Computer Network: The collection of interconnected computer is called computer network.

Two Computers are said to be interconnected .If they are capable of sharing and exchanging information and resources.

The Device can be connected or joined together by wire or wireless medium.

Advantages of Computer Network

1.Resource Sharing: Means to make all programs ,data peripherals available to anyone on the network irrespective of the physical location of the resources and the user.

2.Reliability: Means to keep the copy of the file on two or more different machines so if one of them is unavailable or corrupt(due to hardware failure) then its other copy can be used.

3.Cost factor: Means it greatly reduces the cost since resources can be shared.

4.Huge Storage: It provide the huge storage because computer are connected with each other.

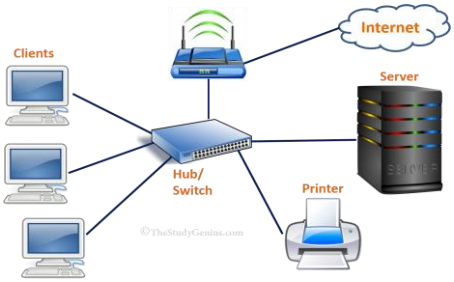
Evolution of Computer Network

- In **1960** a research project was commissioned by Advanced Research Project agency network**(ARPANET)** in the **U.S department of Defence** to connect academic and research institution.
- The first Message was shared between University of California,Los Angeles (UCLA) and Stanford Research Institute(SRI) joined by APRANET in 1969.
- In **1986** National Science Foundation bring connectivity to more people with its **NSFNET** program.
- In 1990 Berners Lee developed HTML and URL thus giving the birth to WWW(World wide web) and internet become popular.

Types of Network

- **PAN(Personal Area Network):**A personal area network is a computer network around an individual person. It generally covers a range of less than 10 meters. Personal Area network can be constructed with cables or wirelessly.

- **LAN(Local Area Network):**It is network that confined to relatively small area .It is generally limited to geographic area such as school lab or office building.
- It is generally privately owned network over a distance not more than **5km.**
- The hardware as well as Software resources are shared through LAN.
- In LAN one computer is designed as a **file server** which store all the software that cab be shared by computers attached to the network.
- Computer connected to the server are called **workstations.**



- **MAN(Metropolitan Area Network):** MAN is the network cover group of nearby corporate office or a city and might to either private or Public .It refers to the network that is spread over an area as big as city.
- By using LAN we can create MAN.

- **WAN(Wide Area Network):**These are the network spread over large distances say across the countries or even continents through cabling or satellite are called WAN. It is even the group of LANs that are spread across several locations and connected together. The largest WAN is Internet.

Solution :Required data rate=(10*1600*8)/20= 6400 bps

- **LAN vs WAN**

LAN	WAN
It is spread over a small area	It is spread over world wide.
It is usually costs less to set up.	It is higher to set it up.
It is usually a single network	It is usually a network of network

- **Switching Technique:** Switching Technique are used for transmitting data across the network. 1. Circuit Switching 2.Packet Switching 3.Message Switching

1.Circuit Switching: In The circuit Switching Technique first the complete end-to-end transmission path between source and the destination computer is established and then message is transmitted through the path. The main advantage of this technique is guaranteed delivery of the message. Mostly Used for voice communication.

2.Packet Switching: In this switching technique fixed size of packets can be transmitted across the network.

3.Message Switching: In the message switching technique no physical path is established between sender and receiver in advance. Thus each node receives the entire message store in it entirely on disk and transmit the message to the next node.if it is not destination node.This type of network is also called **store and forward** network.

Data Communication Terminologies:

Data Channel: Channel is a medium used to carry information of date from one point to another point. Physical medium like cables over which information can exchanged are called channels.

BPS(Baud or Bits Per Second): It is used to measurement for the information carry of communication channel.1 Byte=8bits,1kbps =1024Bytes,1Mbps=1024kbps.

Bandwidth: It is the amount of information transmitted or receive per unit time.

Example: If a user want to upload a text document at the rate of 10 pages per 20 second,What will be required data rate of the channel?(Assume that 1 page contains 1600 characters and each character is of 8 bits.

Data rate required= (Total Data to be uploaded * Total Character in data* each character size(bits)) / Time

- **IP address:** An IP address is a unique address which identifies a device on the internet or at local network.
- **Sender:** A device which send the message in the network is called sender.
- **Receiver:** A device which receive the message in the network is called receiver.
- **Message:** The information or data exchange among sender and receiver is called message.

Transmission Media:

Transmission media is what medium over the message are transmitted.

A communication channel is also called as a medium. Different media have different properties and different environments for various purposes.

There are two types of Transmission media

1.Guided/Wired Media

2.Unguided/Wireless Media

.Guided Media:

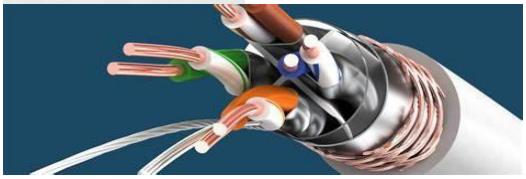
- **1.Twisted Pair cable:** It consist of two identical 1mm thick copper wires insulated and twisted together . The twisted pair cables are twisted in order to reduce crosstalk and electromagnetic induction.There are two types of Twisted pair cable: Unshielded twisted pair cable(UTP) ,Shielded twisted pair cable(STP).

Advantages:

- It is easy to install and maintain.
- It is very inexpensive.

Disadvantages:

- It is incapable to carry a signal over long distance without the use of repeaters.
- Due to low bandwidth these are not capable for broadband application



2.Co-axial Cable: It consist of a solid wire core surrounded by one or more foil or braided wire shields each part is from the other by some kind of plastic insulator .It is mostly use in cable wires.

