Chapter-6 Introduction to Internet, www and Web

Q.no 1 what is Network

Answer
A network is a collection of computers, servers, mainframes, network devices, peripherals, or other devices connected to one another to allow the sharing of data. An excellent example of a network is the Internet, which connects millions of people all over the world. To the right is an example image of a home network with multiple computers and other network devices all connected?

Examples of network devices

- Desktop computers, laptops, mainframes, and servers.
- Consoles and thin clients.
- Firewalls
- Bridges
- Repeaters
- Network Interface cards
- Switches, hubs, modems, and routers.
- Smartphone's and tablets.
- Webcams

Q.no 2 Explain Different type of Computer Network

Answer
A computer network is a group of computers linked to each other that enables the computer to communicate with another computer and share their resources, data, and applications.

- **LAN(Local Area Network)**
1. Local Area Network is a group of computers connected to each other in a small area such as building, office.
2. LAN is used for connecting two or more personal computers through a communication medium such as twisted pair, coaxial cable, etc.
3. It is less costly as it is built with inexpensive hardware such as hubs, network adapters, and Ethernet cables.
4. The data is transferred at an extremely faster rate in Local Area Network.
5. Local Area Network provides higher security

- **WAN(Wide Area Network)**
1. A Wide Area Network is a network that extends over a large geographical area such as states or countries.
2. A Wide Area Network is quite bigger network than the LAN.
3. A Wide Area Network is not limited to a single location, but it spans over a large geographical area through a telephone line, fibre optic cable or satellite links.
4. The internet is one of the biggest WAN in the world.
5. A Wide Area Network is widely used in the field of Business, government, and education.
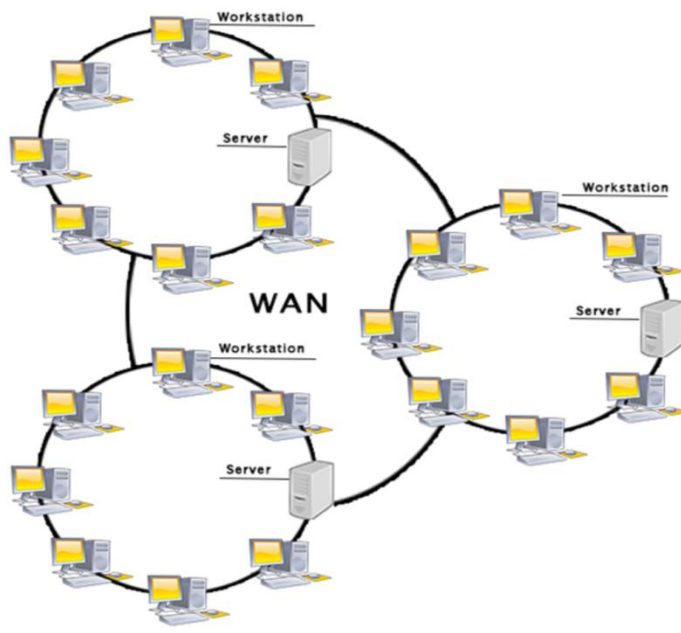
- **Examples Of Wide Area Network:**
  1. Mobile Broadband: A 4G network is widely used across a region or country.
  2. Last mile: A telecom company is used to provide the internet services to the customers in hundreds of cities by connecting their home with fiber.
  3. Private network: A bank provides a private network that connects the 44 offices. This network is made by using the telephone leased line provided by the telecom company.

Advantages Of Wide Area Network:

  1. Geographical area: A Wide Area Network provides a large geographical area. Suppose if the branch of our office is in a different city then we can connect with them through WAN. The internet provides a leased line through which we can connect with another branch.
  2. Centralized data: In case of WAN network, data is centralized. Therefore, we do not need to buy the emails, files or back up servers.

3. **Get updated files:** Software companies work on the live server. Therefore, the programmers get the updated files within seconds.
4. **Exchange messages:** In a WAN network, messages are transmitted fast. The web application like Facebook, Whatsapp, Skype allows you to communicate with friends.
5. **Sharing of software and resources:** In WAN network, we can share the software and other resources like a hard drive, RAM.
6. **Global business:** We can do the business over the internet globally.
7. **High bandwidth:** If we use the leased lines for our company then this gives the high bandwidth. The high bandwidth increases the data transfer rate which in turn increases the productivity of our company.

