PRESTIGE INSTITUTE OF MANAGEMENT AND RESEARCH

TOPIC–COMPUTER NETWORKS
GROUP – 5

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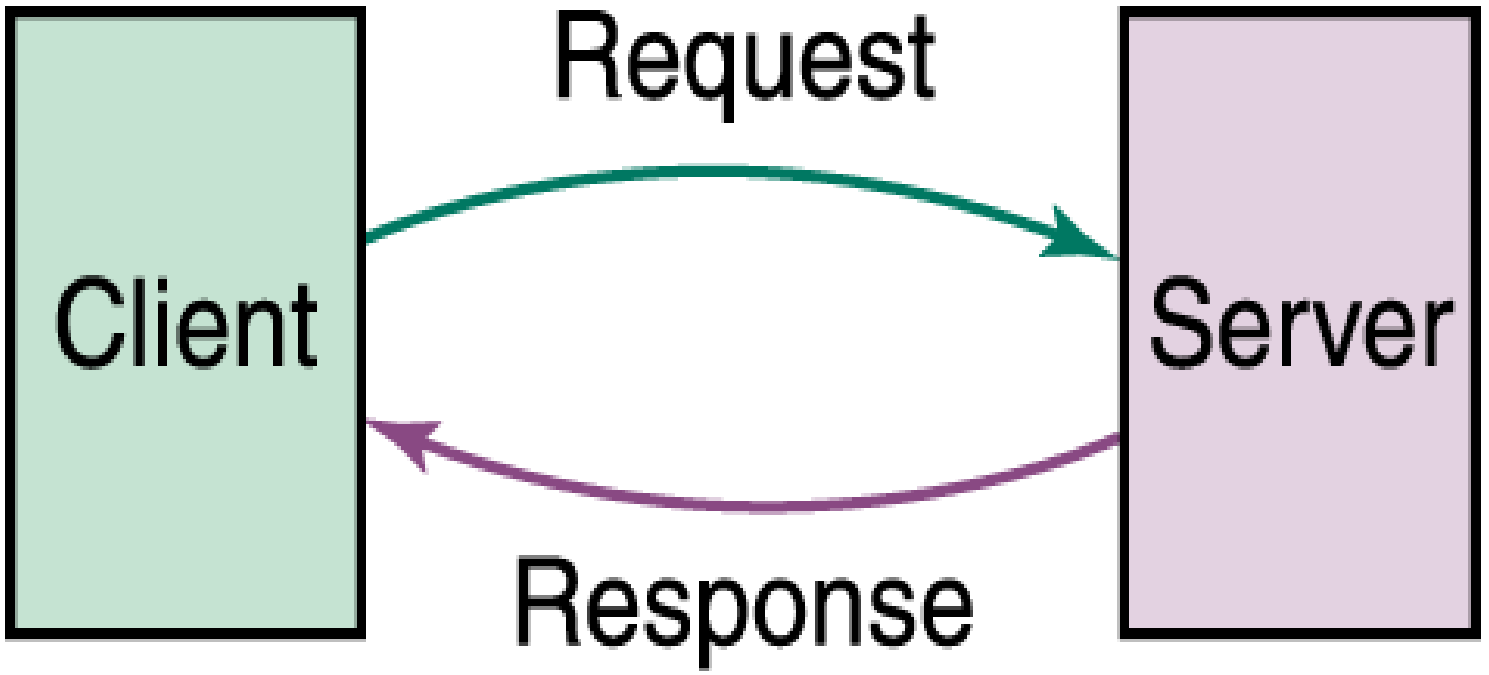
COMPUTER NETWORKS

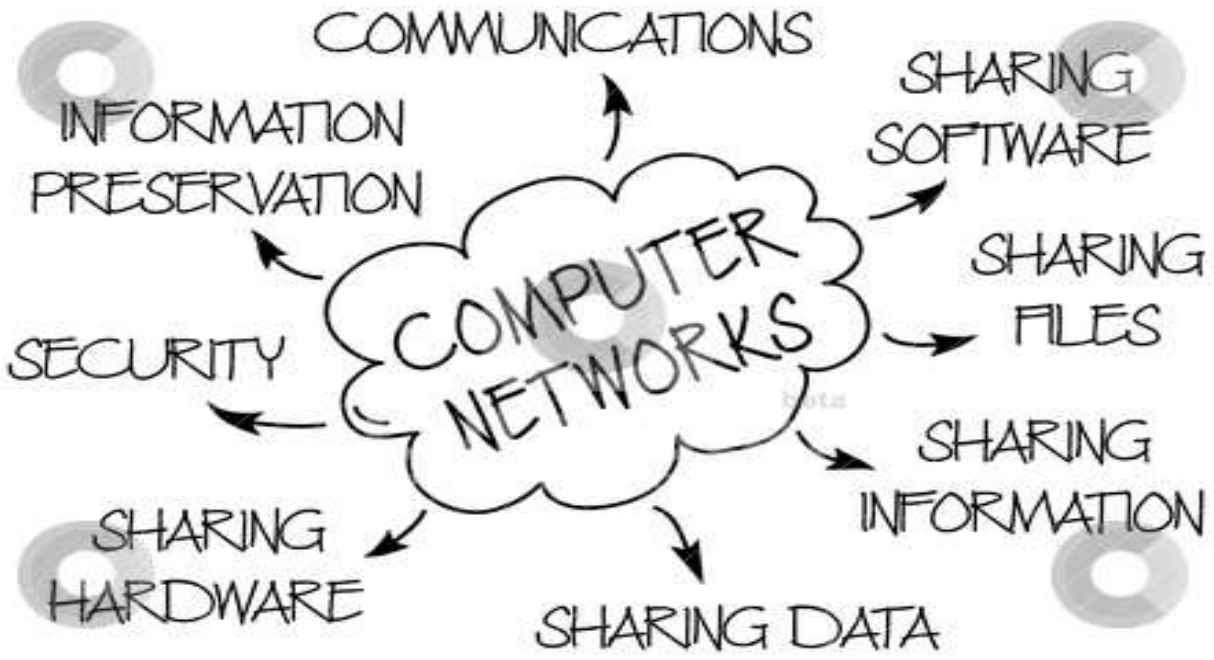
INTRODUCTION

- A computer network is an interconnection of two or more computers that are able to exchange information.
- The computer may be connected via any data communication link, like copper wires, radio links, etc.
- They may be personal computers or large main frames.

- The computer network may be located in a room, building, city, country, or anywhere in the world.
- Computer networks have opened up an entire frontier in the world of computing called the **client/server model.**


