Computer Networks (CS303)

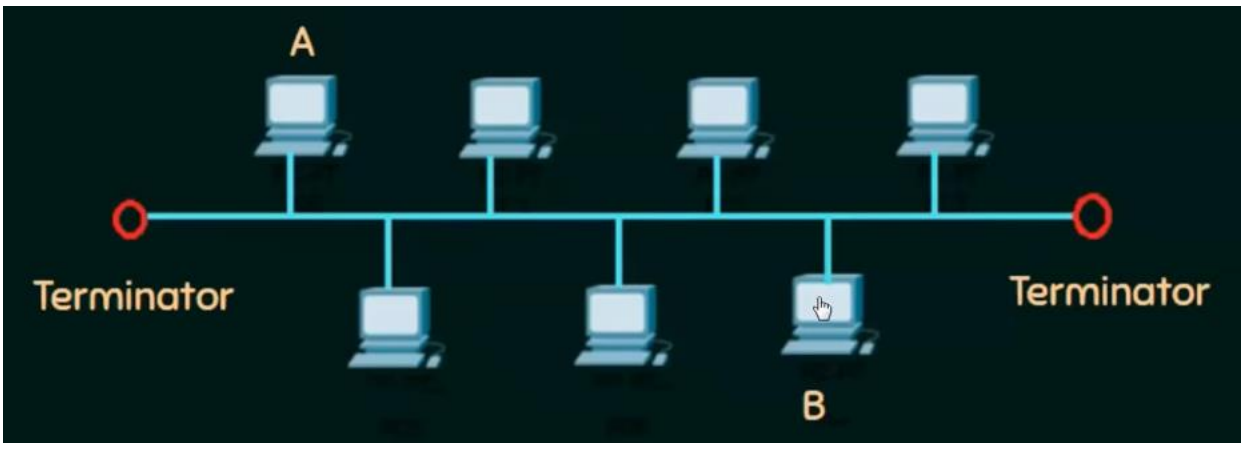
Assignment - 6

U19CS012

1. Create **Bus, Ring, Star** and **Mesh** topology in *Cisco Packet Tracer* to understand the working of all the networking devices and networking media. Do take screenshots of topologies and add appropriate labels in the topology.

