Computer Networks

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Q1. What is tree topology? Write down its advantages and disadvantages.

Tree Topology: A tree topology combines characteristics of linear bus and star topologies. It consists of groups of star-configured workstations connected to a linear bus backbone cable (See fig. 1). Tree topologies allow for the expansion of an existing network, and enable schools to configure a network to meet their needs.

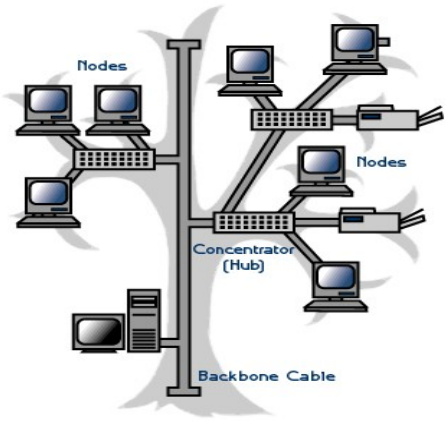

Figure 1: Tree Topology

Advantages:

1. It is an extension of Star and bus Topologies, so in networks where these topologies can't be implemented individually for reasons related to scalability, tree topology is the best alternative.
2. Expansion of Network is possible and easy.
3. Here, we divide the whole network into segments (star networks), which can be easily managed and maintained.
4. Error detection and correction is easy.
5. Each segment is provided with dedicated point-to-point wiring to the central hub.
6. If one segment is damaged, other segments are not affected.

Disadvantages:

1. Because of its basic structure, tree topology, relies heavily on the main bus cable, if it breaks whole network is crippled.
2. As more and more nodes and segments are added, the maintenance becomes difficult.
3. Scalability of the network depends on the type of cable used.

Q2: Write down the features of MAN.

1. The network size falls intermediate between LANs and WANs.
2. A MAN typically covers an area of between 5 and 50 km diameter.
3. A MAN (like a WAN) is not generally owned by a single organization.
4. A MAN often acts as a high speed network to allow sharing of regional resources (similar to a large LAN).
5. It is also frequently used to provide a shared connection to other networks using a link to a WAN.

Q3: What is Internet? Mention some uses of Internet.

Internet: Internet is a network of networks. When two or more Metropolitan Area Networks (MANs) are connected then a bigger network is produced which is called a Wide Area Network (WAN) and that is the Internet. The other names of Internet are information superhighway or cyber space or simply net.

Some important uses of Internet are: (i) E-mail (ii) Chatting (Text based Messaging) (iii) VOIP (Voice Over Internet Protocol`) (iv) Video conferencing (v) Browsing information and so on.

Q4: What do you mean by intranet and extranet?

Intranet: An intranet is a private network of an organization. It is the smallest network than Internet and extranet. It is highly secured network and only the employees of the organization can access here using valid password. Like Internet, an intranet can also be browsed using a browser but only the internal data of the organization.

Extranet: An extranet is a private network of two or more organizations. It is smaller network than Internet but larger than intranet. When the intranets of two or more organizations are connected to each other to share resources and ideas then a bigger network is produced which is still private and called an extranet. It is a secured network and only the employees of the organizations can access here using valid password. Like Internet and intranet, an extranet can also be browsed using a browser but only the internal data of the organizations.

Q5: What are browser and search engine? Give some examples.

Browser: A browser is software used to browse or search information on the net. To search any information using a browser a user needs to know the actual web site address (URL) of his/her required information.

Example: Internet Explorer, Google Chrome, Mozilla Firefox, Opera etc.

Search Engine: A search engine is a software used to search information on the net. To search any information using a search engine a user does not need to know the actual web site address (URL) of his/her required information. Instead of that he/she needs to write some relevant words (keywords) of his/her required information in a predefined place and then make a search. The output of a search engine is some links of web sites of his/her required information.

Example: Google, Yahoo, Bing etc.

Q6: What do you mean by protocol? Mention some protocols.

Protocol: Protocol is a set of rules and procedures established between two computers prior to exchange data between them.

Some protocols and their full meanings are below:

Protocols	**Full meanings**
HTTP	Hyper Text Transfer Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
FTP	File Transfer Protocol
SMTP	Simple Message Transfer Protocol
WAP	Wireless Application Protocol

Q7: Define HTTP, TCP, IP, FTP, SMTP, WAP.

