



# Network Topology & Types of Network

# What is Network Topology?

**A computer network is a collection of two or more computers which are connected together to share information and resources.**



# Types of Topology

## Based on geographical area covered

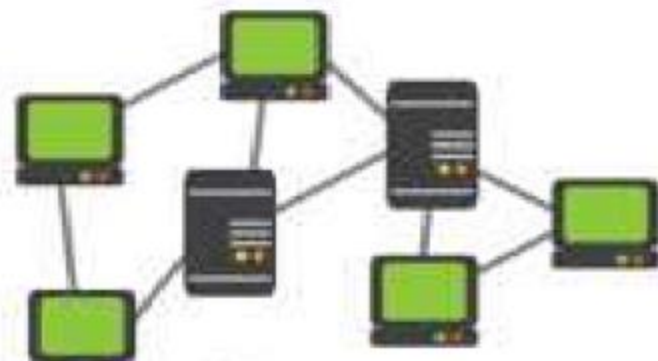
- Local Area Network (LAN)
- Metropolitan Area Network (MAN)
- Wide Area Network (WAN)

## Based on Architecture

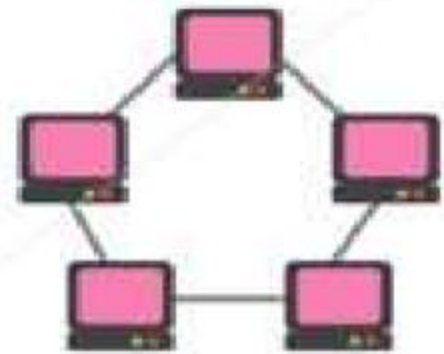
- Bus Topology
- Star Topology
- Ring Topology
- Tree Topology
- Mesh Topology
- Hybrid Topology



