Business Information System

Unit – 3 Communication, Decision Making & Information System

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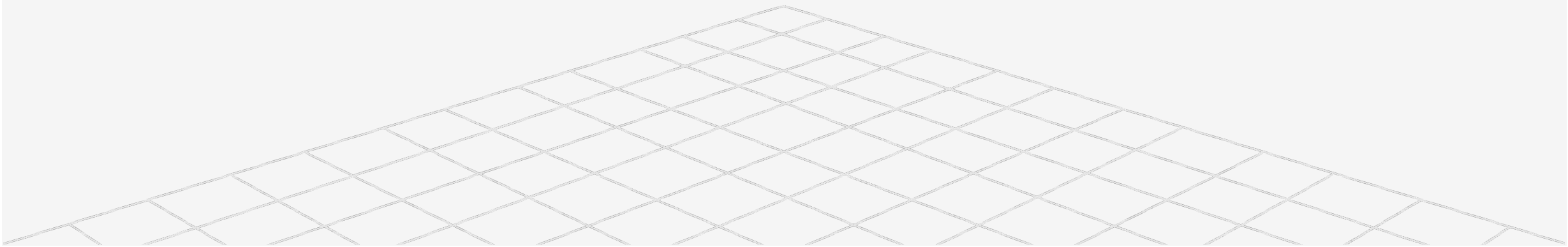
PICA – BCA

Computer Network

- A computer network is a digital telecommunications network which allows nodes to share resources.
- In computer networks, computing devices exchange data with each other using connections between nodes.
- These data links are established over cable media such as wires or optic cables, or wireless media such as Wi-Fi.

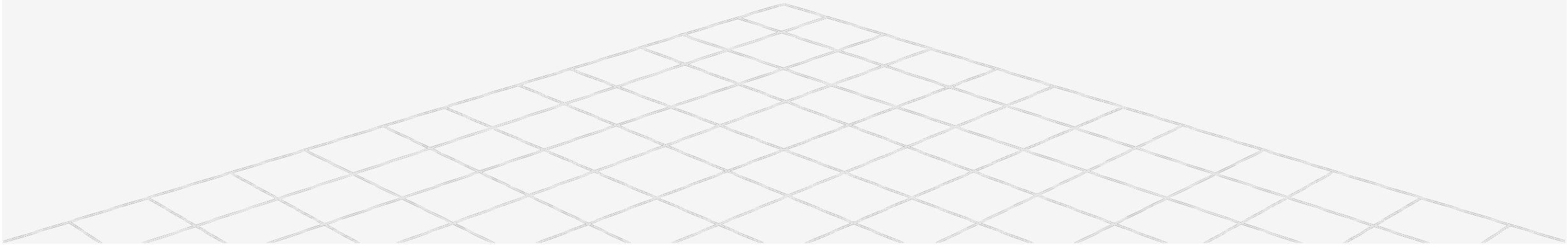


Computer Network

Advantage: It helps users to communicate, view and exchange information with other users.

All members can share

- systems with different configuration,
- share costly peripheral,
- costly software and data in cost effective manner



Computer Network Parameters: Connectivity, Availability and Performance!

Connectivity: Ability of each element of system to exchange the data with other elements.

- High degree of connectivity improves the quality of information to users. But it increases cost and complexity.

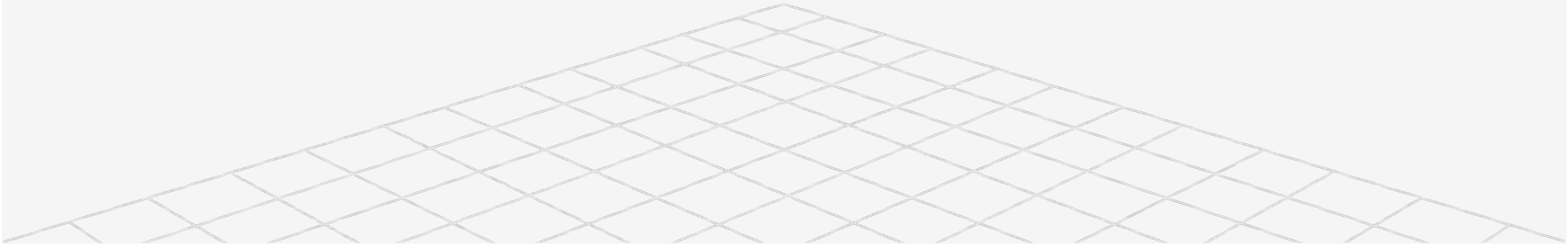
Availability: Availability in a network refers to the percentage of time that an element or user gets in the total time of the net-work.

- In case of high availability requirements, the network has to be organized in such a way that the failure of a single computer or device will not obstruct communication.

Computer Network Parameters: Connectivity, Availability and Performance!

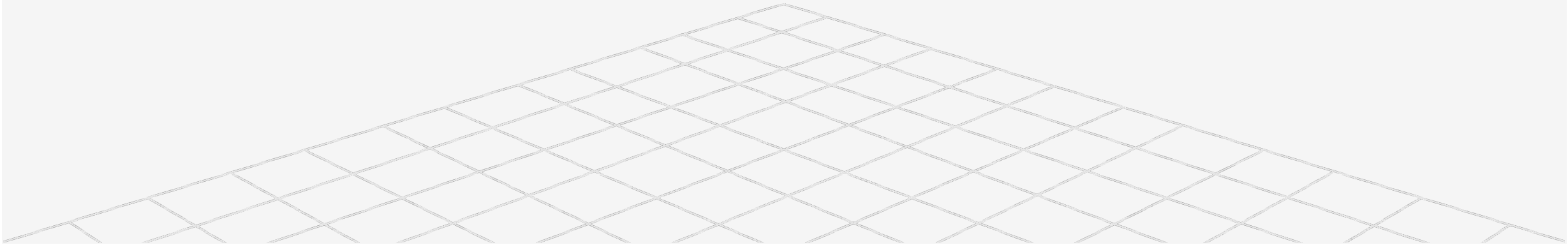
Performance: Response time is the critical measure of performance assessed by the nature of **D**ecentralized **D**ata **P**rocessing (DDP) and application it supports.

- Highly interactive DDP system gives quicker response from processor.
- DDP systems responsible for
  - Moving large volumes of data
  - Speed of transmission of data between user and host system are most critical systems.