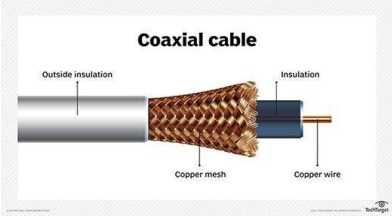
These type of cables are used to carry signals of higher frequencies to a longer distance.

Advantages:

- Data Transmission rate is better than twisted pair cable.
- It provides a cheap means of transporting multi-channel television.

Disadvantages :

- Expensive than twisted pair cable.
- Difficult to manage and reconfigure.



3.Optical Fibre: An optical fibre consists of thin glass fibres that carry information in the form of visible light.

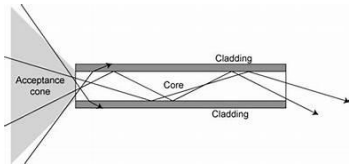
Signals can travel longer distance and electromagnetic noise can not affect the cable.

Advantages:

- Transmit data over long distance with high speed and security.
- Provide better noise immunity.
- Bandwidth is up to 10 gbps.

Disadvantages:

- Expensive as compared to other guided media.
- Need special care while installation.



Unguided Media/Wireless media:

1.Infrared: The Infrared light transmit the data through the air and can propagate throughout a room, but will not penetrate walls.It is secure medium of signal transmission has become common in TV remotes ,automative garage doors, wireless speakers.

2.Radio Waves: The transmission making use of radio frequencies is termed as radio wave transmission.Radio wave frequency is 3Khz -1GHz.These waves can penetrate the walls.These Waves are used in AM(Amplitude Modulation) and FM(Frequency Modulation) radios,Television and cordless phones.

These waves are **omni directional** these wave are move in all direction.

3.Micro-wave: The Microwave transmission is a line of sight transmission.Microwave signal travel at a higher frequency than radio wave and used for transmitting data over a long distance.

These are unidirectional only move in one direction.

Can't Penetrate solid objects like walls,Hills ,Mountains etc.

The frequency of the waves is 1Ghz-300 Ghz.

Used in point to point communication such as unicast communication such as radar and satellite.

Network Devices:

Networking hardware also known as network equipment or devices. These devices are needed to connect the devices in the network and use for communication.

- **1.Modem:** Modem stands for modulator and demodulator. A modem is a hardware device that devices like computer,router,switches to connect with the internet . The role of the modem is to convert Digital signal to Analog at sender side and reverse (Analog to digital) at receiver side.

- **2.RJ45 Connector:** RJ in RJ-45 connector stands for **Registered Jack**. It is a standard type of physical connector for network cables.

- It is small plastic plug mostly use with ethernet Cables.

- **3.Ethernet card :** Ethernet card is also known as network interface card(NIC).

It is a device that attached to each of the workstation and the server and help the workstation establish all important connection with the network. It contain

RJ- 45 slot to connect the ethernet cable with RJ-45 connector.

Each NIC attached to workstation is known as MAC address(48bit hexadecimal digits).It is also known as network interface unit.

4.HUB: A hub is a hardware device that used to connect the several computer together.

A hub is a networking device having multiple ports that are used connect multiple computers and LAN segments together. Send incoming data to all destinations.

Active Hub: It amplifies the signal as it moves from one connected device to another . These are like repeater to extend the length of the network.

Passive Hub: It allow to pass the signal from one computer to another computer without any change**.**

Hub is multiport repeater which broadcast all information to all other ports hence it is called as NON intelligent or Dumb Device.

Hub can send and receive the data but can't do both at the same time.

5.Switch:A switch is a device that used to segment network into different subnetworks or LAN segments.

A switch is responsible for filtering .Transforming data in a specific ways and for forwarding packets between LAN segments.

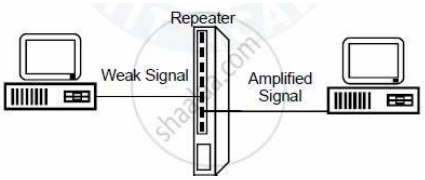
A switch has same job as that Hub i.e to connect multiple computers .But a switch is a smart device .

It can identify the intended destination and send that information only to the target computer.

No unnecessary traffic generated.

Can send and receive the information at the same time.

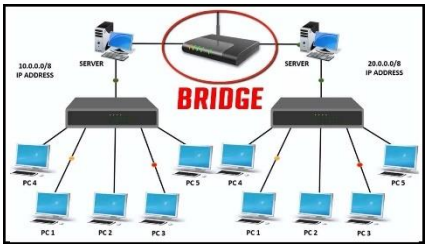
6.Repeater: A Repeater is a device that amplifies and restore signal for long distance transmission.



7.Bridge: A bridge is a device that link two network together.

Bridges are smart enough to know which computer are on which side of bridge so they only allow those messages that need to get to the other side to cross the bridge.

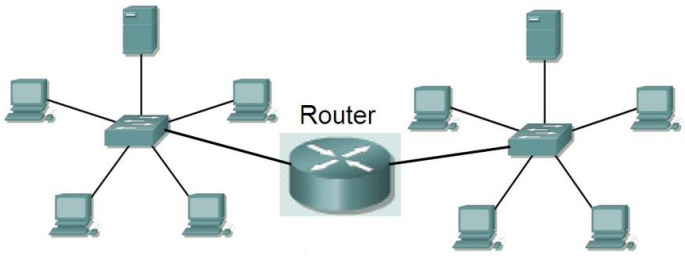
Bridge handle network that follow same protocols.



8.Routers: A device that works like a bridge but can handle different protocols.