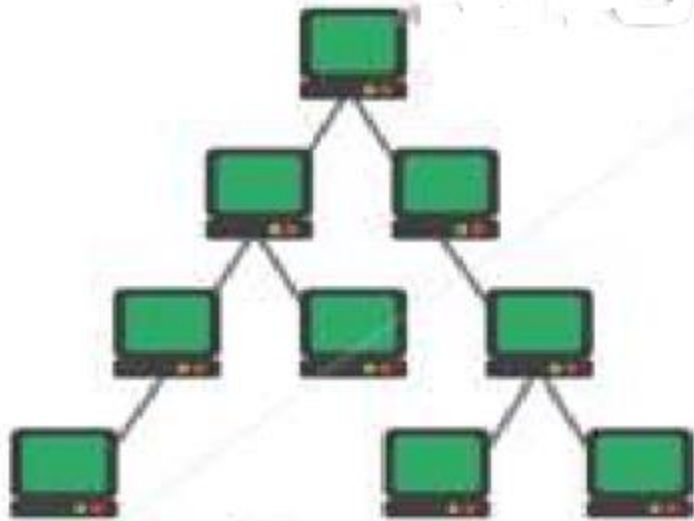
Star



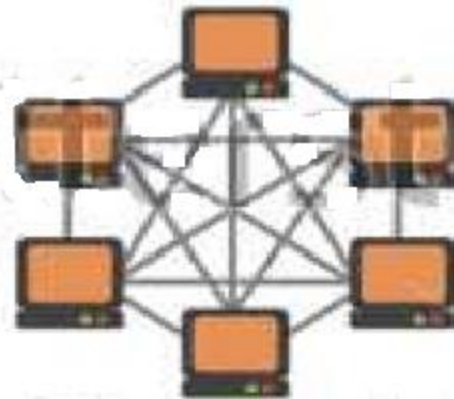
Mesh



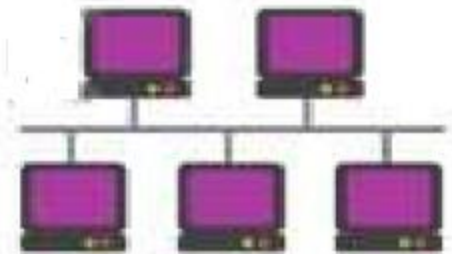
Ring



Tree



Fully Connected



Bus

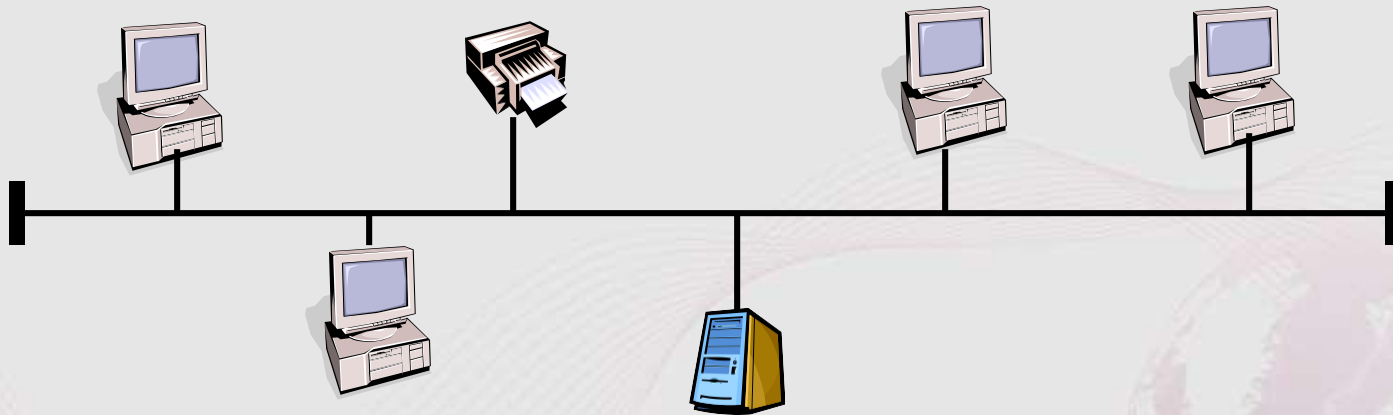


Line

Network topologies are the way in which nodes are connected in a network. The most common network topologies are Star, Mesh, Ring, Fully Connected, Tree, Bus, and Line.

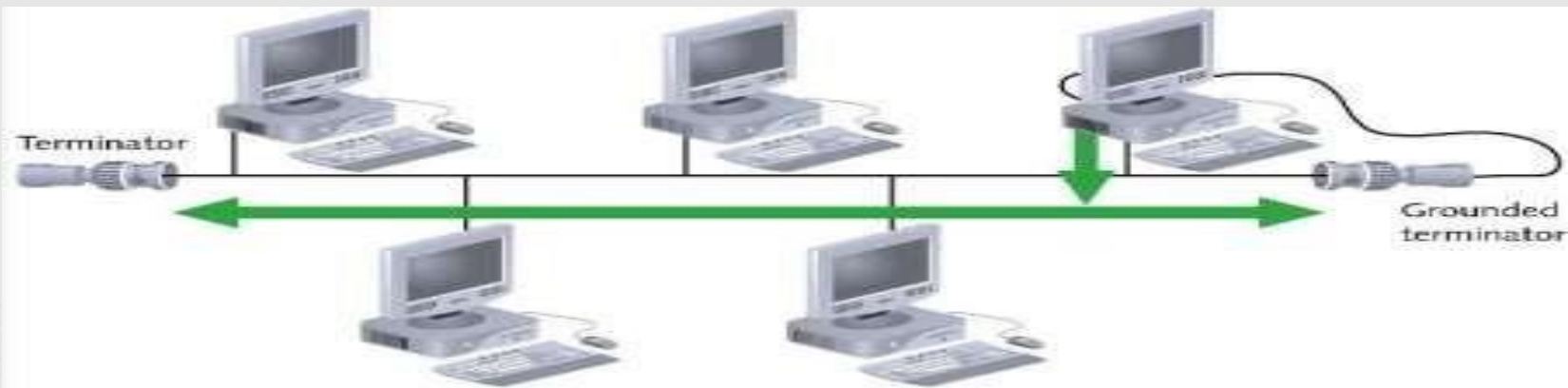
# Bus Topology

A **Bus topology** consists of a single cable—called a **bus**—connecting all nodes on a network without intervening connectivity devices



# Advantages of Bus Topology

- Works well for small networks.
- Relatively inexpensive to implement.
- Easy to expand joining two cables together.
- Used in small network.



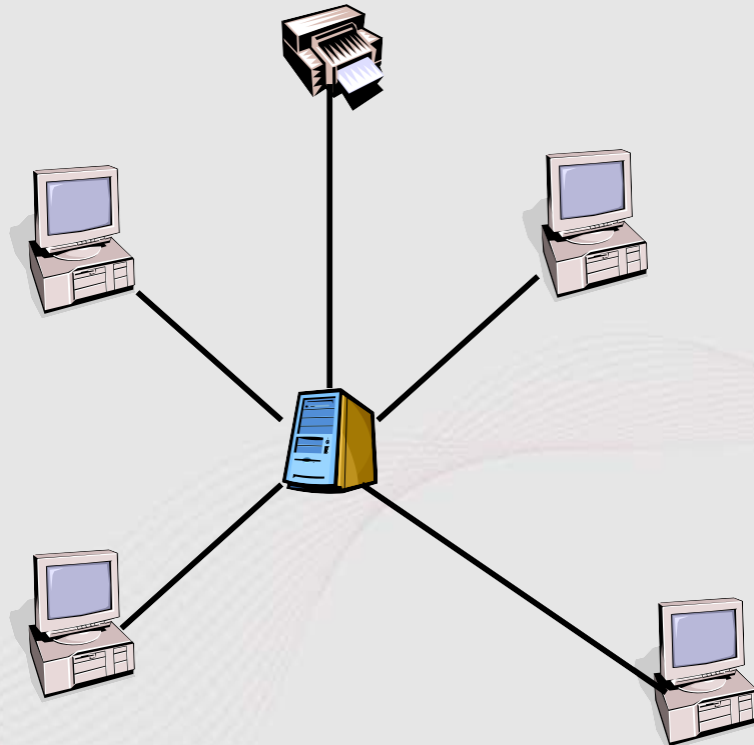
# Disadvantages of Bus Topology

- Management costs can be high
- Cables fails then whole network fails.
- Cables has a limited length.



