

# CSE306

# Computer Network

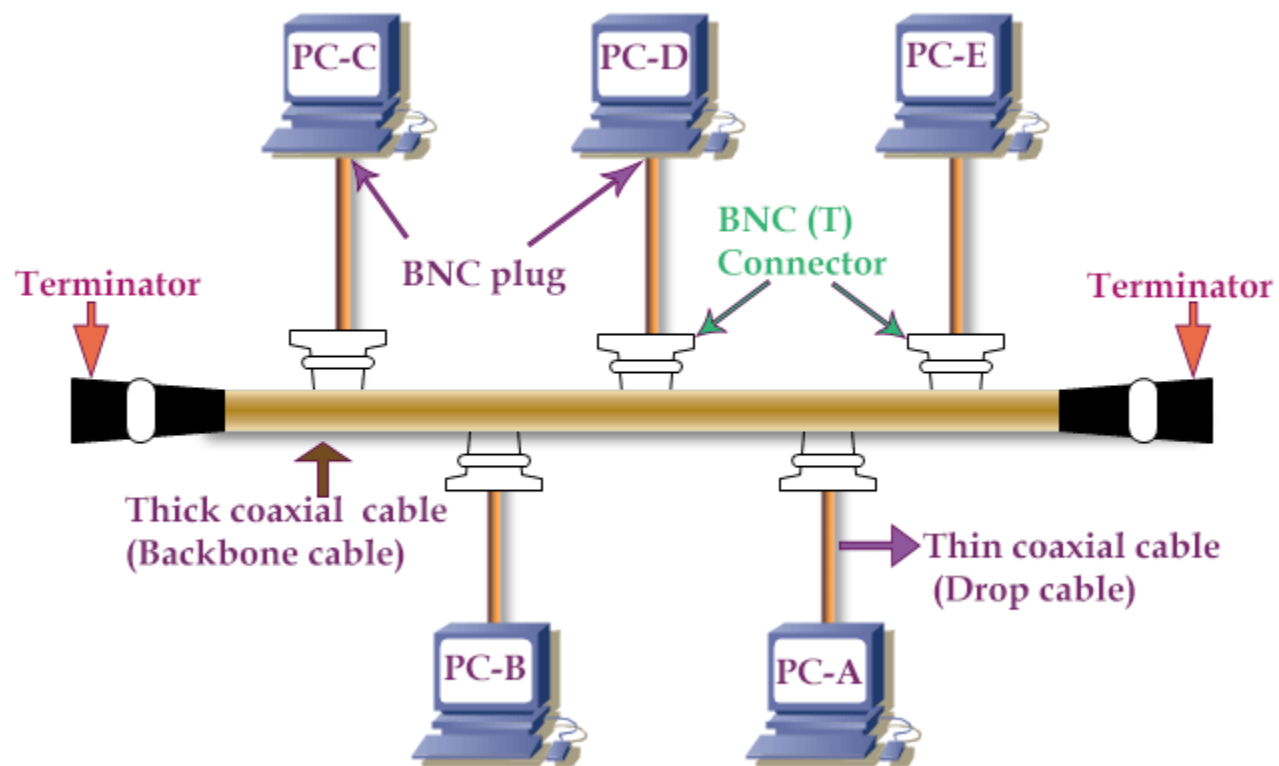
## Unit-1: Network Topology

# Network Topology

- The topology of a network defines how the nodes of a network are connected.
- The shape of the cabling layout used to link devices is called the **physical topology** of the network.
- The **logical topology**, in contrast, is the way that the signals act on the network media, or the way that the data passes through the network from one device to the next without regard to the physical interconnection of the devices.

# Bus topology

- All computers connect through a single continuous coaxial cable. This cable is known as the **backbone cable**.
- Both ends of the backbone cable are terminated through the **terminators**.
- To connect a computer to the backbone cable, a **drop cable** is used.
- To connect the drop cable to the computer and backbone cable, the **BNC plug** and **BNCT connector** are used respectively.



