

1. TELECOMMUNICATION AND NETWORKS

[PART- 1 / 2]

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Q1: what is computer Network?

* A computer Network is a collection of computers and other hardware devices interconnected by a communication channel that allows sharing of resources and information.

(or)

* A computer Network is a collection of computers and terminal devices connected together by a communication system.

☞ The set of computers may include

- * large-scale computers
- * medium-scale computers
- * mini computers and
- * microprocessors.

☞ The set of terminals may include.

- * intelligent terminals
- * dumb terminals
- * work stations of various kinds and
- * miscellaneous devices such as commonly used telephone lines, printers etc.,

Q2: what are the major generic components of telecommunication Network

The major components of telecommunication Network are:

- (i) Terminals
- (ii) computers
- (iii) communication channel
- (iv) Telecommunication processors
- (v) Telecommunication software.

Q3: purpose of telecommunication Network;

- * it allow departments to share hardware devices
- * it allow electronic transfer of text.
- * it facilitate communication b/w organisations.
- * it allow informations to be shared
- * it allow decentralization of various data processing functions.

Q4: what are the different types of Networks commonly found?

- * Local area Network (LAN)
- * Metropolitan Area Network (MAN)
- * wide Area Network (WAN)
- * Virtual private Network (VPN)
- * Intranet
- * Extranet
- * Internet

Q5: Imp point:

Most LAN's and WAN's are interconnected using

- ✓ client/server
- ✓ Network computing
- ✓ peer-to-peer
- ✓ internet networking technologies.

Q6: Imp point:

Telecommunication processors consists of various devices to help interconnect and enhance the capacity and efficiency of telecommunication channels include:

- ✓ Modems
- ✓ multiplexers
- ✓ interworked processors.

Q7:

Imp point:

Telecommunications Networks use

Media like guided (twisted pair, coaxial cable, fiber optic) and unguided (wireless: Terrestrial Microwave, Radio waves, infrared wave, Microwave, communication Satellites)

PC systems

wireless LAN's

other wireless technologies.

Q8: what do you mean by Network as an Enterprise?

* In present world

"most businesses are expected to be Networked Enterprises to be able to sustain and grow"

* The internet and Internet like Network inside the Enterprise are called intranets (within the organization) and
B/w the Enterprise and its trading partners are called "EXTRANETS"

* These and other type of Networks serve as the primary information technology infrastructure for many enterprises.

* Managers, teams, End-users and workgroups use telecommunication networks to Electronically exchange data and information anywhere in the world with

other end users

customers

Suppliers and

Business partners.

[BSC0]

* By using such Networks, companies can perform more effectively as they can:

☞ collaborative more effectively.

☞ Manage their business operations and organisational resources more effectively.

☞ compete successfully in today's fast changing global Economy.

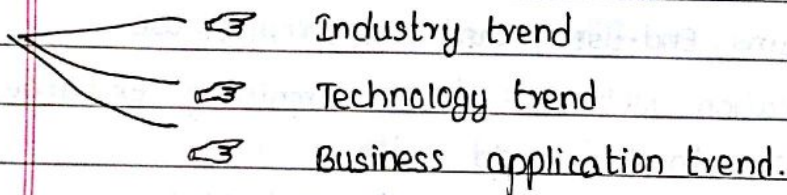
Q:9:

State The latest trends in telecommunication:

* Major trends are occurring in the field of telecommunications and these have a significant impact on management decisions.

* It is Necessary for managers, end users and other stakeholders to be aware of major trends in telecommunication industries, technologies and applications that significantly increase the decision alternatives confronting their organizations.

* The following are the major trends in the telecommunication industry:

BIT

⇒ Industry trend:

Some of the major trends are

* Telecommunications Network and services are available from numerous/various types of large and small telecommunication companies

* Explosive growth of the internet and WWW, has created a lot of new telecommunications products, services and providers.

* Business firms have dramatically increased their use of the internet and web for Electronic commerce and collaboration.

⇒ Technology trend :

Now-a-days , technology move towards

- * open system with unrestricted connectivity ,
using internet networking technologies as Their technology platform, are becoming The primary telecommunications technology drivers.
- * increased industry and technical move towards Building client/server architecture Based on open system architecture.
- * open systems are information systems , that use common standards for hardware, software, applications & networking.
- * change from analog to digital network technologies.
- * change in telecommunication media
ie., Many telecommunications networks are changing from copper wire-based media to fiber-optic lines and satellite transmissions.

Advantages of Fiber optics:

- * Reduced size and installation effort
- * Greater communication capacity
- * Faster transmission speeds
- * Freedom from electrical interference.

⇒ Business application trends:

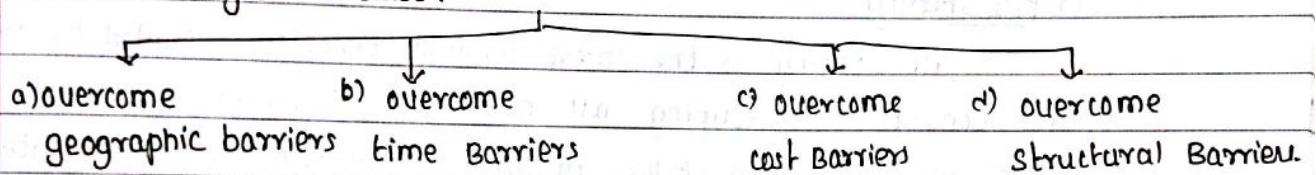
Some of the today's application trends are

- *. The trends towards more vendors, services, internet technologies, open systems, and the rapid growth of the internet, the world wide web and corporate intranets and Extranets dramatically increase the number of feasible telecommunication applications.
- *. Telecommunications networks are playing a vital and pervasive role in E-commerce, enterprise collaboration and internal Business applications that support the operations, management and strategic objectives of both large and small companies.
- *. Telecommunications functions have become an integral part of local and global computers networks that are used to dramatically:
 - ☞ support E-commerce
 - ☞ develop new products and services
 - ☞ develop online operational process
 - ☞ cut costs
 - ☞ Lock in customers and suppliers
 - ☞ shorten Business lead time and responsive times.
 - ☞ Shares resources
 - ☞ improve the collaborations of work groups.

Q10: Business value of telecommunications (or)
strategic capabilities of internet along with their business application:

- * information technology in telecommunications-based business applications helps company overcome barriers to business success.
- * The widely used information systems in enterprise are highly facilitated through telecommunications systems that help in increase in productivity and performance of an organization.

* The strategic capabilities of telecommunications and other information technologies include:



→ OVERCOME GEOGRAPHICAL BARRIERS:

a) capture information about business transactions from remote locations

Ex:- uses the internet and extranet to transmit customer orders from travelling salespeople to a corporate data center for order processing and inventory control

b) overcome time barriers: provide information immediately after it is requested by users even to remote locations.

c) overcome cost barriers:

Reduces the cost compared to traditional means of communication.

d) overcome structural barriers:

support linkage for competitive advantage.

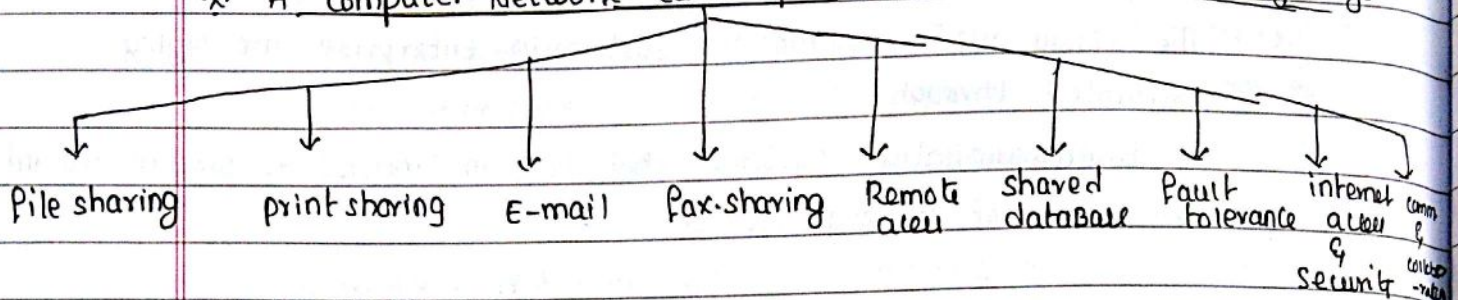
Ex: Business-to-Business electronic commerce websites for transactions with suppliers and customers using internet & extranet.

Q11: short notes on need and scope of communication Networks (or)
Describe the ways in which a computer network can help business?

* organisations can improve efficiency by sharing information



* A computer network can help the business in the following ways:



(i) File sharing:

File sharing is the most common function provided by Networks and consists of grouping all data files together on a server (or) servers. When all the data files in an organization are concentrated in one place,

it is much easier for staff to share documents & other data.

(ii) print sharing:

When printers are available over the network, multiple users can print to the same printer.

This facility can reduce the no. of printers the organisation must purchase & maintain.

(iii) E-mail:

Email enables the staff of an office to communicate with each other quickly and effectively.

(iv) Fax-sharing:

Through the use of shared modem(s) users can fax the documents directly from their computer without print them on paper.