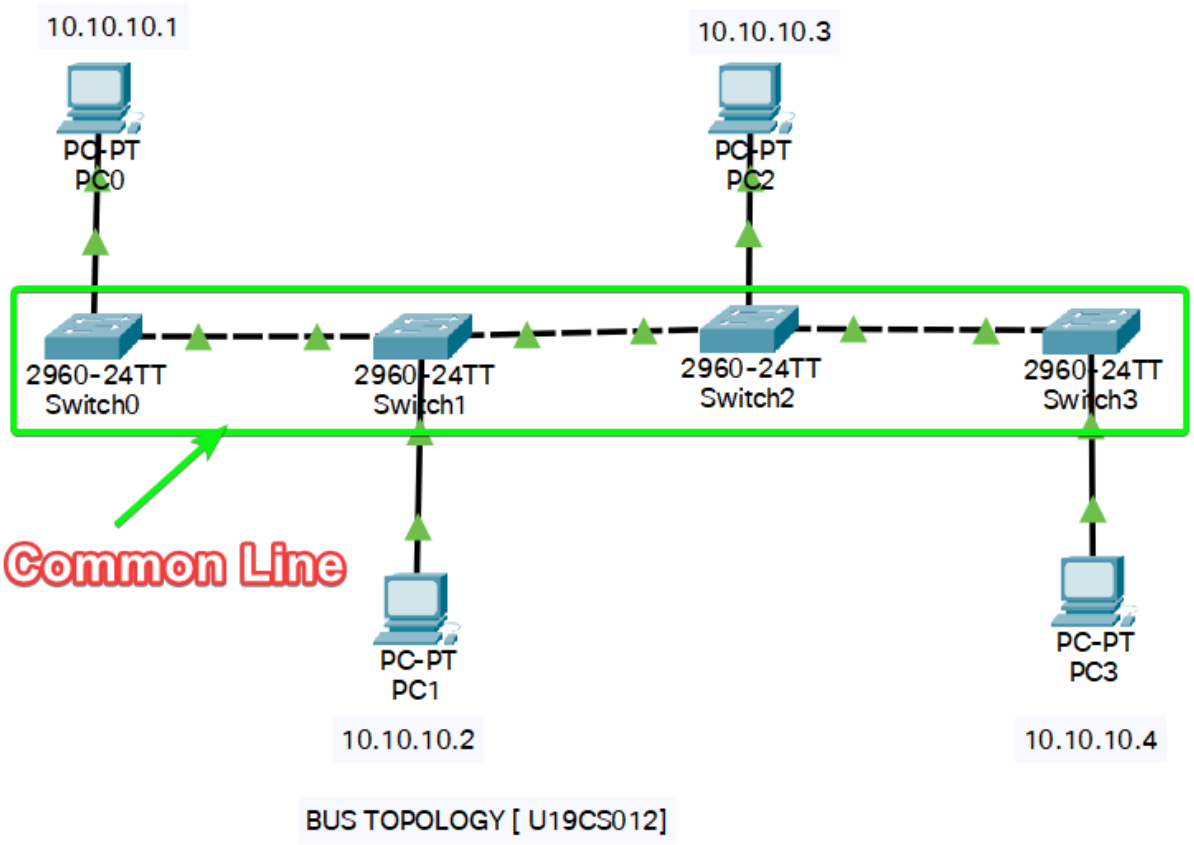
A.) Bus Topology

- ✓ All data transmitted between nodes in the network is transmitted over this **common transmission medium** and is able to be received by all nodes in the network simultaneously.
- ✓ A signal containing the address of the intended receiving machine travels from a source machine in **both direction** to all machines connected to the bus until it finds the intended recipient.



Procedure:

1.) Connect 4 End devices in Bus topology using 4 switches as shown below.



BUS TOPOLOGY [U19CS012]

2.) Configure IP Address of Each End Device as Shown.

3.) Lets Check the Connection using Pin Command. [From 10.10.10.1 to 10.10.10.4]

Simulation

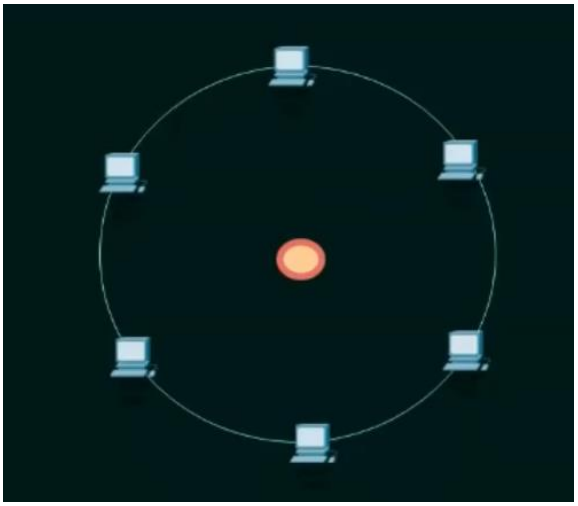
[https://vimeo.com/600911484]

```
Packet Tracer PC Command Line 1.0
C:\>ping 10.10.10.4

Pinging 10.10.10.4 with 32 bytes of data:

Reply from 10.10.10.4: bytes=32 time=39ms TTL=128
Reply from 10.10.10.4: bytes=32 time=22ms TTL=128
Reply from 10.10.10.4: bytes=32 time=21ms TTL=128
Reply from 10.10.10.4: bytes=32 time=21ms TTL=128

Ping statistics for 10.10.10.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 21ms, Maximum = 39ms, Average = 25ms
```

Advantages	Disadvantages
Only one wire – Less expensive.	Not fault tolerant (No redundancy).
Suited for temporary network.	Limited cable length.
Node failures does not affect others.	No security.