# Star Topology

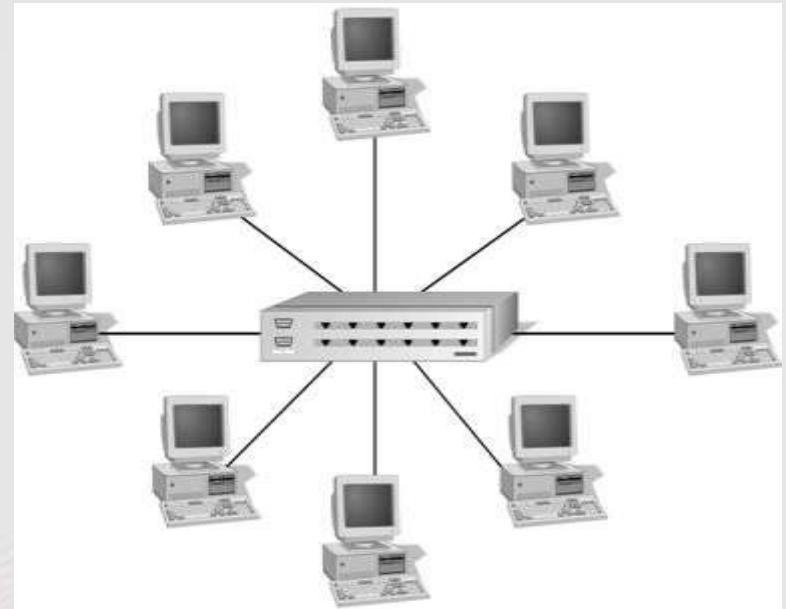
A star network is designed with each node (file server, workstation, peripheral) connected directly to a central network hub or server.





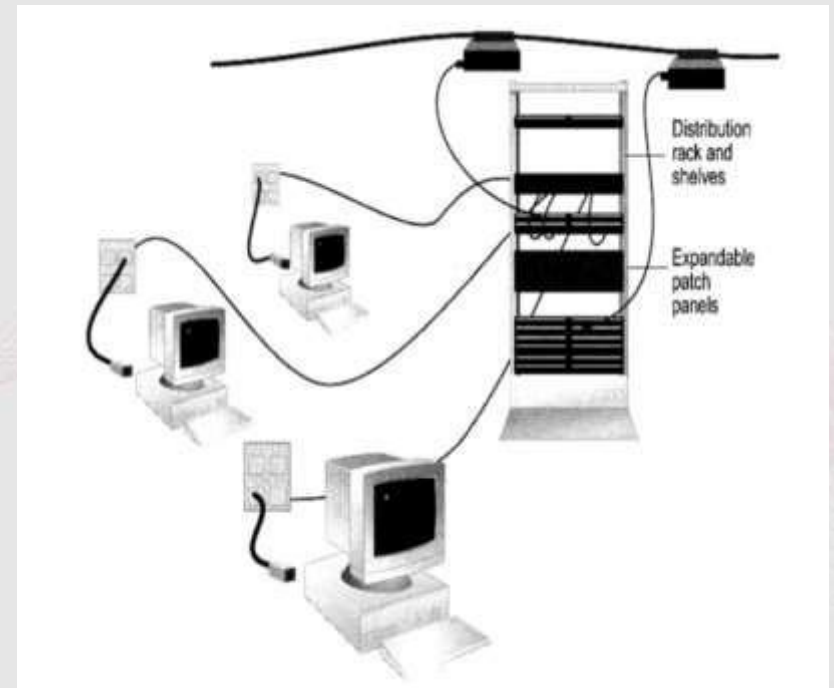
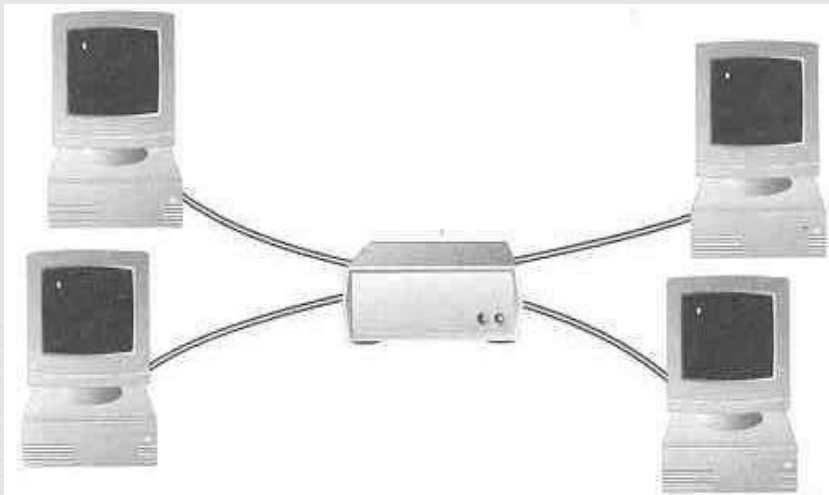
# Advantages of Star Topology

