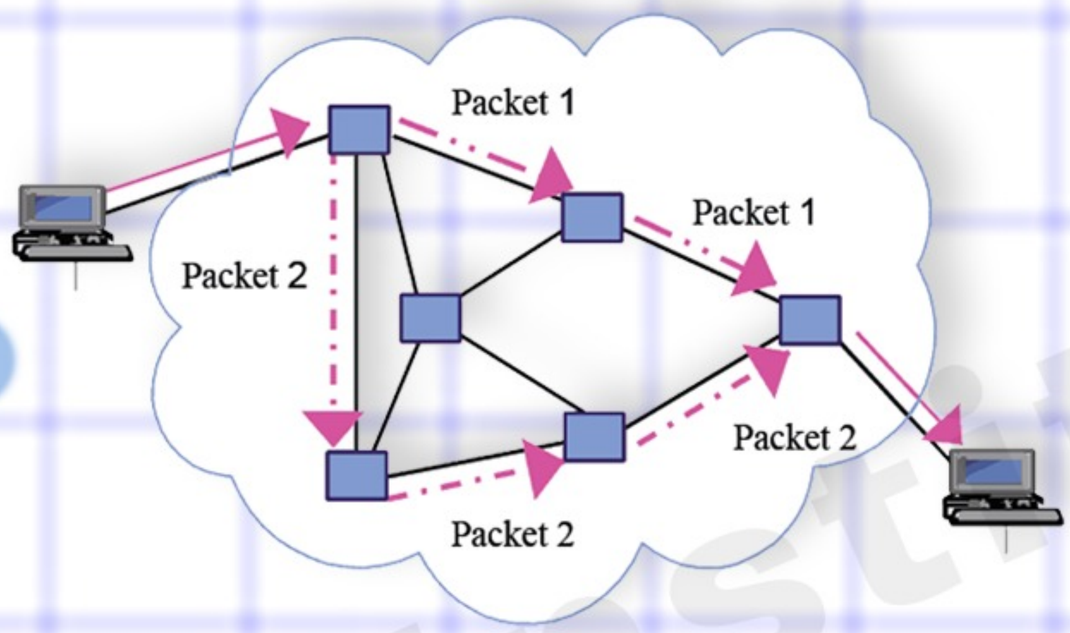
Circuit switching is originally designed for voice application. For example telephone communication.

Message Switching



- Message switching is a middle part of the circuit switching and packet switching
- In this switching complete message is treated as single data unit.
- Generally it is same as packet switching because it is not established circuit.

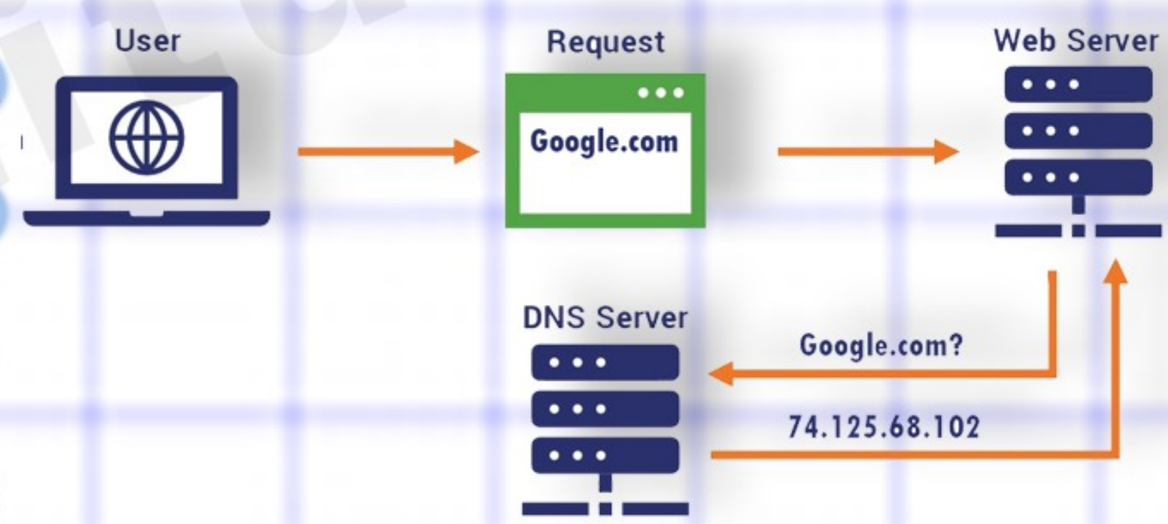
Packet switching



- In this switching data is divided into packets.
- It is connectionless switching technique.
- Each packet contains switching information and assemble information.