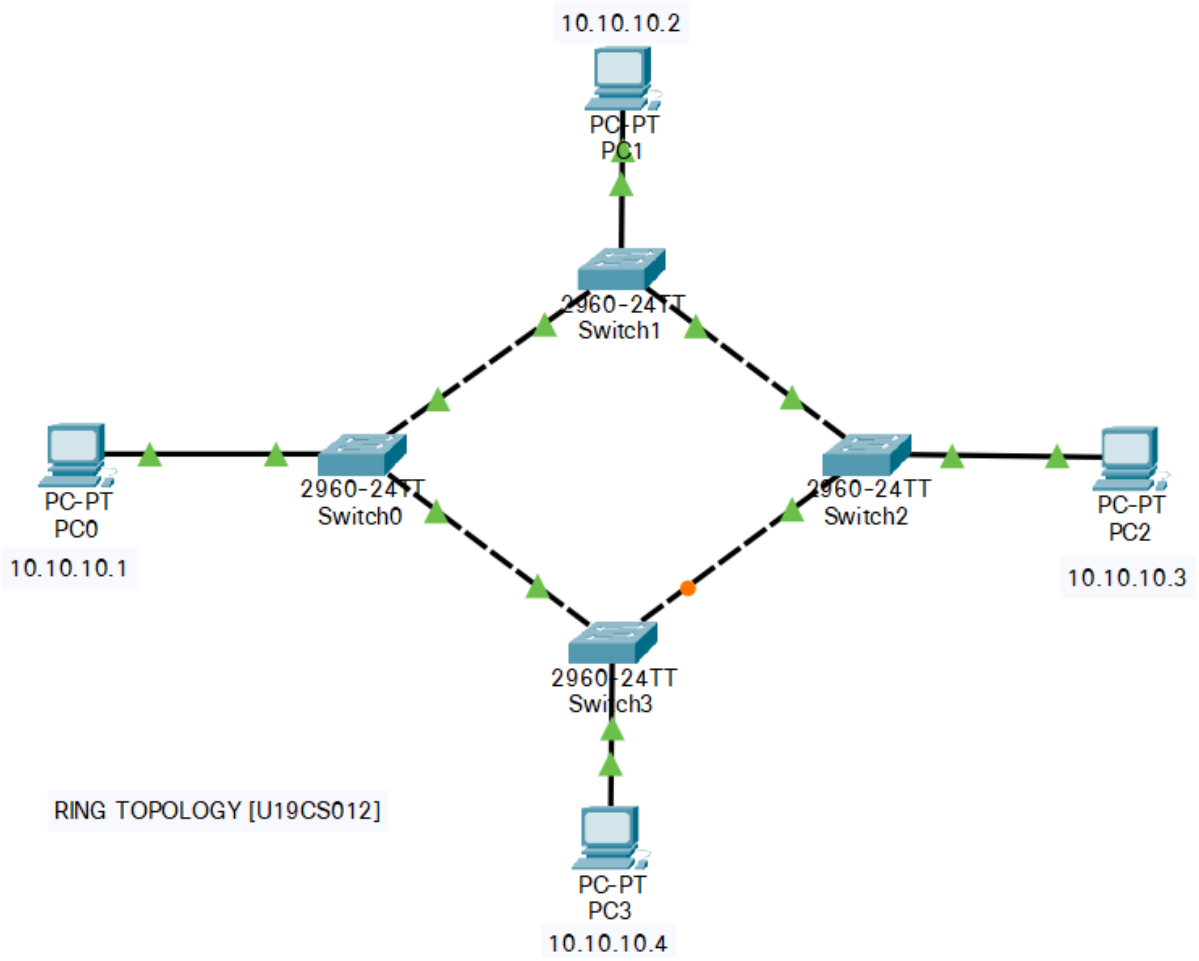
B.) Ring Topology

- ✓ A Ring topology is a bus topology in a closed loop.
- ✓ Peer-to—Peer LAN topology.
- ✓ Two connections: one to each of its nearest neighbors.
- ✓ Unidirectional.
- ✓ Sending and receiving data takes place with the help of a TOKEN



Procedure:

1.) Connect 4 End devices in Ring topology using 4 switches as shown below.