Request
Client
Server
Response

ADVANTAGES OF COMPUTER NETWORK



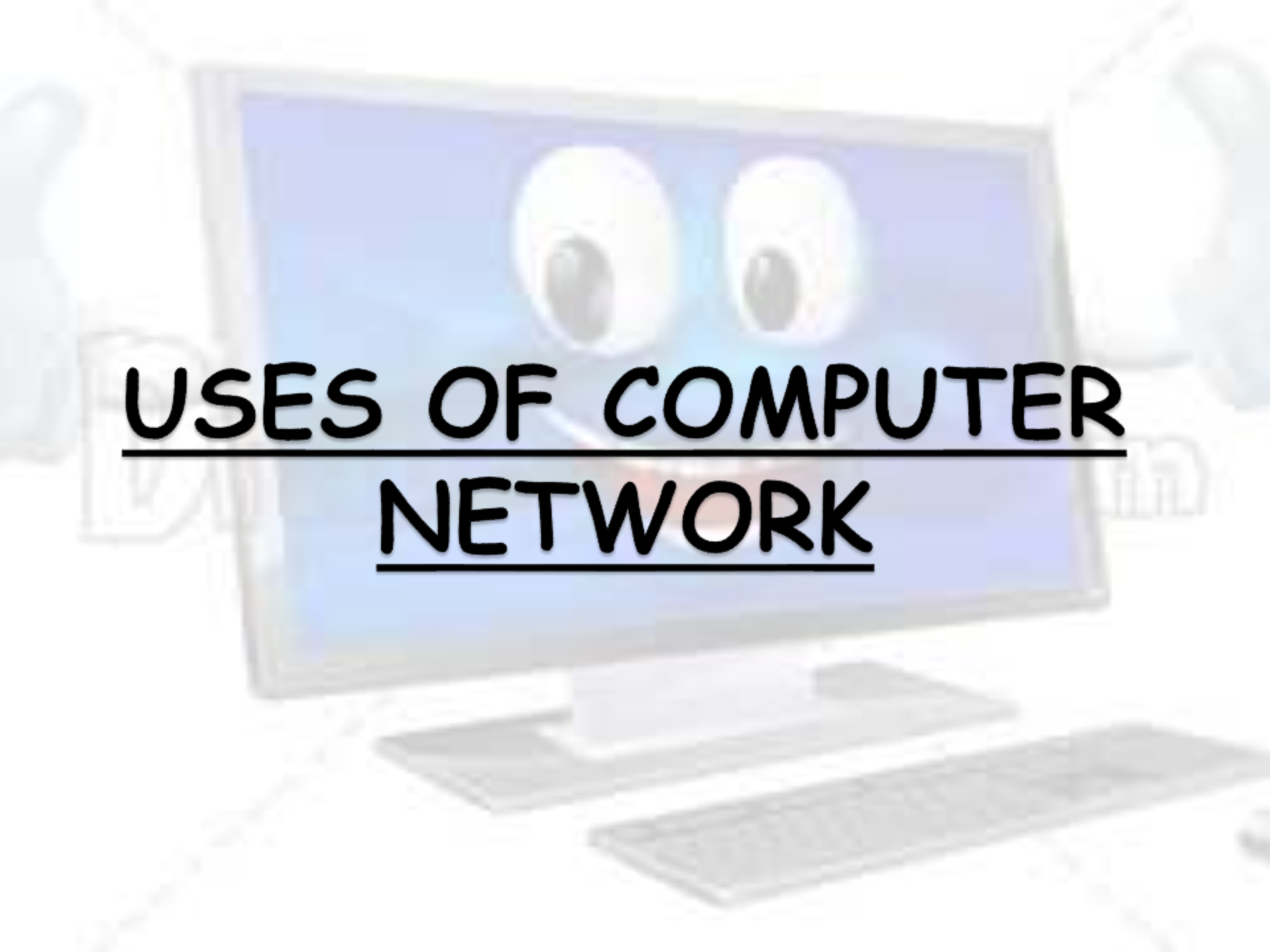
- **FILE SHARING** – Networks offer a quick and easy way to share files directly.

- **RESOURCE SHARING** – All computers in the network can share resources such as printers, fax machines, scanners, and modems.

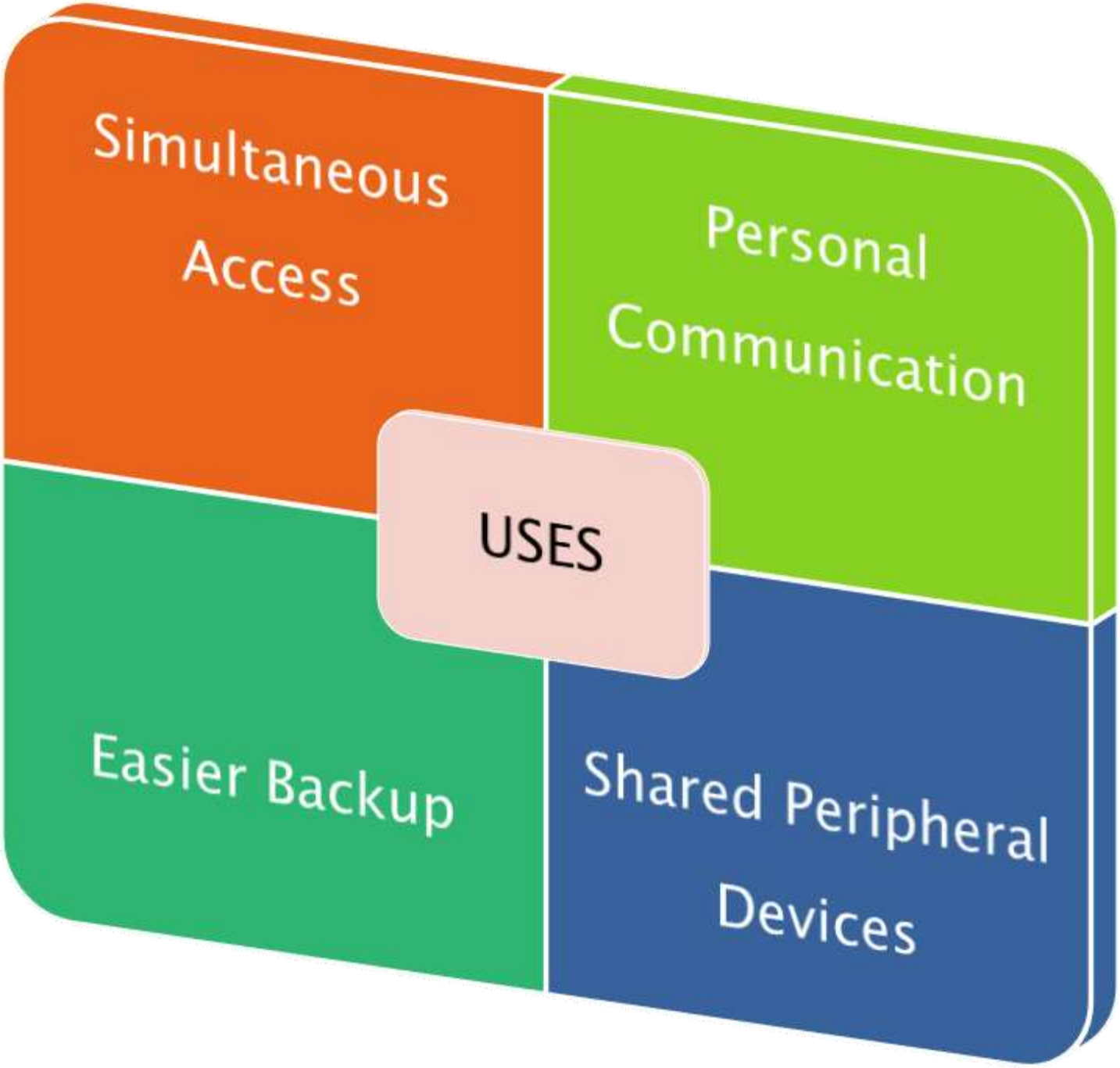
- **COMMUNICATION** –Those on the network can communicate with each other via e-mail, instant messages, etc.

- **Flexible Access** – Networks allow their users to access files from computers throughout the network.

- **Sharing of Information** – Computer networks enable us to share data and information with the computers that are located geographically large distance apart.