Advantages	Disadvantages
It is very simple to install.	It is very difficult to troubleshoot.
It uses less cable than other topologies.	It provides a slow data transfer speed.
It is relatively inexpensive.	A single fault can bring the entire network down.

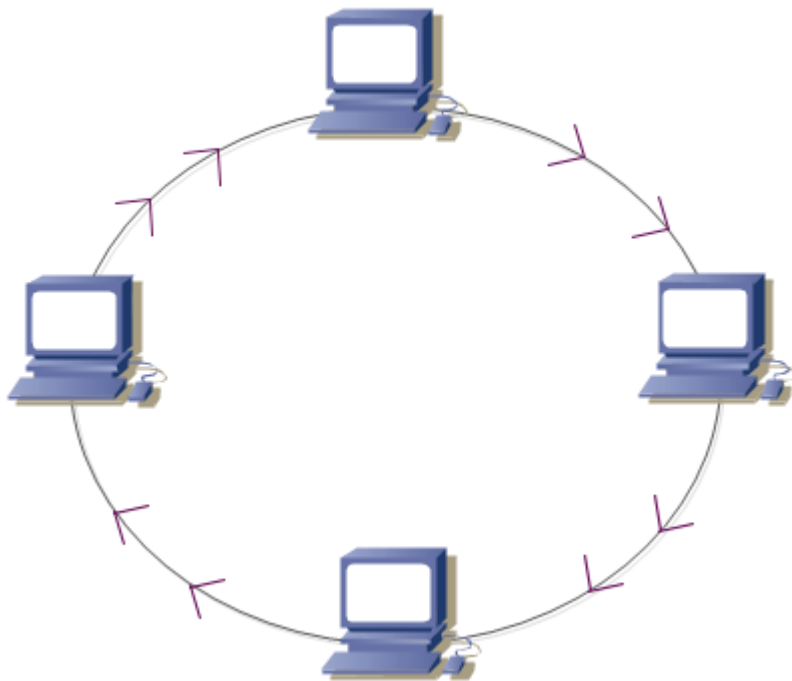
# Ring topology

- All computers connect in a circle.
- Each computer directly connects to two other computers in the network.
- Data moves down a one-way path from one computer to another.
- When data signals pass from one computer to the next, each computer regenerates the signals.

Since the signals are regenerated on each passing computer, the quality of the signals remains constant throughout the ring.

- Like the bus topology, this topology is also no longer used in modern networks. This topology was originally developed by IBM to overcome the existing drawbacks of the bus topology.

Advantages	Disadvantages
It does not use terminators.	It uses more cables.
It is relatively easy to troubleshoot.	It is too expensive.
Since data flows only in one direction, there is no collision in the network.	A single break in the cable can bring the entire network down.



# Ring Topology

## *Applications:*

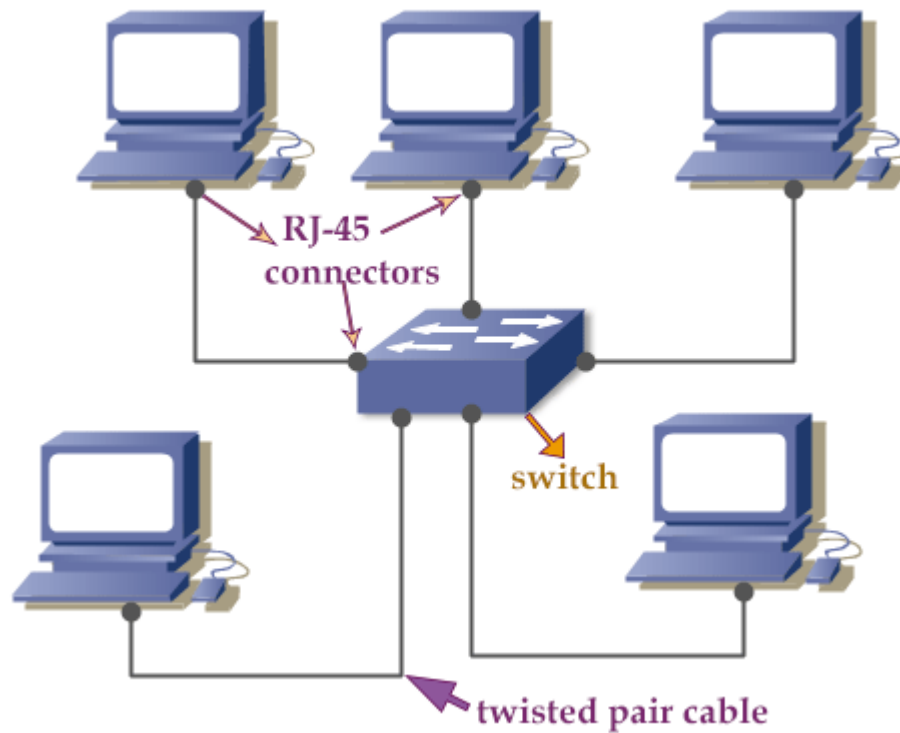
- Ring topologies are found in some office buildings or school campuses.
- Today high speed LANs made this topology **less popular**.