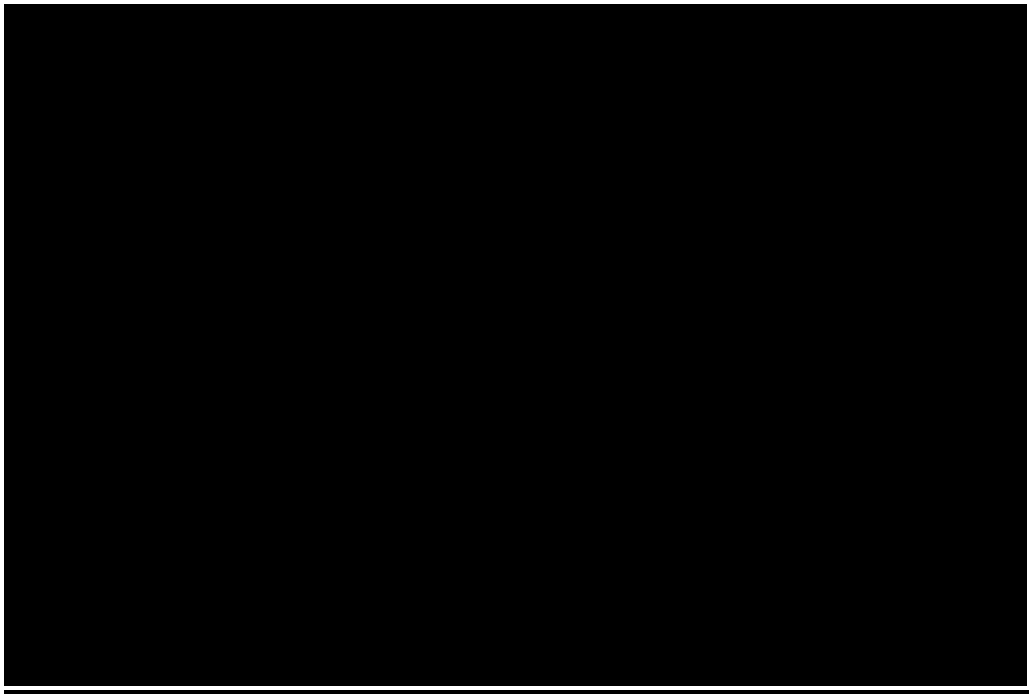


2.) Configure IP Address of Each End Device as Shown.

3.) Lets Check the Connection using Pin Command. [From 10.10.10.1 to 10.10.10.3]

```
C:\>ping 10.10.10.3

Pinging 10.10.10.3 with 32 bytes of data:

Reply from 10.10.10.3: bytes=32 time=32ms TTL=128
Reply from 10.10.10.3: bytes=32 time=15ms TTL=128
Reply from 10.10.10.3: bytes=32 time=17ms TTL=128
Reply from 10.10.10.3: bytes=32 time=16ms TTL=128

Ping statistics for 10.10.10.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 15ms, Maximum = 32ms, Average = 20ms
```

Simulation

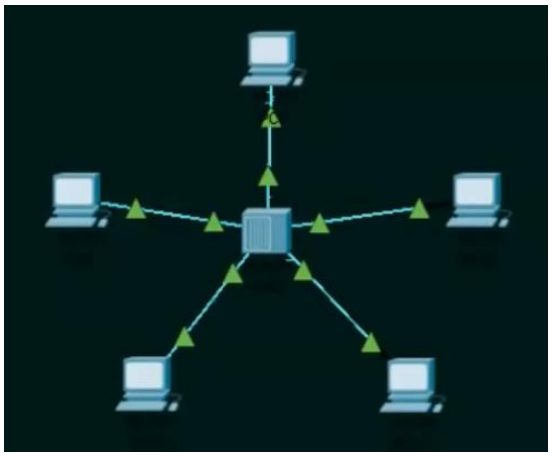


[https://vimeo.com/600939073]

Advantages	Disadvantages
Performance better than Bus topology.	Unidirectional. Single point of failure will affect the whole network.
Can cause bottleneck due to weak links.	↑ in load – ↓ in performance.
All nodes with equal access.	No security.