USES OF COMPUTER NETWORK

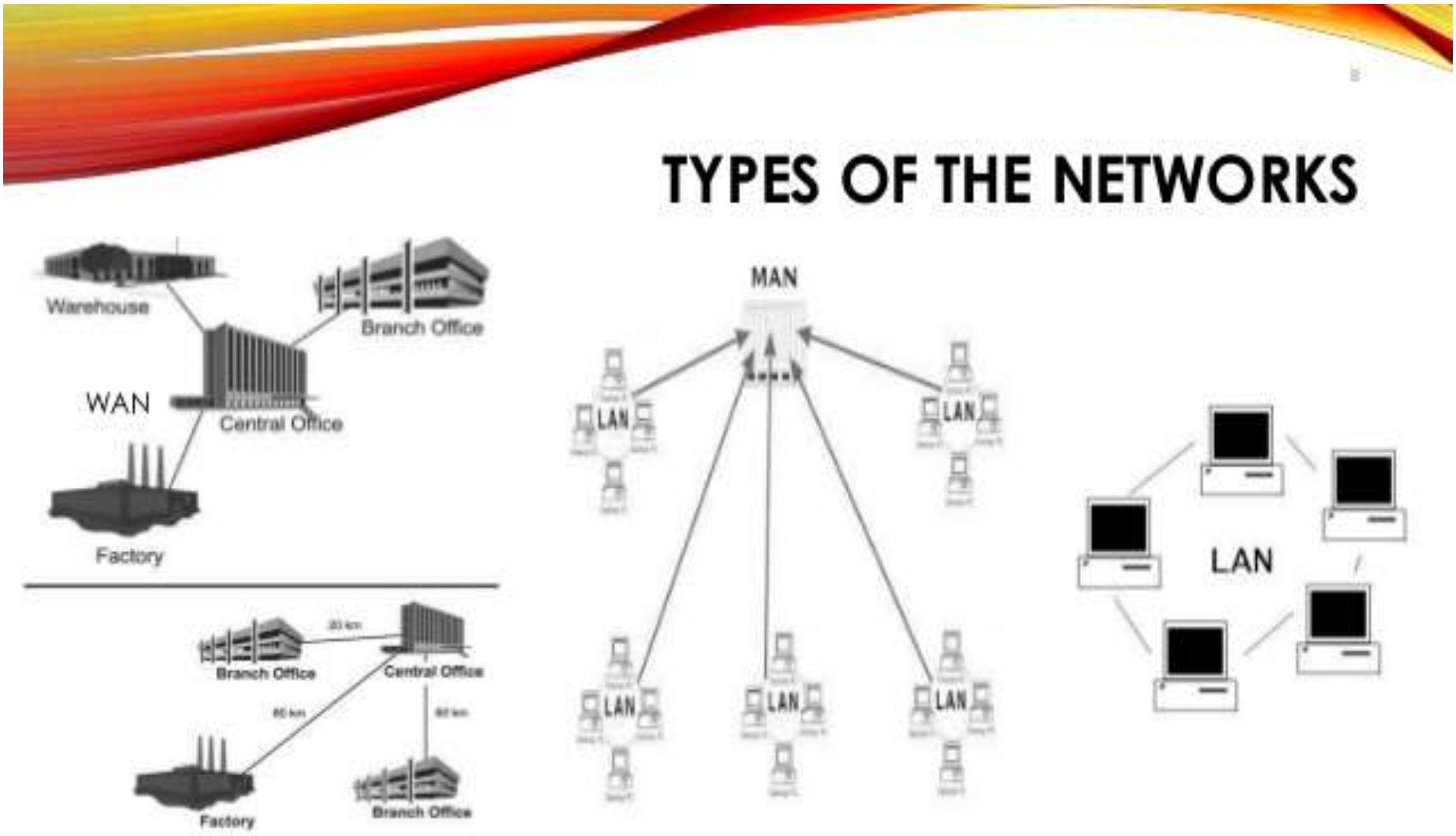

Simultaneous Access
Personal Communication
USES
Easier Backup
Shared Peripheral Devices

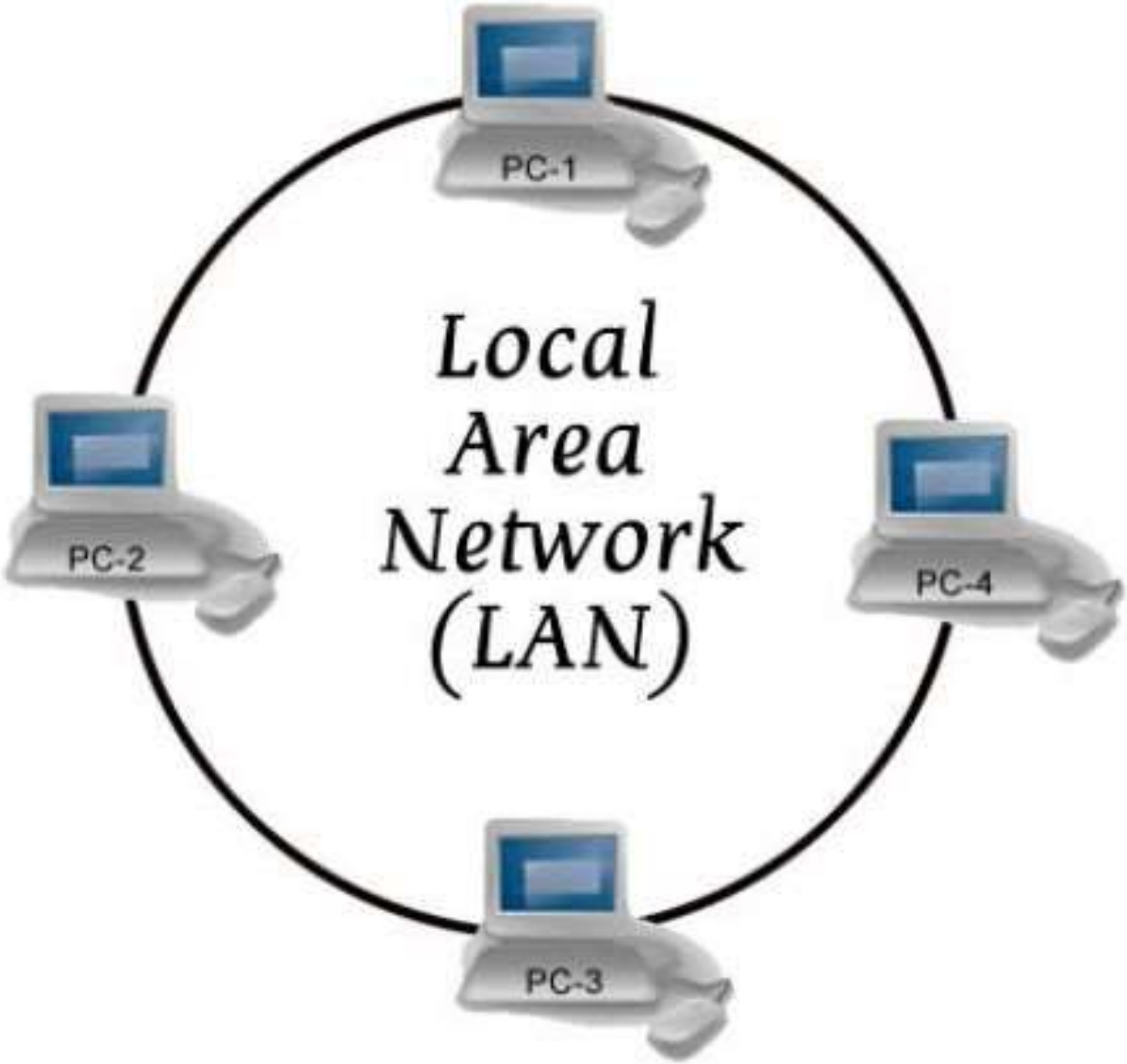
TYPES OF NETWORK

The different types of network are based on following:

- **Size of the network** – Refers to the area over which the network is spread.
- **Connection** – Refers to the transmission media and protocols used for connecting.
- **Network topology** – Arrangement of computers on the network.