Types of Network

1. LAN (Local Area Network)
2. MAN (Metropolitan Area Network)
3. WAN (Wide Area Network)



Types of Network

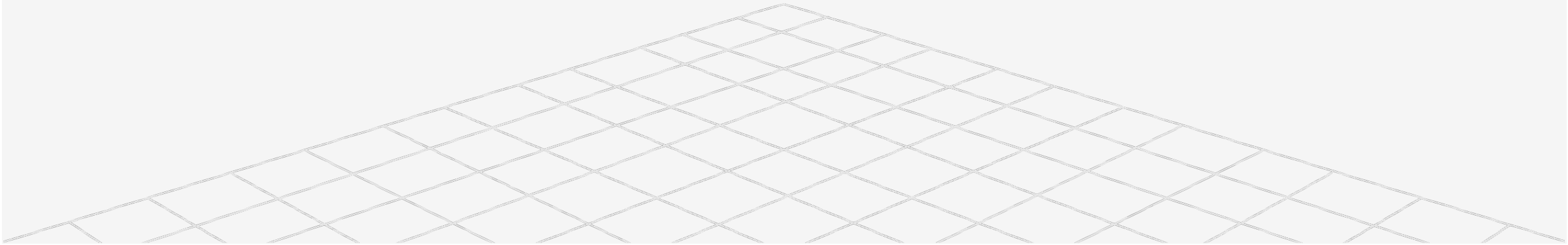
LAN (Local Area Network):

- LAN is a group of computers connected to each other in a small area such as building, office.
- LAN is used for connecting two or more personal computers through a communication medium such as twisted pair, coaxial cable, etc.
- It is less costly as it is built with inexpensive hardware such as hubs, network adapters, and Ethernet cables.
- The data is transferred at an extremely faster rate in Local Area Network.
- Local Area Network provides higher security.

Types of Network

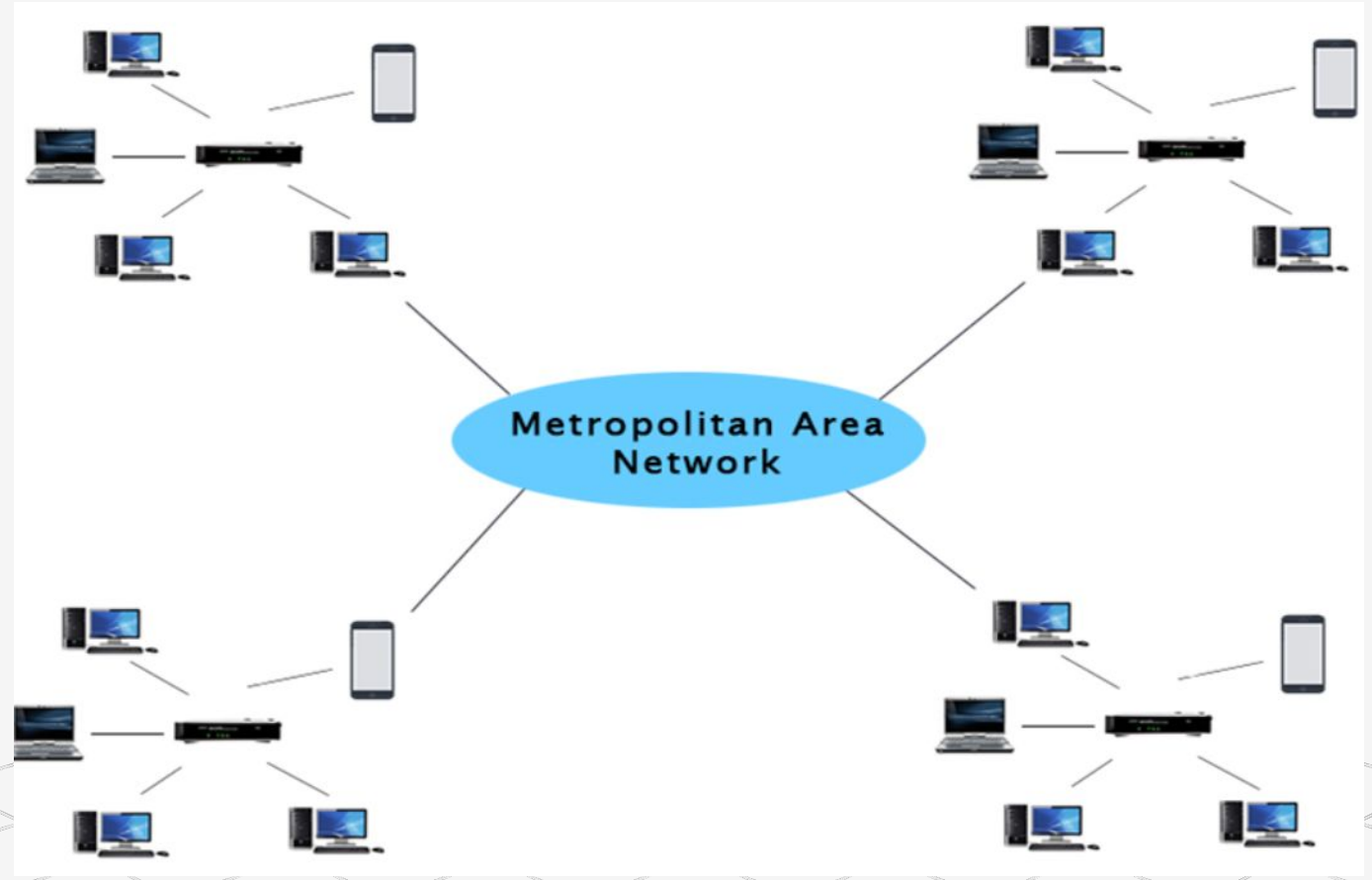
MAN (Metropolitan Area Network):

- A metropolitan area network is a network that covers a larger geographic area by interconnecting a different LAN to form a larger network.
- Government agencies use MAN to connect to the citizens and private industries.
- In MAN, various LANs are connected to each other through a telephone exchange line.
- The most widely used protocols in MAN are ATM, ISDN, etc.
- It has a higher range than Local Area Network(LAN).



Types of Network

MAN (Metropolitan Area Network):



MAN (Metropolitan Area Network):

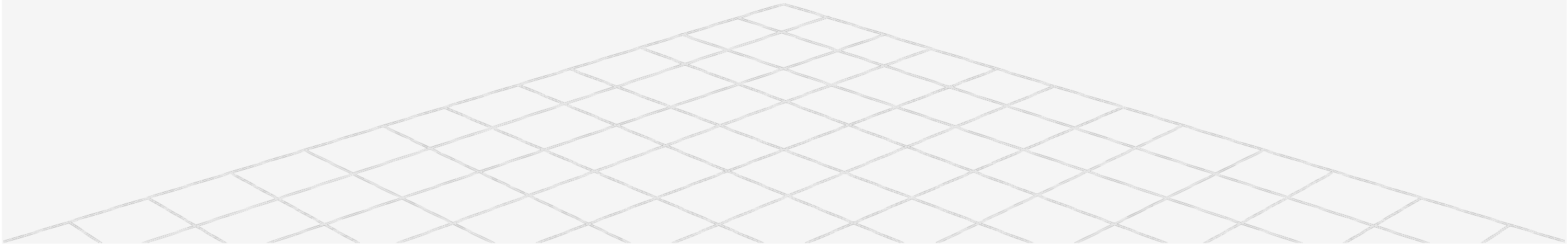
Uses Of Metropolitan Area Network:

- MAN is used in communication between the banks in a city.
- It can be used in an Airline Reservation.
- It can be used in a college within a city.
- It can also be used for communication in the military.