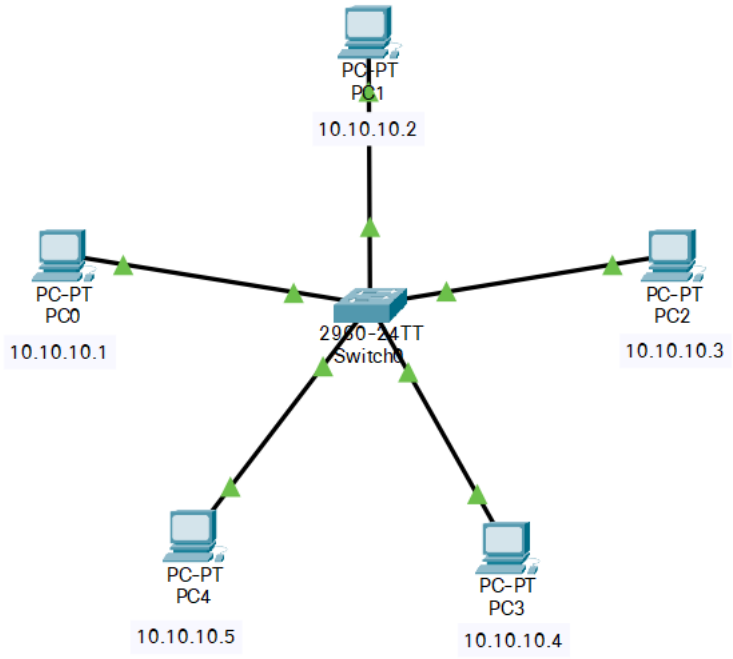
C.) Star Topology

- ✓ Every node is connected to a central node called a hub or switch.
- ✓ Centralized Management.
- ✓ All traffic must pass through the hub or switch.



Procedure:

1.) Connect 5 End devices in Star Topology using 1 switches as shown below.



STAR TOPOLOGY [U19CS012]

2.) Configure IP Address of Each End Device as Shown.

3.) Lets Check the Connection using Pin Command. [From 10.10.10.1 to 10.10.10.4]

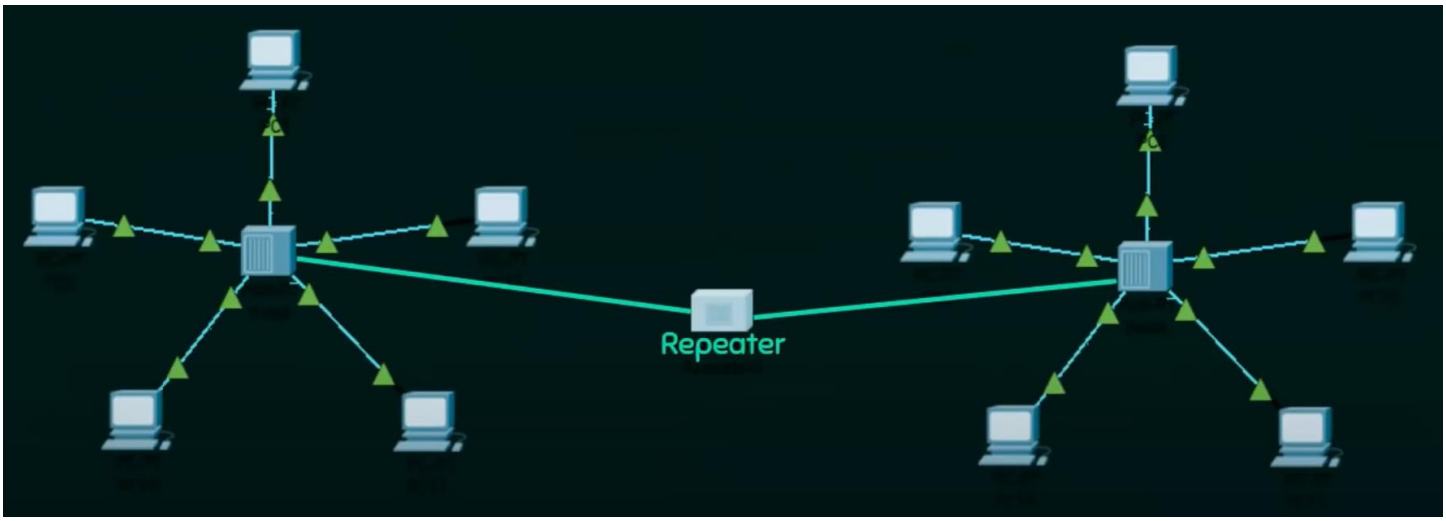
```
Packet Tracer PC Command Line 1.0
C:\>ping 10.10.10.4

Pinging 10.10.10.4 with 32 bytes of data:

Reply from 10.10.10.4: bytes=32 time=17ms TTL=128
Reply from 10.10.10.4: bytes=32 time=9ms TTL=128
Reply from 10.10.10.4: bytes=32 time=8ms TTL=128
Reply from 10.10.10.4: bytes=32 time=7ms TTL=128

Ping statistics for 10.10.10.4:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 7ms, Maximum = 17ms, Average = 10ms
```