- Good option for modern networks
- Low startup costs
- Easy to manage
- Offers opportunities for expansion
- Most popular topology in use wide variety of equipment available



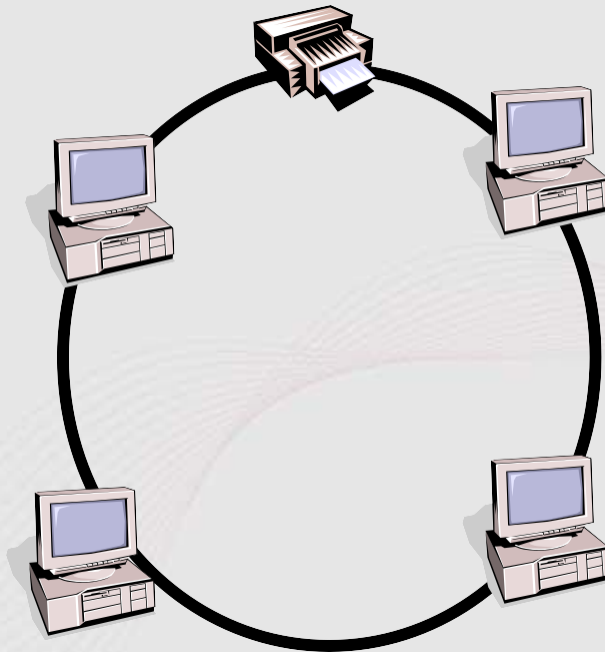
# Disadvantages of Star Topology

- Hub is a single point of failure
- Requires more cable than the bus
- Cost of installation is high.



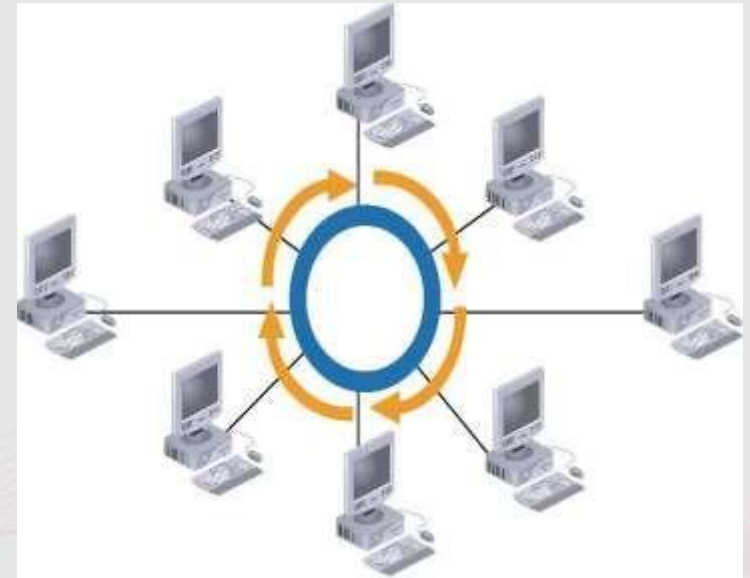
# Ring topology

A ring network is one where all workstations and other devices are connected in a continuous loop. There is no central server.



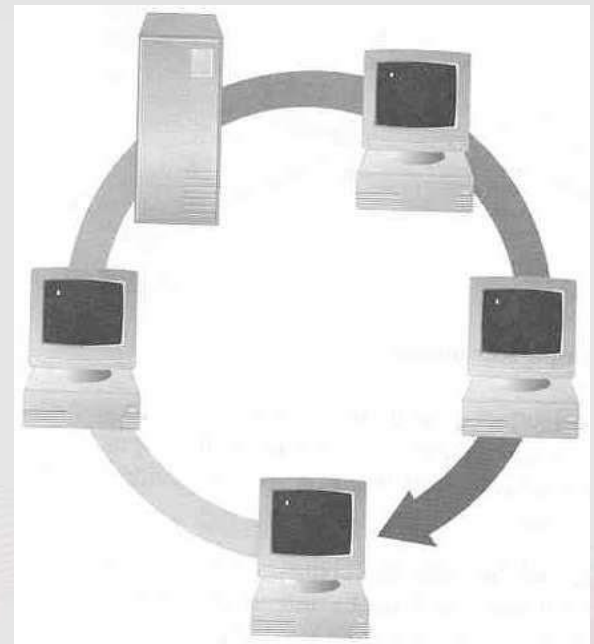
# Advantages of Ring Topology

- Easier to manage; easier to locate a defective node or cable problem
- Well-suited for transmitting signals over long distances on a LAN
- Handles high-volume network traffic