(v) Remote Access:

It provides sharing of computer resources such as harddisk, printers etc., by multiple users simultaneously to reduce the cost of installing and maintaining multiple resources in an organisation.



The user can access the information from locations outside the office.

(vi) Shared database:

Shared database are an important subset of file sharing. If the organization maintains an extensive database, a Network is the only effective way to make the database available to multiple users at the same time.

* (vii) Fault tolerance:

This is the process of making sure that there are several lines of defense against accidental data loss.

Tape backups, servers attached to an uninterruptible power supply (ups) and redundant hardware are examples of such defense lines.

(viii) Internet access and security:

It provides access to the Internet for transferring the document and to access the resources available on WWW by maintaining data security through firewall system in the organization's Network.

(ix) Communication and collaboration:

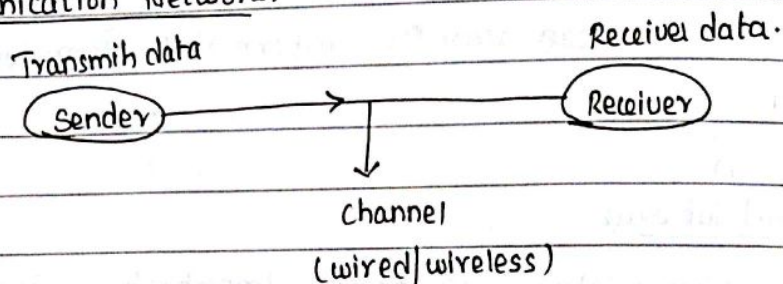
A network allows employees to share files, views to other people at work and exchange ideas more efficiently.

ie., it provides communication & collaboration with other employees at work.

Q.12: Short Notes on telecommunication Network model
(or)

components of telecommunication Network model?

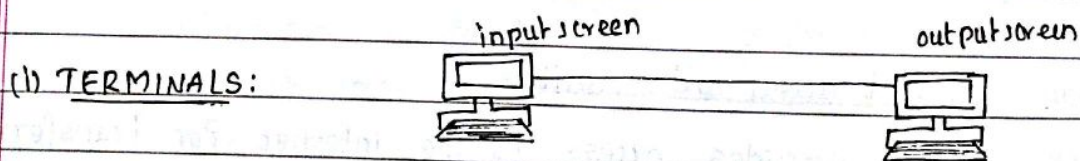
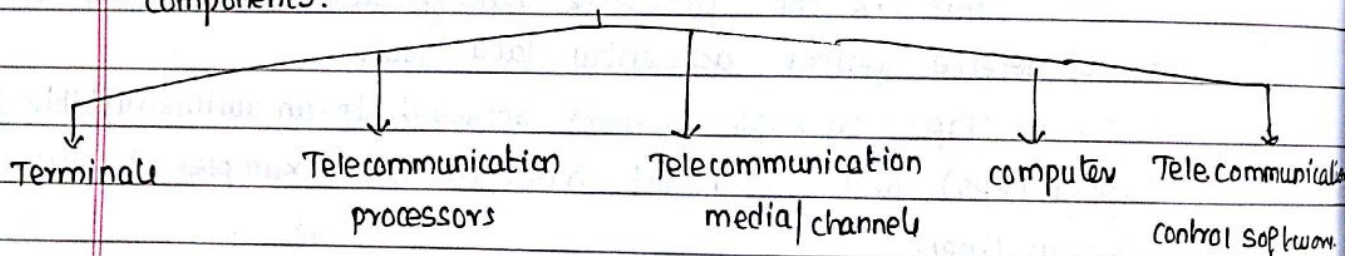
Telecommunication Network:



A communication network is any arrangement where Sender transmits a message to the receiver over a communication channel consisting of some type of medium.



Telecommunication model consists of five basic categories of components:



Terminals are the starting and stopping points in any telecommunication network environment.

Any input (or) output device that is used to transmit (or) receive data can be classified as a terminal component.

Example: video terminals (video conference), Telephones etc.,

(ii) Telecommunication processors:

Telecommunication processors support data transmission and reception between terminals and computers by providing a variety of control and supporting functions.



They include Network interface cards (NIC), Modems, multiplexer and internetwork processors (such as switch, router, hub, bridge, repeater & gateway)

(iii) Telecommunications media/channel:

Telecommunication media connects the message source with the message receiver by means of guided (or) unguided media.

- * Guided media/Bound media (Twisted pair, coaxial cable & Fiberoptic)
- * Unguided/unbound media (Terrestrial wave, Microwaves, Radio waves, infrared wave and communication satellites)

(iv) computers:

* In a telecommunication networks, computers of all sizes and types are connected through media to perform their communication assignment.

* They include

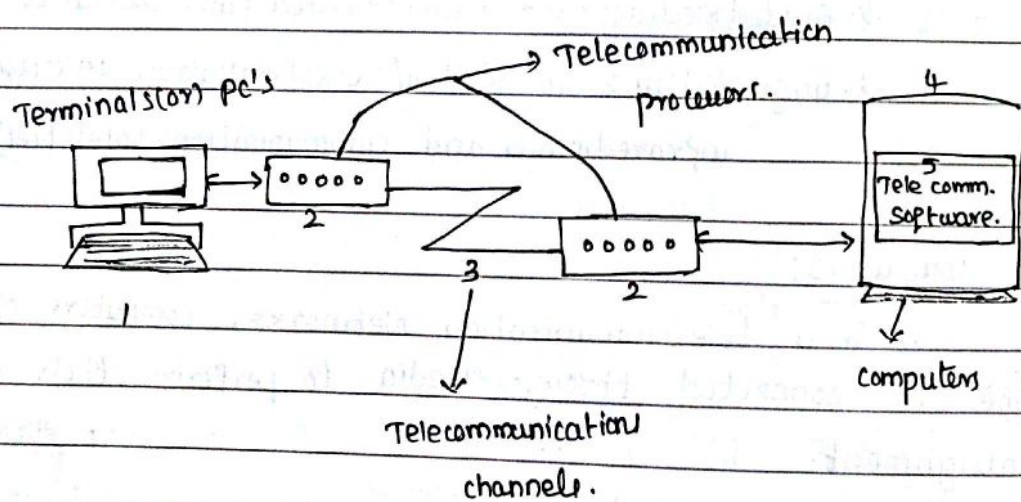
- ⌚ Host computers (mainframes)
- ⌚ Front-end processor (miniframes) and
- ⌚ Network services (micro computers)

(v) Telecommunication control software:

* This contains/consists of programs that control telecommunication activities and manage the functions of telecommunication networks.

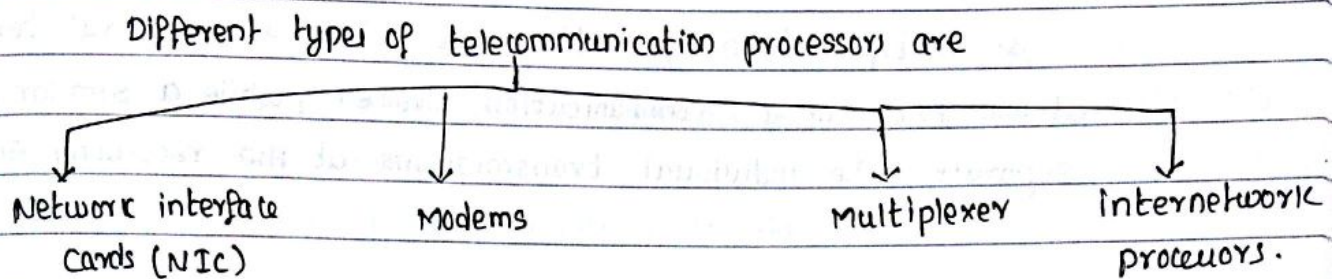
* This software can reside on almost all components of the network and can provide the following features.

- ⌘ Activity monitoring
- ⌘ performance monitoring
- ⌘ priority Assigning
- ⌘ Transmission Error connection
- ⌘ Network problem mitigation.



Q13: Telecommunication processor in detailed manner:

Telecommunication processors support data transmission & reception b/w terminals and computers by providing a variety of control and support functions.



(i) Network interface cards (NIC):

* NIC is a computer hardware component that connects a computer to a computer network.

* it has additional memory for buffering incoming and outgoing data packets,
Thus improving the network throughput.