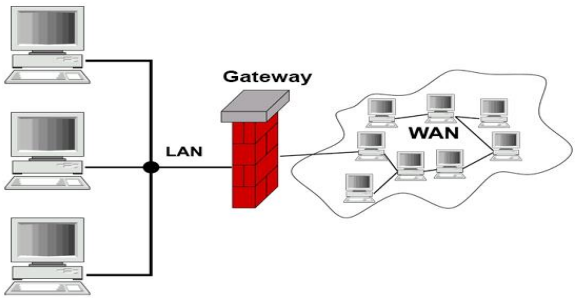
The router is responsible for forwarding data from one network to a different network.

If the destination is unknown to the router ,it sends the traffic to the another router which knows the destination.



9.Gateway: A gateway is a device that connect dissimilar networks.

It is establishes an intelligent connection between a local area network with completely different structure.



10.Wi-fi Card: It is similar to Ethernet card but it allow the computers to connect with other devices without wire.

It may be internal or external .

It allows to connect our device to hotspot available.

Advantage is that it allows computer to become part of network without being physically connected through without wire and can be placed anywhere.

Network Topologies:

The smallest unit of network is called topology. It is a way how the device are connected in the network.

1.Bus Topology: In bus topology all the nodes or computers are connected to a main cable called backbone.

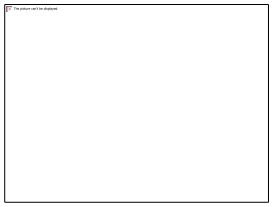
If a node send to a message to the other node it send the signal to the backbone. Then the signal travel through the backbone cable and it is received by the Destination node.

Advantage:

- Easy to implement
- It require less cable length hence it is cost effective.
- Failure of node does not affect the network.

Disadvantages:

- In case of the cable failure entire network goes down.
- At a time only one node can transmit the data.



2.Star Topology: In the star Topology each node is directly connected to a hub/switch. If any node has to send any information to any other node ,It send the signal to the hub/switch .

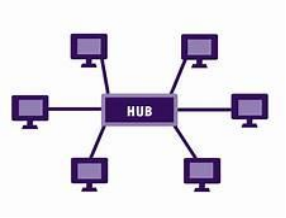
The star topology used to separate cable for each node/workstation.

Advantages:

- It is easy to implement.
- It is easy to diagnose the fault in the star topology.
- If one or more node fails rest of the network can still function.

Disadvantages:

- Failure of Hub/Switch leads to the failure of entire network.
- It is require more cable length as compared to bus topology.



3.Ring Topology: In ring topology every computer node is connected to the next computer in the ring .

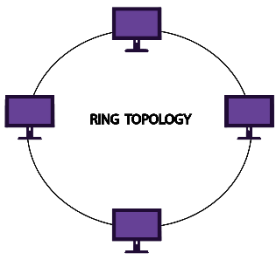
The message flow around the ring in one direction.

Advantages:

- Easy to install and configure.
- Easy to detect the problem.
- All the data flow in one direction, reducing the chance of packet collision.

Disadvantages:

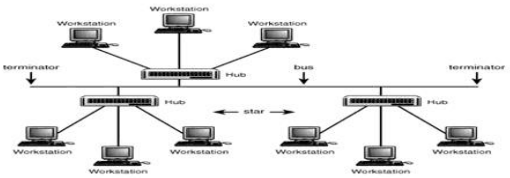
- All data transferred over the network which can make the network slower.
- The entire network will be impacted if one workstation shuts down.



4.Tree Topology: Tree Topology is a combination of bus and star topology .It is used to combine multiple star topologies.

Advantages:

- It offers easy way of network expansion.
- Even if one network fails the other network remains connected and working.



TREE TOPOLOGY

Network Protocol

- In network there are variety of computers connected to each other and share data in many ways. For interaction among these some rules are applied how and when a device send and receive the data packet.

1.HTTP(Hyper Text Transfer protocol): It is a communication protocol for the transfer of information on the internet and world wide web.

HTTP is a request and response standard between client and server

HTTP is used to transfer all the files and other data from one computer to other computer on world wide web.It was developed by Tim Berner Lee in 1989.

2.FTP(File Transfer Protocol):

FTP is used to transfer the files from local machine to web server.

It is also help to upload the file from local computer to web server.

3.TCP/IP: TCP is responsible for verifying the correct delivery of data from client to server.Data can be lost in the intermediate network.

TCP adds support to detect error or lost data and trigger retransmission until the data is correctly and completely received.

IP: IP is responsible for moving packet of data from node t o node.IP forwards each packet based on a four byte destination address(IP number).The internet authorities assign ranges of numbers to different organizations.

4.SMTP(Simple Mail Transfer Protocol): It is a set of guidelines that allows software to transmit electronic mail(email) over the internet.It is a program used for sending message to other computer users based on email address.

5.POP3: POP 3 stands for post office protocol version 3 .It is a client server protocol in which email is received and held for you by your internet.

It allow to download the received message on local machine and user can read then even when they are not connected to the internet.

The advantage is that once message are downloaded the user can cut the internet connection and read his /her emails at own leisure without incurring further communication cost.

6 HTTPS: Hyper text transfer Protocol secure is an extension of the hypertext transfer protocol.It is used to secure the communication over a computer network .In HTTPS the communication is encrypted using transport layer security or secure socket layer security.

7.VOIP(Voice over internet protocol): It is protocol that enable voice communication over the internet through the compression of voice into the data packets that can be efficiently transmitted over the data network and convert back into the voice at receiving end. It uses packet switching for this.

8.Telnet: Telnet is one of the earliest remote login protocol on the internet .Through Telnet an administrator or another user can access someone computer remotely.

9.PPP(Point to Point Protocol): PPP is a communication protocol which establishes a dedicated and direct connection between two communicating devices.

This protocol defines how two devices will authenticate each other and establish a direct link between them to exchange the data.