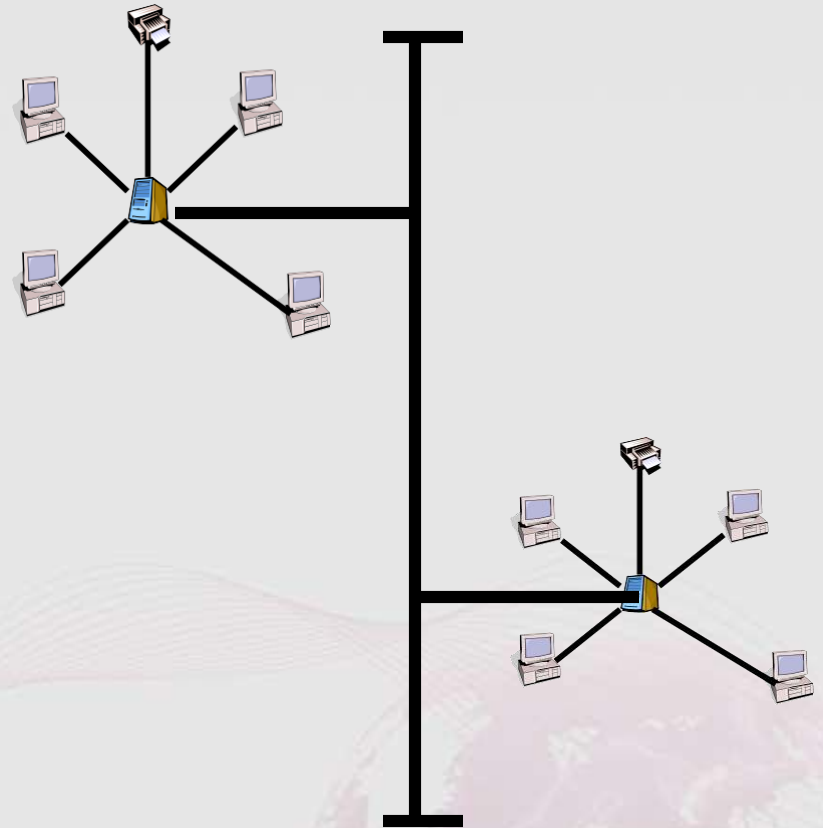
# Disadvantages of Ring Topology

- Expensive
- Requires more cable and network equipment at the start
- Not used as widely as bus topology
  - Fewer equipment options
  - Fewer options for expansion to high-speed communication



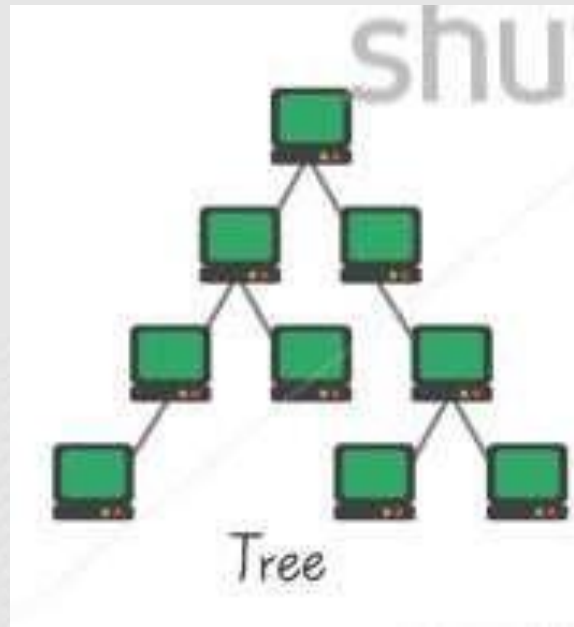
# Tree topology

- It has a root node and all other nodes are connected to it forming a hierarchy. It is also called Hierarchical Topology.



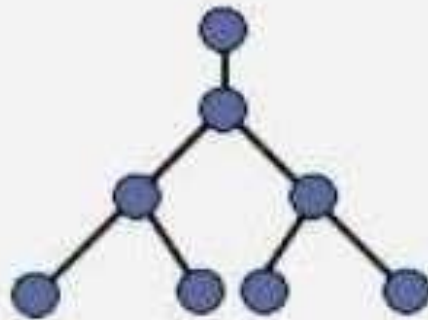
# Advantages Of Tree Topology

- Extension of Bus and Star Topology.
- Expansion of nodes is possible and easy.
- Easily managed and maintained.



# Disadvantages Of Tree Topology

- Heavily cabled.
- Costly.
- If more nodes are added maintenance is difficult.
- Central hub fails, network fails.