Disadvantages of Wide Area Network:

1. **Security issue:** A WAN network has more security issues as compared to LAN and MAN network as all the technologies are combined together that creates the security problem.
2. **Needs Firewall & antivirus software:** The data is transferred on the internet which can be changed or hacked by the hackers, so the firewall needs to be used. Some people can inject the virus in our system so antivirus is needed to protect from such a virus.
3. **High Setup cost:** An installation cost of the WAN network is high as it involves the purchasing of routers, switches.
4. **Troubleshooting problems:** It covers a large area so fixing the problem is difficult.
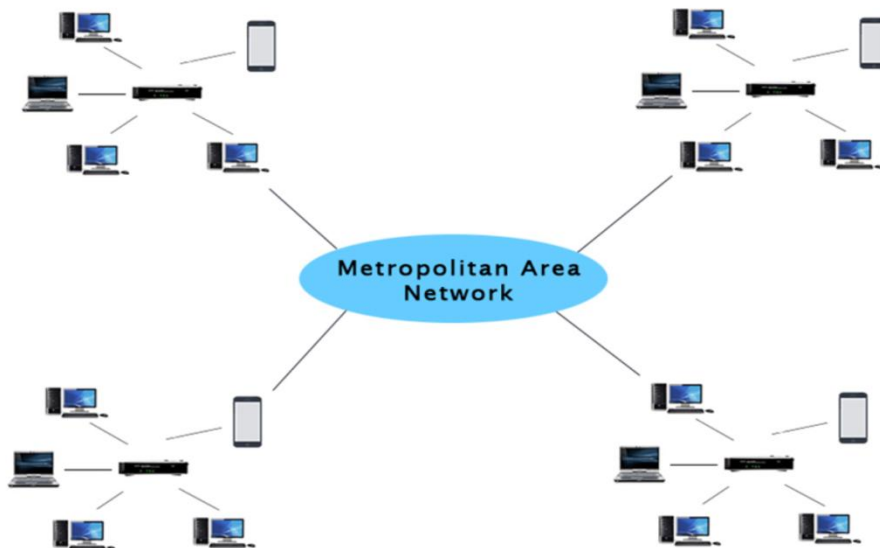
MAN(Metropolitan Area Network)

A metropolitan area network is a network that covers a larger geographic area by interconnecting a different LAN to form a larger network.
Government agencies use MAN to connect to the citizens and private industries.
1. In MAN, various LANs are connected to each other through a telephone exchange line.

2. The most widely used protocols in MAN are RS-232, Frame Relay, ATM, ISDN (Integrated Services Digital Network), OC-3, ADSL, etc.
3. It has a higher range than Local Area Network(LAN).

Uses Of Metropolitan Area Network:

  ◦   MAN is used in communication between the banks in a city.
  ◦   It can be used in an Airline Reservation.
  ◦   It can be used in a college within a city.
  ◦   It can also be used for communication in the military

Q.no 3 what do you mean by topology? What are the most popular topologies?

Answer

Topology defines the structure of the network of how all the components are interconnected to each other.
There are two types of topology:
1. Physical topology.
2. Logical topology

The physical topology is the way you physically lay out the network, like a map, and the logical topology is the way the information flows on the network. Usually, the physical and logical topology is the same, but

sometimes they can differ, such as in a physical star/logical ring topology.