ON THE BASIS OF SIZE

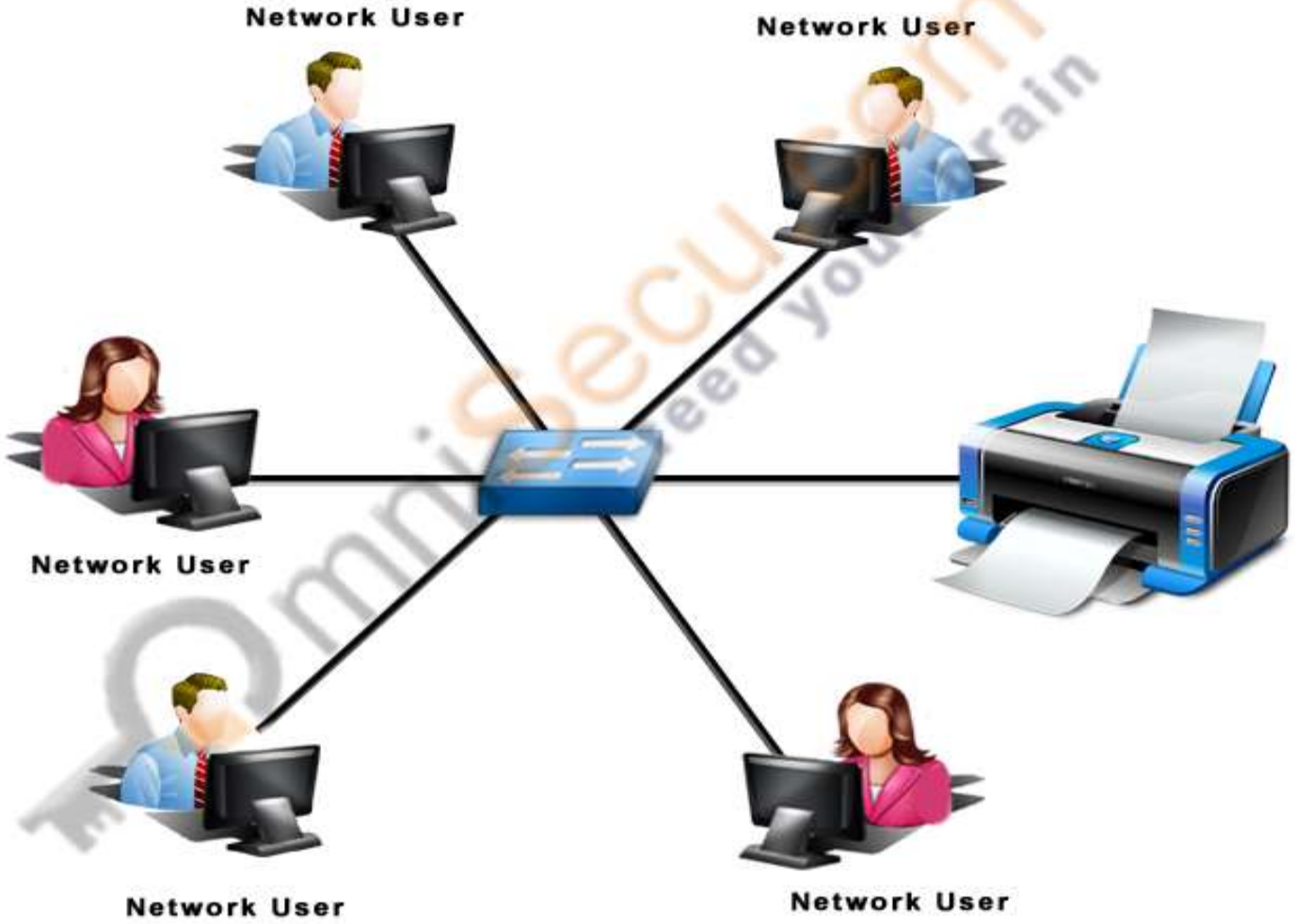



PC-1
PC-2
PC-4
PC-3
Local
Area
Network
(LAN)

LAN

- LAN is a computer network widely used for local communication.
- LAN connects computers in a small area like a room, building, office, or a campus spread up to a few kilometers.
- They are privately owned networks, to exchange information.

- Star, Bus, and Ring are some of the common LAN networking topologies.
- LAN runs at a speed of 10 mbps to 100 mbps and has low delays.
- A LAN based on wifi wireless network technology is called wireless local area network(WLAN).

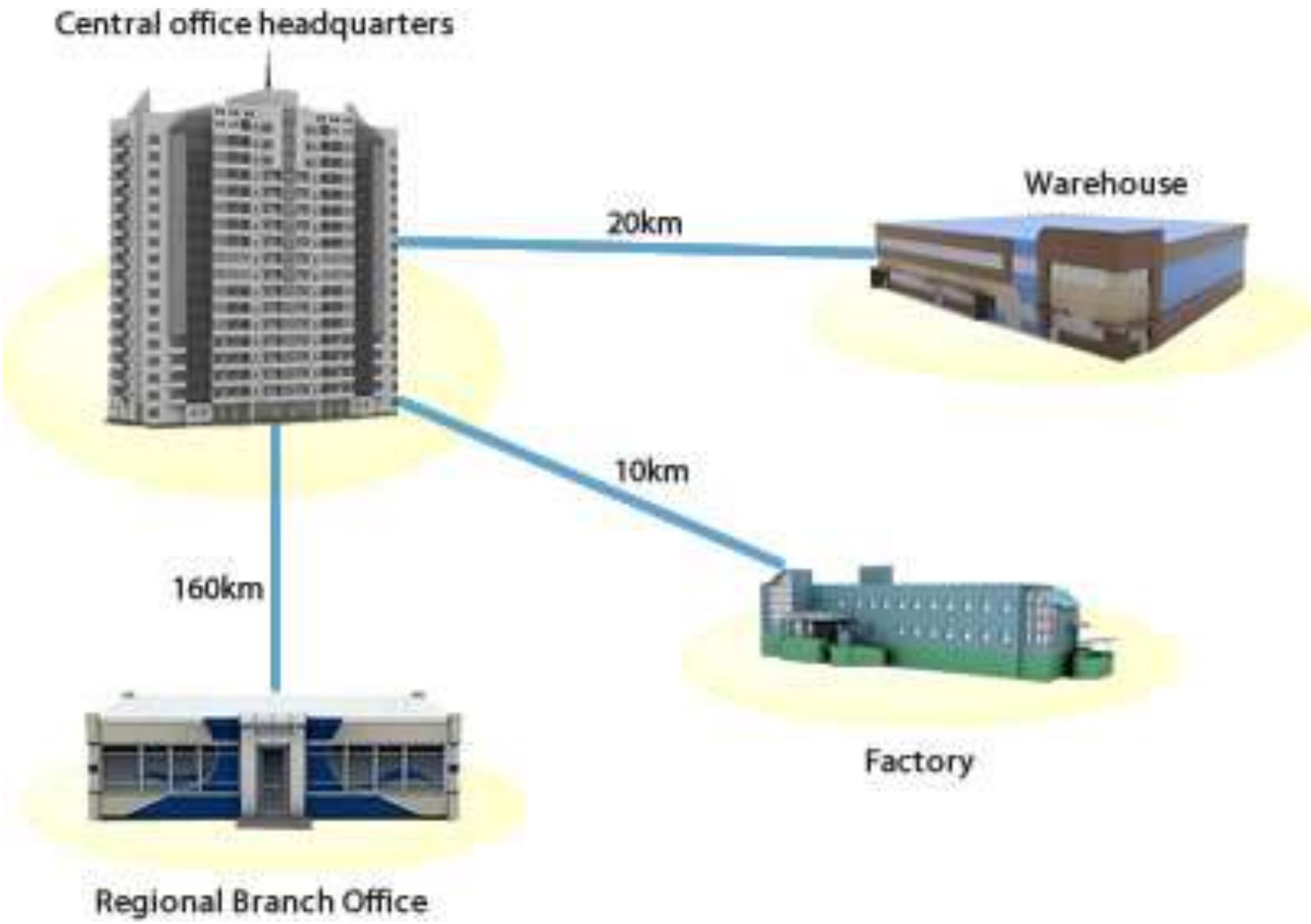


LOCAL AREA NETWORK (LAN)

METROPOLITIAN AREA NETWORK (MAN)

MAN

- MAN is a computer network spread over a city. The computers in a MAN are connected using cables.
- MAN connects several LAN spread over a city.
- It covers the distance upto 30-50 km.
- Example- Cable television network.


Central office headquarters
Warehouse
20km
10km
160km
Factory
Regional Branch Office

WIDE AREA NETWORK (WAN)

WAN

- WAN is a network that connects computers over long distances like cities, countries, continents or world wide.
- WAN uses public, leased, or private communication links to spread over long distances.
- WAN uses telephone lines, satellite link and radio link to connect.

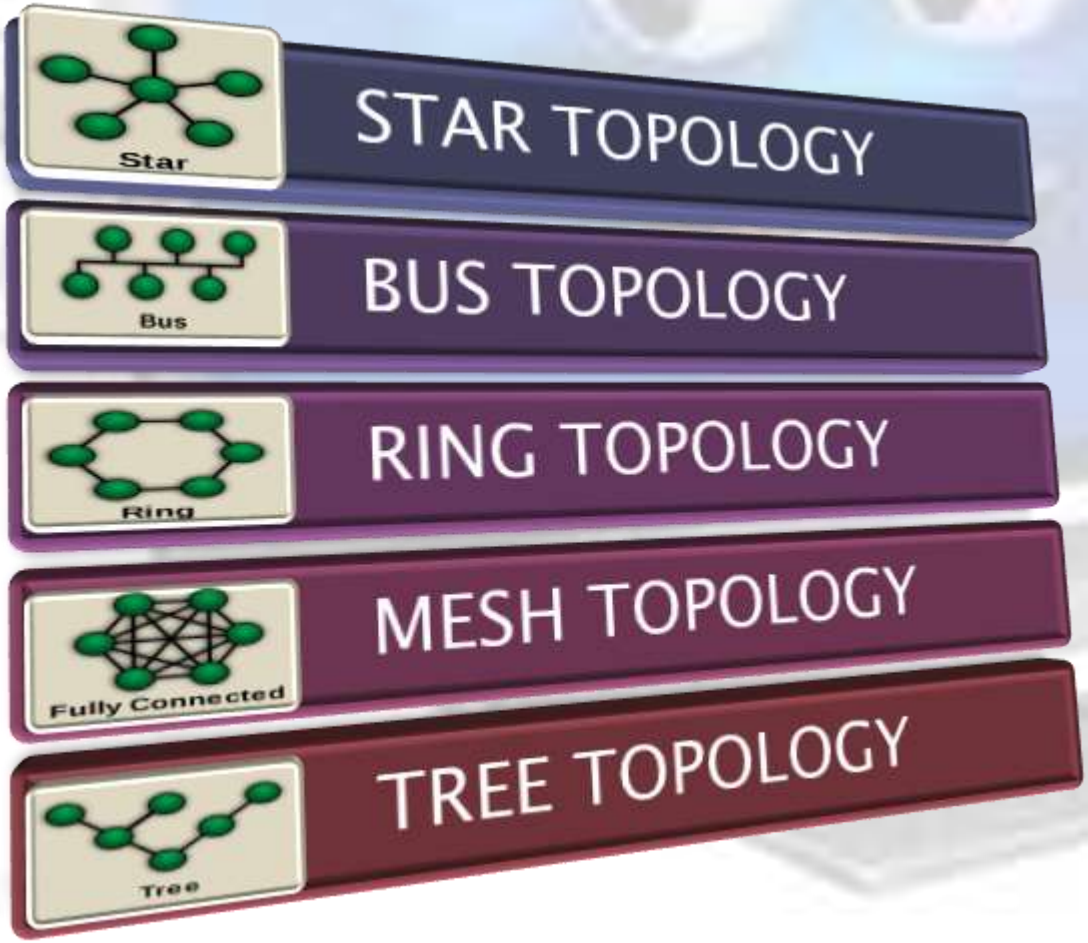
- The need to be able to connect any number of computers at any number of sites, results in WAN technology to be different from the LAN technology.
- It is slower and less reliable than a LAN.
- INTERNET is a common example of WAN.