MISCELLANEOUS

DNS(Domain Name Server)



- Most organizations use domain names that are easy to remember.
- It is not only necessary to know the full URL of a web page to locate the page.
- If you know the domain name, you can start at the home page of the site and click link until you find the web page you want like www.google.com.

HTML(Hyper Text Markup Language)

- It is a set of command used to create worldwide web document.
- The command allowed the document created to define the part of the document.
- For example, you may have text Mark as heading paragraph, bulleted text, footers, etc.
- There are also command that left you image, sound, animation and movies as well as command that let you specify link to other document.

Uniform Resource Locators (URL)

Just as buildings and houses have a street address, webpages also have unique addresses to help people locate them. On the Internet, these addresses are called URLs (Uniform Resource Locators)

There are two types of URL

Absolute URL.

When you use absolute URL, you point directly to a file. Ex:-protocol://domain/path

Relative URL

A relative URL point to a file or directory in relation to the present file. Partial Internet address which point to a directory or file in relation to the current directory or file.

For faster and more effective coding, we recommend relative URLs. Rather than including the entire URL for each page you link, relative URLs cut down on the workload and time needed.
For example, coding /about/ is much faster than https://www.example.com/about.

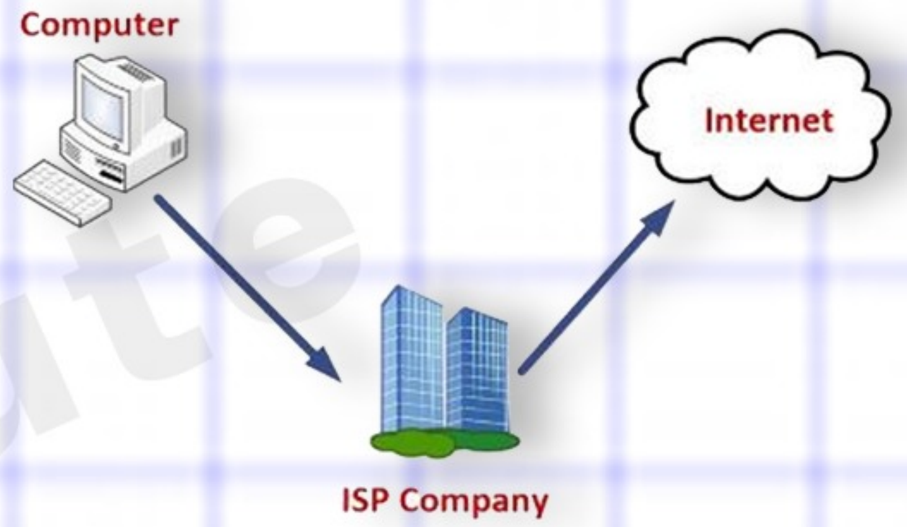
Some list of letter addressing system are

.com- Commercial organization.
.org- Non profitable organization.
.gov-Government department.
.net-Networking organizations.
.co-Company.
.edu-Educational institutions.
.info-Informations.