PHYSICAL TOPOLOGIES
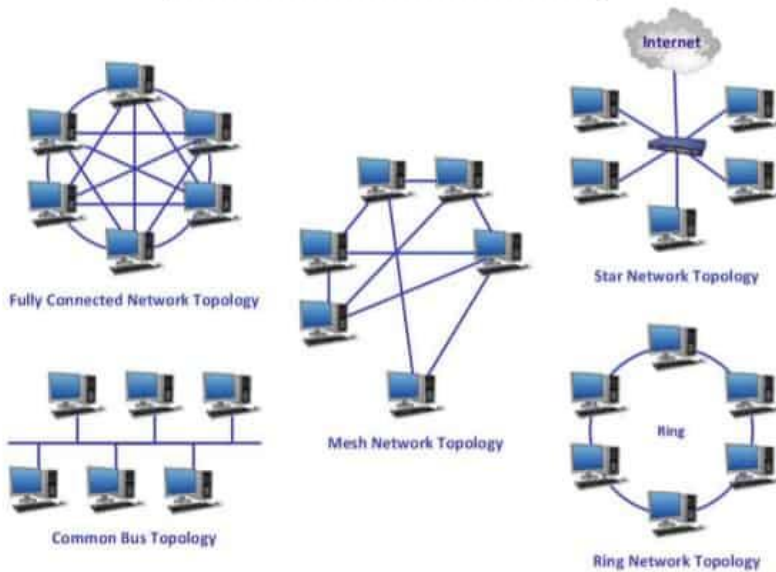
Type of topology

- bus topology,
- mesh topology,
- ring topology,
- star topology,
- tree topology and
- hybrid topology.

- **Bus topology**

A bus topology is a network setup where each computer and network device is connected to a single cable or backbone. Depending on the type of computer network card, a coaxial cable or an RJ-45 network cable is used to connect them together.
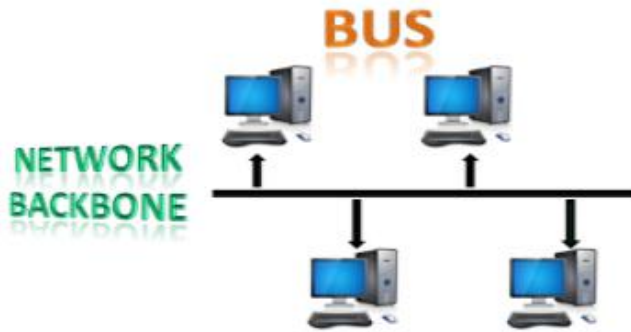
Working of bus topology

- The bus topology is designed in such a way that all the stations are connected through a single cable known as a backbone cable.
- Each node is either connected to the backbone cable by drop cable or directly connected to the backbone cable.
- When a node wants to send a message over the network, it puts a message over the network. All the stations available in the network will receive the message whether it has been addressed or not.
- The bus topology is mainly used in 802.3 (Ethernet) and 802.4 standard networks.
- The configuration of a bus topology is quite simpler as compared to other topologies.
- The backbone cable is considered as a "single lane" through which the message is broadcast to all the stations.
- The most common access method of the bus topologies is CSMA (Carrier Sense Multiple Access).

Advantages of bus topology

- It works well when you have a small network.
- It's the easiest network topology for connecting computers or peripherals in a linear fashion.
- It requires less cable length than a star topology.

Disadvantages of bus topology

• It can be difficult to identify the problems if the whole network goes down.

• It can be hard to troubleshoot individual device issues.

• Bus topology is not great for large networks.

• Terminators are required for both ends of the main cable.

• Additional devices slow the network down.

• If a main cable is damaged, the network fails or splits into two.