(ii) Modems:

* A modem is a device that converts a digital computer signal into an analog signal (ie., it modulates the signal) and converts an analog signal into a digital computer signal (ie., it demodulates the signal)

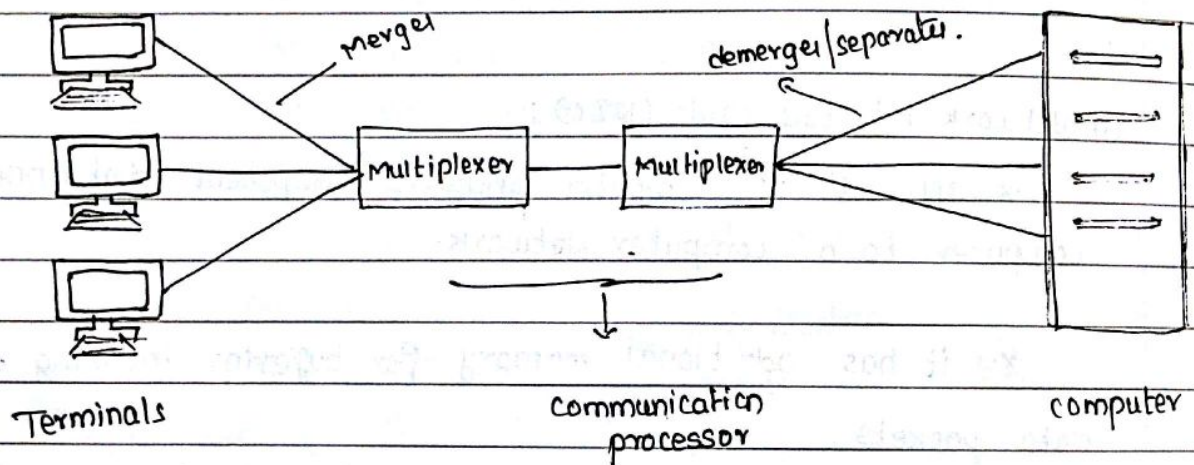
* The word 'modem' is a contraction of modulate and demodulate.

* Modems are required, to send computer data with ordinary telephone lines bcoz computer data is in digital form But telephone lines are analog.

(iii) Multiplexers:

•x: A multiplexer is a communication processors that allow a single communication channel to carry simultaneous data transmissions from many terminals.

•x: Multiplexer, merges the transmissions of several terminals at one end of a communication channel, while a similar unit separates the individual transmissions at the receiving end.



(iv) Internetwork processors:

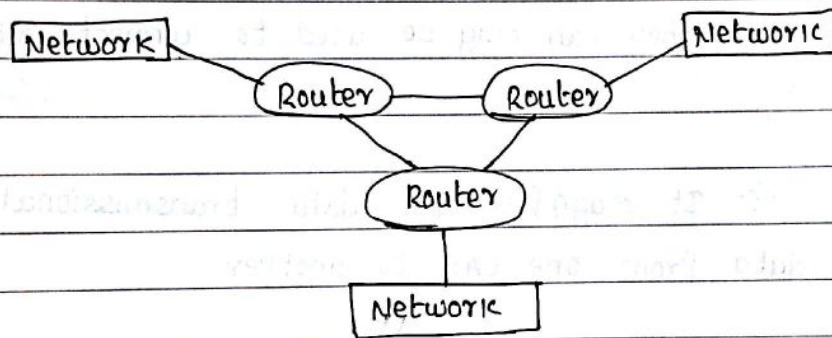
Telecommunications^{Network} are interconnected by a special purpose communication processors called internetwork processors

Such as Switches, Routers, Hub, Bridges, Repeaters and Gateways

(i) Switch:

Switch is a communication processor, that makes connection b/w telecommunications circuits in a network,

so that a telecommunications message can reach its intended destination.

(ii) Router:

* Router is a device which connects two (or) more networks with each other having same network protocols.

* This device helps to select the best route (shortest & most reliable route) for data communication, where there are multiple paths between them.

"Routers perform the 'traffic redirecting' functions on the internet"

(iii) Hub:

Hub is a port-switching communication processor.



Eg: Switch Box

This allows for the sharing of the network resources such as servers, LAN workstations, printers etc...

- * It has multiple input/output ports.

(iv) Bridge:

* Bridge is a communication processor that connects numerous LAN's that have the same set of communication rules and protocols.

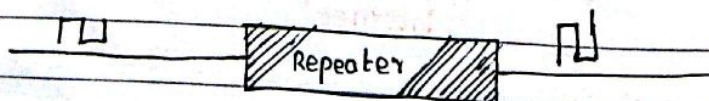
* They can only be used to connect networks of the same type.

* It magnifies the data transmissional signal while passing data from one LAN to another.

(v) Repeater:

* Repeater is a device, which simply repeats the incoming signal for outgoing communication on channel but with increased strength.

* Repeater is also known as amplifier, it amplifies the incoming signal for long distance communication.



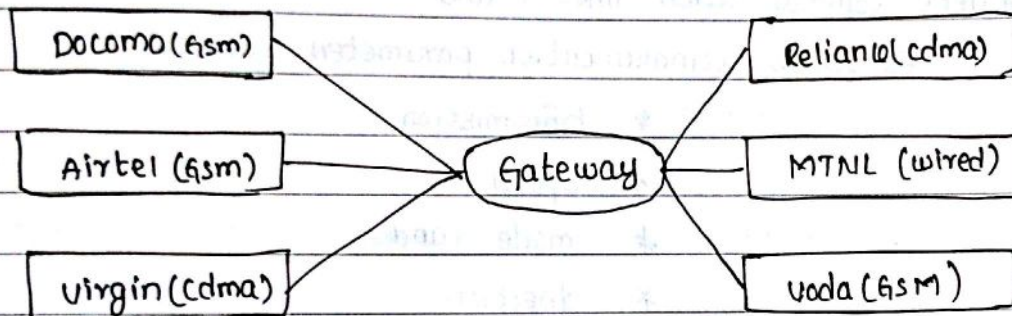
(vi) Gateway:

* Gateway is a communication process that connects network that use different communication architectures.

(or) ↓

* A device that connects two (or) more dissimilar Network i.e., The Network having different protocols.

Ex:



Q:14 write a short note on Network management and functions of Network management?

* Telecommunication software packages provide a variety of communications support service.

Ex:

They work with a communication processor to connect and disconnect communication links and

Establish communication parameters such as

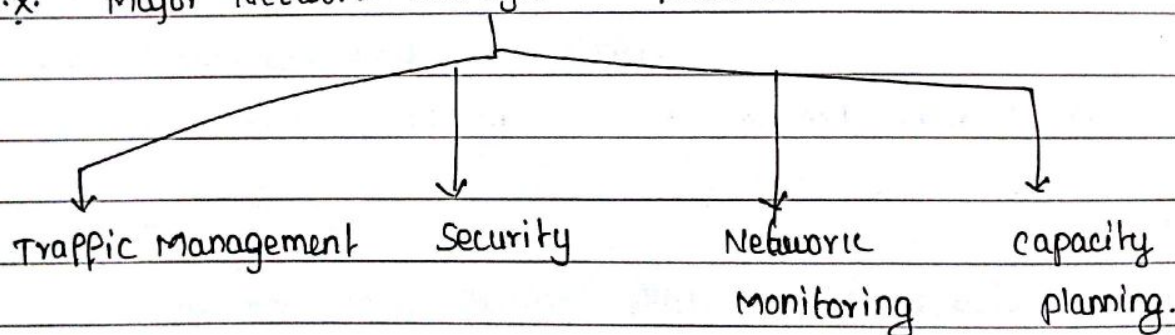
* transmission

* speed

* mode and

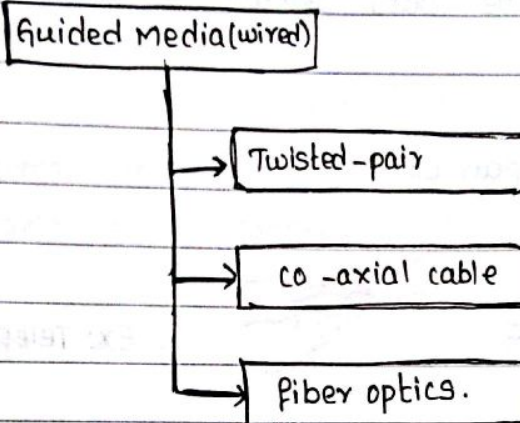
* direction.

* Major Network management Functions



Q15: write about different kinds of cables commonly used in LAN
(or)

what are the popular guided media available.



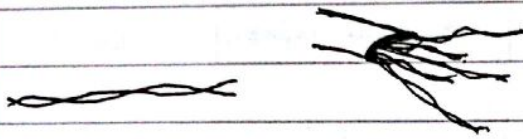
Telecommunication medium:

• * communication medium is a path between the sender and the receiver that carries the data in the form of signals.

• * communication media is divided into two groups: Guided media and unguided media.

Guided Media / Bound Media:

Guided Transmission media uses a "cabling" systems that guides the data signals along a specific path.

☺ Twisted - pair cables:

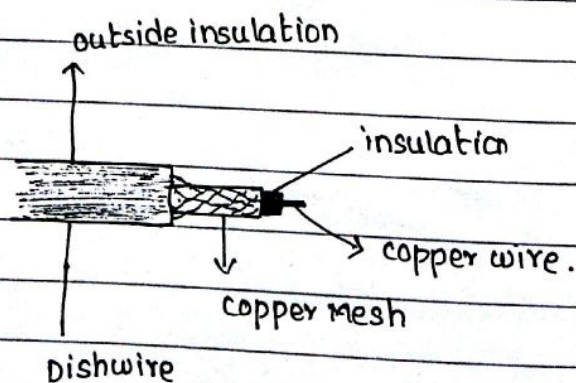
Ex: Telephone wire

* Twisted pair is ordinary telephone wire, consisting of copper wire twisted into pairs.

* It is most widely used media for telecommunications and is used for both voice and data transmissions.

* It is used extensively in home and office telephone systems and many LAN's and WAN's.