HTTP: The Hypertext Transfer Protocol (HTTP) is an application protocol for distributed, collaborative, and hypermedia information systems. HTTP is the foundation of data communication for the World Wide Web. Hypertext is structured text that uses logical links (hyperlinks) between nodes containing text.

TCP: The Transmission Control Protocol (TCP) is one of the main protocols of the Internet protocol suite. It originated in the initial network implementation in which it complemented the Internet Protocol (IP). Therefore, the entire suite is commonly referred to as TCP/IP.

IP: The Internet Protocol (IP) is the method or protocol by which data is sent from one computer to another on the Internet. Each computer (known as a host) on the Internet has at least one IP address that uniquely identifies it from all other computers on the Internet.

FTP: The File Transfer Protocol (FTP) is a standard network protocol used for the transfer of computer files from a server to a client using the Client–server model on a computer network.FTP is built on a client-server model architecture and uses separate control and data connections between the client and the server.

SMTP: Simple Mail Transfer Protocol (SMTP) is an Internet standard for electronic mail (email) transmission. First defined by RFC 821 in 1982, it was last updated in 2008 with Extended SMTP additions by RFC 5321, which is the protocol in widespread use today.

WAP: Wireless Application Protocol (WAP) is a technical standard for accessing information over a mobile wireless network. A WAP browser is a web browser for mobile devices such as mobile phones that uses the protocol.

Q8: Why is the Internet sometimes called "networks of networks"?

Ans: The Internet is not synonymous with World Wide Web. The Internet is a massive network of networks, a networking infrastructure. It connects millions of computers together globally, forming a network in which any computer can communicate with any other computer as long as they are both connected to the Internet. That's why internet is called networks of networks.

Q9: What is Communication Media? How many types of Communication media?

Ans: Communication media or communication channels are those media through which data can be sent or travelled from one place to another place in the communication network.

Types of media: Communication Media is two types these are:

1. Bounded Media (1 . Twisted pair 2. Coaxial cable 3. Optical fiber)
2. Unbounded Media (1. Radio wave 2. Microwave 3. Wireless)

Q10: Describe Bounded Media with advantages and disadvantages.

Twisted Pair Cable: In twisted pair cable communication two copper wires are twisted. The wires are separated by covering them insulated plastic materials (casing or jacket).

Types:

1. UTP (Unshielded Twisted Pair) 2. STP (Shielded Twisted Pair)

Advantages: 1. Available in local market. 2. Low price. 3. Easy to installation.

Disadvantages: 1. Low bandwidth (kbps-mbps) 2. Short distance communication. (maximum 100 meter)

Applications: Telephone line, LAN etc.

Coaxial Cable: In coaxial cable communication a single heavy copper wire is used. The wire is covered with insulated plastic foam. Then a net of wires are used to surround the plastic insulation. Finally a heavy plastic casing or jacket is used to protect the inner two layers from external harm.

Types:

1. Thinnet coaxial cable (light and flexible with low bandwidth) 2. Thicknet coaxial cable (heavy and non-flexible with high bandwidth)

Advantages: 1. Available in local market. 2. Medium price. 3. Medium bandwidth. (Mbps-gbps)

Disadvantages: 1. A bit costly. 2. Medium distance communication. (Maximum 1 k.m) Applications: Cable TV line, MAN etc.

Optical Fiber Cable: In optical fiber cable communication a fiber or strand (straw or narrow pipe) is used. The inner side of the fiber is coated with glass (core glass). Then the fiber is covered with another protection of plastic or glass which is called cladding. Finally a heavy plastic or metallic casing or jacket is used to protect the inner two layers from external harm.

Types:

1. Step index fiber (equal refraction angle in all places) 2. Graded index fiber (refraction angle is higher in center than periphery) 3. Single mode fiber (laser light is fallen in a single direction or angle) 4. Multimode fiber (laser light is fallen in multiple direction or angle)

Advantages: 1. High bandwidth (gbps-tbps). 2. High distance communication.

Disadvantages: 1. Costly. 2. Installation is complex.

Applications: WAN, Submarine cable etc.

Q11: Discuss the operation of optical fiber communication media.

Ans: In optical fiber cable communication a fiber or strand (straw or narrow pipe) is used. The inner side of the fiber is coated with glass (core glass). Then the fiber is covered with another protection of plastic or glass which is called cladding. Finally a heavy plastic or metallic casing or jacket is used to protect the inner two layers from external harm. The figure of optical fiber communication system is shown in below.