Mesh topology

A network setup where each computer and network device is interconnected with one another, allowing for most transmissions to be distributed even if one of the connections go down. It is a topology commonly used for wireless networks. Below is a visual example of a simple computer setup on a network using a mesh topology.
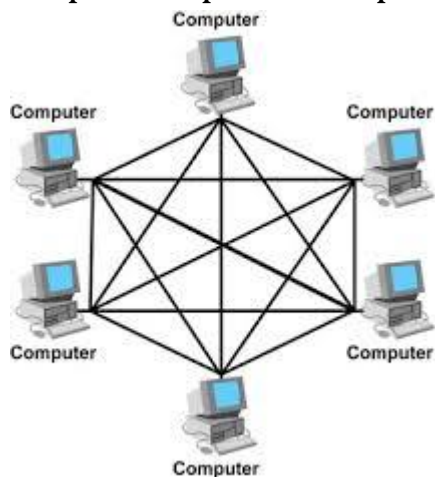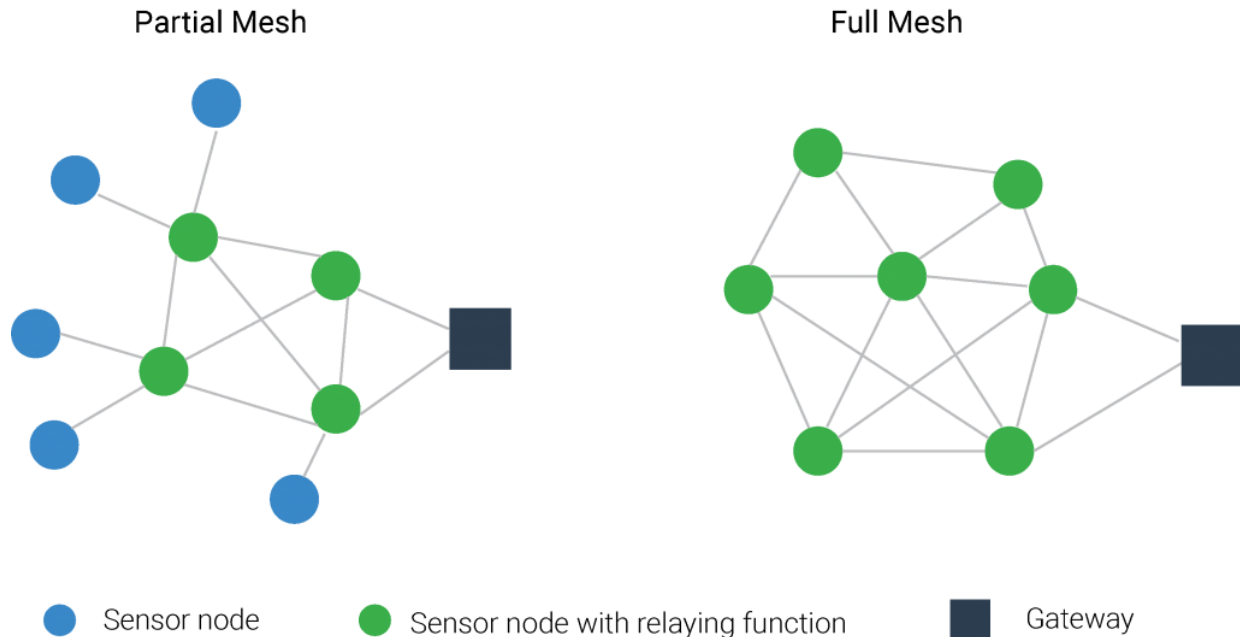

Different types of mesh topology
A mesh topology can be

• full mesh topology
• Partially-connected mesh topology.

In a full mesh topology, every computer in the network has a connection to each of the other computers in that network.

In a partially-connected mesh topology, at least two of the computers in the network have connections to multiple other computers in that network. It is an inexpensive way to implement redundancy in a network. If one of the primary computers or connections in the network fails, the rest of the network continues to operate normally.

Advantages of a mesh topology

- Manages high amounts of traffic, because multiple devices can transmit data simultaneously.
- A failure of one device does not cause a break in the network or transmission of data.
- Adding additional devices does not disrupt data transmission between other devices.

Disadvantages of a mesh topology

- The cost to implement is higher than other network topologies, making it a less desirable option.
- Building and maintaining the topology is difficult and time consuming.

- The chance of redundant connections is high, which adds to the high costs and potential for reduced efficiency.

Ring topology
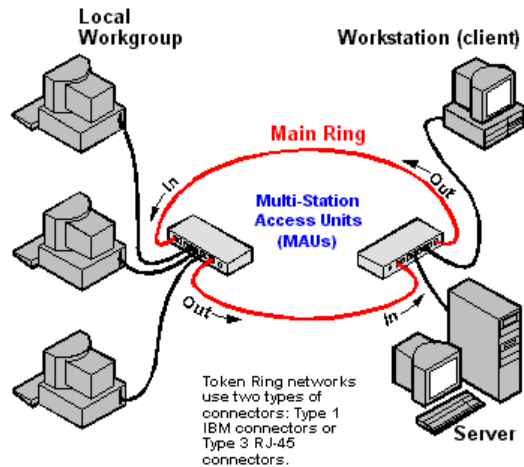
A ring topology is a network configuration in which device connections create a circular data path. Each networked device is connected to two others, like points on a circle. Together, devices in a ring topology are referred to as a ring network.

In a ring network, packets of data travel from one device to the next until they reach their destination. Most ring topologies allow packets to travel only in one direction, called a unidirectional ring network. Others permit data to move in either direction, called bidirectional.

The major disadvantage of a ring topology is that if any individual connection in the ring is broken, the entire network is affected.