* It is inexpensive and easy to install.

☺ coaxial cable:

- * This telecommunication media consists of copper (or) aluminium wire wrapped with spacers to insulate and protect it.
- * co-axial cable can carry a large volume of data
- * it provides high-speed data transmission used in Metropolitan areas for cable tv systems . and for short distance of connection of computers and peripheral devices.
- * it is extensively used in office building and other work sites of LAN
- * These cables can be laid anywhere, like underground and floors of lakes and oceans.
- * The only disadvantage of coaxial cable is that it is more expensive than twisted-pair

😊 Fibre optic:

- * This media consists of one (or) more hair-thin filaments of glass fibre wrapped into a protective jacket.
- * signals are converted to light form and fired by laser in bursts.
- * optical fibres can carry digital and analog signals and provide increased speed and greater carrying capacity than coaxial cable and twisted pair lines.
- * Easy to install and data is more secure in fibre optic Networks.

Q16: what are the popular unguided media available:

unguided media/unbound media (wireless):

↳ unguided transmission media consists of a means for the data signals to travel but nothing to guide them along a specific path

↳ The data signals are not bound to a cabling media.

EX:

unguided media

→ Terrestrial Microwave

→ Radio wave

→ Microwave

→ infrared wave

→ communication satellite

😊 Terrestrial microwave:

• It uses atmosphere as the medium to transmit the signals

• It is used extensively^{used} for high-volume as well as long distance communications of both data and voice in the form

• It typically uses frequency spectrum from 2GHz to 40GHz

😊 Radio waves:

☞ Radio waves are an invisible form of Electro magnetic Radiation that varies in wavelength from a millimeter to 1,00,000 cm

☞ Radio waves are most commonly used transmission media in the wireless LAN.

☞ it typically uses frequency spectrum from 3GHz to 300GHz

😊 infrared waves:

☞ infrared light is used in industrial, scientific and medical applications.

☞ Night-vision devices using infrared illumination allow people (or) animals to be observed without observer being detected.

😊 Microwaves:

☞ microwaves are radio waves with wavelength ranging from 1mm to 1meter and the frequency b/w 300MHz to 300GHz

☞ These are used for communication,
radar systems
radio astronomy
navigation and
spectroscopy.

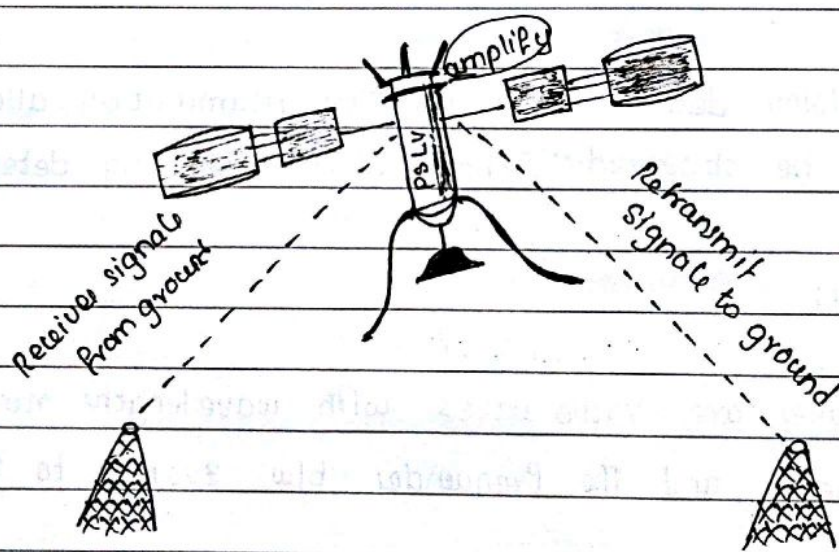
😊 communication satellites:

☞ communication satellites use the atmosphere as the medium through which to transmit signals.

☞ A satellite is some solar-powered electronic device that receives, amplifies and retransmits signals;

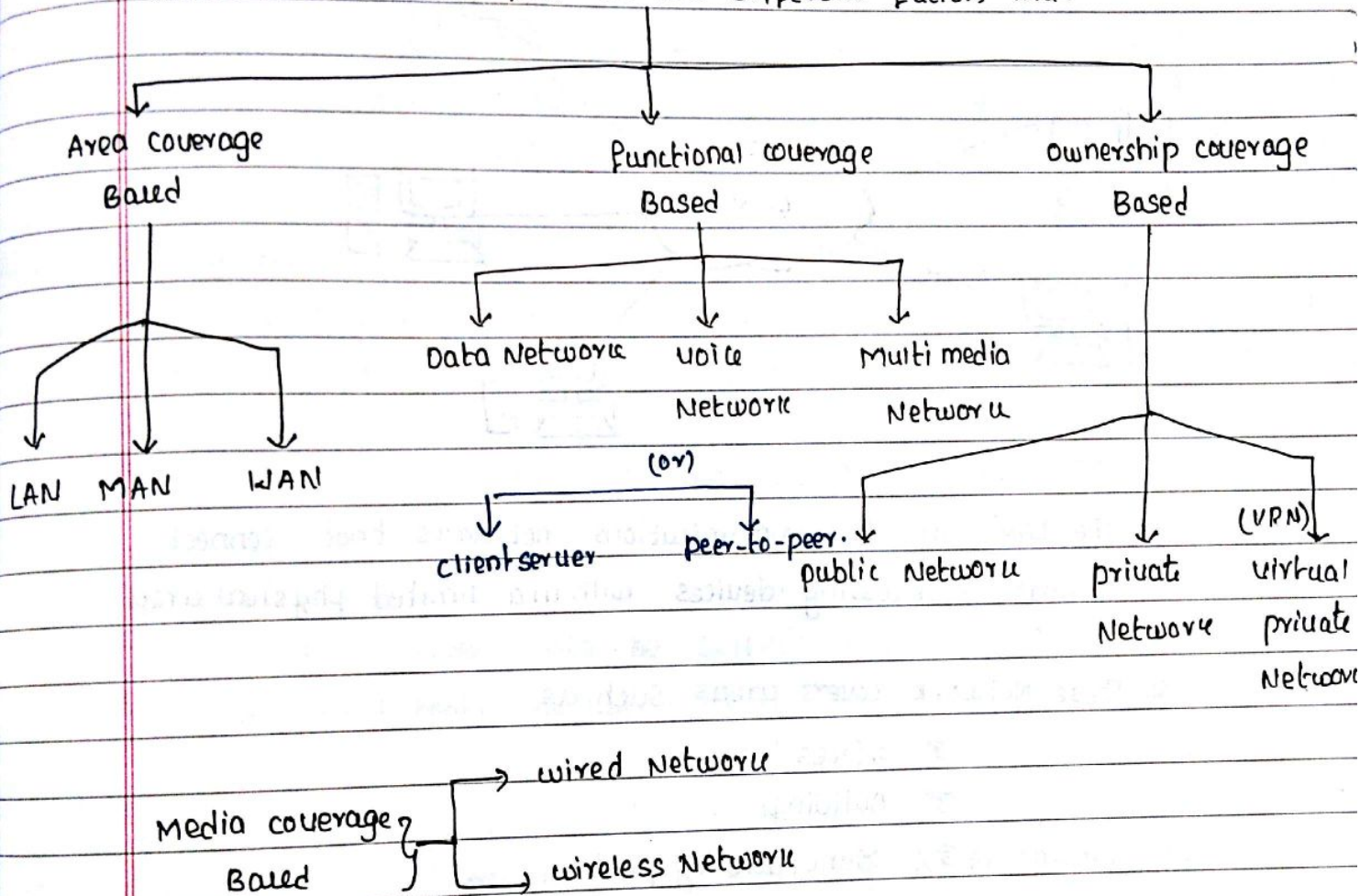
The satellite acts as a relay station b/w satellite transmission stations on the ground.

☞ They are used extensively for high volumes as well as long distance communication of both data and voice.

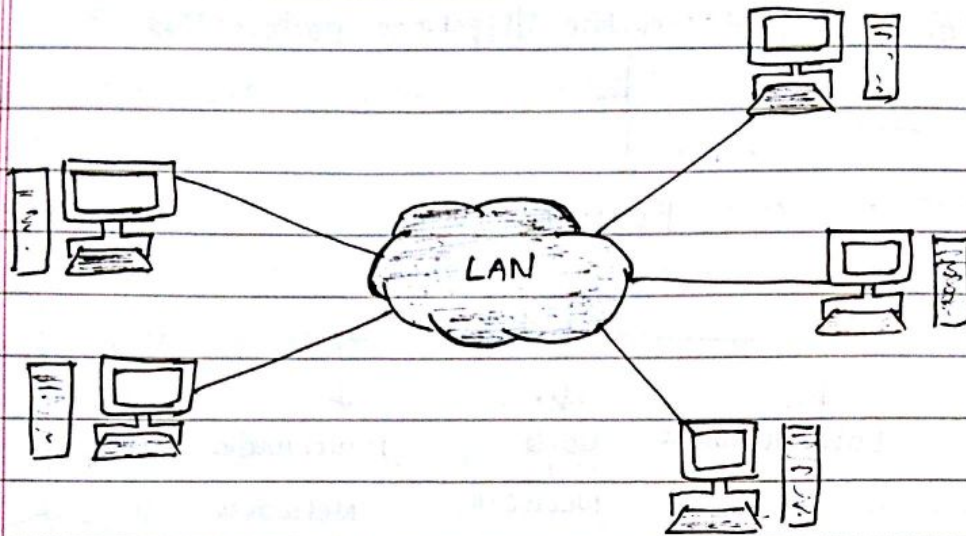


Q17: classifications of telecommunication networks:

There are many different types of telecommunication networks which can be classified on the different factors like.