Seattle
Wide
Area
Network
New York
Los Angeles
Miami

Introduction to Topology

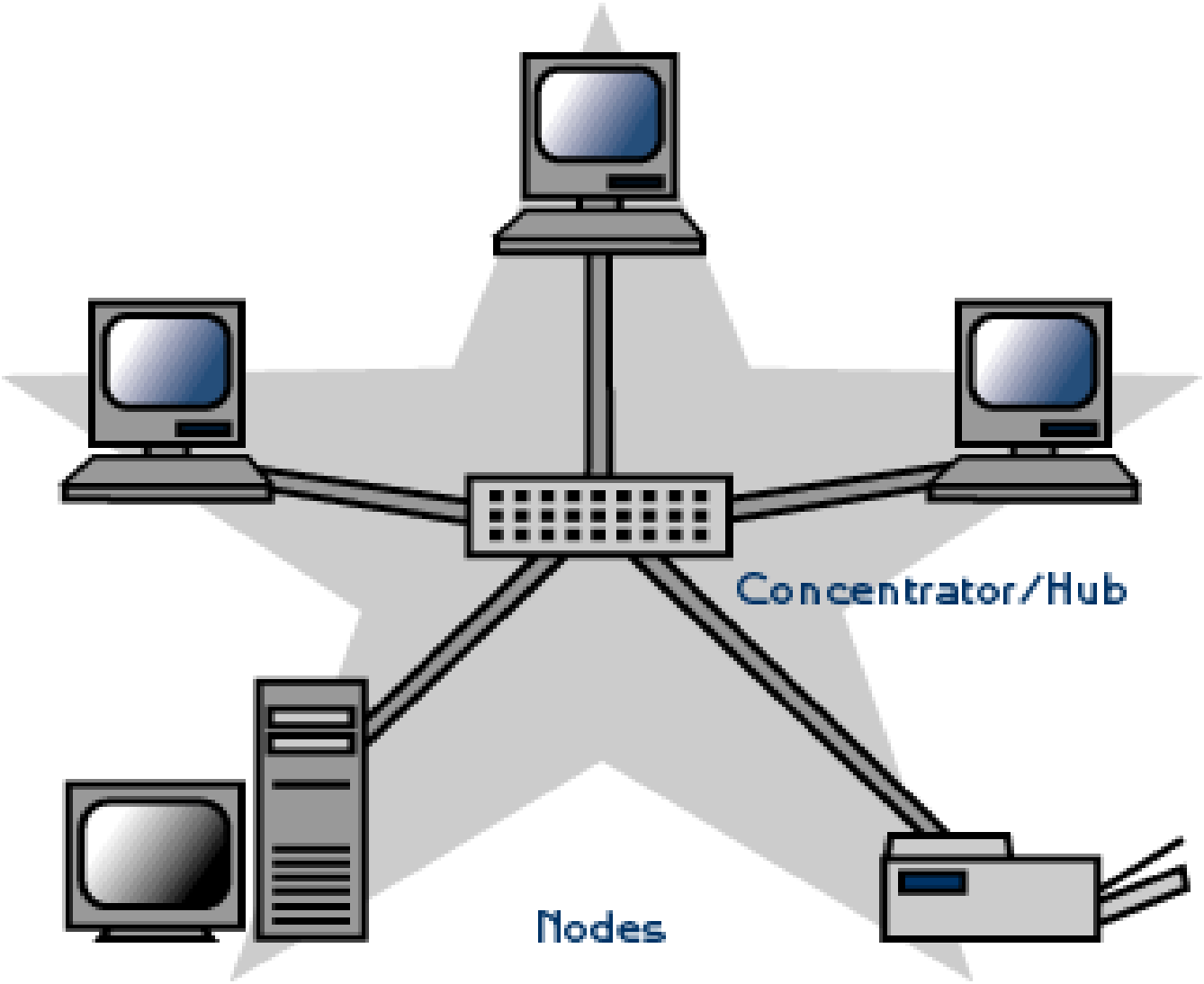
- It is the physical way in which computers are interconnected.

- Five basic network structures are :



STAR TOPOLOGY

- Devices are connected to a central computer called **HUB.**
- A Star network is particularly appropriate for organizations that require a centralized data base or a centralized processing facility.
- For example, a star network may be used in banking for centralized record keeping in an on-line branch office environment.


Concentrator/Hub
Nodes

ADVANTAGES:

- It is easy to add new and remove nodes.
- A node failure does not bring let down the entire network.
- It is easier to diagnose network problems through a central hub.

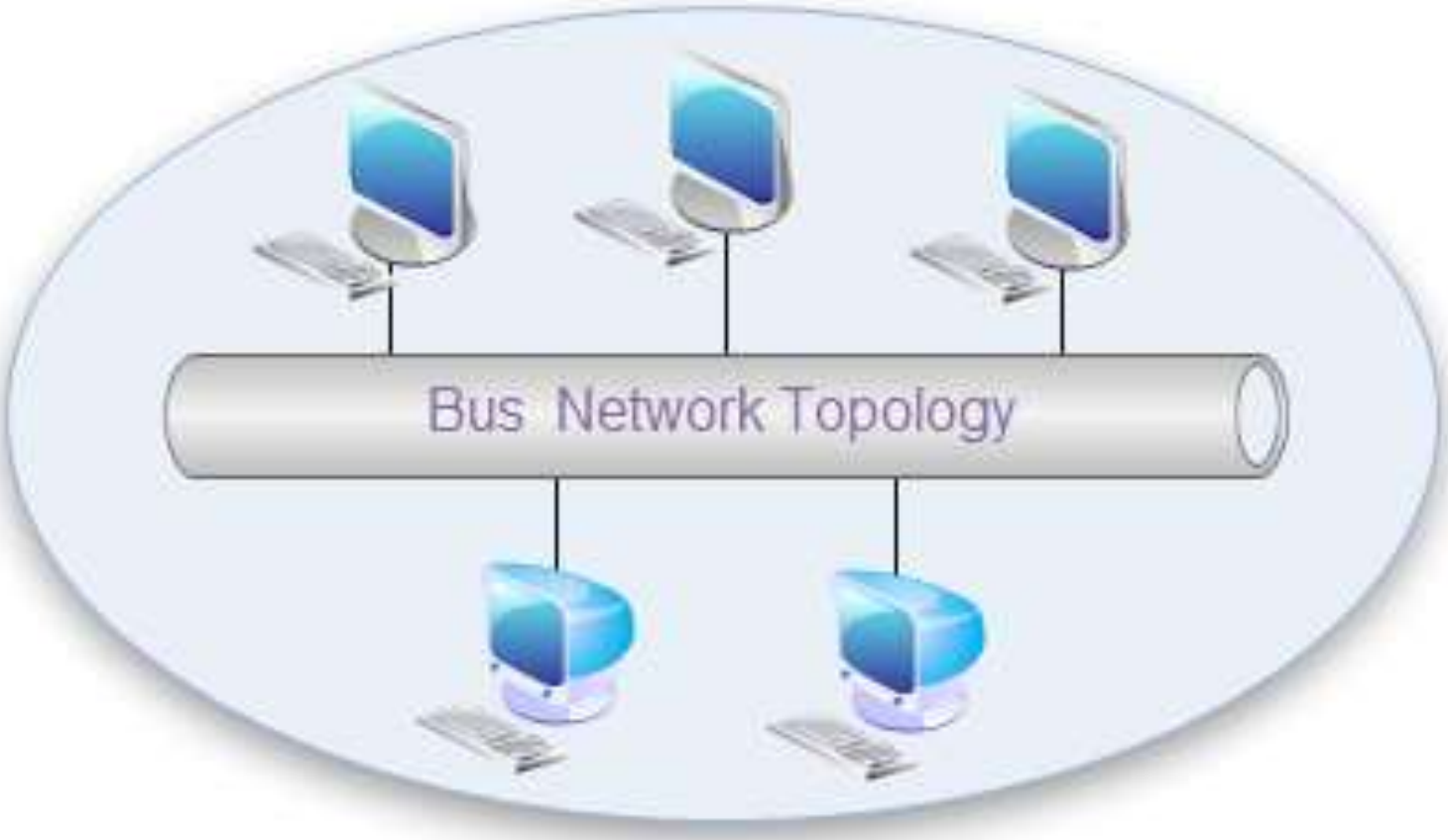
DISADVANTAGES:

- If the central hub fails, the whole network ceases to function.
- It costs more to cable a star configuration than other topologies because more cable is required than other topologies.

BUS TOPOLOGY

- In Bus topology a single network cable runs in the building or campus and all nodes are linked along with this communication line with two endpoints called the bus or backbone.

- This structure is very popular for local area networks


Bus Network Topology

ADVANTAGES:

- Reliable in very small networks as well as easy to use and understand.

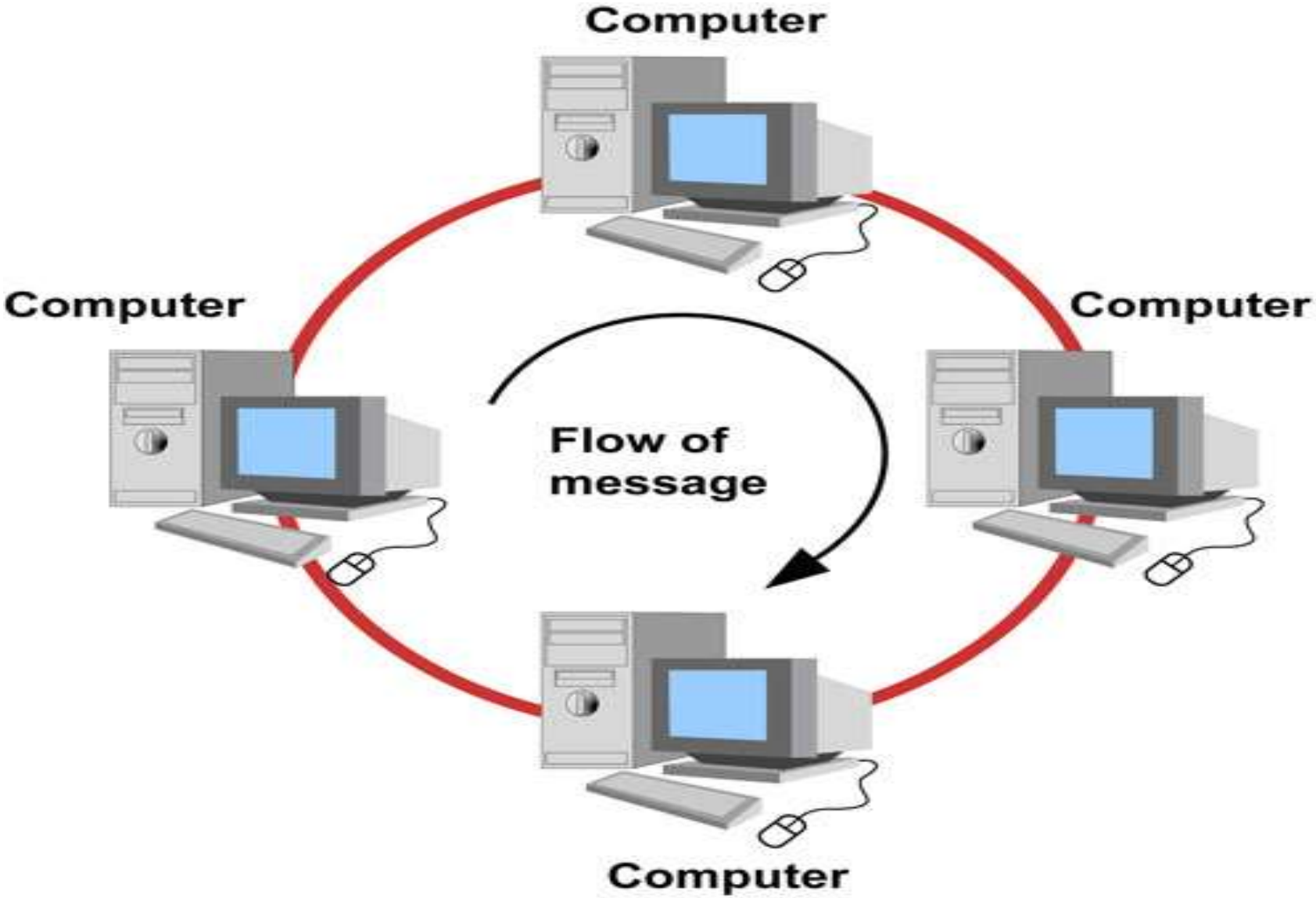
- Requires the least amount of cable to connect the computers together and therefore is less expensive than other cabling arrangements.

DISADVANTAGES:

- Heavy network traffic can slow a bus considerably.
- Each connection between cables weakens the electrical signal.

RING TOPOLOGY

- In Ring topology the network cable passes from one node to another until all nodes are connected in the form of a “loop or ring”.
- Transmits in only one direction.
- Used in LAN’S and WAN’S.


Computer
Computer
Computer
Flow of message
Computer

ADVANTAGES:

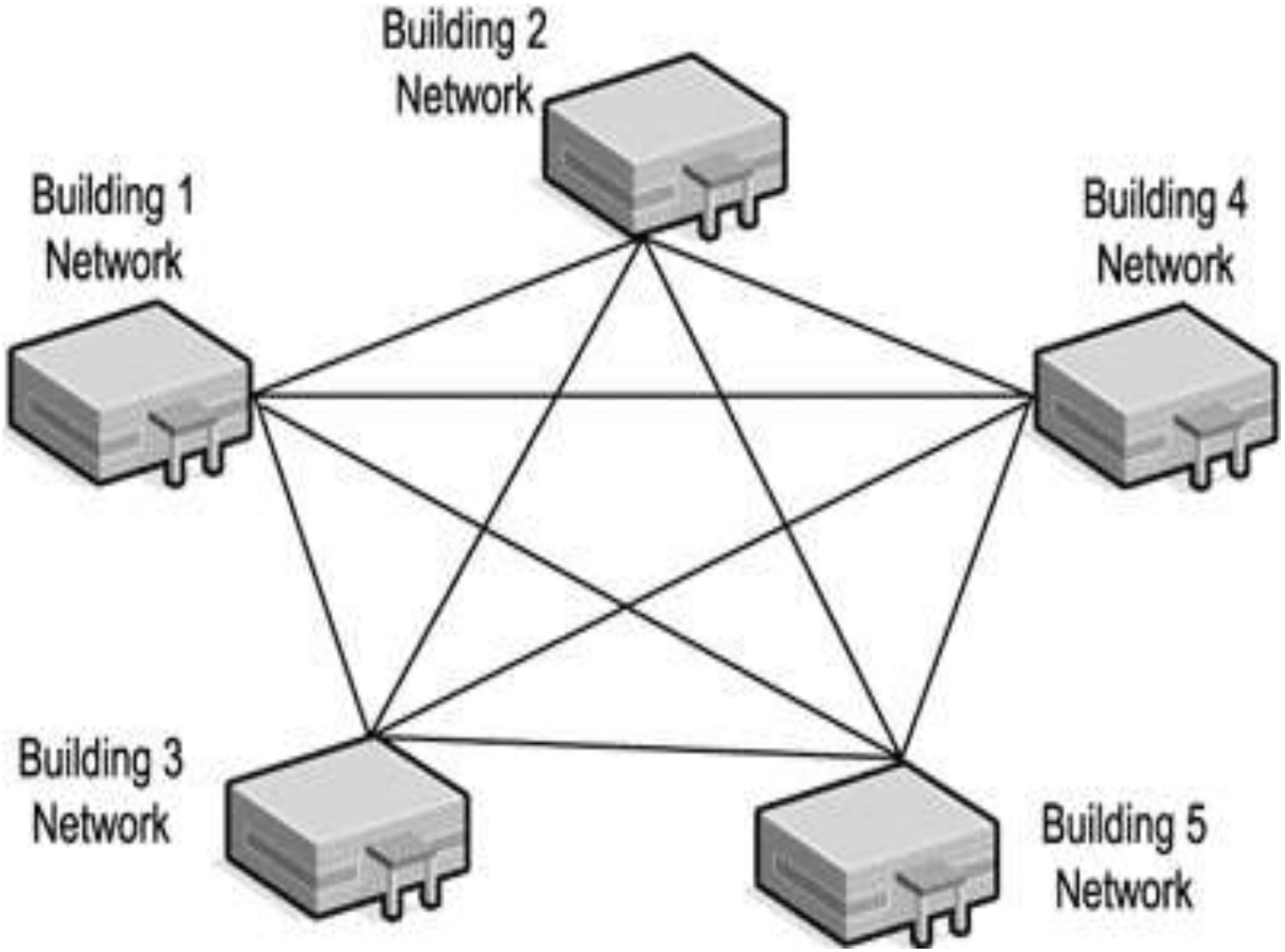
- Ring networks can span longer distances than other types of networks.
- Ring networks are easily extendable.