Ring topologies may be used in either LANs (local area networks) or WANs (wide area networks). Depending on the type of network card used in each computer of the ring topology, a coaxial cable or an RJ-45 network cable is used to connect computers together.

Advantages of ring topology

- All data flows in one direction, reducing the chance of packet collisions.
- A network server is not needed to control network connectivity between each workstation.
- Data can transfer between workstations at high speeds.

• Additional workstations can be added without impacting performance of the network.

Disadvantages of ring topology

• All data being transferred over the network must pass through each workstation on the network, which can make it slower than a star topology.

• The entire network will be impacted if one workstation shuts down.

• The hardware needed to connect each workstation to the network is more expensive than Ethernet cards and hubs/switches.

Star topology

Switch, router, or hub
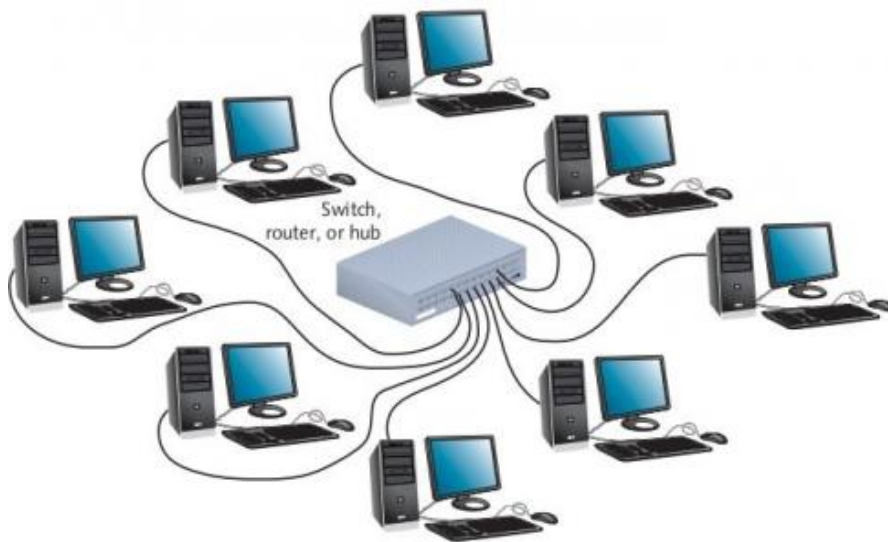
star topology is one of the most common network setups. In this configuration, every node connects to a central network device, like a hub, switch, or computer. The central network device acts as a server and the peripheral devices act as clients. Depending on the type of network card used in each computer of the star topology, a coaxial cable or an RJ-45 network cable is used to connect computers together.

Advantages of star topology

• Centralized management of the network, through the use of the central computer, hub, or switch.

- Easy to add another computer to the network.
- If one computer on the network fails, the rest of the network continues to function normally.