Q18: write about Local Area Network (LAN) Explain characteristics of LAN?



* The LAN's are telecommunications networks that connect information-processing devices within a limited physical area.

* These Network covers areas such as

☞ offices

☞ Buildings

☞ Manufacturing plant

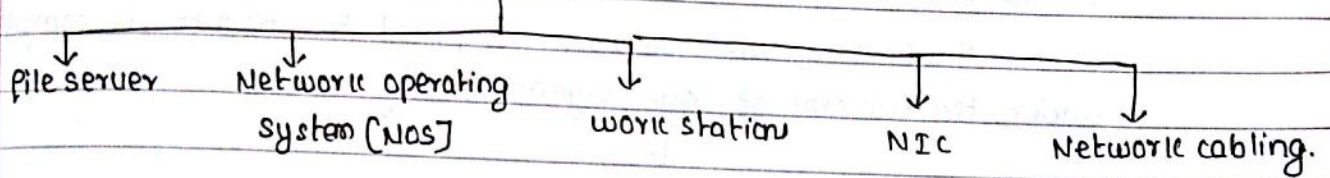
* The two main purposes of LAN are

↓
To Link computers within an organisation so that they can share expensive peripheral devices and

↓
To allow these computers to communicate with each other.

Components of LAN:

LAN has following five components



(i) File server:

☞ A file server is a computer system used for the purpose of managing the file system, handling network communications & other functions.

☞ A server may be dedicated (or) non-dedicated.

(ii) NOS:

It is loaded into the server's hard disk along with system management tools and user utilities.

(iii) workstations:

workstations are attached to the server through the NIC and cabling.

(iv) NIC

Every device connected to a LAN needs a NIC to plug into the LAN.

(v) Network cabling:

once the server, workstations and NIC cards are in place, network cabling is used to connect everything together.

characteristics of LAN:

⇒ The key characteristics of LAN are/is the fact that

"whole of the network, confined to one site, is completely under the control of one organization"



* Restricted to geographical area:

The LAN is primarily a data transmission system intended to link computer and associated devices within a restricted geo-graphical area such as an office (or) buildings

* ^{Enable} Multiple users to share data:

LAN

organisations use LAN's because they enable multi users to share software, data and devices.

* physical media : (Guided)

LAN use a shared physical media, which is routed in the whole campus to connect various systems.

* High speed media:

LAN use high-speed media (1 mbps to 30 mbps (or) more)

* private owned and operated:

LAN is mostly private owned and operated.

Q19: Describe the various attributes of LAN?

Q20: why users prefer LAN (or) Factors contributed to growth of LAN?

The following factors have contributed to LAN:

• LANs on a distributed environment allow to have our own independent processing stations while sharing expensive computer resources like printers, plotters and disk file etc.,

further LAN provides

(i) Security:

Security for programs and data can be achieved using servers that are locked physically and logically. and diskless nodes also offer security by not allowing users to download important data (or) uploaded unwanted software (or) virus.

(ii) Expand PC usage through inexpensive workstations:

once a LAN has been set-up, it is very easy and economical to ^{add} additional workstation by adding NIC to existing workstations/PCs.

(iii) Distributed processing:

LAN with multi-users communication and information exchange helps to develop distributed processing system.

(iv) Electronic mail and message broadcasting:

E-mail allows users to communicate more easily among themselves through a mail-box on the server.

(v) organisational Benefits:

with The shared computer hardware ,software and peripherals, we can reduce cost and drastic reduction in time and cost of training man power to use the systems.

(vi) Data management benefits:

Since data is located centrally on the server ,it becomes much Easier to manage it, access it, as well as back it up.

(vii) Software cost and upgradation:

If the organisation is concerned about using licensed purchased software ,

a Network version can save a lot of money since there would be no need to buy multiple copies of the same software for Every machine in the organisation.

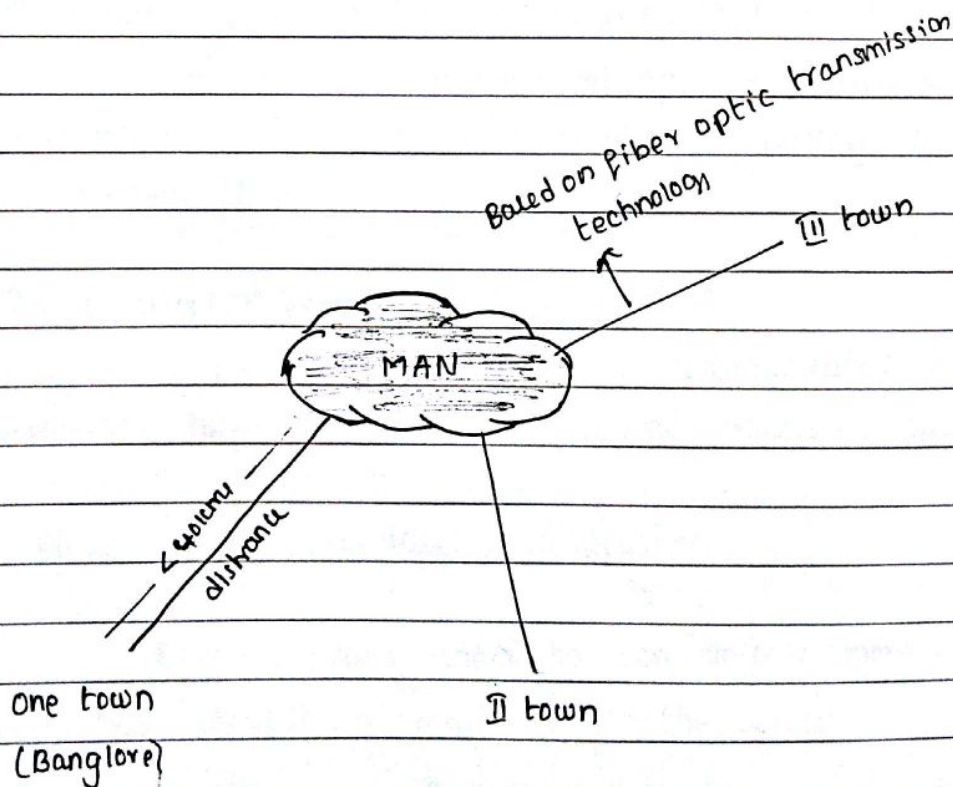
Q21:

Metropolitan Area Network:

- * A MAN is somewhere between a LAN and a WAN.
- * MAN refers to a network that connects systems (or) LAN's within a metropolitan area (roughly 40 kms in length from one point to another)
- * MAN's are Based on Fiber optic transmission technology and provide high speed inter connection b/w sites.
- * MAN can support Both data and voice.

Example:

cable television Networks are Best Example of MAN's that distribute television signals.



Q22:

Wide Area Network:

* Wide area Network are telecommunication Networks that cover large geographic area such as long distance telephone service, satellite transmission and under-sea cables.

* These Network covers areas such as

- ☞ Large city (or) Metropolitan area
- ☞ whole country
- ☞ Many countries and continents.

* Example:

- ☺ Air line reservation
- ☺ interstate Banking Networks.

Q23:

what is meant by Network topology? what are different topologies (or)
structures available?

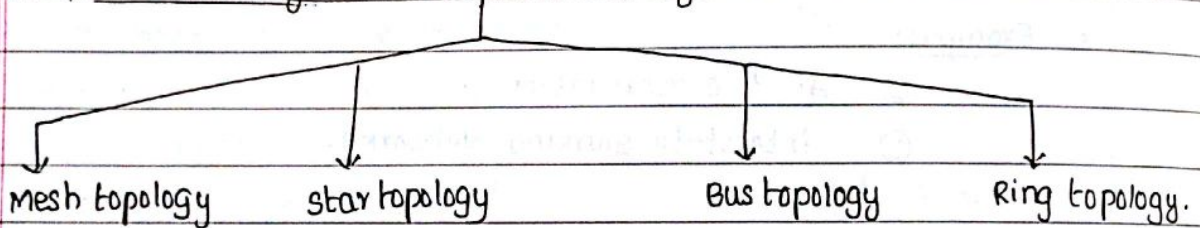
The geometrical arrangement of computer resources, remote devices, and communication facilities is known as network topology.