Types of Network

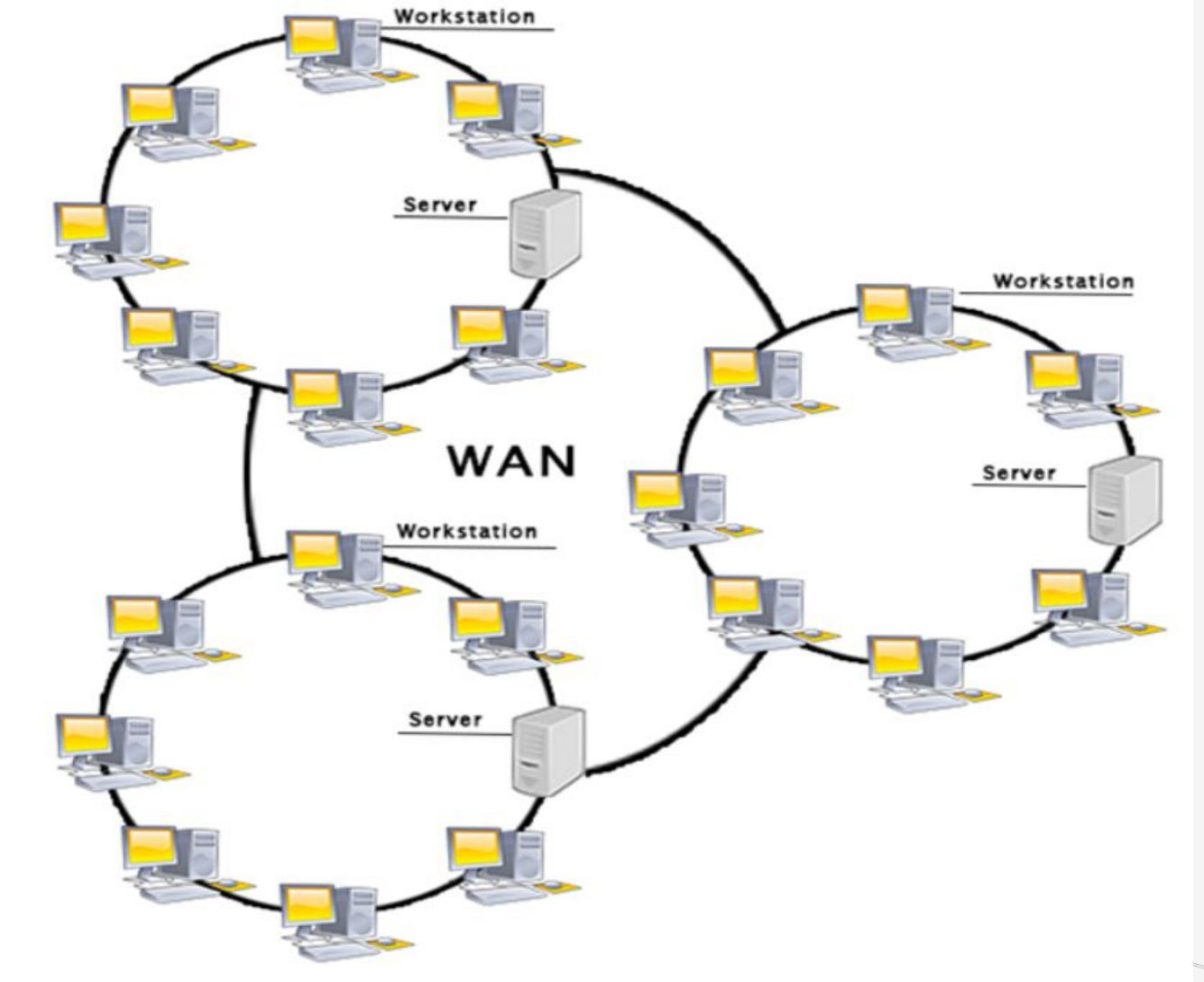
WAN (Wide Area Network):

- A Wide Area Network is a network that extends over a large geographical area such as states or countries.
- A Wide Area Network is quite bigger network than the LAN.
- A Wide Area Network is not limited to a single location, but it spans over a large geographical area through a telephone line, fiber optic cable or satellite links.
- The internet is one of the biggest WAN in the world.
- A Wide Area Network is widely used in the field of Business, government, and education.



Types of Network

WAN (Wide Area Network):



Types of Network

WAN (Wide Area Network):

Examples Of Wide Area Network:

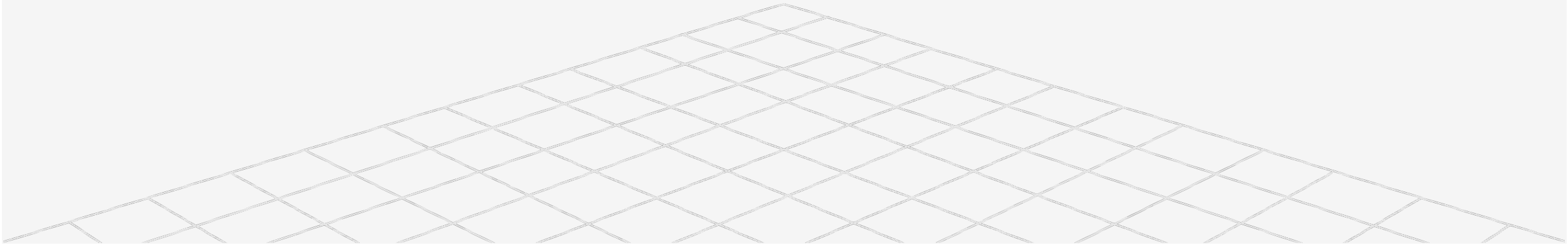
- **Mobile Broadband:** A 4G network is widely used across a region or country.
- **Last mile:** A telecom company is used to provide the internet services to the customers in hundreds of cities by connecting their home with fiber. (Example: GTPL)
- **Private network:** A bank provides a private network that connects the 44 offices. This network is made by using the telephone leased line provided by the telecom company.

Types of Network

BASIS OF COMPARISON	LAN	MAN	WAN
Expands to	Local Area Network	Metropolitan Area Network	Wide Area Network
Meaning	A network that connects a group of computers in a small geographical area.	It covers relatively large region such as cities, towns.	It spans large locality and connects countries together. Example Internet.
Ownership of Network	Private	Private or Public	Private or Public
Design and maintenance	Easy	Difficult	Difficult
Propagation Delay	Short	Moderate	Long
Speed	High	Moderate	Low
Fault Tolerance	More Tolerant	Less Toleran	Less Tolerant
Congestion	Less	More	More
Used for	College, School, Hospital.	Small towns, City.	Country/Continent.