# Star Topology

- All computers connect to a centralized networking device.
- Usually, a networking switch or a Hub (in earlier days) is used as the centralized device.
- Each computer in the network uses its own separate twisted pair cable to connect to the switch.
- The twisted-pair cable uses **RJ-45** connectors on both ends.
- In modern computer networks, the star topology is the king. Nearly all new network installations, including small home and office networks, use some form of star topology.

- Star topology used in Local Area Networks(LANs).
- High speed LAN often used STAR.



Advantages	Disadvantages
It is easy to install.	It uses more cables than other topologies.
Relocating computers is easier than other topologies.	If the centralized device fails, it brings the entire network down.
Since each computer uses its separate cable, a fault in the cable does affect other computers of the network.	The total installation cost is higher than the other topologies.
Troubleshooting is relatively easy.	Use the twisted pair cable which is prone to break.
It provides a higher data transfer speed.	Too many cables make the network messy.

# Polls

- In a star topology with six computers, we need \_\_\_\_\_ links.

**A) 1**

**B) 3**

**C) 6**

**D) 12**

# Mesh Topology

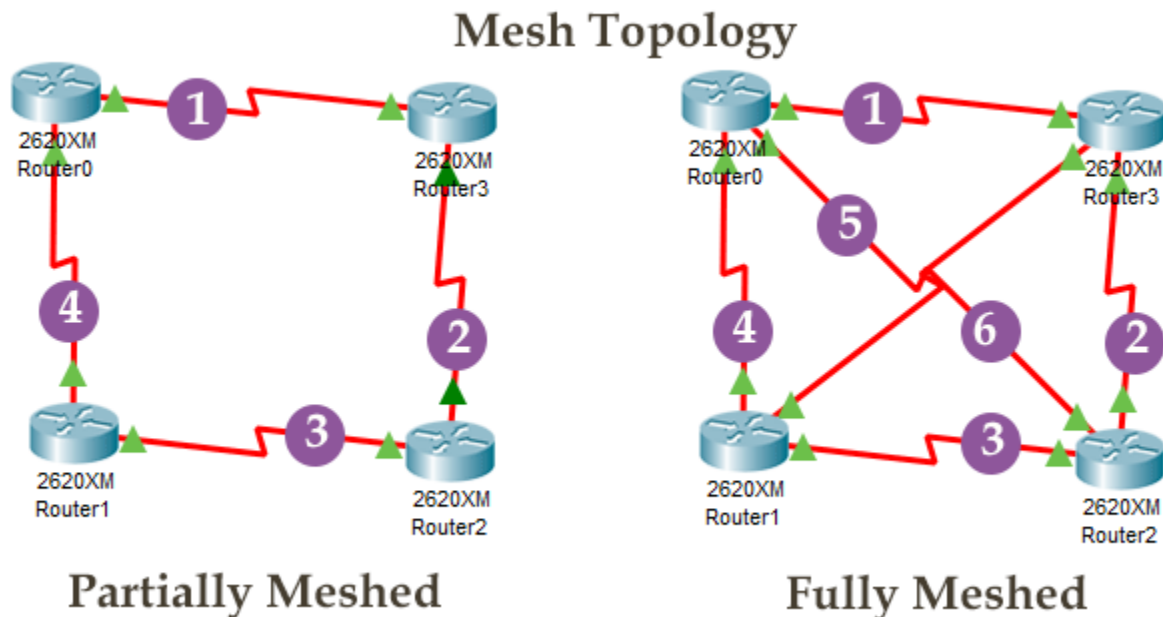
- In this topology, multiple paths exist between end devices.
- Based on paths, a mesh topology can be divided into two types; **fully meshed** and **partially meshed**.
- If a direct path exists from each end device to every other end device in the network, it's a fully meshed topology.
- If multiple paths exist between the end devices in the network, it's a partially meshed topology.
- Mesh topology is commonly used in the WAN network for backup purposes. This topology is not used in the LAN network implementations.