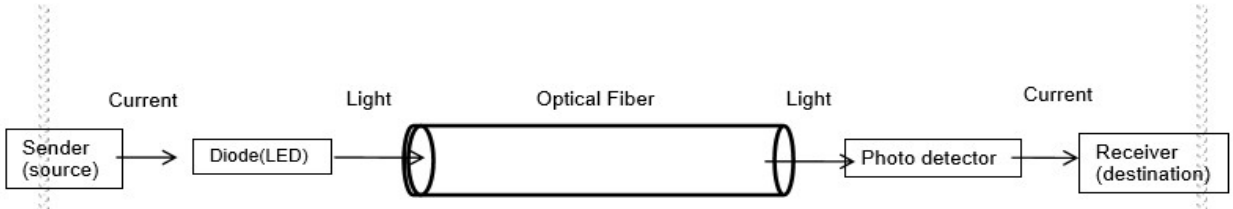

Figure: Optical Fiber communication system.

From this figure it is shown that when source send current it is fed to Diode. Light emitting diode emits light through optical fiber. Light is then fed Photo detector whose main function is that to converts light energy into electrical energy, which is the reverse energy conversion to a laser. Finally photo detector passes the message to the destination.

Q12: What is Modem? Write down the function of Modem.

Modem: Modem means modulation and demodulation. It is the bridge between digital and analog signals.

Function of Modem: The main function of modem is modulation and demodulation. The functional figure of modem is shown in figure 3.

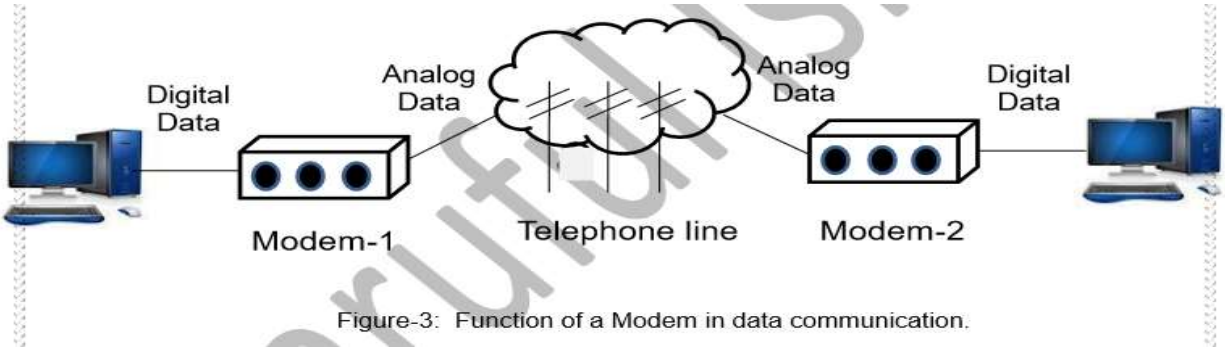

Figure-3: Function of a Modem in data communication.

In modulation section it converts digital signal into analog signal on the other hand in demodulation section it converts analog signal into digital signal. A modem's transmission speed is measured in bits per second (bps)

Application of Modem in Data Communication: Different means of data communication: Pigeon, Postal media etc.

Q12: What do you mean by WWW, E-mail, HTML, and Newsgroup?

WWW: WWW means World Wide Web. It is the basic part of internet which supports hypertext documents. User can import live, interactive data and executable programs from the WWW.

E-mail: E-mail means Electronic mail. Anyone with an e-mail account can send and receive text message to other users of the internet. Most E-mail programs also permit user to attach data and program files to message.

HTML: HTML means Hypertext markup language. The HTML is a page description language that creates hypertext documents. It provides a range of feature to design and create multimedia web pages.

Newsgroup: A newsgroup is a discussion about a particular subject consisting of notes written to a central Internet site and redistributed through Usenet, a worldwide network of news discussion groups. Usenet uses the Network News Transfer Protocol (NNTP).

Q13: What do you mean by internet access providing and internet presence providing by an ISP?

Internet access providing: An Internet service provider (ISP) is an organization that provides services for accessing and using the Internet. Internet service providers may be organized in various forms, such as commercial, community-owned, non-profit, or otherwise privately owned.

Internet presence providing: An Internet presence provider (IPP) is a company that provides the disk space, high-speed Internet connection, and possibly the Web site design and other services for companies, organizations, or individuals to have a visible presence (meaning Web site) on the Internet.