Country code related letter addressing system some of

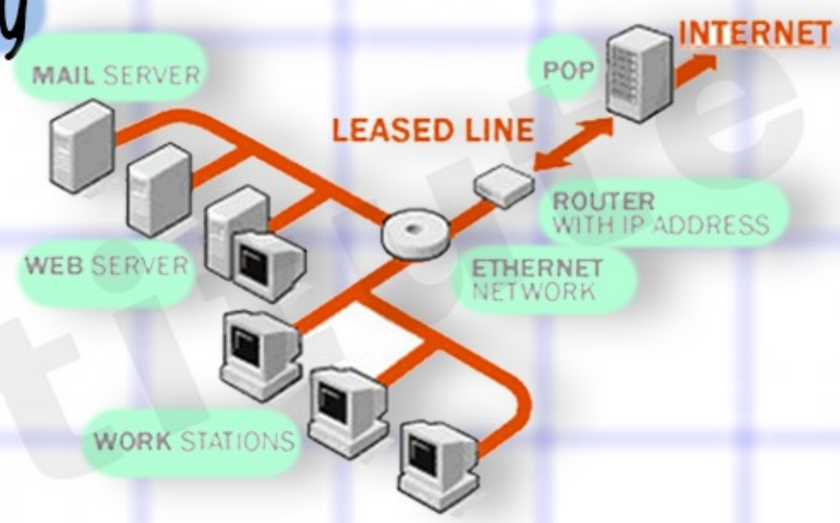
.in-India.
.us-United States.
.ca-Canada.
.jp-Japan.
.uk-United Kingdom.
.pk-Pakistan.

ISP



Internet service providers are the company who provide the service to access the Internet on a node

Leased lines



It is dedicated line used primarily by ISP business and other large enterprises to connect LAN and campus networks to the Internet using the existing infrastructure of the public telephone network or other providers.

Broadband

- It includes a broad range of technologies, all of which provide higher data rate access to the Internet.
- This high speed Internet connection is provided through either cable or telephone companies.
- This technology use wires or fibre optic cables in contrast to wireless broadband.

Types of broadband

Dial up

Dial-up is a type of Internet connection that uses a telephone line to connect to the Internet. It is the oldest and slowest type of Internet connection, with speeds typically ranging from 56 to 64 kbps. Dial-up connections are less commonly used today, as they have largely been replaced by faster broadband connections.

DSL (Digital Subscriber Lines)

DSL (Digital Subscriber Line) is a type of broadband technology that uses telephone lines to deliver high-speed Internet access. DSL uses a modem to convert the digital data from a computer into a high-frequency signal that can be transmitted over a telephone line.

USB tethering

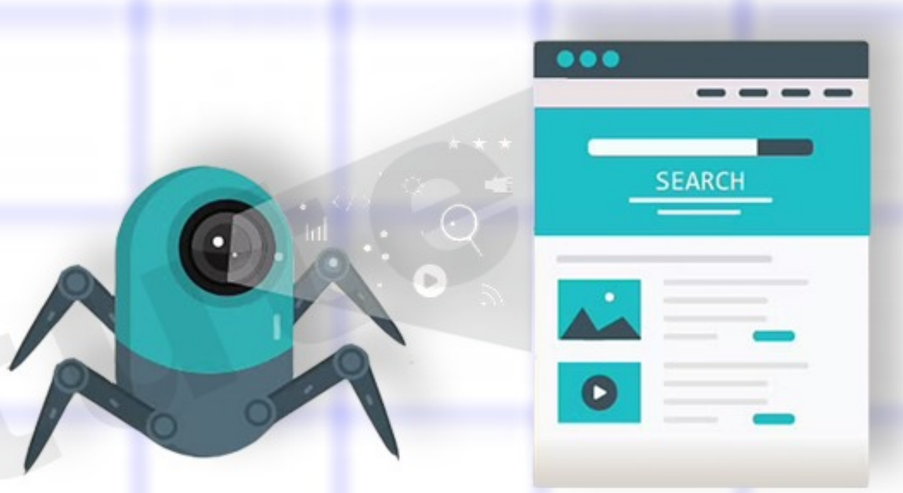
Tethering is the sharing of a mobile device's Internet connections with other connected computer. You can share your phone's mobile data with another devices like your laptop through Tethering.It makes your laptop be able to connect it to the Internet when there is no network connections. There are three types of tethering

- USB, tethering,
- Wi-Fi tethering,
- Bluetooth tethering.

IMEI (International Mobile Equipment Identity)

IMEI number that identify your phone. If your phone is stolen you can call your network provider and have them blacklist the device using its IMEI number which should make it useless to the thief even if they change the SIM card.

Web Crawler



A computer program that automatically and systematically searches web pages for certain keywords. Each search engine has its own proprietary computation (called an "algorithm") that ranks websites for each keyword or combination of keywords.