Internetworking Terminologies:

- **1.WWW(world wide web):** WWW stands for world wide web . The Tim Berner Lee. It is a collection of linked documents or Pages . It support Multimedia documents. It is a set of protocol that allows you to access any document on the net through a naming system called URL(Uniform Resource Locator).
- **2.Web Browser :** A web browser is a www client that navigates through the world wide web and display pages. A web browser is a software used to access the website. E.g Internet Explorer , Firefox ,Google Chrome.
- **3.Web server:** A web server is a www server that responds to request made by web server.
- **4.URL(Uniform Resource Locator):**Each web site has a unique address that is called URL .URL look like this

Type://address.domain name//path

Type: Refers to the server in which the file is located (FTP,HTTP)

Address: Address of server

Domain Name: Name domain like .com ,.in ,.edu etc.

Path: Location of the file in the server.

5.Domain Name: Domain refers to the type of domain in which they categorized the type of organization and country.

Like **.com for commercial website**
.in for India
.edu for Education
.org for organisation
.mil for military etc.

6.Webpage: It is a HTML document .It is a single page of the website that contain the information about the website.

7.Website: A collection of webpages is called website.

8.Webportal: It is a website that host other websites. In other words a web portal has hyperlinks to many other websites are called web portals.Eg. Yahoo.com,google.com etc.

9.Web hosting: It is a way of hosting a web server application on a computer system through which the contents are readily available to any web browser.

10.Homepage: First page of the website is called the homepage.

11.HTML(Hyper Text Markup Language): The web document is written in a special language are called HTML. It tells the browser how the data ,image and text that should be displayed.

12.XML(Extensible Markup Language): It is stands for Extensible Markup Language. It is a language for defining a structured information. In XML we can create our own webpage.

Abbreviation:

HTML(Hyper Text Markup Language)
XML(Extensible Markup Language)
GNU(GNU's not UNIX)
FTP(File Transfer Protocol)
FSF(Free Software Foundation)
GSM(Global System for Mobile Communication)
WiFi (Wireless Fidelity)
CDMA(Code Division Multiple Access)
HTTP(Hyper Text Transfer Protocol)
ARPANET(Advanced Research Project Agency of Network)
MODEM(Modulator Demodulator)
WLL(Wireless in Local Loop)
TCP/IP(Transmission Control Protocol/Internet Protocol)
PPP(Ponit to Point Protocol)
WWW(World wide web)
URL(Uniform Resource Locator)
GPRS(General Packet Radio Service)
VoLP(Voice over Internet Protocol)
SMTP(Simple Mail transfer Protocol)
POP(Post Office Protocol)
EDGE Enhanced Data rates for Global Evolution
Telnet(Teletype Network) **PHP**(Personal Home Page)
4G(Fourth Generation) **IPR**(Intellectual Property Right
ASP(Active Server Pages)
JSP(Java Server Pages)
VB(Visual Basic)
Virus (Vital Information Resource Under Size
OSS open source software.

MCQ

Q1.Which switching technique breaks data into smaller packets and send them independently to their destination.

Ans: Packet switching

Q2.Which measurement indicates the amount of data that can be transmitted over a communication channel in a given time?

Ans: Bandwidth

Q3.Which of the following is not a wired communication media?

a) Twisted Pair cable c) Co-axial Cable
b) Fiber Optics **d) Radio Waves**

Q4.What is the maximum distance a signal travel in a LAN using Ethernet technology without requiring a repeater?

a) **100 meter** c) 1 kilometer
b) 10 kilometer d) 100 kilometer

Q5.Which of the following network topologies is most fault-tolerant?

Ans: Mesh Topology

Q6.Which protocol is used to send Emails?

Ans: SMTP

Q7.Which protocol is used to access the web pages?
Ans: HTTP

Q8. Which of the protocol is used for transferring files between computers?

Ans:FTP

Q9.Which protocol is used for secure communication over the Web?

Ans: HTTPS

Q10.Which protocol is used for the remote login?

Ans Talnet

Q11.Which of the following devices is used to connect multiple devices in a network?

a) Modem c)Ethernet Card
b) Router **d) Switch**

Q12.Which of the following is used to define the structure of the web page?

Ans. HTML

Q13. Which of the following is used to provide a Unique address for a website?

Ans. URL

Q14. Which of the following is used to host a website?

Ans. Web Server

Q15.What is the main purpose of the computer Network?

a) To store data on multiple devices.
b) To share resources and communicate between devices.
c) To encrypt data for secure transmission.
d) To Provide power to multiple devices

Q16.What is sender in data communication?

Ans. The device that transmit the Data.

Q17.What is an IP address used for in networking?

a) To identify specific device on the network
b) To encrypt data for secure transmission.
c) To determine the location of the network.
d) To regulate the speed of Data Transmission

Q18.What is repeater used for in networking?

Ans. To amplify and regenerate signal over long distance.

Q19.What is modem used in the networking?

Ans. To convert digital signal to analog and analog to digital.

Q20.What is the purpose of a router in networking?

a) To connect multiple network together.
b) To provide power to devices on the network
c) To amplify and regenerate signal over long distance.
d) To provide security for the network.

Q21.What do you mean by firewall?

Ans: Hardware/Software to stop unauthorized access.

Q22. An IPv4 Address is ……..long

Ans:32 bit

Q23.DNS stands for……

Ans.Domain Name System

Q24.IPV6 address is…….long.

Ans: 128 bit

Q25. It is a way to translate the textual domain name to corresponding IP address.

Ans.Domain Name system.

Q26.Computer connected by a network across different cities is an example of……..

Ans. MAN (Metropolitan Area Network)

Q27…… is a network tool used to test the download and upload broadband speed.

Ans. speed test

Q28.A…… is networking device that connects computers in a network by using packet switching to receive and forward date to the destination.

Ans Switch

Q29.Mohan wants to transfer picture from His friend mobile to his laptop. He uses Bluetooth technology to connect two devices .Which type of network will be formed in this Case.