- To know how many connections require to make a network fully meshed, we can use the following formula.

$$\text{Required connections} = n * (n-1) / 2$$

*Here,  $n$  is the number of end devices or locations.*

- If the number of connections in a network is less than the total required number of the connections then the network is considered as the partially meshed network.



# Advantages of Mesh

1. They use dedicated links so each link can only carry its own data load. So **traffic problem** can be avoided.
2. It is robust. If **any one link get damaged** it cannot affect others.
3. It gives privacy and security.(Message travels along a dedicated link)
4. Fault identification and fault isolation are easy.

# Disadvantages of Mesh

1. The amount of **cabling** and the number of **I/O ports** required are very large. Since every device is connected to each devices through dedicated links.
2. The sheer bulk of wiring is larger then the available space.
3. Hardware required to connected each device is highly expensive.



# Applications of Mesh Topology

1. Telephone Regional office.
2. WAN.(Wide Area Network).

# Pools

- In a fully connected mesh topology with six computers, we need \_\_\_\_\_ links.

A) 6

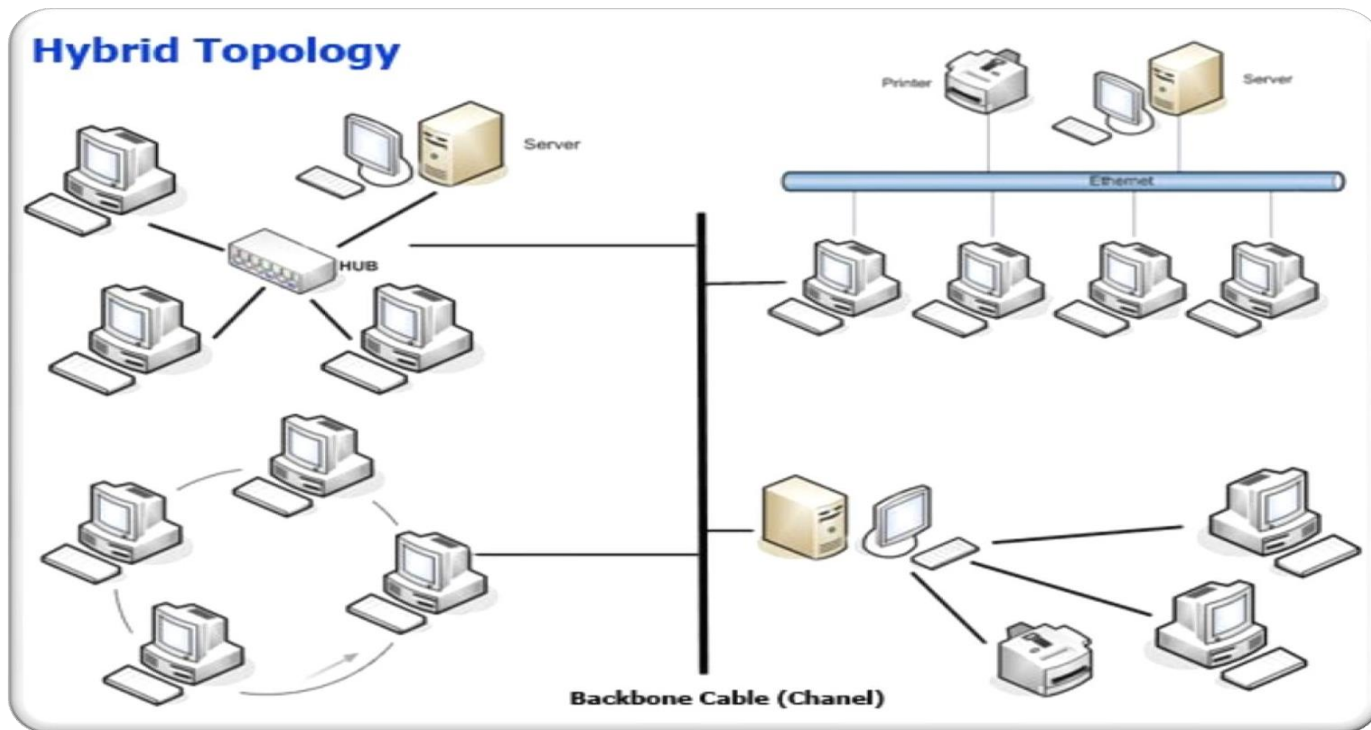
B) 15

C) 30

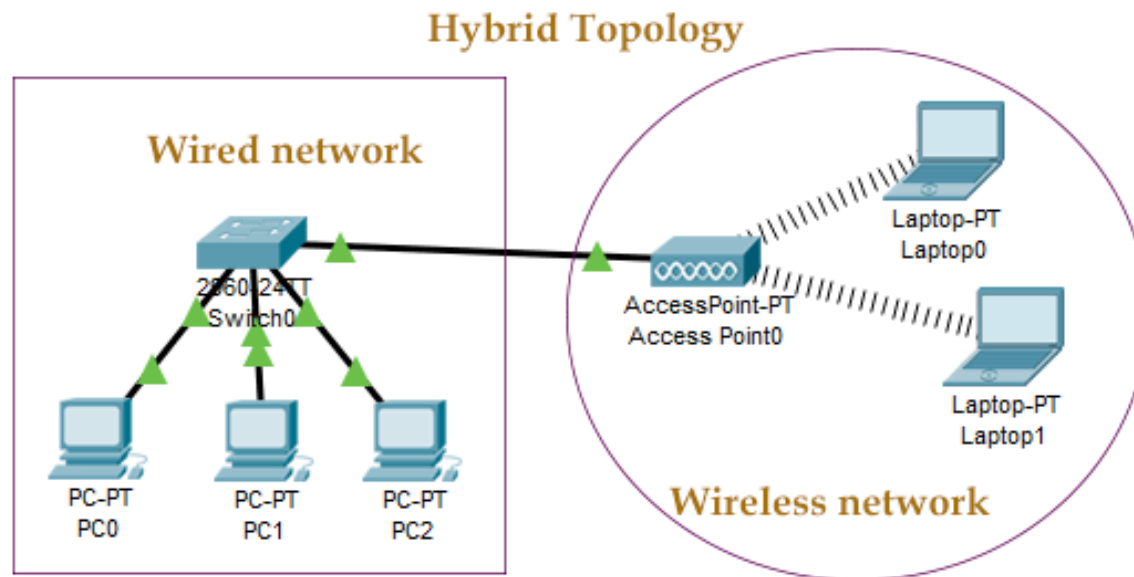
D) 36

# Hybrid Topology

- This topology is a mix of two or more topologies.
- For example, there are two networks; one is built from the star topology and another is built from the bus topology. If we connect both networks to build a single large network, the topology of the new network will be known as the hybrid topology.



- Today not restricted to the bus and star topologies.
- Can combine any topology with another topology.
- In modern network implementations, the hybrid topology is mostly used to mix the wired network with the wireless network.



# Polls

- If all the devices are connected to a central hub, then topology is called
  - (a) Mesh
  - (b) Ring
  - (c) Star
  - (d) Bus

# Polls

- In mesh topology, relationship between one device and other device is called
  - (a) Primary to peer
  - (b) Peer to peer
  - (c) peer to primary
  - (d) peer to secondary