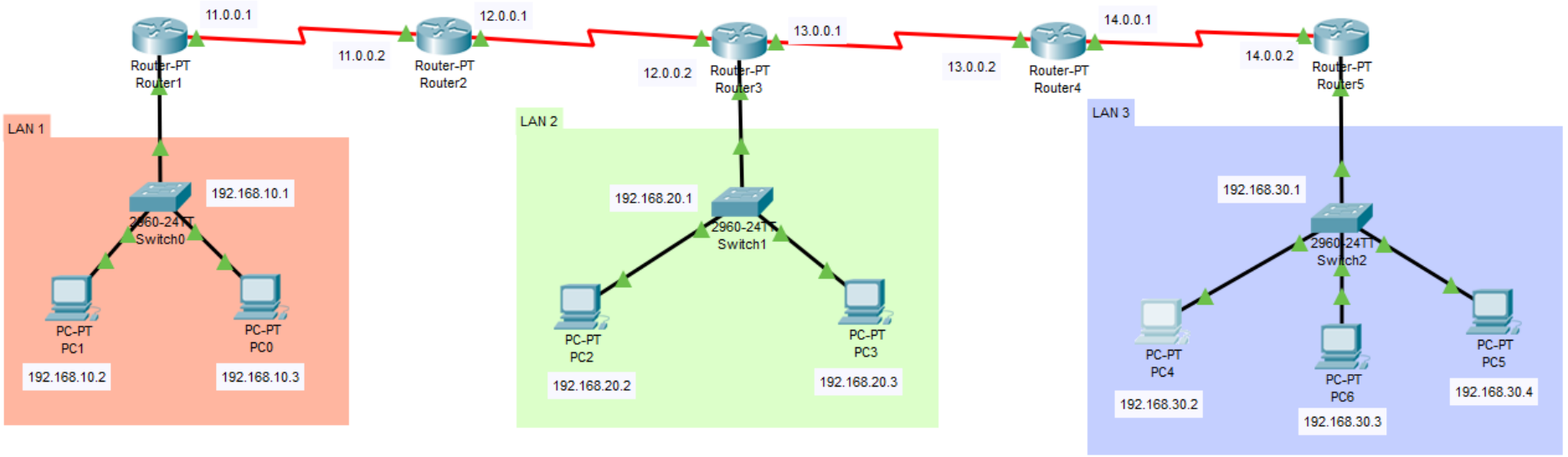
1. **Take one topology containing 3 different LANs and 5 routers. Assume LAN 1 and LAN 3 contains 2 systems and LAN 2 contains 3 systems. Connect these 3 LANs using 5 routers as per your understanding.**
    a. **Give IP addresses to all systems and routers (keep in mind all rules for that explaimed in the video).**
    b. **Show device configuration (ip address, mask and gateway address) of atleast one system from every LAN.**
    c. **Give MAC addresses (Mnemonic name can be given i.e. M1, MR11, etc) .**
    d. **Decide Source device and Destination device and path from source to destination.**
    e. **Show the content of source mac dest mac, source port dest port, source ip dest ip for every hop in the path from source to destination.**
    f. **Explain hop to hop delivery, source to destination and end to end delivery .**


11.0.0.1
11.0.0.2
12.0.0.1
12.0.0.2
13.0.0.1
13.0.0.2
14.0.0.1
14.0.0.2
Router-PT
Router1
Router-PT
Router2
Router-PT
Router3
Router-PT
Router4
Router-PT
Router5
LAN 1
192.168.10.1
2960-24TT
Switch0
PC-PT
PC1
192.168.10.2
PC-PT
PC0
192.168.10.3
LAN 2
192.168.20.1
2960-24TT
Switch1
PC-PT
PC2
192.168.20.2
PC-PT
PC3
192.168.20.3
LAN 3
192.168.30.1
2960-24TT
Switch2
PC-PT
PC4
192.168.30.2
PC-PT
PC6
192.168.30.3
PC-PT
PC5
192.168.30.4