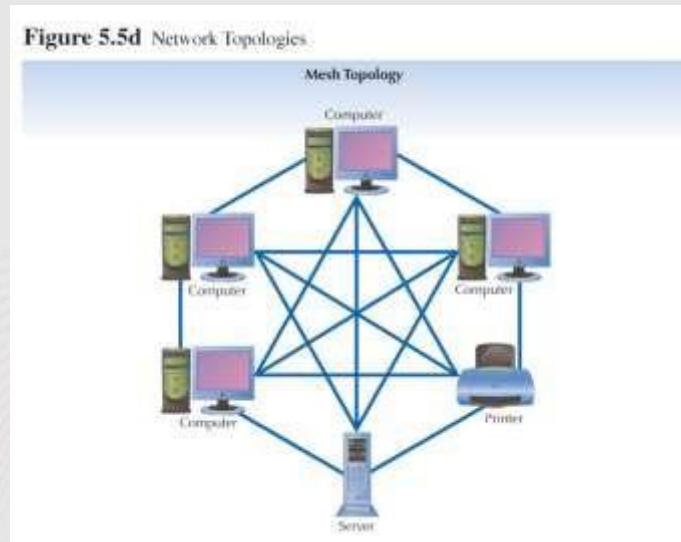
**Hierarchical**



# Mesh Topology

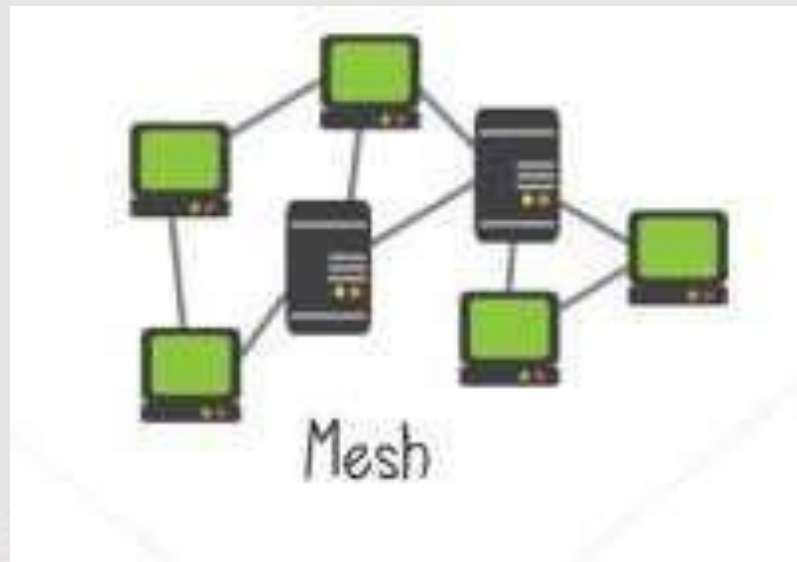
It is a point-to-point connection to other nodes or devices. Traffic is carried only between two devices or nodes to which it is connected. Mesh has  $n(n-2)/2$  physical channels to link  $n$  devices.

Figure 5.5d Network Topologies.



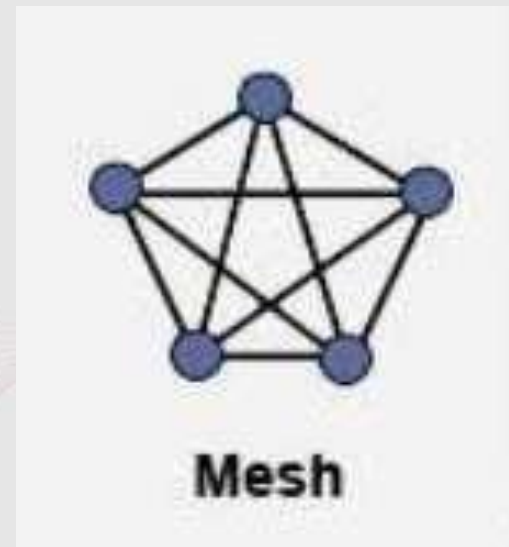
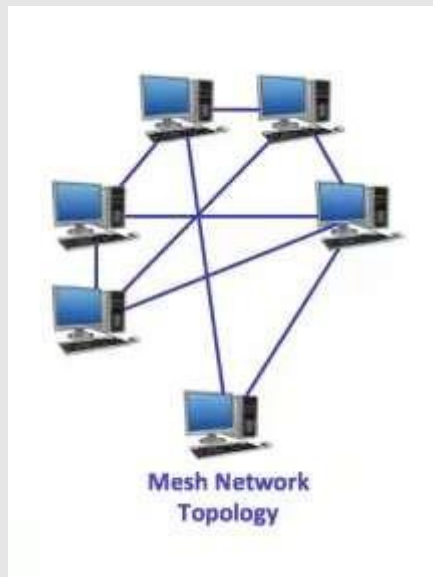
# Advantages Of Mesh Topology

- Each connection can carry its own data load.
- Fault is diagnosed easily.
- Provide security and privacy.