Web Indexing

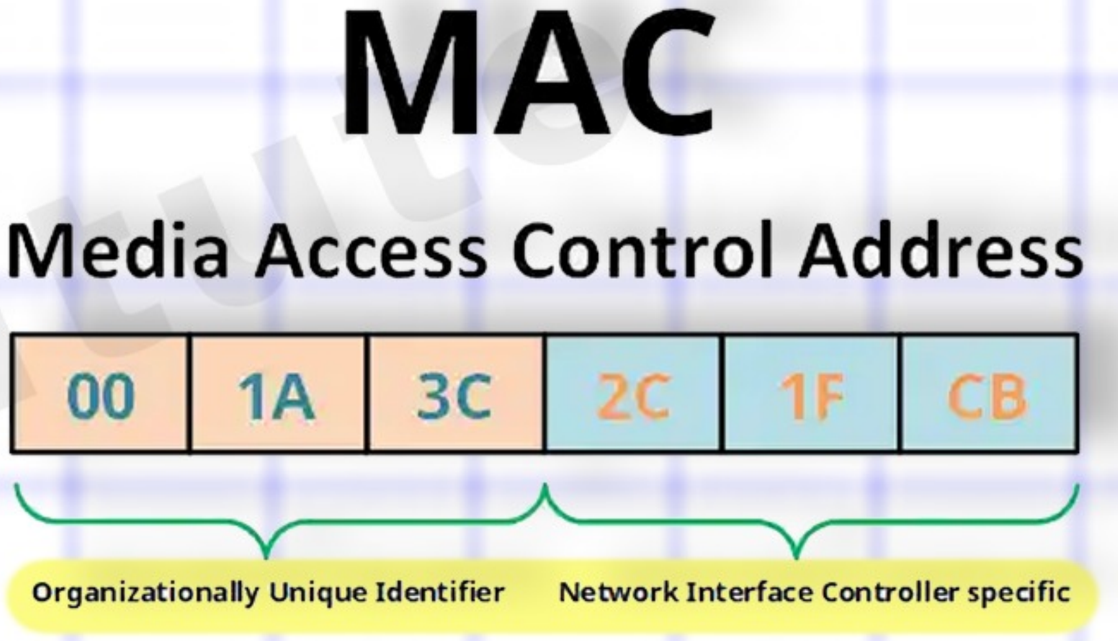
Website indexation is the process by which a search engine adds web content to its index. This is done by "crawling" webpages for keywords, metadata, and related signals that tell search engines if and where to rank content.

Search Algorithm

The searching algorithms are used to search or find one or more than one element from a dataset. These type of algorithms are used to find elements from a specific data structures.

MAC Address

A Media Access Control address (MAC address) is a hardware identifier that uniquely identifies each device on a network. Primarily, the manufacturer assigns it. They are often found on a device's network interface controller (NIC) card.



Router

A router is a networking device that forwards data packets between computer networks.

Routers are a critical component of modern computer networks, as they provide the connectivity and routing necessary for devices to communicate with one another and access the Internet.

HUB AND SWITCH Difference

S.NO	HUB	SWITCH
1	Works in half Duplex mode.	Full of likes.
2	Sends data in form of bits.	Send data in form of frames
3	Broadcast device.	Multicast device.
4	Works in physical layer of OSI model.	Works in data link network layer of OSI model.
5	Used to connect devices with the same network.	Used to connect devices to the Network.
6	Does not store any mac address of a node in the network.	Stores MAC address and I P address of notes in the network.
7	Type are:- Active hub, Passive hub and intelligent hub.	Types are:- layer 2 and layer 3 switch.
8		

BRIDGE

A bridge is a networking device that connects two separate computer networks together, allowing them to communicate with each other.

MODEM

A modem is a device that allows digital signals to be transmitted over analog telephone lines. The term "modem" is derived from the words "modulator-demodulator." The modem modulates the digital signals from a computer into an analog signal that can be transmitted over a telephone line, and then demodulates the analog signal received over the telephone line back into digital signals that can be processed by a computer i.e.

Convert Analog Signal To Digital Signal