

Chapter 11: Computer Networks

Computer network is a group of computers and other computing hardware devices.

Advantages: Resource sharing, Price-performance ratio, Communication, Reliability, Scalability.

Data communication is the exchange of digital data between any two devices through a medium of transmission.

Five basic elements of data communication system: Message, Sender, Receiver, Medium and Protocol.

Communication channel or communication medium: The medium for data transmission over a computer network.

Two types of communication media: Guided (wired) and unguided (wireless).

Guided media: physical wires or cables are used. Coaxial cable, twisted pair cable (Ethernet cable) and optical fibre cable are examples.

Unguided media: Wireless medium is used. Radio waves, microwaves or infrared signals are examples.

Bluetooth technology uses radio waves for short range communication between devices. Cell phones, laptops, mouse, keyboard, tablets, headsets, cameras, etc.

Wi-Fi (Wireless Fidelity) makes use of radio waves to transmit information across a network like cell phones, televisions and radios.

Wi-MAX (Worldwide Interoperability for Microwave Access) uses radio waves to provide high-speed wireless Internet access over very long distances (a whole city).

Satellite links use radio waves for long distance wireless communication systems.

Communication devices: NIC, Hub, Switch, Repeater, Bridge, Router, Gateway.

Network Interface Card (NIC): A device that enables a computer to connect to a network and communicate.

Hub: A device used in a wired network to connect computers/devices of the same network.

Switch: An intelligent device that connects several computers to form a network.

Repeater: A device that regenerates incoming electrical, wireless or optical signals through a communication medium

Bridge: A device used to split a network into different segments and interconnected.

Router: A device that can interconnect two networks of the same type using the same protocol. It is more intelligent than bridge.

Gateway: A device that interconnects two different networks having different protocols.

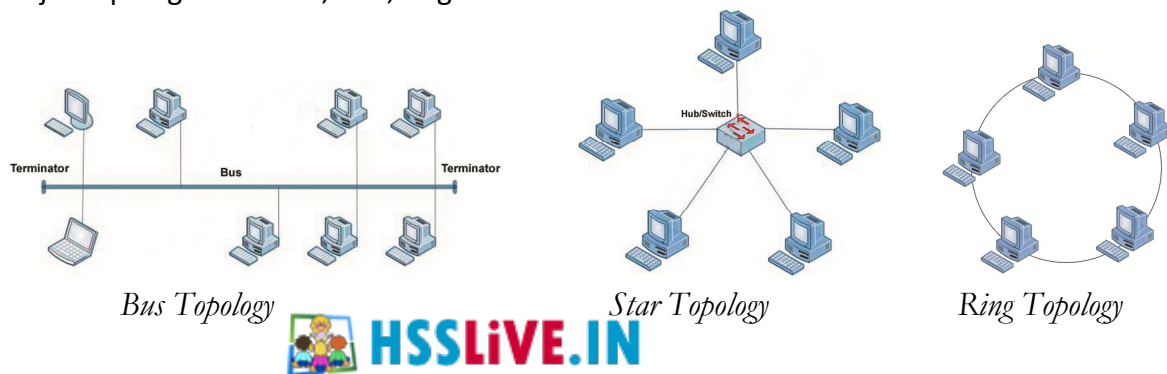
Data Terminal Equipments: Modem, Multiplexer

Modem: It converts digital signals to analog signals and converts the analog signals back to digital signals.

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Multiplexer: It combines (multiplexes) the inputs from different sources and sends them through different channels of a medium.

Topology: The way in which the nodes are physically interconnected to form a network. Major topologies are bus, star, ring and mesh.



Types of network: PAN (Personal Area Network), LAN (Local Area Network), MAN (Metropolitan Area Network) and WAN (Wide Area Network).

Parameter	PAN	LAN	MAN	WAN
Area covered	Small area (Up to 10 m radius)	A few meters to a few Kilometers (Up to 10 Km radius)	A city and its vicinity (Up to (100 Km radius)	Entire country, continent, or globe
Transmission speed	High speed	High speed	Moderate speed	Low speed
Networking cost	Negligible	Inexpensive	Moderately expensive	Expensive

Logical Classification: Peer-to-peer and Client server

Peer-to-peer network: No dedicated servers. Here a number of computers are connected together for the purpose of sharing information or devices.

Client-server: It consists of high-end computer (called server) serving lower configuration machines called clients.

Protocol: The set of rules to be followed in a network for data transmission. TCP/IP, SPx/IPx are examples. HTTP, FTP and DNS are three sub protocols of TCP/IP protocol suite.

HTTP stands for Hypertext Transfer Protocol. It is a standard protocol for transferring requests from client-side and to receive responses from the server-side.

FTP stands for File Transfer Protocol. It is a standard for exchanging of data and program files across a network.


DNS stands for Domain Name System. DNS returns the IP address of the domain name, that we type in our web browser's address bar.

Media Access Control (MAC) address: A universally unique address (12 digit hexadecimal number) assigned to each NIC (Network Interface Card) by its manufacturer.

IP address: A unique 4 part numeric address assigned to each node on a network, for their unique identification.

URL stands for Uniform Resource Locator. URL is a formatted text string used by web browsers to identify a network resource on the Internet. URL string can be divided into three parts – Network protocol, Domain name, File name.

Questions from Previous Years' Question Papers

1. Which one of the following transmission media carries information in the form of light signals?
a) Coaxial cable b) Shielded twisted pair
c) Optical fibre cable d) Wi-Fi  (1) (July 2017)
2. Internet is an example of _____.
a) MAN b) PAN c) WAN d) LAN (1) (July 2017)
3. Explain the advantages of forming networked computers than keeping them stand-alone computers. (3) (July 2017)
4. a) Different networks with different protocols are connected by a device called
(i) Router (ii) Bridge (iii) Switch (iv) Gateway (1) (March 2017)
b) Define protocol. (1) (March 2017)
5. Compare any three types of networks based on span of geographical area. (3) (March 2017)
6. Write notes on the following:
a) IP address b) MAC address c) Modem (3) (Sept. 2016)
7. Define network topology. Explain any four network topologies in detail. (3) (Sept. 2016)
8. Identify the type of LAN topology in which there are more than one path between nodes.
(a) Star (b) Ring (c) Mesh (d) Bus (1) (March 2016)
9. Any device which is directly connected to a network is generally known as _____. (1) (March 2015)
10. In topology all the nodes are connected to a main cable. (1) (Sept. 2015)
11. Bluetooth can be used for communication.
i) long distance ii) short distance
iii) mobile phone iv) all of these (1) (Sept. 2015)
12. ABC Ltd. required connecting their computers in their company without using wires. Suggest suitable medium to connect the computers. Explain. (3) (Sept. 2015)
13. (a) To make data transfer faster, a switch stores two different addresses of all the devices connected to it. What are they? (1)
(b) There are 5 computers in your computer lab. Write short notes on any three possible methods to interconnect these computers. Draw the diagram of each method. (3) (March 2015)