(or)

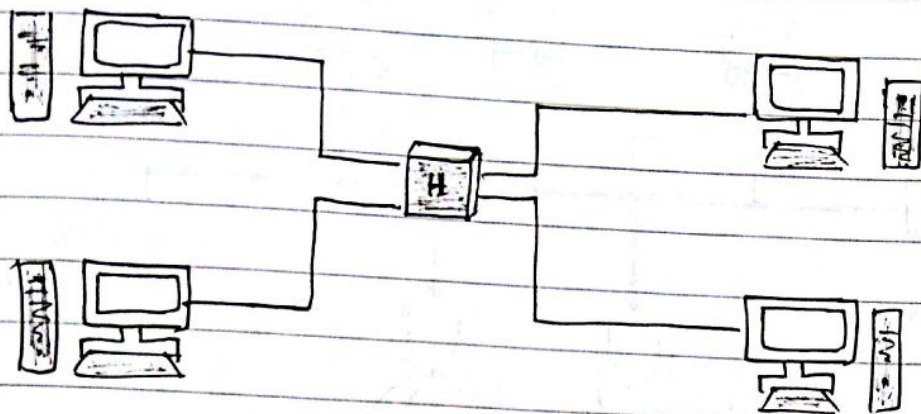
Network topology determines how one computer in the Network can communicate with other computers.



most commonly used Network topologies:



(i) star topology (or) star Network:



- * This is most commonly used structure topology
- * A star Network consists of one central switch (or) Hub (or) computer which acts as a medium to transmit messages.
- * The central computer is usually a mainframe (host), which acts as the file server.
- * The central unit acts as the traffic controller among all the other computers tied to it.
- * If a node wants to transmit information from one node to another, it can be done by sending the details to the central node, which in turn sends them to the destination.

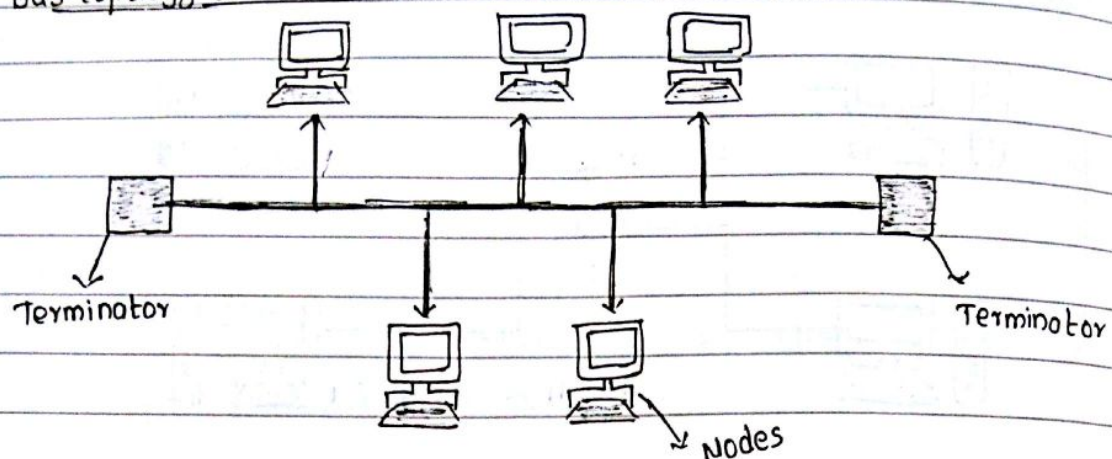
Advantages:

- ✓ Easy to add new nodes and removing existing nodes
- ✓ A node failure does not bring down the entire network
- ✓ Several users can use the central unit at the same time.
- ✓ It is easier to diagnose network problems through a central hub.

Disadvantages:

- ✓ If central hub fails, the whole network ceases to function.
- ✓ Considered less reliable than a ring network, because if hub fails there is no backup processing.
- ✓ The performance and scalability of the network depends upon capabilities of the hub.

(ii) Bus topology (or) Bus Network:



* In a Bus Network, a single length of wire, cable (or) optical fiber connects a number of computers.

* In this method, all communications travel along this cable which is called a bus.

* Two ends of the cable are terminated with terminators.

* Bus Network has a decentralized approach.

Advantages:

☞ There is no host computer (or) file server, which makes bus network reliable as well as easy to understand.

☞ If one of the node/micro computer fails, it will not affect the entire network.

☞ Requires least amount of cable to connect the computers together.

☞ It is easy to extend the network.

Two cables can be easily joined with a connector, making a longer cable for more computers to join the network.

3 A repeater can also be used to extend a Bus configuration.

Disadvantages:

- 3 if there is a problem with main cable, the entire Network goes down.
- 3 Heavy traffic can slow down the network.
- 3 Each New connection weakens the signal.
- 3 Difficult to trouble shoot Bus Network.

* Advantages:

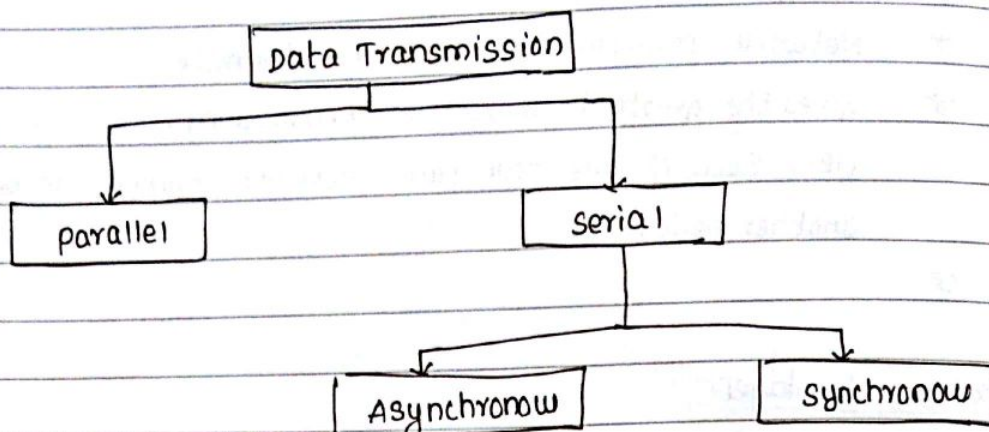
- 3 Highly reliable
- 3 Network problems are easier to diagnose
- 3 Gives the greatest amount of redundancy.
(ie., Even if one node fails, network traffic can be redirected to another node)

3

* Disadvantages:

- 3 The cost of installation and maintenance is high
- 3 More cabling is needed
- 3 complex to set-up

Q24: Digital data transmission:



* data transmission on a communication channel between two machines can occur in several different ways

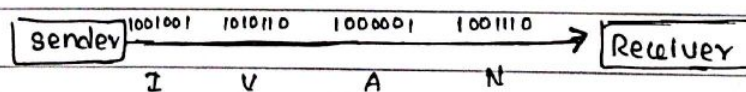


There are two methods of transmitting digital data

(i) serial transmission

(ii) parallel transmission.

(i) Serial transmission:



In serial transmission,

"The bits of Each byte are sent along a single path one after another. Then the receiver assembles the incoming bit streams into character.

Example: RS-232 is an Example of serial port, used for Mouse (or) Modem.

Advantages.

- * Less Expensive
- * suitable

Disadvantages

* time consuming and slow process

classmate

Date

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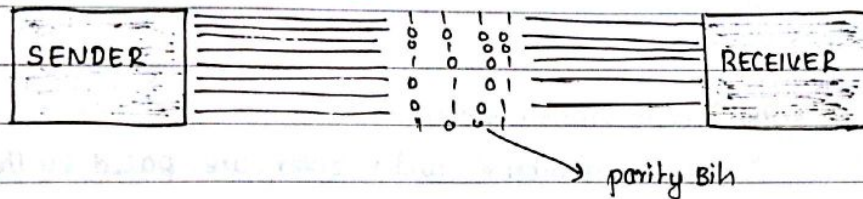
* There are two basic ways of transmitting serial binary data

Synchronous

Asynchronous

(ii) parallel transmission:

1 byte = 8 bits ($B_1, B_2, \dots, B_8$)



* in parallel transmission all the bits of each byte are transmitted simultaneously

i.e., Each bit will have a unique channel, dedication to it.

* For ASCII character we need eight channels. All Bits are transmitted together and arrive at the destination together.

Example: parallel port being used for printer.

Advantages:

➤ Data can be transmitted at a very high speed.

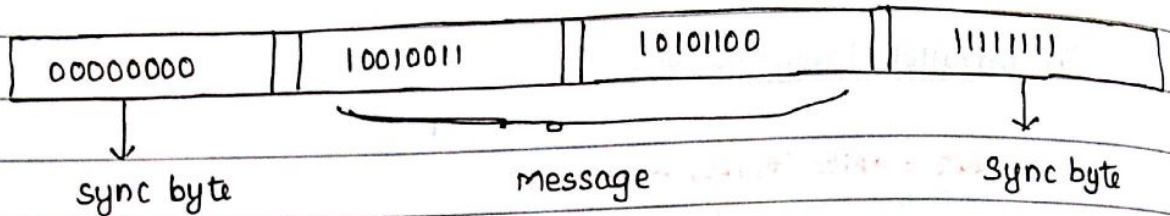
Disadvantages

➤ As it uses parallel paths, cross talk may occur

➤ More channels are needed, Hence it is costly.