Network Topology

1. Bus
2. Star
3. Ring
4. Mesh
5. Tree
6. Hybrid

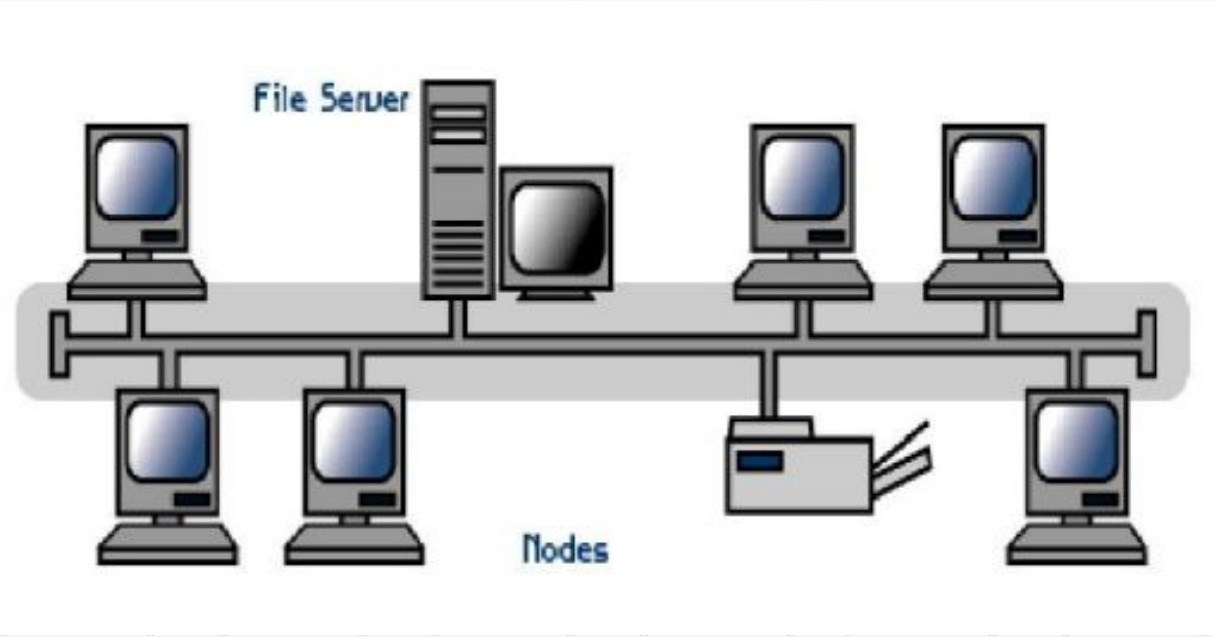


Network Topology

Bus Topology: All the nodes (file server, workstations, and peripherals) on a bus topology are connected by one single cable.

- A bus topology consists of a main run of cable with a terminator at each end. All nodes (file server, workstations, and peripherals) are connected to the linear cable.

- Popular on LANs because they are inexpensive and easy to install.



Network Topology

Bus Topology:

Advantages:

- Easy to implement and extend
- Required less cable
- Typically the least cheapest topology to implement
- Best for small networks

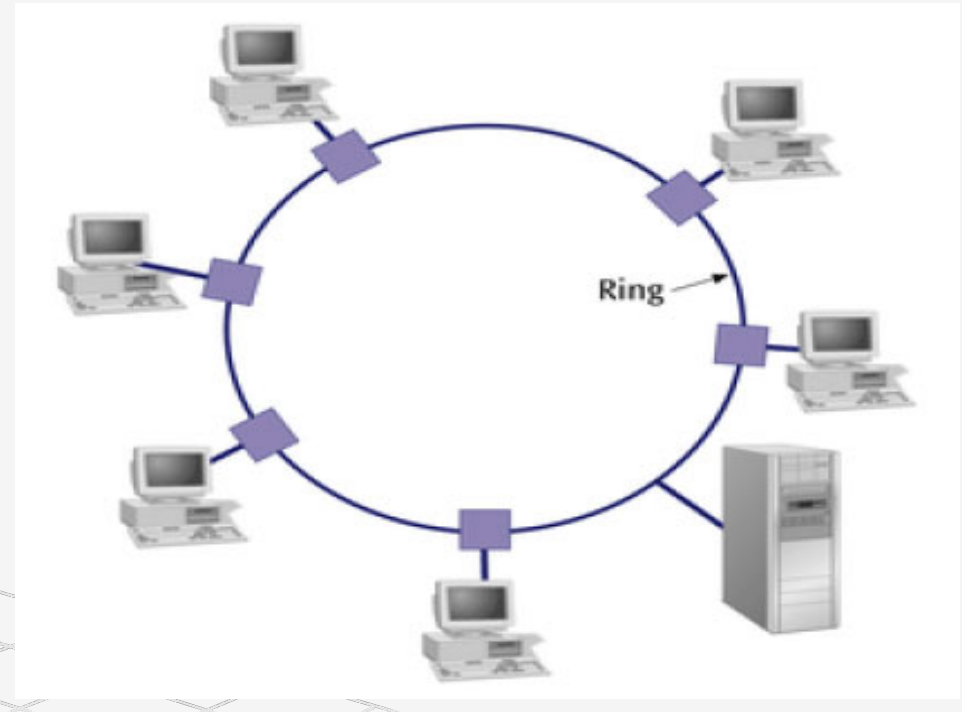
Disadvantages:

- Difficult to administer/troubleshoot
- Limited cable length and number of stations
- A cable break can disable the entire network; no redundancy
- Maintenance costs may be higher in the long run
- Performance degrades as additional computers are added

Network Topology

Ring Topology:

- In a ring network, every device has exactly two neighbors for communication purposes.
- All messages travel through a ring in the same direction.
- A failure in any cable or device breaks the loop and can take down the entire network.
- To implement a ring network we use the Token Ring technology
- A token, or small data packet, is continuously passed around the network. When a device needs to transmit, it reserves the token for the next trip around, then attaches its data packet to it.



Network Topology

Ring Topology:

Advantages:

- This type of network topology is very organized
- Performance is better than that of Bus topology
- No need for network server to control the connectivity between workstations
- Additional components do not affect the performance of network
- Each computer has equal access to resources