# Disadvantage of mesh topology

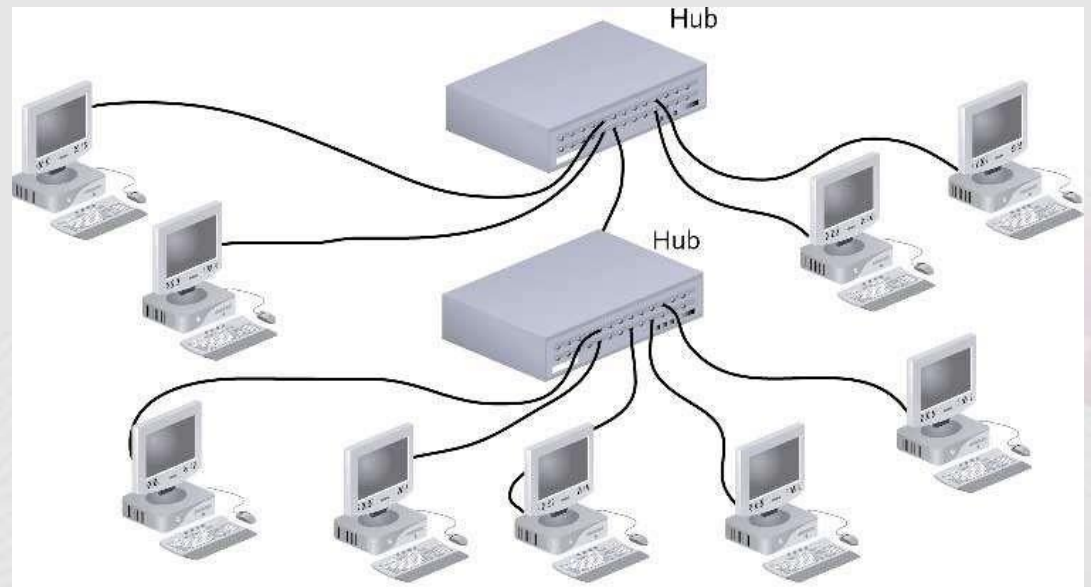
- Installation and configuration is difficult.
- Cabling cost is more.
- Bulk wiring is required.



# Hybrid Topology

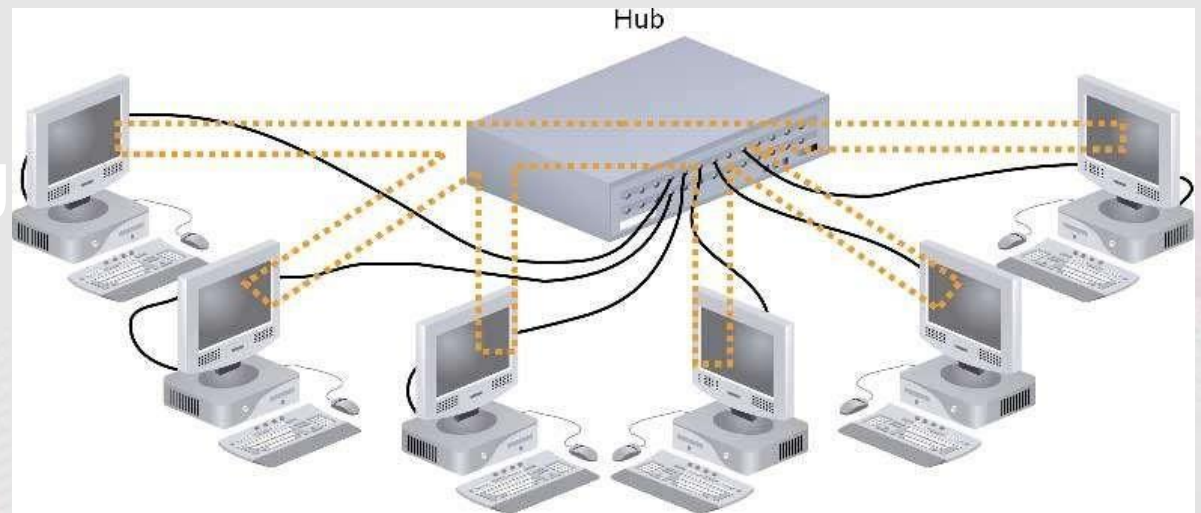
It is the mixture of two or more topologies. Therefore it is called Hybrid topology. A hybrid topology combines characteristics of linear bus and star and/or ring topologies.