Disadvantages of star topology

- May have a higher cost to implement, especially when using a switch or router as the central network device.
- The central network device determines the performance and number of nodes the network can handle.
- If the central computer, hub, or switch fails, the entire network goes down and all computers are disconnected from the network.
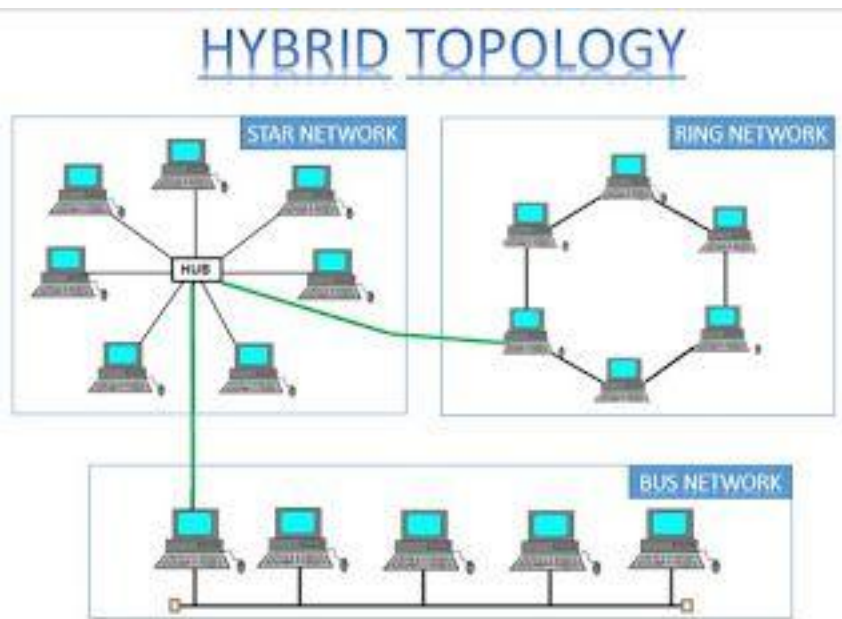
Tree topology
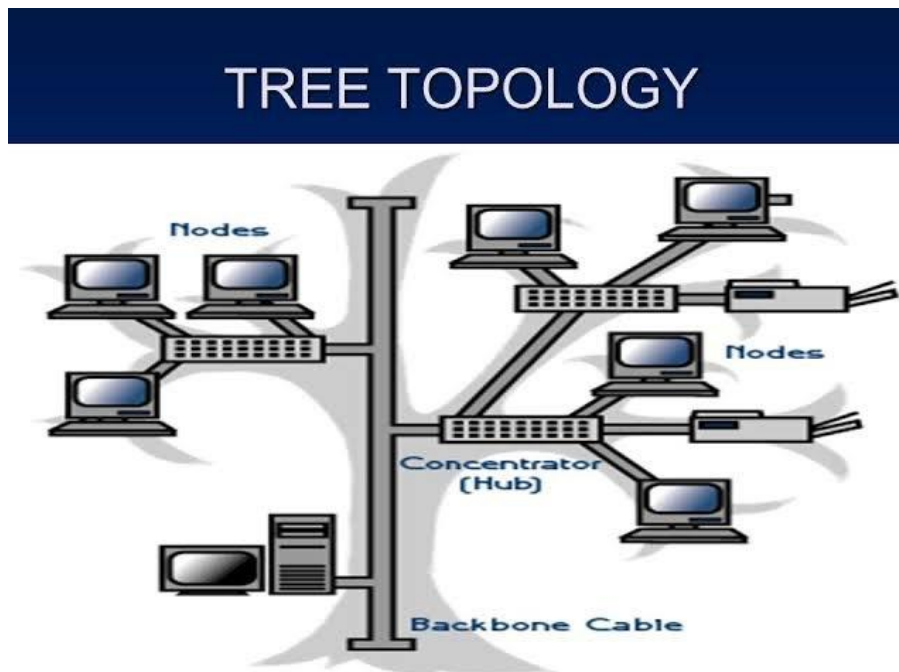
A tree topology is a special type of structure in which many connected elements are arranged like the branches of a tree. For example, tree topologies are frequently used to organize the computers in a corporate network, or the information in a database.

In a tree topology, there can be only one connection between any two connected nodes. Because any two nodes can have only one mutual

connection, tree topologies create a natural parent and child hierarchy. a tree topology is also known as a star bus topology. It incorporates elements of both a bus topology and a star topology.
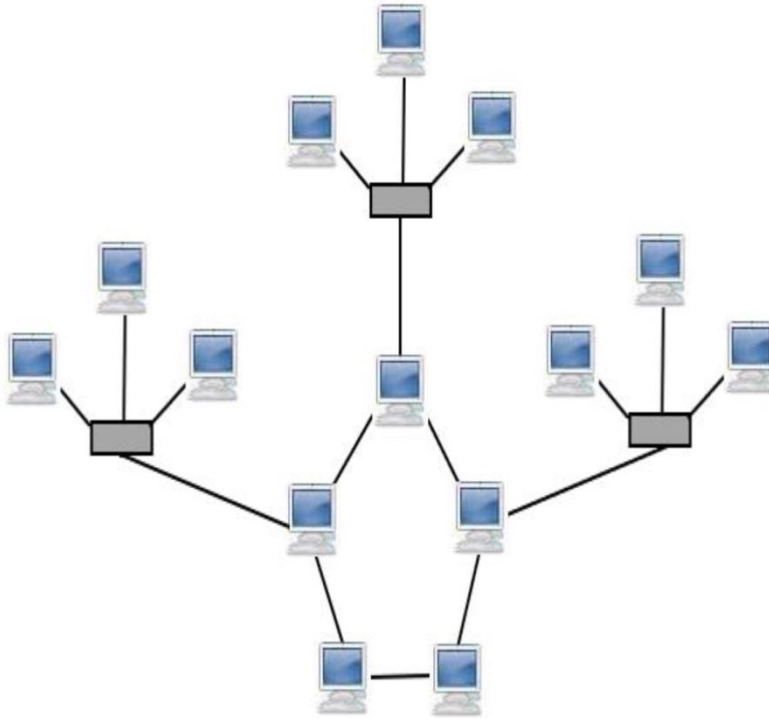
Hybrid topology