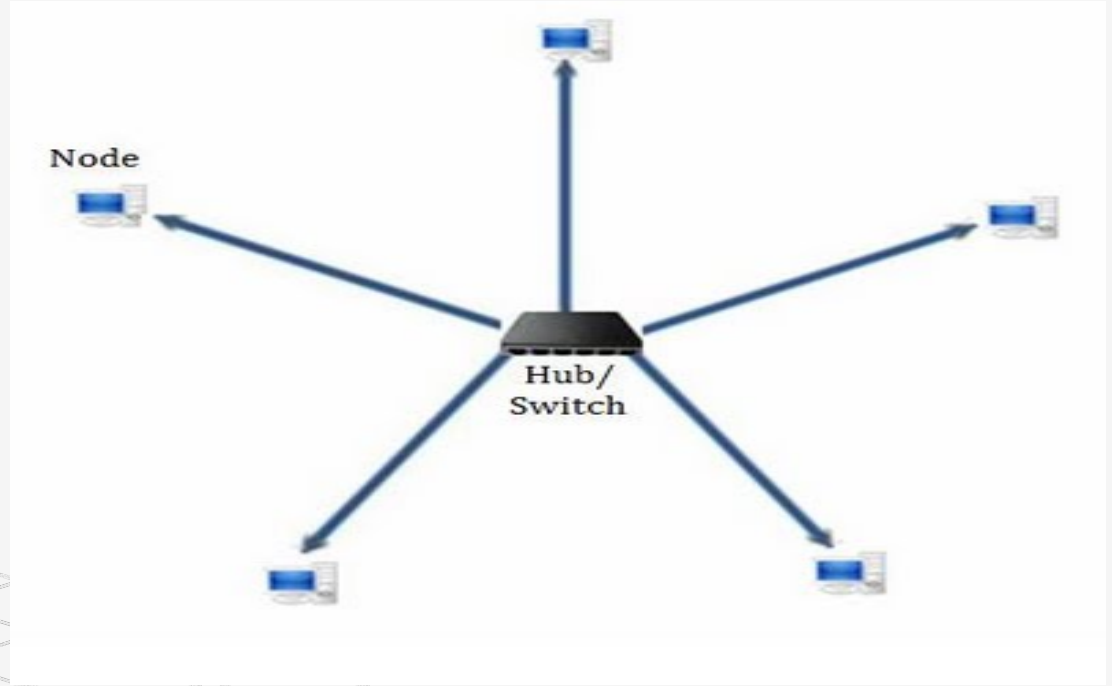
Disadvantages:

- Each packet of data must pass through all the computers between source and destination, slower than star topology
- If one workstation or port goes down, the entire network gets affected
- Network is highly dependent on the wire which connects different components

Network Topology

Star Topology: In a star network, each node (file server, workstations, and peripherals) is connected to a central device called a hub.

- The hub takes a signal that comes from any node and passes it along to all the other nodes in the network.
- Data on a star network passes through the hub, switch, or concentrator before continuing to its destination.
- The hub, switch, or concentrator manages and controls all functions of the network.
- The star topology reduces the chance of network failure by connecting all of the systems to a central node.



Network Topology

Star Topology:

Advantages:

- Compared to Bus topology it gives far much better performance
- Easy to connect new nodes or devices
- Centralized management. It helps in monitoring the network
- Failure of one node or link doesn't affect the rest of network

Disadvantages:

- If central device fails whole network goes down
- The use of hub, a router or a switch as central device increases the overall cost of the network
- Performance and as well number of nodes which can be added in such topology is depended on capacity of central device

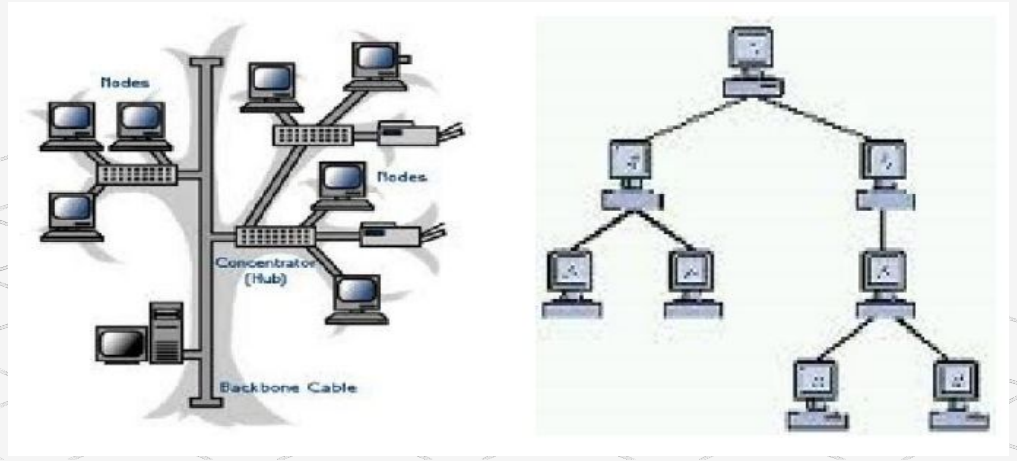
Network Topology

Tree Topology: A tree topology (hierarchical topology) can be viewed as a collection of star networks arranged in a hierarchy.

This tree has individual peripheral nodes which are required to transmit to and receive from one other only and are not required to act as repeaters or regenerators.

The tree topology arranges links and nodes into distinct hierarchies in order to allow greater control and easier troubleshooting.

This is particularly helpful for colleges, universities and schools so that each of the connect to the big network in some way.



Network Topology

Tree Topology:

Advantages:

- Point-to-point wiring for individual segments.
- Supported by several hardware and software vendors.
- All the computers have access to the larger and their immediate networks.

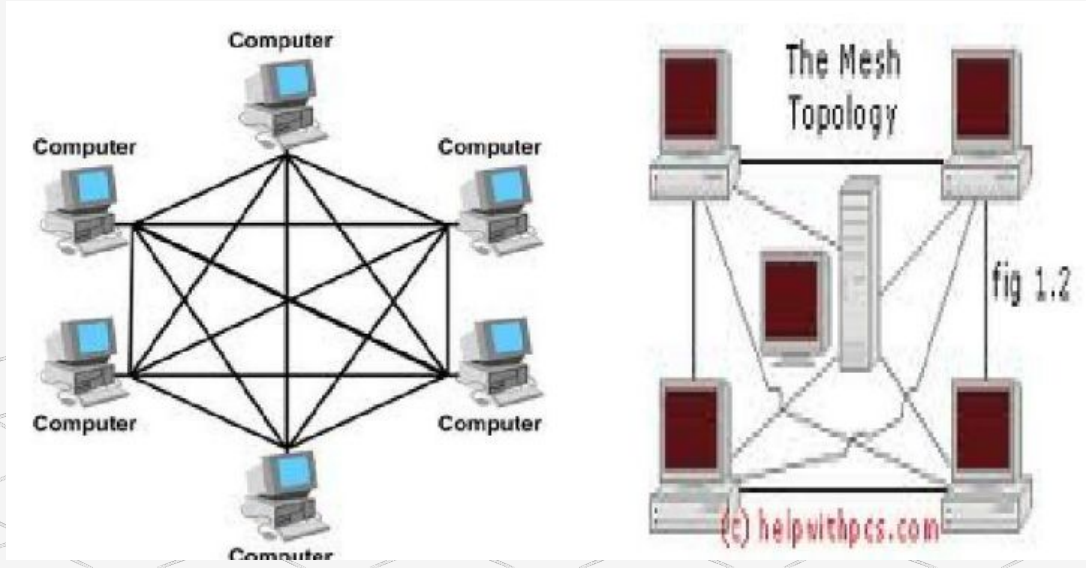
Disadvantages:

- Overall length of each segment is limited by the type of cabling used.
- If the backbone line breaks, the entire segment goes down.
- More difficult to configure and wire than other topologies.

Network Topology

Mesh Topology: In this topology, each node is connected to every other node in the network.

- Implementing the mesh topology is expensive and difficult.
- In this type of network, each node may send message to destination through multiple paths.
- While the data is travelling on the Mesh Network it is automatically configured to reach the destination by taking the shortest route which means the least number of hops.