Ans .PAN (Personal area network)

Q30.The Modem at the sender side work as a……..

Ans. Modulator

Q31.The Modem at the receiver side work as a……..

Ans Demodulator

Q32.In case of ……..switching Before the communication starts a dedicate path is identified between sender and receiver.

Ans.Circuit

Q33.Which type of topology is best suited for large business which must carefully control the coordinate the operation of distributed branch outlets?

Ans.Star

Q34.Computers connected to a LAN can.

a) Run Faster
b) Go on line
c) E-mail
d) Share information or share resources.

Q35. Name a network device which sends the data to the indented node in the network(LAN).

Ans. Switch

Q36. To connect network of similar protocols……..are used

Ans: Bridge

Q37.Which of the following establish PAN.

a) WAN C) MAN
b) **PAN** D) LAN

Q38 The vast network of computer that connect millions of people all over the world is called.

Ans. Internet

Q39. What kind of transmission medium is most appropriate to carry data in a computer network that is exposed to electrical interference.

Ans: Optical Fiber

Q40 Frames from one LAN can be transmitted to another LAN via the device.

Ans. Bridge

Q41. A collection of Hyperlinked documents on the internet form the .

Ans.World wide web

Q42. Which device is used to access your computer by other computer or talk over phone.

Ans. Modem

Q43. Which of the following is the fastest medium of data transfer?

a) Co-axial Cable
b) Twisted pair cable
c) Optical fibre
d) None of above

Q44.The Location of the resource or web page on the internet is given by

Ans.URL

Q45.A……Typically connects personal computer within a very limited geographical area usually within a Single building.

Ans.LAN

Q46 …….. is a set of rules.

Ans Protocol

Q47…… is a small piece of text stored on the user computer by a web browser.

Ans Cookies.

Q48.What is the benefit of the computer network with your computer.

Ans . a) increase the computer speed.

b)Sharing of cables to cut down expenses and clutter.

c) Sharing of resources to cut down on the amount of equipment needed.

d) Increase the speed of the network.

Q49……is not a network device.

a) Firewall
b) Router
c) Protocol
d) Gateway

Q50 Differentiate between Radio link and microwaves.

Radiowaves or Radio Links	**Micro waves**
Data is transmitted outward from the antenna through free space in all the direction .It is means a slow means of communication	Data is transmitted based on line of sight principle it is faster than radio waves

Q51 Distinguish between MAC address and IP Address.

MAC Address	**IP address**
MAC address is a physical address that is given by the NIC(Network interface card) manufacturer.It is a 6 byte address separated by colon(:) Eg. 20:A6:E4:45:6B:2F	IP address is a logical address (unique) assigned to all network on TCP/IP network.it is a 4 Byte address separated by dot(.). Eg. 192.168.52.2

Q52. Difference between circuit switching and packet switching.

Circuit switching	Packet Switching
Resource reservation is the feature of the circuit switching because path is fixed for data transmission	There is no resource reservation because bandwidth is shared among users.
It is more Reliable	It is less reliable
It work on End-to End Connection	It works on store and forward technique.

Q53.Difference Between HTML and XML.

HTML	XML
Stands for Hyper Text Markup Language	Stands for Extensible Markup Language
File Extension is .html	File Extension is .xml
HTML is not case sensitive	XML is case sensitive
HTML tags are predefined tags	XML tags are user defined Tags

Q54.Difference Between LAN and WAN.

LAN	WAN
LAN stands for Local Area Network	WAN stands for Wide Area Network
LAN work in small area like office ,Building ,School	WAN work in world wide area. Best example of WAN is internet.

Q55 Difference between FTP and HTTP .

Ans.

FTP	HTTP
FTP is a protocol which is used to transfer files among workstation	HTTP is protocol used to transfer files from a web server onto a web browser on order to view a web page that is on internet

Q56 Difference between Star Topology and Bus Topology.

Ans.

Star Topology	Bus Topology
Star Topology is non linear	Bus Topology is linear
Switch is used to connect the computer	No switch is used

Q57 What is difference between SWITCH and HUB.

Ans.

Switch	Hub
Switch provides a dedicated line at full bandwidth between two devices	HUB doesn't provide a dedicated line Hub Share Bandwidth.

Q58 What term is use for a software/hardware device which is used to permitting authorized communications. This Term is also used foe a device or set of devices configured to permit ,deny,encrypt, decrypt or proxy all computer traffic between different security domains based upon a set of rules and other cretria.

Ans: Firewall

Q59.What is protocol? Which protocol is used to search information from internet using an internet browser?

Ans: Protocol is a set of rules that two or more computer must follow to communicate on network . WWW(world Wide Web) ,HTTP(Hyper Text Transfer Protocol) is used for searching information from internet using internet browser.

Q60. Suggest network type(out of LAN,MAN,WAN)
For connecting each of the following set of their offices: Back office and Work Office and Work office Back Office and south office.

Ans.

Back office and Work Office-LAN
Back Office and south office-WAN

Q61 What is the difference between Message switching and Packet Switching.

Message Switching	Packet Switching
In message switching there is no upper limit of Data	There is a upper limit of sending Data.
In message Switching Packets are stored on Disk.	All packets are stored in main memory .

Q62.Out of the following which is the fastest wired and wireless medium of communication.

Infrared, Coaxial Cable, Ethernet, Microwave ,Optical Fibre.

Ans: Wired: Optical Fibre

Wireless: Infrared

Q63. Distinguish between Websites and Web Browser.

Ans: Website is a collection of Webpages served from a single web domain. While web Browser is a software that is used to accept and display the web pages.

TIPS TO SOLVE QUESTION BASED ON CASE STUDY

1.Name the Most suitable wing where the server should be installed Justify.