A hybrid topology is a type of network topology that uses two or more differing network topologies. These topologies can include a mix of bus topology, mesh topology, ring topology, star topology, and tree topology.

Types of hybrid topologies

The two most commonly used types of hybrid topologies are the following.

Star-Ring hybrid topology

A star-ring hybrid topology is a combination of the star topology and ring topology. Two or more star topologies are connected together through a ring topology.
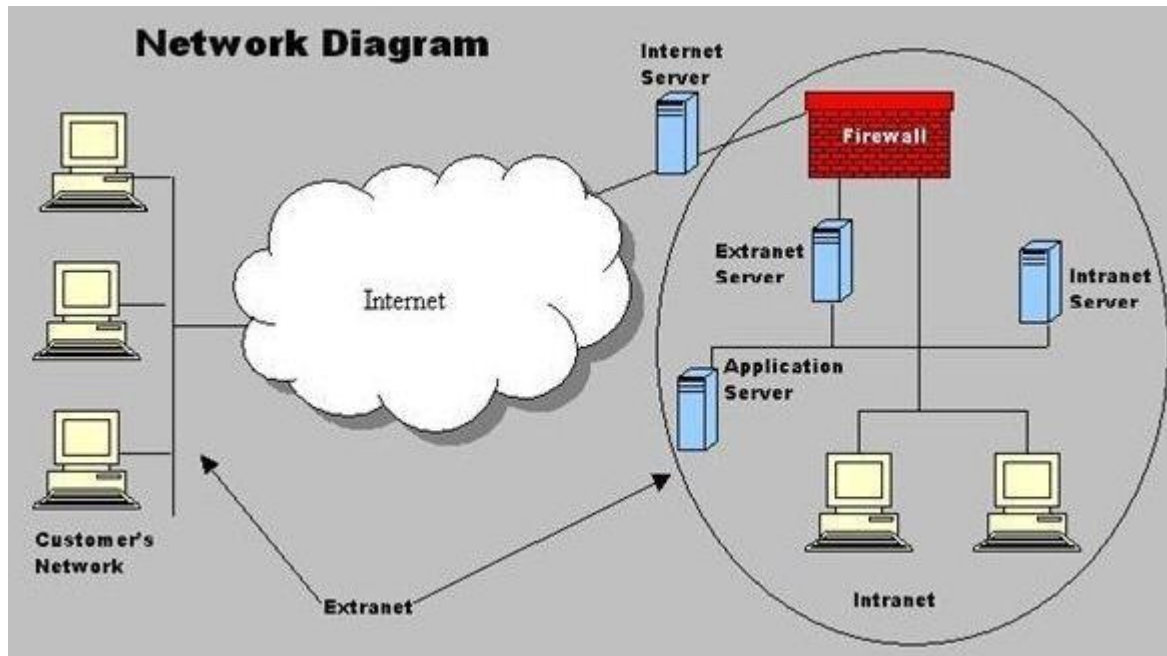
Star ring topology

Star-Bus hybrid topology

A star-bus hybrid topology is a combination of the star topology and bus topology. Two or more star topologies are connected together through a bus topology.