Q25: write about synchronous and Asynchronous methods of data transmission

Synchronous transmission:



* In synchronous transmission

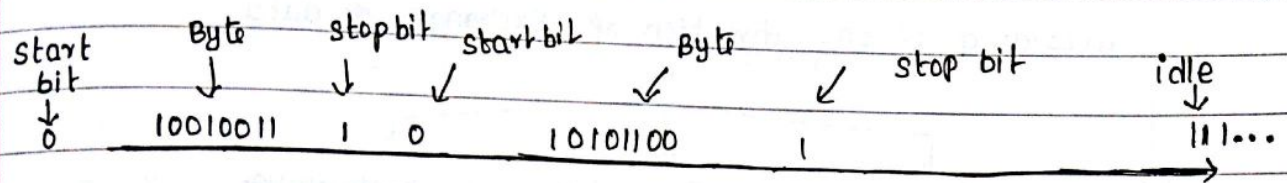
"The transmitter and receiver are paced by the same clock and have same speed"

The receiver continuously receives (Even when no bits are transmitted) The information at the same rate the transmitter sends it.

* in addition supplementary information is inserted to guarantee that there are no error during transmission.

* A group of synchronization bits must be placed at the beginning and at ending of each block to maintain synchronization

Asynchronous Transmission:



In this mode one character is transmitted at a time and each character is preceded by a start signal and succeeded by a stop signal that control the transfer of data.

(or)

- ① In this each character is sent at irregular intervals in time as in case of characters entered at keyboard in real time.
- ② So, the sender provides a synchronization signal to the receiver before starting the transfer of each message.

For Example

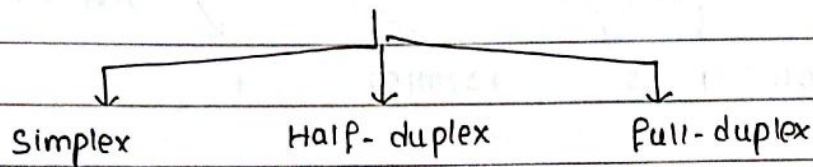
Imagine that a single byte is transmitted during a long period of silence.... The receiver will not be able to know if this is 00010000, 10000000, 00000100.

To correct this problem

If one character is transmitted at a time and each character is preceded by some a start signal (usually 0) and succeeded by a stop signal (usually 1).

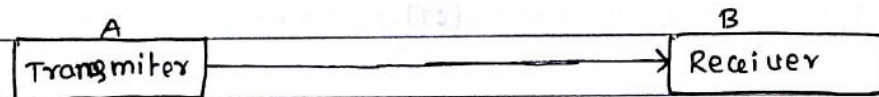
Q26: write about different kinds of data communication (or) transmission modes:

There are 3 different modes transmission models characterised according to the direction of Exchange of data.



(i) Simplex:

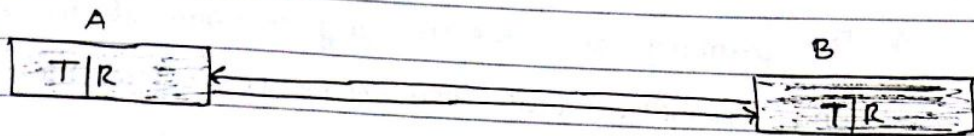
Simple A to B only



* A simplex connection in which the data flows in only one direction ~~for the other~~ from transmitter to the receiver

* This type of connection is useful if the data do not need to flow in both directions.

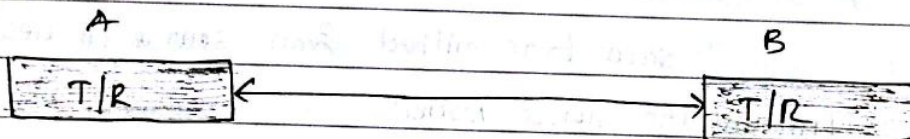
* Example: computer to printer.

(ii) Half duplex

Half duplex A to B (or) B to A

* A half duplex connection (semi duplex connection) allow data can be transmitted in both directions but only one side at a time.

* Example: walkie Talkie.

(iii) Full duplex

Full duplex A to B and B to A

* A full duplex connection is a connection in which the data flow in both directions simultaneously.

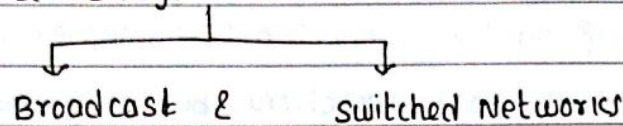
Example: mobile phones

Q27:

discuss various switching techniques used in a computer network?

* The primary objective in any communication network is simply moving information from one source to one (or) more destination nodes.

* Based on the techniques used to transfer data, communication networks can be categorized into



⇒ In broadcast networks,

"data transmitted by one node is received by many (or) all other nodes"

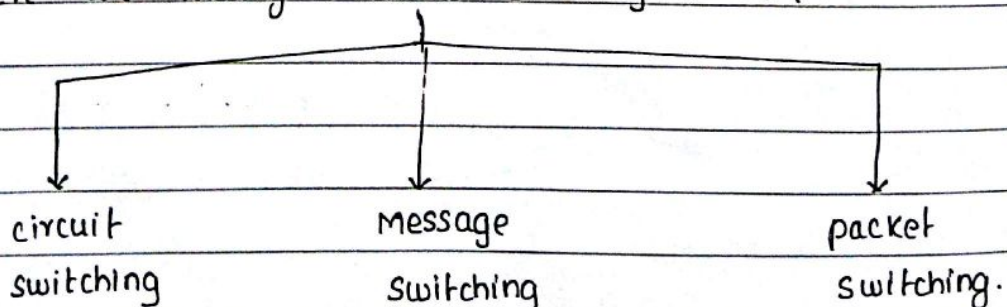
⇒ In switched-network

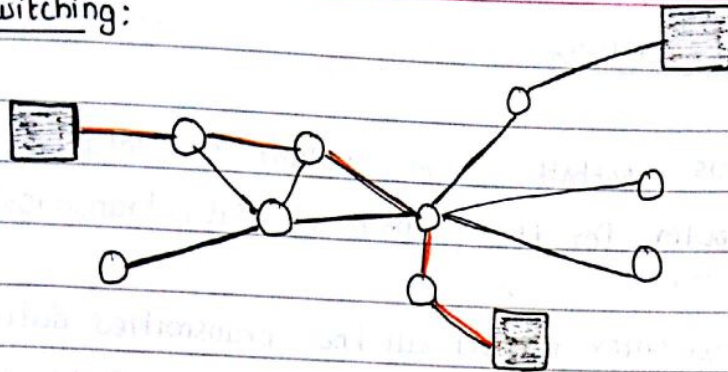
"data transmitted from source to destination is routed through the switch nodes"

* The way in which the nodes switch data from one link to another as

it is transmitted from source to destination node is referred to as switching technique.

⇒ There are mainly 3 common switching techniques



Ques: (i) circuit switching:

- * A circuit switching is the simplest method of data communication.
- * The route is dedicated and exclusive, and released only when the communication session terminates.
- * At any point of time only two communication devices can transmit information to each other.
- * Once a circuit is established b/w two stations, it is exclusively used by two parties and the dedicated link becomes unavailable to others till the call is terminated.
- * A single circuit is used for the entire duration of call.

Example:

circuit switching is what most of us encounter on our home phones.

We place a call and either get our destination party (or) encounter a busy signal;

- * A single circuit is used for the entire duration of call.

(ii) Message Switching:

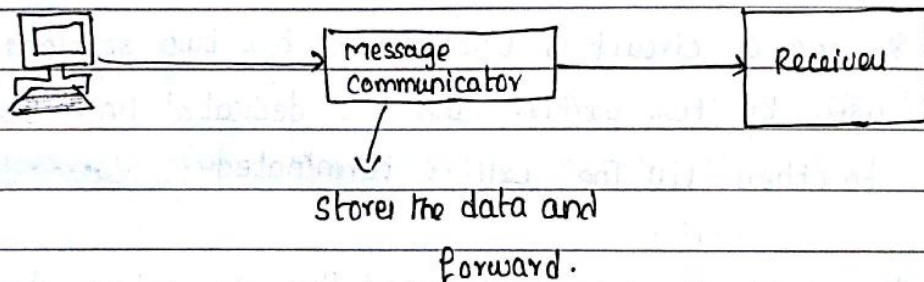
* In this method, heavy volume of data is transmitted using special computer for the purpose of data transmission.



* The computer receives all the transmitted data; stores it, and when an outgoing communication line is available, forwards it to the destination point.

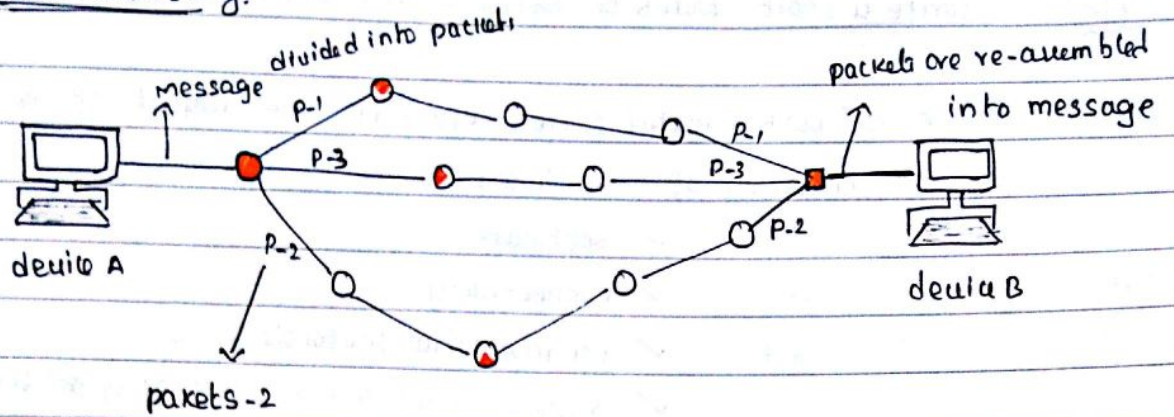
Thus, the whole message is transmitted in one go.