Ans: Server is to be placed in building/wing where number of computers are Maximum.

2.Draw the cable Layout.

Ans. i) Use Star Topology

ii) Use the 80-20 rule (Connect the Building having shortest distance .For N building ,N-1 wires are required. No Loops.

3.Suggest the placement of networking Device

a) Hub/Switch : In all building /Office /wing to connect all the computer.

b) Repeaters: In between the building /office /wing where distance more than 70 to 100 meter to generate the signal.

c) Modem: Should be installed at wing/building/office that have maximum number of computer or where the server is installed.

d) Firewall: A network security device to prevent unauthorized access to or from the network.

4. Which communication medium or Internet Connecting Technology is used for connecting offices?

Internet connecting Technology

Compromise with Cost not with speed

Compromise with Speed not with Cost

Cable Connection possible(Optical Fibre)

Cable Connection Possible

(Dial-up connection/Ethernet Cable)

Cable connection not possible (Hilly area ,Long Distance etc.)

Radio wave Communication

Cable connection not possible (Hilly area ,Long Distance etc.)

Satellite Communication

In case of wireless connection take care of the following:

1. If compromise on speed but not on cost then broadband connection will be suitable.
2. Moderate /Economical wireless connection is Radio wave /Microwave. If area is hilly then radio wave is preferred.
3. The best wireless medium is Satellite.
4. The best wired medium for high speed connectivity is optical fibre.

CASE STUDY BASED QUESTIONS

- **Question 1:Intelligent Hub India is a knowledge community aimed to uplift the standard of skills and knowledge in the society. It is planning to setup its training centers in multiple towns and villages pan India with its head offices in the nearest cities. They have created a model of their network with a city, a town and 3 villages as given. As a network consultant, you have to suggest the best network related solution for their issues/problems raised in (i) to (iv) keeping in mind the distance between various locations and given parameters. Shortest distance between various locations:**

Shortest distance between various locations:

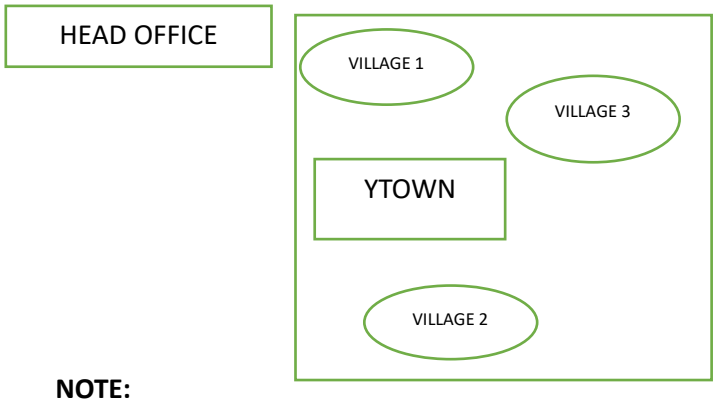
VILLAGE 1 To YTOWN	2KM
VILLAGE 2 To YTOWN	1.2 KM
VILLAGE 3 To YTOWN	3 KM
VILLAGE1 TO VILLAGE 2	3.5 KM
VILLAGE1 TO VILLAGE 3	4.5 KM
VILLAGE 2 TO VILLAGE 3	3.5 KM
CITY Head office to YHUB	30 KM

Number of computers installed at various location are as follow

YTOWN	100
VILLAGE 1	10
VILLAGE 2	15
VILLAGE 3	15
CITY OFFICE	5

Computer Network
GMSSSS,Bilaspur ,Yamunanagar

XCITY **YHUB**



NOTE:

In villages there are community centres in which one room has been given as centres, in which training centre to this organization to install computers.

The organization has got financial support from the government and top IT companies.

1. Suggest the most appropriate location of the SERVER in the YHUB (out of the 4 locations), to get the best and effective connectivity. Justify your answer.

2. Suggest the best wired medium to efficiently connect various locations within the YHUB.

3. Which hardware device will you suggest to connect all the computers within each location of YHUB?

4. Which server/protocol will be most helpful to conduct live interaction of Experts from Head office and people at YHUB locations?

Answer:

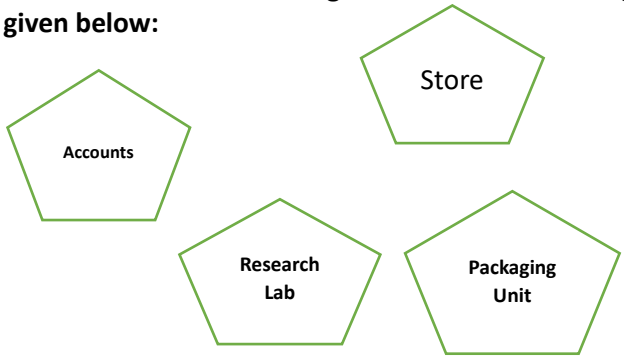
(i) YTOWN Justification: 1.Since it has the maximum number of computers.

(ii) Optical Fibre

(iii) Switch or Hub

(iv) Video conferencing or VoIP or any other correct service/protocol.