Simulation

[https://vimeo.com/600947146]

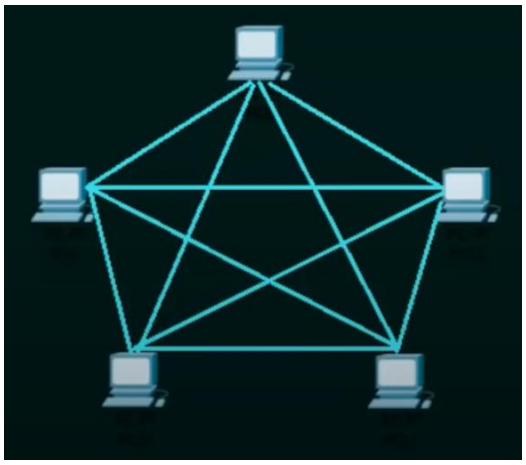
Advantages	Disadvantages
Easy to design and implement.	Single point of failure affects the whole network.
Centralized administration.	Bottlenecks due to overloaded switch/Hub.
Scalable.	Increased cost due to switch/hub.

Extra [Extended Star Topology]



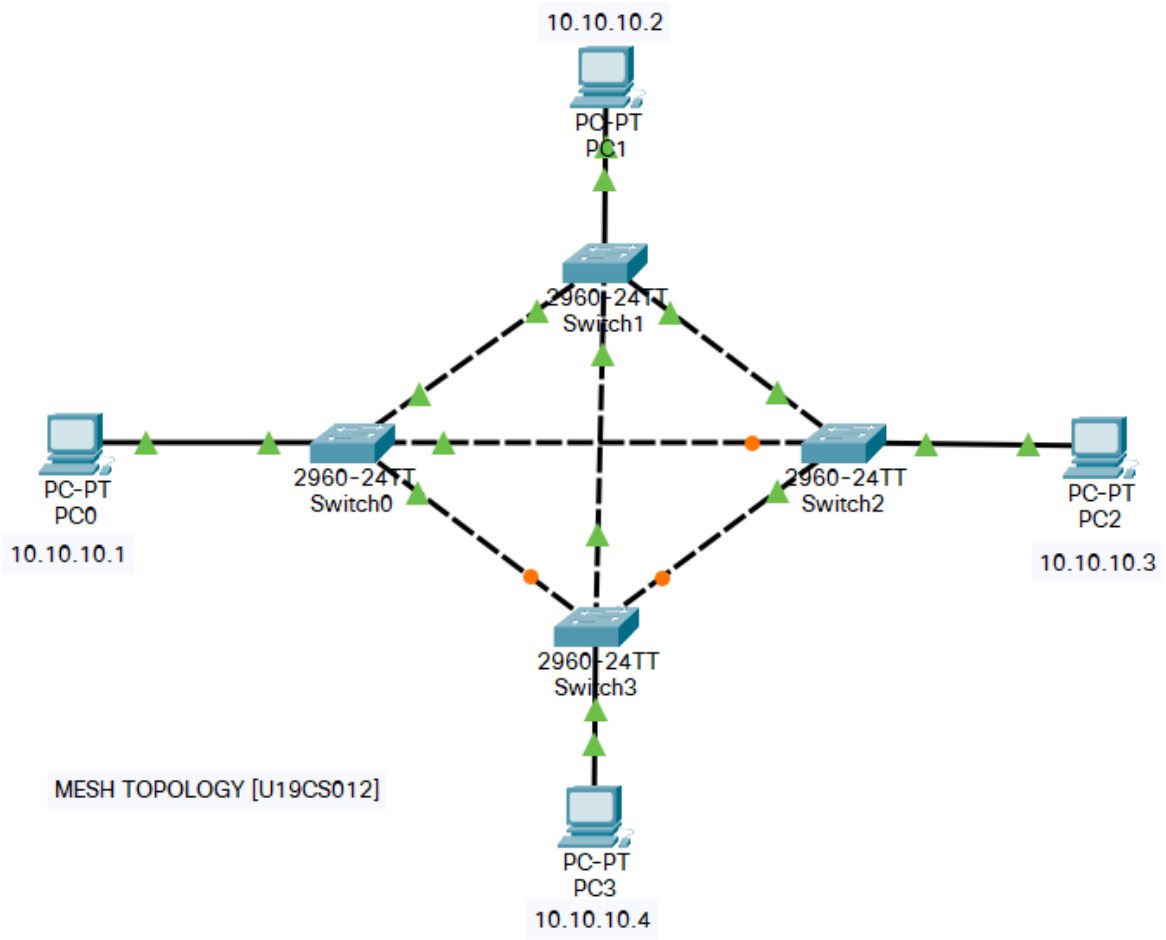
D.) Mesh Topology

- ✓ Each node is directly connected to every other nodes in the network.
- ✓ Fault tolerant and reliable.



Procedure:

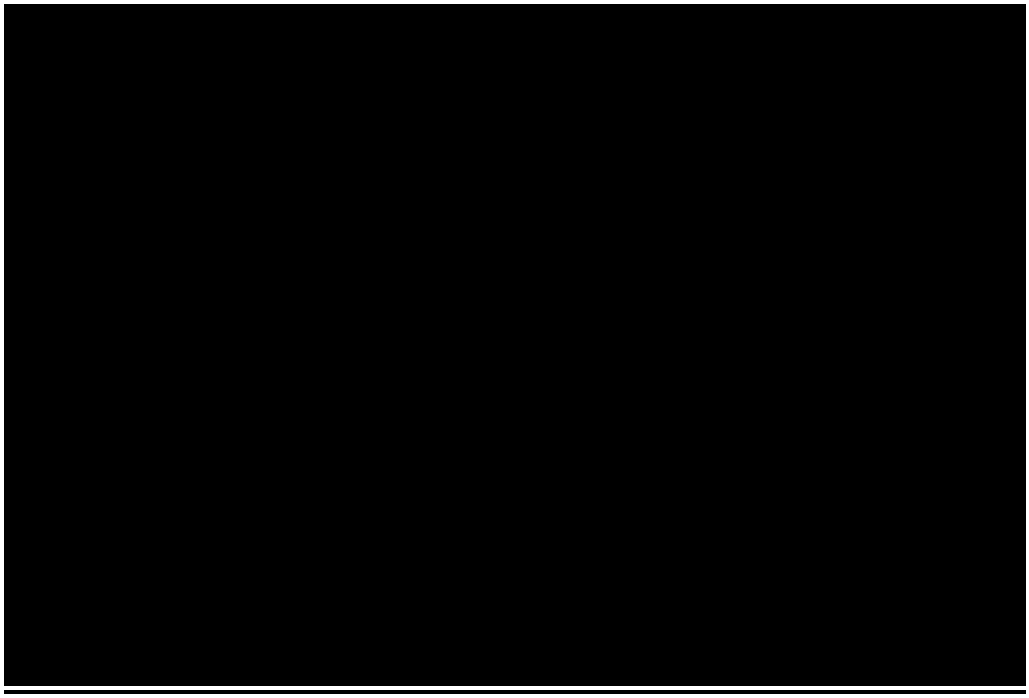
1.) Connect 4 End devices in Mesh Topology using 4 switches as shown below.



2.) Configure IP Address of Each End Device as Shown.
3.) Lets Check the Connection using Pin Command. [From 10.10.10.1 to 10.10.10.3]

```
Packet Tracer PC Command Line 1.0
C:\>ping 10.10.10.3

Pinging 10.10.10.3 with 32 bytes of data:

Reply from 10.10.10.3: bytes=32 time=33ms TTL=128
Reply from 10.10.10.3: bytes=32 time=17ms TTL=128
Reply from 10.10.10.3: bytes=32 time=14ms TTL=128
Reply from 10.10.10.3: bytes=32 time=17ms TTL=128

Ping statistics for 10.10.10.3:
    Packets: Sent = 4, Received = 4, Lost = 0 (0% loss),
Approximate round trip times in milli-seconds:
    Minimum = 14ms, Maximum = 33ms, Average = 20ms
```

Simulation



[https://vimeo.com/600952441]

Advantages	Disadvantages
Fault tolerant.	Issues with broadcasting messages.
Reliable.	Expensive and impractical for large networks.

SUBMITTED BY: BHAGYA VINOD RANA [**U19CS012**]