* This characteristic is often referred to as store-and-forward.



Example: voice-mail

(ii) Packet switching:



- * packet switching refers to protocols in which messages are broken up into small transmission units called packets, before they are sent.
- * Each packet is transmitted individually across the net
- * The packets travel in different routes to reach destination,
- * Each packet has header information which enables it to route the packet to its destination
- * At the destination the packets are reassembled into the original message

😊 This method is currently used to transmit data in Internet.

Destination	}	Header
Source address		
Data	}	Body

data packet.

Q28:

write a short Notes on Network Architecture?

• Network architecture refers to the layout of the Network.

consisting of Hardware

✓ Software

✓ Connectivity

✓ communication protocols &

✓ mode of transmission (such as wired (or) wireless)

• The goal of Network architecture is to promote an open, simple, flexible and efficient telecommunication environment.

• There are two Basic Network architectures

↓
OSI Model

(open system interconnection)

↓
TCP/IP model

(Transmission control protocol /

Internet protocol)

Q29: what is protocols?

• ✕ protocols are Rules Software that performs a variety of actions necessary for data transmission b/w computers.

😊 ✕ protocols are a set of Rules for inter-computer communication that have been agreed upon and implemented by many vendors, users and standard bodies.

✕ protocols allow heterogeneous computer to talk to each other.

* protocols means Rule^(or) followed by devices for error free & reliable data commu.

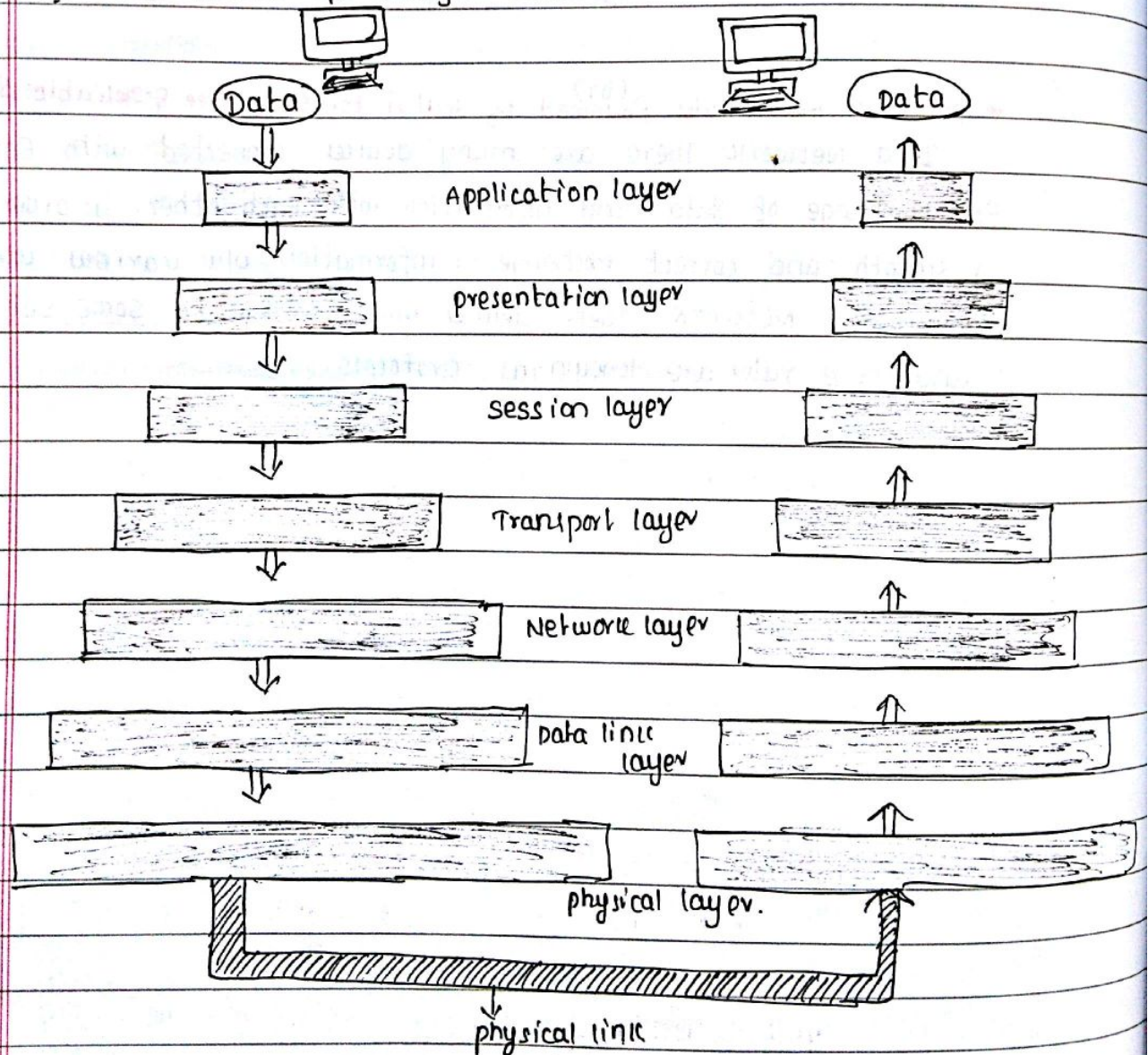
In a Network There are many devices connected with each other for exchange of data and information with each other. In order to have a smooth and correct exchange of information b/w various connected devices in network, These devices must adhere to some set of rules and these rules are known as protocols.

Q30:

OSI Model of communication:

OSI Model $\Rightarrow$ Open system interconnection model.

- * OSI Model of communication has been designed/outlined by international standards organisation (ISO)
- * It is designed to facilitate communication among the various Hardware and software platforms which are heterogeneous in Nature.
- * OSI consists of 7 layers as shown below.



(i) physical layer: (or) 1st layer

physical layer is a hardware layer which specifies mechanical features as well as electromagnetic features.

"NETWORK TOPOLOGY is part of this layer"

(ii) data link layer: (or) 2nd layer:

Data link layer is also a hardware layer which specifies channel access control method and ensure reliable transfer of data through the transmission medium.

(iii) Network layer: (or) 3rd layer

It makes a choice of physical route of transmission of data.
(i.e., it ensure proper routing of data)

(iv) Transport layer (or) 4th layer

Ensure reliable transfer of data between ~~two~~ users, processes, assemblies and disassembles message packets

provides error recovery and flow control

"Multiplexing and Encryption are undertaken at this layer"

(v) Session layer (or) 5th layer

Establishes, maintains and terminates sessions between user processes.

"Identification and authentication are undertaken at this layer"

userid & password, session layer maintain checkpoints

(vi) Presentation layer (or) 6th layer:

This layer controls on screen, display of data, transforms data to a standard application interface.

"Encryption, data compression can also be undertaken at this layer."

(vii) Application layer (or) 7th layer:

This layer provides services like file transfer, file sharing etc.,

"Deadlock situation controls are undertaken at this layer"

Q31:

TCP/IP:

TCP = Transmission control protocol

IP = Internet protocol

↓

The protocol used on the internet is called TCP/IP (or) internet protocol suit

- * TCP/IP consists of five levels or layers of protocols that can be related to the seven layers of the OSI architecture.
- * TCP/IP is used by the internet and by all intranets & extranets.
- * Many companies and organisations are also converting their client/server Network to TCP/IP

Five levels of TCP/IP protocol

TCP/IPOSI Model

Application (or) process layer	{	Application layer presentation layer session layer
Host to Host transport layer	{	Transport layer
internet protocol (IP)	{	Network layer
Network interface	{	data link layer
physical layer.	{	physical layer

•* Application (or) protocol layer:

This layer provides communication services for end users application and appropriate data transmission formats and codes. & supports the accomplishment of telecommunication sessions.

•* Host-to-Host transport layer:

This layer supports the organization and transfer of data between ^{the} nodes in the network.

•* Internet protocol (IP):

This layer provides appropriate routing by establishing connections among network links.

•* Network interface:

This layer supports the error-free organisation and transmission of data in the network.

•* physical layer:

This layer provides physical transmission of data on the telecommunication media in the network.

TCP $\Rightarrow$ This part deals with assembling and disassembling of data packets i.e.,

i.e., creating data packets from the files to be transferred.

IP $\Rightarrow$ This packet handles forwarding (or) routing of data packets on internet channel from source to destination.

Q32: Network A Functional Based classification :

Based on functions, telecommunication networks are classified in to two types