Network Topology

Mesh Topology:

Advantages:

- No traffic problem as there are dedicated links.
- It has multiple links, so if one route is blocked then other routes can be used for data communication.
- Points to point links make fault identification easy.

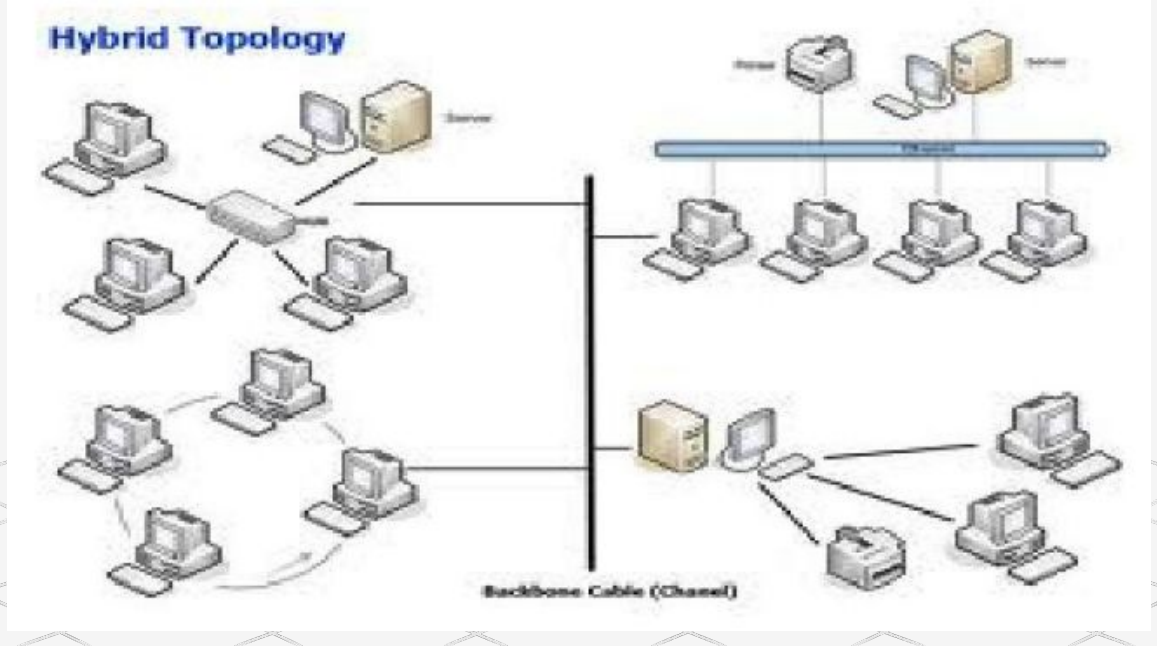
Disadvantages:

- There is mesh of wiring which can be difficult to manage.
- Installation is complex as each node is connected to every node.
- Cabling cost is high.

Network Topology

Hybrid Topology: A combination of any two or more network topologies.

- A hybrid topology always accrues when two different basic network topologies are connected.
- It is a mixture of above mentioned topologies. Usually, a central computer is attached with sub-controllers which in turn participate in a variety of topologies.



Network Topology

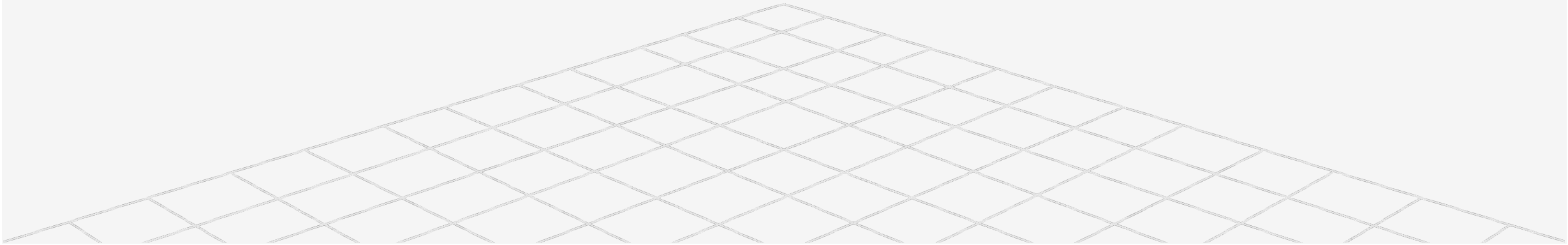
Hybrid Topology:

Advantages:

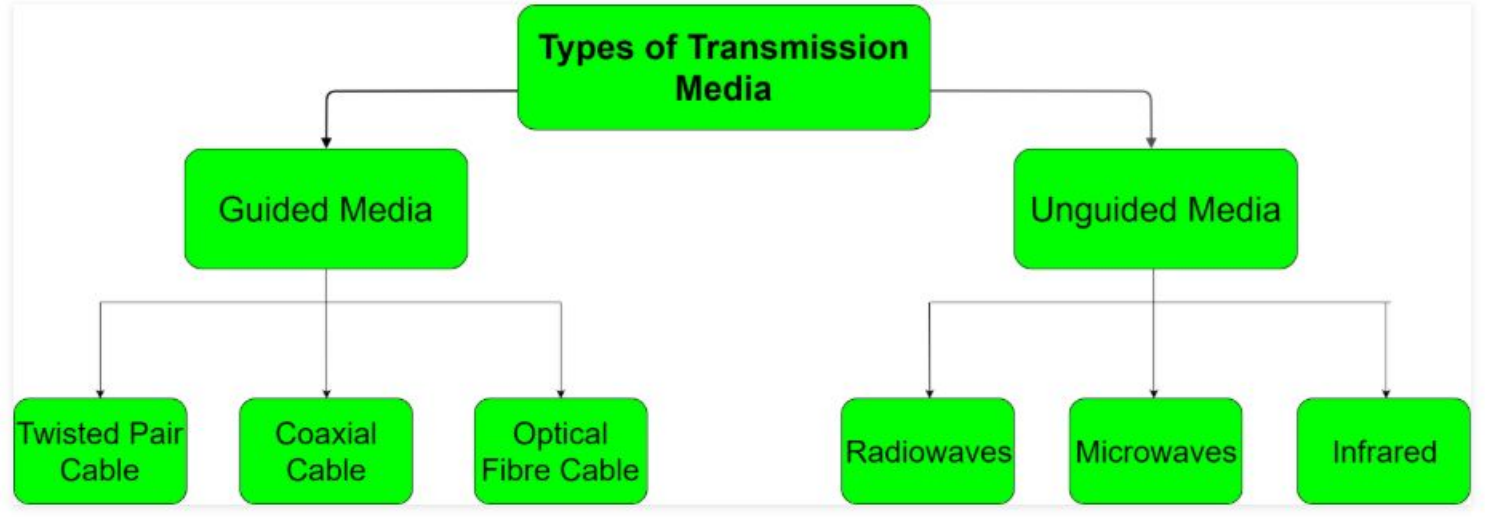
- It is extremely flexible.
- It is very reliable.