Star-Wired  
Bus



# Advantages of hybrid topology

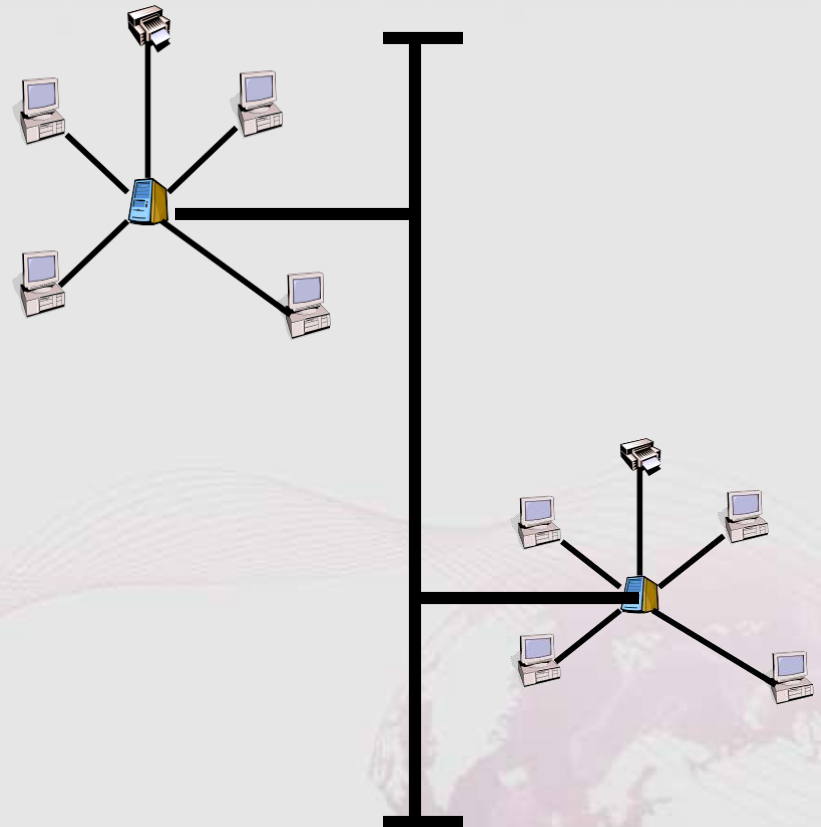
- Reliable as error detecting and trouble shooting is easy.
- Effective.
- Scalable as size can be increased easily.
- Flexible.



Star-Wired Ring

# Disadvantages Of Hybrid Topology

- Complex in design.
- Costly.



	<b>Bus Topology</b>	<b>Ring Topology</b>	<b>Star Topology</b>
<b>Structure</b>	there is a single central cable (backbone) and all computers and other devices connect to it	all computers and other devices are connected in a circle	there is a central host and all nodes connect to it
<b>Host existence</b>	depends on network needs	depends on network needs	yes
<b>Connection between nodes</b>	It has no connection between the nodes.	yes	no
<b>Host failure</b>	network can still run	network will fail	network will fail
<b>Node failure</b>	network can still run	network will fail	network can still run
<b>Ease of troubleshooting</b>	difficult. Need to search for the problematic node one by one	depends on backbone. If there is a backbone, troubleshooting is difficult. If there is no backbone, the focus is on the two nodes not communicating	depends on the host. It is easier to repair the problematic host. However, if the nodes fail, then each node has to be searched
<b>Ease of adding or removing nodes</b>	easy	difficult	average
<b>Number of nodes when extending network</b>	many	limited	limited

# Types of Network:

- A computer network may be small or big as per number of computers and other network devices linked together. Thus, networks vary in size, complexity and geographical area spread. On the basis of geographical spread, network may be classified as-



# PAN (Personal Area Network) :

The PANs are small network, used to establish communication between computer and other hand-held devices in small proximity up to 10 meters using wired USB connectivity or wireless system like Bluetooth or Infrared. PANs are used to connect computers, laptops, Mobiles and other IT-enabled devices to each others.

# LAN (Local Area Network):

- This system spans on a small area like a small office or home. The computer systems are linked with wire/cables or wireless (Wi-Fi) system. The key purpose of LAN is to sharing the resources. LAN users can share data, programs, printer, Disk, modem etc.





# MAN (Metropolitan Area Network):

- A large computer network that usually spans a city or a large campus. MAN usually interconnects a number of LANs. It also shares the computing resources among users.

# WAN (Wide Area Network):

- This type of network spreads over large geographical area across countries and continents. WANs are generally used to interconnect several other types of networks such as LANs, MANs etc. It facilitates fast and efficient exchange of information at high speed and low cost.

## Network Types:

<b>PAN (Personal Area Network):</b> 	<b>LAN (Local Area Network):</b> 	<b>MAN (Metropolitan Area Network):</b> 	<b>WAN (Wide Area Network):</b> 
Spread in the <b>proximity of an individual</b>	Spread <b>across a room, building, or campus</b>	Spread <b>within a city</b>	Spread <b>across a city, country, or continent.</b>
Cover an area of a <b>few meters radius.</b>	Cover an area of a <b>few meters to a few kilometres radius.</b>	Cover an area of a <b>few kilometres to a few hundred kilometres radius</b>	Cover an area of <b>over hundreds of kilometres radius.</b>
Set up using guided media ( <b>USB cable</b> ) or unguided media ( <b>Bluetooth, Infrared</b> ).	Set up using wired media ( <b>UTP cables, Co-axial cables</b> etc.) or wireless media ( <b>Infrared, radio waves</b> ) i.e. <b>WLAN (wireless LAN)</b>	Set up using all types of <b>all guided and unguided media</b>	Set up using <b>all types of all guided and unguided media</b>
Owned, controlled, and managed by a <b>single person</b>	Owned, controlled, and managed by a <b>single person or organization.</b>	Owned and operated by a <b>government body or a large corporation</b>	<b>Not owned by anyone,</b> WANs is interconnected computers, LANs, MANs, and maybe other WANs.