Star bus topology

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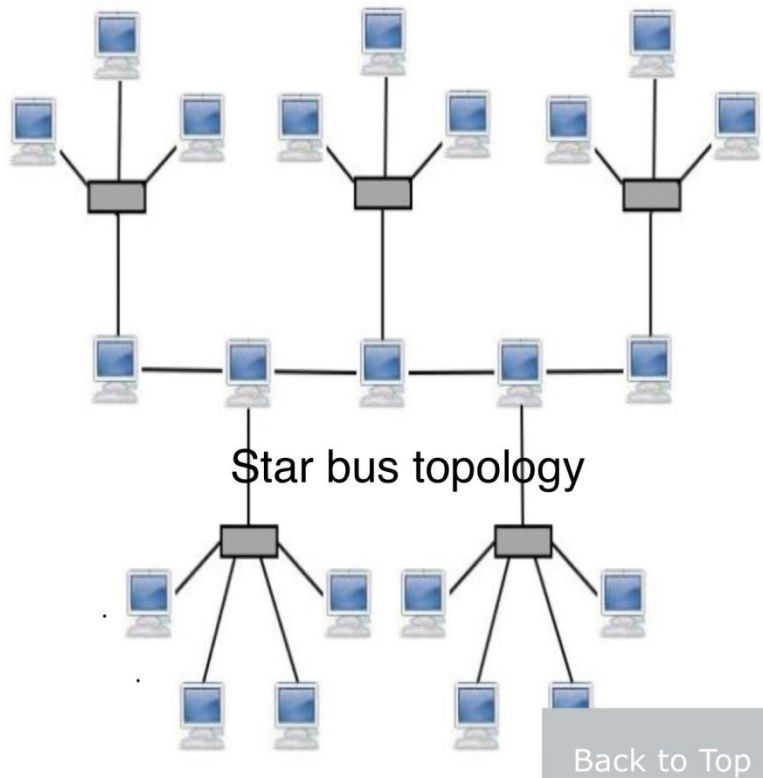
Q. no 4 Differentiate between internet & intranet & extranet?
Answer

The Internet is the global system of interconnected computer networks that use the Internet protocol suite (TCP/IP) to link devices worldwide.

An intranet is a private computer network that uses Internet protocols, network connectivity, and possibly the public telecommunication system to securely share part of an organization's information or operations with its employees.

An extranet is an intranet that can be partially accessed by authorized outside users, enabling businesses to exchange information over the Internet securely. It is a controlled private network that allows access to partners, vendors and suppliers or an authorized set of customers — normally to a subset of the information accessible from an organization's intranet.

Q.no 5 what are network protocol?
Answer

In the world of technology, there are vast numbers of users' communicating with different devices in different languages. That also includes many ways in which they transmit data along with the different software they implement. So, communicating worldwide will not be possible if there were no fixed 'standards' that will govern the way user communicates for data as well as the way our devices treat those data.

Type of Protocol

1- Transmission Control Protocol (TCP): TCP is a popular communication protocol which is used for communicating over a network. It divides any message into series of packets that are sent from source to destination and there it gets reassembled at the destination.

2- Internet Protocol (IP): IP is designed explicitly as addressing protocol. It is mostly used with TCP. The IP addresses in packets help in routing them through different nodes in a network until it

reaches the destination system. TCP/IP is the most popular protocol connecting the networks.

3- User Datagram Protocol (UDP): UDP is a substitute communication protocol to Transmission Control Protocol implemented primarily for creating loss-tolerating and low-latency linking between different applications.

4- Post office Protocol (POP): POP3 is designed for receiving incoming E-mails.

5- Simple mail transport Protocol (SMTP): SMTP is designed to send and distribute outgoing E-Mail.

6- File Transfer Protocol (FTP): FTP allows users to transfer files from one machine to another. Types of files may include program files, multimedia files, text files, and documents, etc.

7- Hyper Text Transfer Protocol (HTTP): HTTP is designed for transferring a hypertext among two or more systems. HTML tags are used for creating links. These links may be in any form like text or images. HTTP is designed on Client-server principles which allow a client system for establishing a connection with the server machine for making a request. The server acknowledges the request initiated by the client and responds accordingly.

8- Hyper Text Transfer Protocol Secure (HTTPS): HTTPS is abbreviated as Hyper Text Transfer Protocol Secure is a standard protocol to secure the communication among two computers one using the browser and other fetching data from web server. HTTP is used for transferring data between the client browser (request) and the web server (response) in the hypertext format, same in case of HTTPS except that the transferring of data is done in an encrypted format. So it can be said that https thwart hackers from interpretation or modification of data throughout the transfer of packets.

9- Telnet: Telnet is a set of rules designed for connecting one system with another. The connecting process here is termed as remote login. The system which requests for connection is the local computer, and the system which accepts the connection is the remote computer.

10-   Gopher: Gopher is a collection of rules implemented for searching, retrieving as well as displaying documents from isolated sites. Gopher also works on the client/server principle.