Disadvantages:

- Expensive



Transmission Medium



Transmission Medium

1. **Guided Media:** It is also referred to as Wired or Bounded transmission media. Signals being transmitted are directed and confined in a narrow pathway by using physical links.

Features:

- High Speed
- Secure
- Used for comparatively shorter distances

There are 3 major types of Guided Media:

Twisted Pair Cable

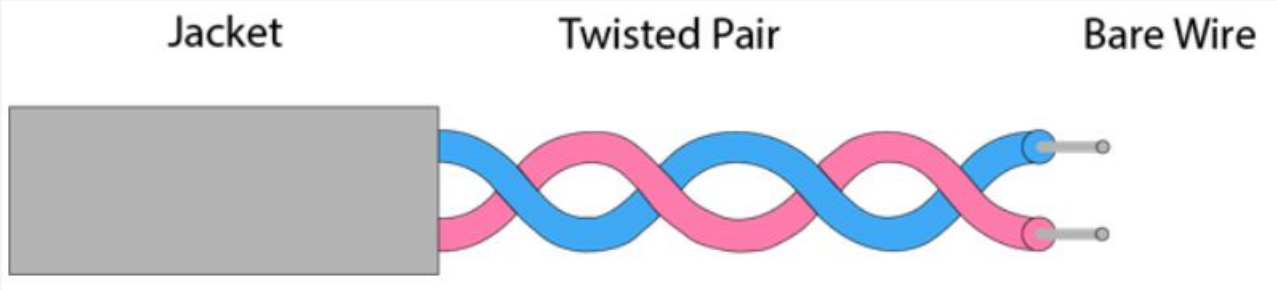
Coaxial Cable

Optical Fibre Cable

Transmission Medium

a. Twisted Pair Cable: Twisted pair is a physical media made up of a pair of cables twisted with each other. A twisted pair cable is cheap as compared to other transmission media. Installation of the twisted pair cable is easy, and it is a lightweight cable.

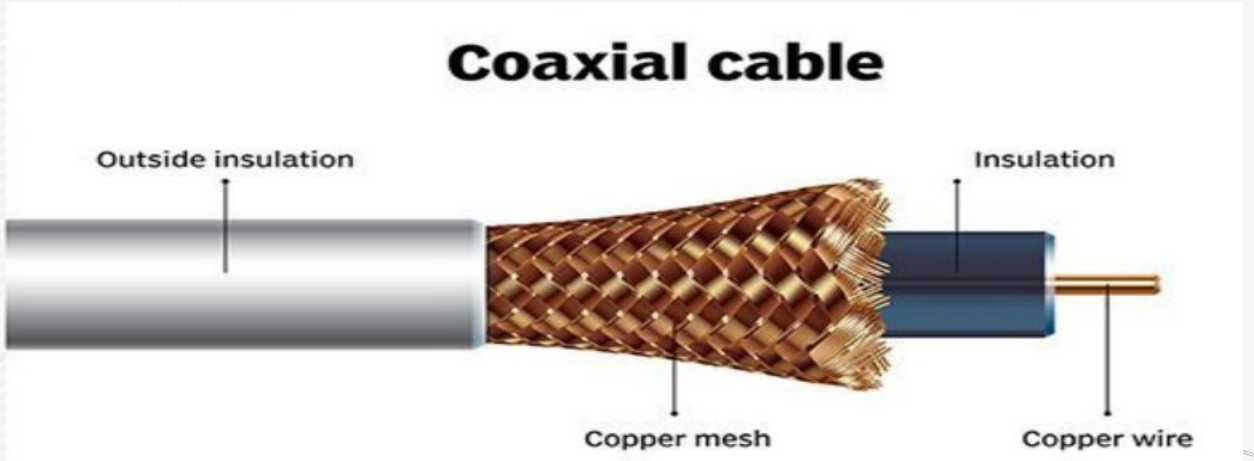
A twisted pair consists of two insulated copper wires arranged in a regular spiral pattern.



Transmission Medium

b. Coaxial Cable: Coaxial cable is very commonly used transmission media, for example, TV wire is usually a coaxial cable.

- The name of the cable is coaxial as it contains two conductors parallel to each other.
- It has a higher frequency as compared to Twisted pair cable.
- The inner conductor of the coaxial cable is made up of copper, and the outer conductor is made up of copper mesh. The middle core is made up of non-conductive cover that separates the inner conductor from the outer conductor.



Transmission Medium

Coaxial Cable Example:

Advantages of Coaxial cable:

- The data can be transmitted at high speed.
- It has better shielding as compared to twisted pair cable.
- It provides higher bandwidth.

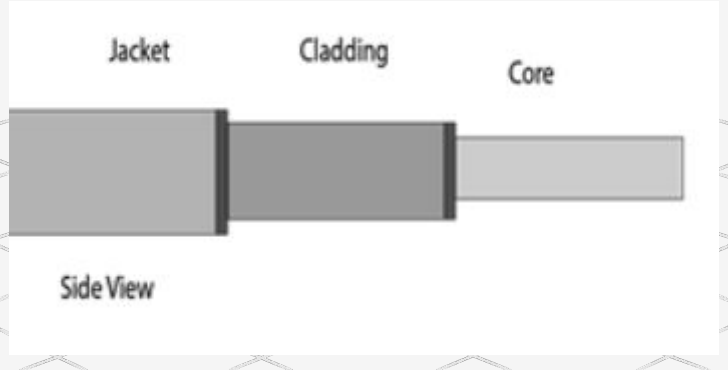
Disadvantages of Coaxial cable:

- It is more expensive as compared to twisted pair cable.
- If any fault occurs in the cable causes the failure in the entire network.

Transmission Medium

c. Optical Fibre Cable: Fibre optic cable is a cable that uses electrical signals for communication.

- Fibre optic is a cable that holds the optical fibres coated in plastic that are used to send the data by pulses of light.
- The plastic coating protects the optical fibres from heat, cold, electromagnetic interference from other types of wiring.
- Fibre optics provide faster data transmission than copper wires.
- Example: Internet, Television, Military & Space Application and many more.



Transmission Medium

Optical Fibre Cable Example:

Optical Fibre Cable Advantages:

- **Greater Bandwidth:** The fibre optic cable provides more bandwidth as compared copper. Therefore, the fibre optic carries more data as compared to copper cable.
- **Faster speed:** Fibre optic cable carries the data in the form of light. This allows the fibre optic cable to carry the signals at a higher speed.
- **Longer distances:** The fibre optic cable carries the data at a longer distance as compared to copper cable.
- **Better reliability:** The fibre optic cable is more reliable than the copper cable as it is immune to any temperature changes while it can cause obstruct in the connectivity of copper cable.

Transmission Medium

2. Unguided Media: An unguided transmission transmits the electromagnetic waves without using any physical medium. Therefore it is also known as wireless transmission.