Q2. Rajan Medicos Center has set up its new center in Dubai. It has four buildings as shown in the diagram given below:



Distance between various Building are as follow :

Accounts to Research Lab	55 m
Accounts to store	150m
Store to Packaging Unit	160m
Packaging Unit to Research Lab	60m
Accounts to Packaging Unit	125m
Store to Research Lab	180m

Numbers of Computer

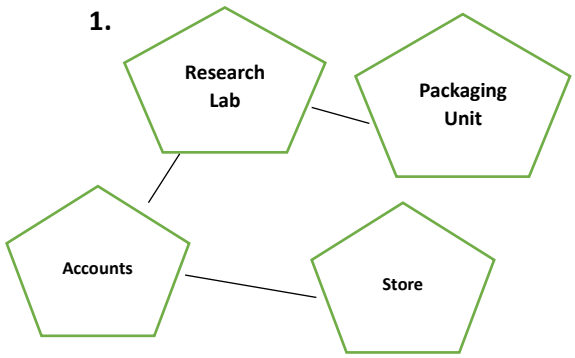
Accounts	**25**
Research Lab	**100**
Store	**15**
Packaging Unit	**60**

As a network expert, provide the best possible answer for the following queries:

1. **Suggest a cable layout of connections between the buildings.**
2. **Suggest the most suitable place (i.e. building) to house the server of this organization.**
3. **Suggest the placement of the following device with justification:**
   (a) Repeater (b) Hub/Switch
4. **Suggest a system (hardware/software) to prevent unauthorized access to or from the network.**

Ans:

1.



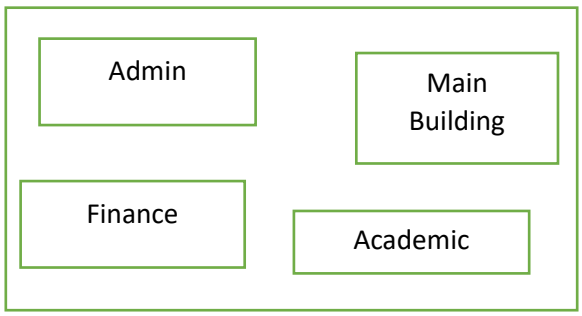
2.Server to be placed in Research Lab because Research Lab has maximum number of computers.

3. a) Repeater must be placed between Accounts and Store Path because the length of path is 150m.

b) Hub/Switch should be place in every building.

4.Firewall

Q3. Sanskar University of Himachal Pradesh is setting up a secured network for its campus at Himachal Pradesh for operating their day-to-day office & web based activities. They are planning to have network connectivity between four buildings. Answer the question (i) to (iv) after going through the building positions in the campus & other details which are given below:



The distance between various buildings of university are given as:

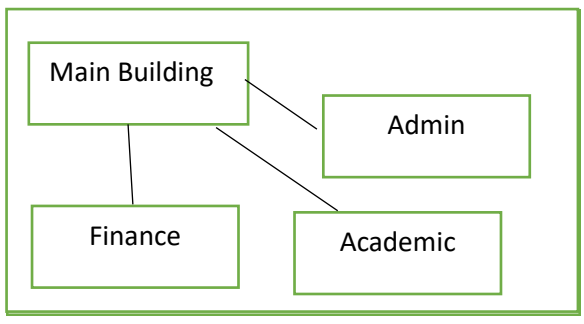
Building 1	Building 2	Distance in Mtrs
Main	Admin	50
Main	Finance	100
Main	Academics	70
Admin	Finance	50
Finance	Academics	70
Admin	Academics	60

Number of Computer

Building	No.Of Computer
Main	150
Admin	75
Finance	50
Academic	60

As a network expert, you are required to give best possible solutions for the given queries of the university administration:

(i) Suggest cable layout for the connection between the various buildings,
(ii) Suggest the most suitable building to house the server of the network of the university,
(iii) Suggest the placement of following devices with justification:
Switch/Hub
Repeater
(iv) Suggest the technology out of the following for setting-up very fast Internet connectivity among buildings of the university
1.Optical Fibre
2.Coaxial cable
3.Ethernet Cable
Ans: i)



ii) Main Building Because it has maximum number of computers.
iii) Switch /Hub Must be placed in every building
Repeater must be placed between finance and Mian Building because the distance is more than more than 70 mtrs.
iv) optical Fiber

Assertion and Reason Based Questions:

(a) Both A and R are true and R is the correct explanation for A

(b) Both A and R are true and R is not the correct explanation for A

(c) A is True but R is False

(d) A is false but R is True

1) **Assertion(A):** A router is more powerful and intelligent than HUB or Switch.
Reason(R): It has advanced capabilities as it can analyse the Data and decide the data is packet and send it to the other network.
Ans: C
2) **Assertion(A):** The Repeater is a device that amplifies the network over the geographical distance.
Reason(R): A Hub is a device which is used to connect more than one device in the network.
Ans: B
3) **Assertion(A):** VoIP stands for Voice over Internet Protocol.
Reason(R): It is a Technology that allows you to make voice calls using a broadband internet connection instead of a regular phone line.
Ans: A
4) **Assertion(A):** Bus topology is based on a central which act as hub.
Reason(R): Bus Topology involves a low cost of installation time.
Ans: D
5) **Assertion(A):** A protocol means the rules that are application for a network.
Reason(R): Local Area Network is an example of protocol.
Ans: C
6) **Assertion(A):** A hub is a networking device used to create LAN.
Reason(R): A hub is a device that is used to segment networks into different subnetworks.
Ans: C
7) **Assertion(A):** An access point is a device that connect dissimilar network.
Reason(R): Access point broadcast wireless signal wi fi cards can detect.
Ans: D
8) **Assertion(A):** Routers transmit data in more efficient way.
Reason(R): Routers maintains a routing table.
Ans: A

9) Assertion(A): A Gateway connects dissimilar network.

Reason(R): Gateway establishes a connection between local network and external network.

Ans: A

10) Assertion (A): The concept of communication refers to the exchange of information between a sender and a receiver.

Reason (R): Communication involves the transmission of a message over a communication medium using a set of agreed-upon protocols.

Ans: A

11). Assertion (A): The sender in data communication is the device that receives the message.

Reason (R): The sender is the device that initiates the communication and transmits the message to the receiver.

Ans D

12). Assertion (A): The receiver in data communication is the device that decodes the message and interprets its meaning.

Reason (R): The receiver is the device that receives the message and is responsible for ensuring that it is transmitted correctly.