DISADVANTAGES:

- Relatively expensive and difficult to install.
- Failure of one computer on the network can affect the whole network.
- Adding or removing computers can disrupt the network.

MESH TOPOLOGY

- In mesh network, there is random connection of nodes using communication links.
- Mesh topology is the general topology for wide area network.
- A mesh network may be fully connected or connected with only partial links.


Building 2
Network
Building 1
Network
Building 4
Network
Building 3
Network
Building 5
Network

ADVANTAGES:

- The reliability is very high as there are always alternate paths available if direct link between two nodes is down.

- Yields the greatest amount of redundancy in the event that one of the nodes fails where network traffic can be redirected to another node.

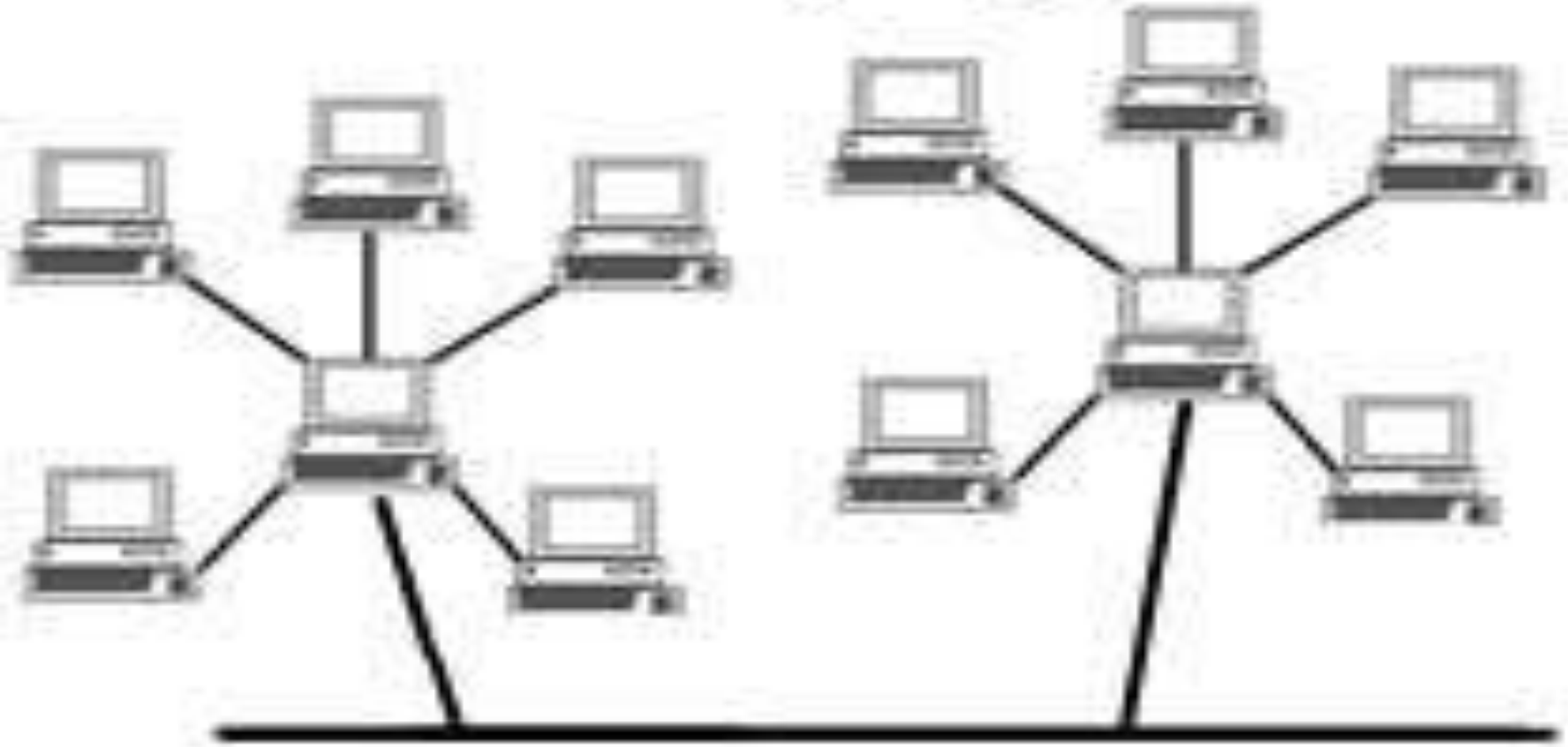
DISADVANTAGES:

- The cost of installation and maintenance is high (more cable is required than any other configuration).

TREE TOPOLOGY

- A tree topology connects one star network to the other star network.
- It is an extension of star topology.
- Here, we divided the whole network into segment which can be easily managed and maintained.

Tree Topology



http://www.computerhope.com

Advantages

- Each segment is provided with dedicated point-to-point wiring to central hub.
- Error detection and correction is easy.
- If one segment is damaged, other segment are not affected.
- Expansion of network is possible and easy.

DISADVANTAGES

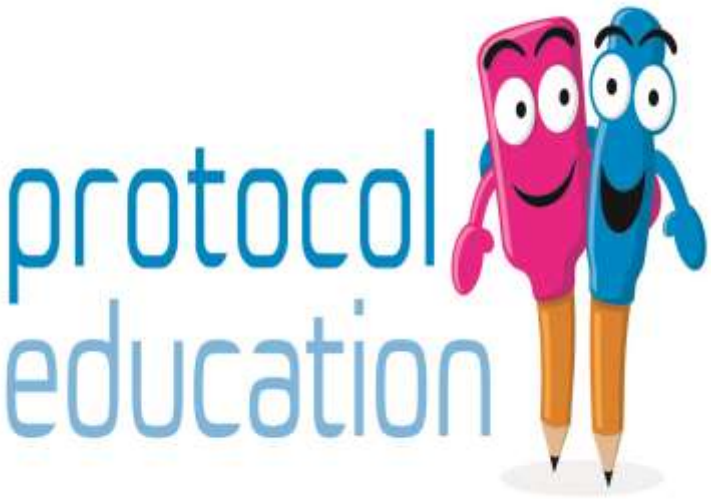
- As multiple segments are connected to a central hub, the networks depend heavily on the hub. Its failure affects the entire network.
- Maintenance is not easy and cost are high.
- With increase in size beyond a point, the management becomes difficult.

KNOW THE
RULES!

PROTOCOL

PROTOCOL CONCEPT

- A network protocol defines rules and conventions for communication between network devices.
- Protocols specify interactions between the communicating entities.