Features:

- Signal is broadcasted through air
- Less Secure
- Used for larger distances

There are 3 major types of Unguided Media:

Radio Waves

Microwaves

Infrared

Transmission Medium

a. Radio Waves:

- Radio waves are the electromagnetic waves that are transmitted in all the directions of free space.
- Radio waves are omnidirectional, i.e., the signals are propagated in all the directions.
- The range in frequencies of radio waves is from 3Khz to 1Ghz.
- In the case of radio waves, the sending and receiving antenna are not aligned, i.e., the wave sent by the sending antenna can be received by any receiving antenna.
- An example of the radio wave is FM radio, Cordless Phones.

Transmission Medium

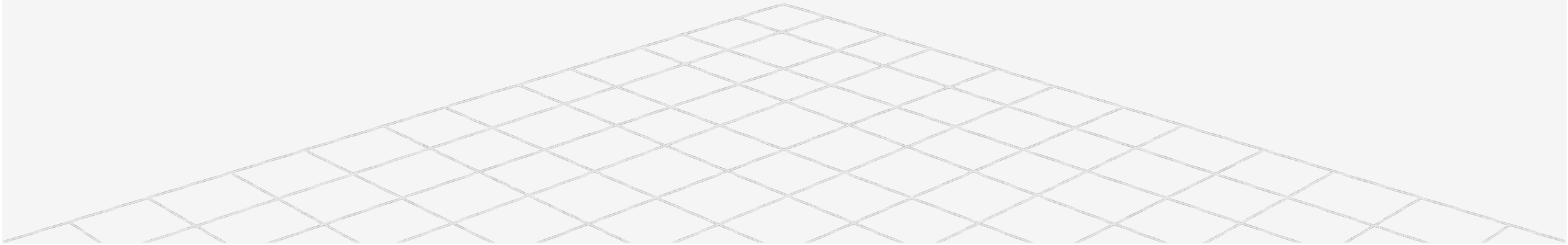
b. Microwaves:

- It is a line of sight transmission i.e. the sending and receiving antennas need to be properly aligned with each other.
- The distance covered by the signal is directly proportional to the height of the antenna. Frequency Range:1GHz – 300GHz.
- These are majorly used for mobile phone communication and television distribution.

Transmission Medium

c. Infrared:

- An infrared transmission is a wireless technology used for communication over short ranges.
- The frequency of the infrared in the range from 300 GHz to 400 THz.
- It is used for short-range communication such as data transfer between two cell phones, TV remote operation, data transfer between a computer and cell phone resides in the same closed area.



Decision Making Concepts

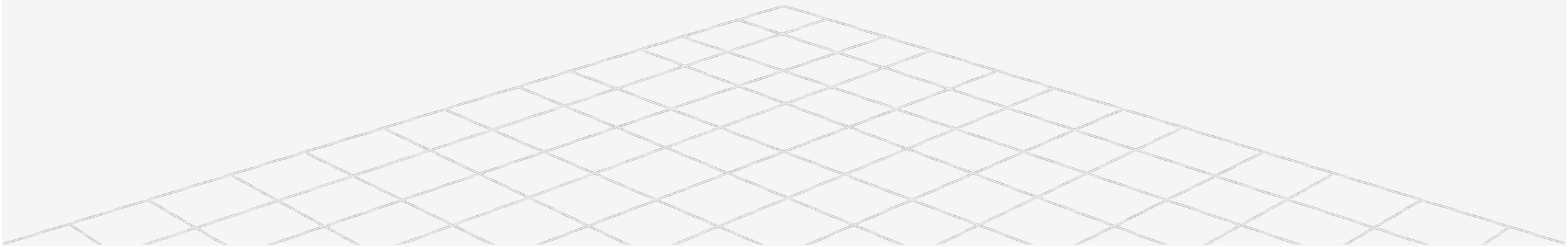
- The word “decision” is derived from the Latin root **decido**, meaning to **cut off**.
- A decision is the choice out of several options made by the decision maker to achieve some objective in a given situation.
- Business decisions are those, which are made in the process of conducting business to achieve its objectives in a given environment.
- Decision maker is rational person.

Characteristics of decision making:

- Sequential in nature.
- Exceedingly complex due to risks and trade offs.
- Influenced by personal values.
- Made in institutional settings and business environment

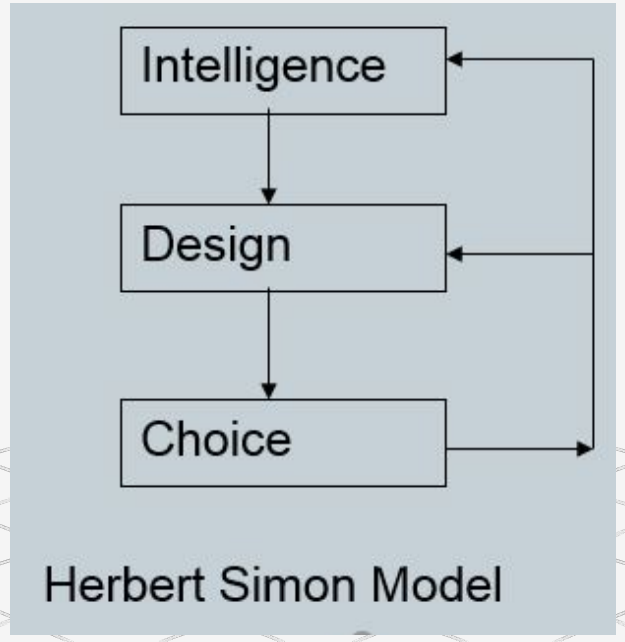
Decision Making Concepts

- The thought process of selecting a logical choice from the available options.
- When trying to make a good decision, a person must weight the positives and negatives of each option, and consider all the alternatives.
- For effective decision making, a person must be able to forecast the outcome of each option as well, and based on all these items, determine which option is the best for that particular situation.



Decision Making Process

- Decision-making is a process which the decision-maker uses to arrive at a decision.
- Herbert Simon said that a decision maker follows the process disregarding the decision and the type of decision and the motive behind the decision.



Decision Making Process

- **Intelligence:** MIS collects the data. the data is scanned, examined, checked and edited. Further, the data is sorted and merged with other data and computations are made, summarized and presented. Identifies a problem calling for a decision.

- **Design:** The manager develops a model of the problem situation on which he can generate and test the different decisions to facilitate its implementation. Inventing, developing and analyzing the different decision alternatives and testing the feasibility of implementation. Assess the value of the decision outcome.

- **Choice:** The manager evolves a selection criterion such as maximum profit, least cost, minimum waste, least time taken, and highest utility. Select one alternative as a decision, based on the selection criteria.

Transaction Processing System

Transaction processing is a way of computing that divides work into individual, indivisible operations, called transactions. A transaction processing system is a software system, or software/hardware combination, that supports transaction processing.

- handles most of the internal information
- Generate operational information for lower managers
- Provide necessary input for MIS

Examples: Airline Reservation System, Bank Accounting Processing System, Electronic Transfer of Funds.

Thank You...