Ans D

13). Assertion (A): Bandwidth is the amount of data that can be transmitted over a communication medium in a given amount of time.

Reason (R): Bandwidth is typically measured in bits per second (bps) or bytes per second (Bps).

Ans:B

14). Assertion (A): IP address is a unique identifier assigned to every device connected to a network.

Reason (R): IP address stands for Internet Protocol address and is used to enable communication between devices on a network.

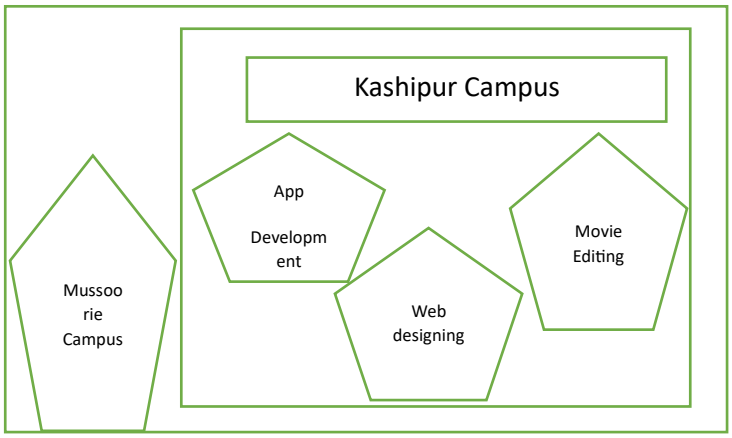
Ans A

19. Assertion (A): Circuit switching is a technique used to transmit data in which a dedicated physical path is established between the sender and receiver for the duration of the transmission.

Reason (R): Circuit switching is more efficient than packet switching for transmitting large amounts of data.

Ans:C

Q.MakeInIndia Corporation, an Uttarakhand based IT training company, is planning to set up training centres in various cities in next 2 years. Their first campus is coming up in Kashipur district. At Kashipur campus, they are planning to have 3 different blocks for App development, Web designing and Movie editing. Each block has number of computers, which are required to be connected in a network for communication, data and resource sharing. As a network consultant of this company, you have to suggest the best network related solutions for them for issues/problems raised in question nos. (i) to (v), keeping in mind the distances between various blocks/locations and other given parameters.



Distance Between various Blocks/Locations:

Block	Distance
App Development to web Designing	28 m
App Development to Movie Editing	55 m
Web Designing to Movie Editing	32 m
Kashmir Campus to Mussoorie Campus	232 km

Number of Computer

Block	No. of Computer
App Development	75
Web Designing	50
Movie Editing	80

1.Suggest the most appropriate block/location to house the SERVER in the Kashipur campus (out of the 3 blocks) to get the best and effective connectivity. Justify your answer.

2.Suggest a device/software to be installed in the Kashipur Campus to take care of data security.

3. Suggest the best wired medium and draw the layout to economically connect various blocks within the Kashipur Campus.

4. Suggest the placement of the following devices with appropriate reasons:

a)Switch/Hub

b) Repeater

5) Suggest a protocol that shall be needed to provide Video Conferencing solution between Kashipur Campus and Mussoorie Campus.

Ans:

1.Movie Editing is the most appropriate to install the server as it has the maximum number of computers.

2. Firewall

3.Ethernat cable

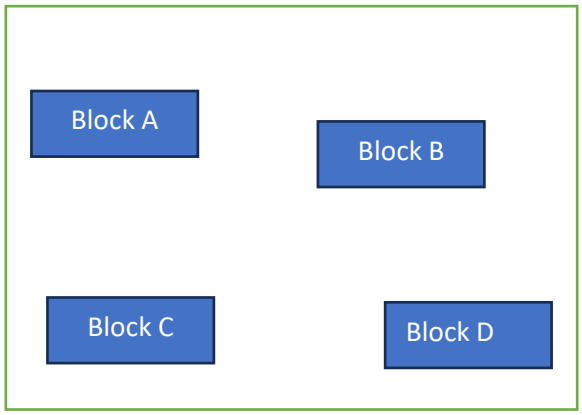
4.a)Switch and Hub will be placed in all blocks .

b) Repeater is not required because the block distance is less than 70 mtrs.

5.VoIP.

Q. Be Happy Corporation has set out new centre at Noida, Uttar Pradesh for its office and web-based activities. It has 4 blocks of buildings.

c) WAN
d) Satelite



Distance Between the Various Blocks is as follow:

A to B	40m
B to C	120 m
C to D	100 m
A to D	170 m
B to D	150 m
A to C	70 m

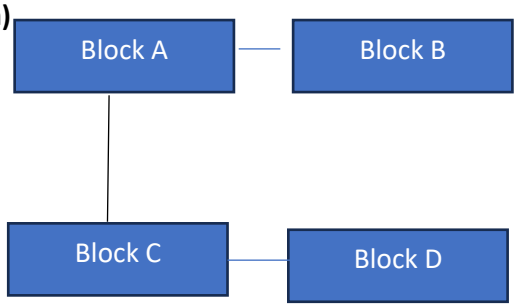
No. of Computer in each Block:

Block A	15
Block B	40
Block C	115
Block D	25

(a) Suggest and draw the cable layout to efficiently connect various blocks of buildings within the Noida center for connecting the digital devices.
(b) Suggest the placement of the following device with justification
i. Repeater
ii. Hub/Switch
(c) Which kind of network (PAN/LAN/WAN) will be formed if the Noida office is connected to its head office in Mumbai?
(d)Which fast and very effective wireless transmission medium should preferably be used to connect the head office at Mumbai with the center at Noida?

Ans

a)



b) **Repeater:** Between Block C and Block D because distance is more than 70 meter.
Hub/Switch : Hub and Switch are placed in each Block to share the data.