TYPES OF PROTOCOL

Protocol has Five types-

- TCP (Transmission Control Protocol)
- IP (Internet Protocol)
- HTTP (Hyper Text Transfer Protocol)
- FTP (File Transfer Protocol)
- HTTPS (Hyper Text Transfer Protocol Secure)

TCP (Transmission Control Protocol)

- It provides reliable transport service i.e. it ensures that messages sent from sender to receiver are properly routed and arrive at the destination.
- TCP converts messages into a set of packages at the source which are then reassemble back into messages at the destination. For this, TCP operates with the packet switching techniques.

Packet Switching Techniques –

- The message is divided into small packets.
- Each packet contains address and information.
- The address is used to route the packet to its destination.

IP(Internet Protocol)

- IP allows different computers to communicate.
- IP handles the dispatch of packets over the network.
- It handles the addressing of packets, and ensures that a packet reaches its destination travelling through multiple networks.

TCP/IP protocol makes it possible for any pair of computers connected to internet to communicate, despite their hardware differences.

ftp(file transfer protocol)

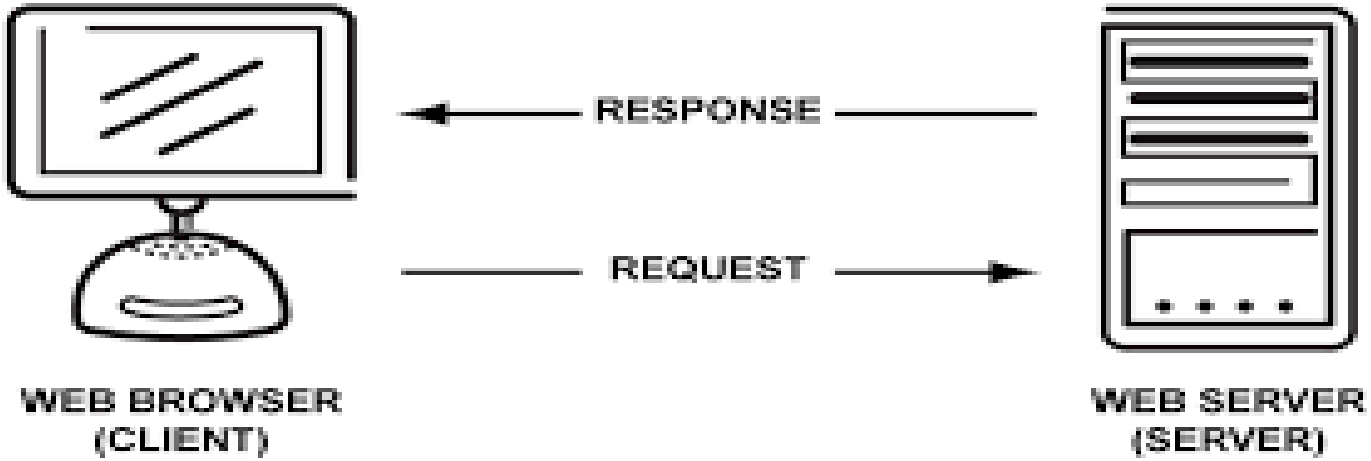
- The File Transfer Protocol (FTP) is a standard network protocol used to transfer computer files from one host to another.
- FTP is built on client server architecture.

FTP SITE

HTTP (HYPER TEXT TRANSFER PROTOCOL)

- HTTP is the underlying protocol used by the World Wide Web.
- HTTP defines how messages are formatted and transmitted and what actions web servers and browsers should take in response to various commands.

- For example, when you enter a URL in your browser, this actually sends an HTTP commands to the Web server directing it to fetch and transmit the requested Web page.



HTTPS

HTTPS(SECURE)

- HTTPS stands for Hyper Text Transfer Protocol over SSL(Secure Socket Layer). It is used by Web servers to transfer and display web content securely.

- HTTPS used by any website that is collecting sensitive customer data such as banking information or purchasing information

HARDWARE COMPONENTS

- HUB
- REPEATER
- BRIDGE
- ROUTER
- GATEWAY

HUB

- A hub is a multiport connecting device that is used to interconnect LAN devices.

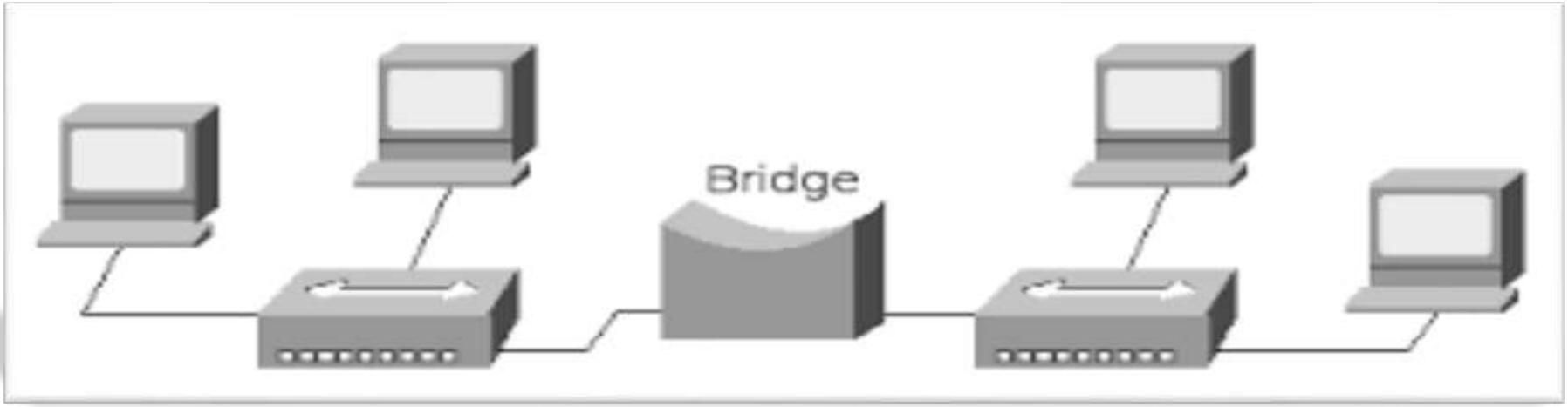
- A hub can be used to extend the physical length of a network.

REPEATER

- Repeater boost or amplifies the signal before passing it through to the next section of cable.

BRIDGES

- It connects the network with same protocol and topology.
- The main task of a bridge computer is to receive and pass data from one LAN to another.



ROUTER

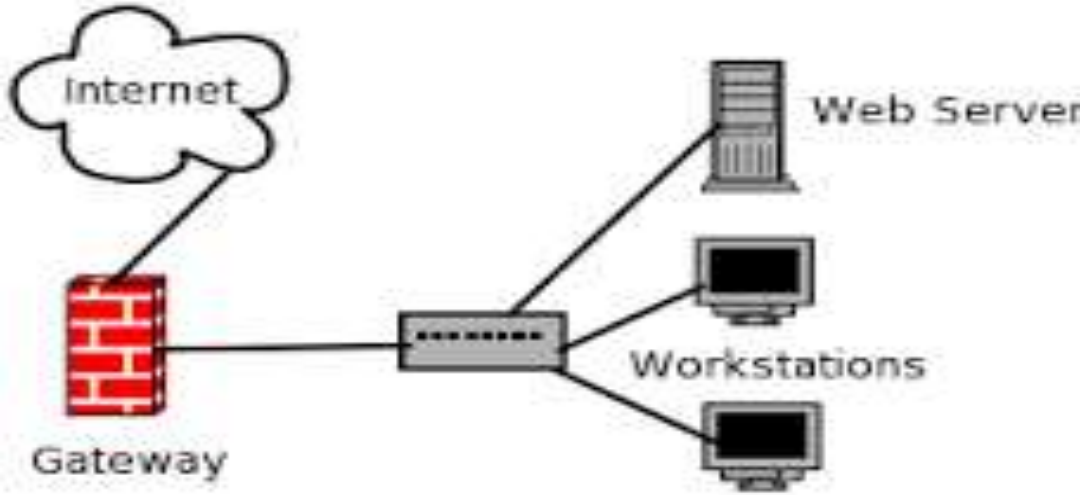
- A router is a device that connects multiple networks using similar or different protocols.

- Routers are used when several networks are connected together.

GATEWAYS

- Gateway is a device that connects two or more networks with different types of protocol.

- It receives data from one network and converts it according to the protocol of other network.



Thank
you