A] Give IP addresses to all systems and routers

Device Configurations

SR NO.	NAME	IP ADDRESS	SUBNET MASK	DEFAULT GATEWAY	MAC ADDRESS
			LAN1		
1	PC0	192.168.10.3	255.255.255.0	192.168.10.1	0030.A3EE.18C2
2	PC1	192.168.10.2	255.255.255.0	192.168.10.1	0001.4213.D230
			LAN2		
3	PC2	192.168.20.2	255.255.255.0	192.168.20.1	0001.63CA.D49D
4	PC3	192.168.20.3	255.255.255.0	192.168.20.1	0060.3E4B.E903
			LAN3		
5	PC4	192.168.30.2	255.255.255.0	192.168.30.1	0005.5E32.C726
6	PC5	192.168.30.4	255.255.255.0	192.168.30.1	000D.BD6D.39D8
7	PC6	192.168.30.3	255.255.255.0	192.168.30.1	0060.7031.7EEE

ROUTER 1

SERIAL

SERIAL	IP ADDRESS	SUBNET MASK
Serial2/0	11.0.0.1	255.0.0.0

FAST ETHERNET0/0

IP ADDRESS	192.168.10.1
SUBNET MASK	255.255.255.0
MAC ADDRESS	0002.4A05.B624

STATIC ROUTING

SR NO	NETWORK	MASK	NEXT HOP
1	192.168.20.0	255.255.255.0	11.0.0.2
2	192.168.30.0	255.255.255.0	11.0.0.2
3	12.0.0.0	255.0.0.0	11.0.0.2

ROUTER 2

SERIAL

SERIAL	IP ADDRESS	SUBNET MASK
Serial2/0	11.0.0.2	255.0.0.0
Serial3/0	12.0.0.1	255.0.0.0

STATIC ROUTING

SR NO	NETWORK	MASK	NEXT HOP
1	192.168.20.0	255.255.255.0	12.0.0.2
2	192.168.10.0	255.255.255.0	11.0.0.1
3	192.168.30.0	255.255.255.0	12.0.0.2

ROUTER 3

SERIAL

SERIAL	IP ADDRESS	SUBNET MASK
Serial2/0	12.0.0.2	255.0.0.0
Serial3/0	13.0.0.1	255.0.0.0

FAST ETHERNET0/0

IP ADDRESS	192.168.20.1
SUBNET MASK	255.255.255.0
MAC ADDRESS	00E0.A3B7.29B9

STATIC ROUTING

SR NO	NETWORK	MASK	NEXT HOP
1	192.168.10.0	255.255.255.0	12.0.0.1
2	192.168.30.0	255.255.255.0	13.0.0.2

ROUTER 4

SERIAL

SERIAL	IP ADDRESS	SUBNET MASK
Serial2/0	13.0.0.2	255.0.0.0
Serial3/0	14.0.0.1	255.0.0.0

STATIC ROUTING

SR NO	NETWORK	MASK	NEXT HOP
1	192.168.30.0	255.255.255.0	14.0.0.2
2	192.168.20.0	255.255.255.0	13.0.0.1
3	192.168.10.0	255.255.255.0	13.0.0.1

ROUTER 5

SERIAL

SERIAL	IP ADDRESS	SUBNET MASK
Serial2/0	14.0.0.2	255.0.0.0

FAST ETHERNET0/0

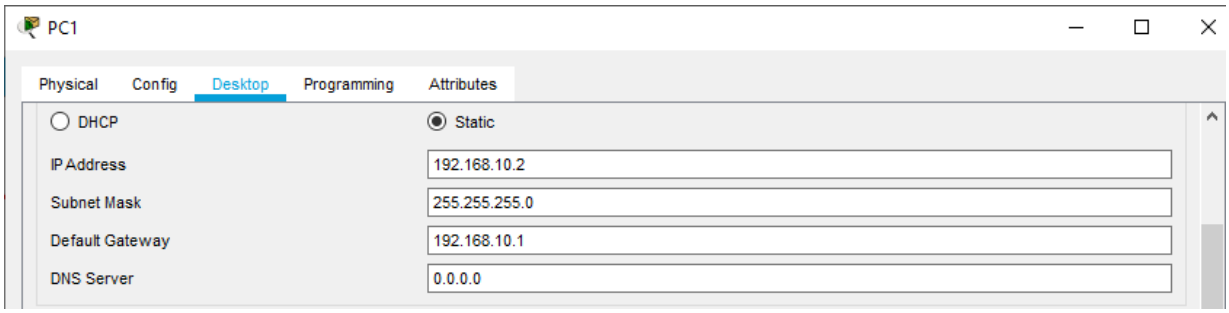
IP ADDRESS	192.168.30.1
SUBNET MASK	255.255.255.0
MAC ADDRESS	00E0.F729.27B1

STATIC ROUTING

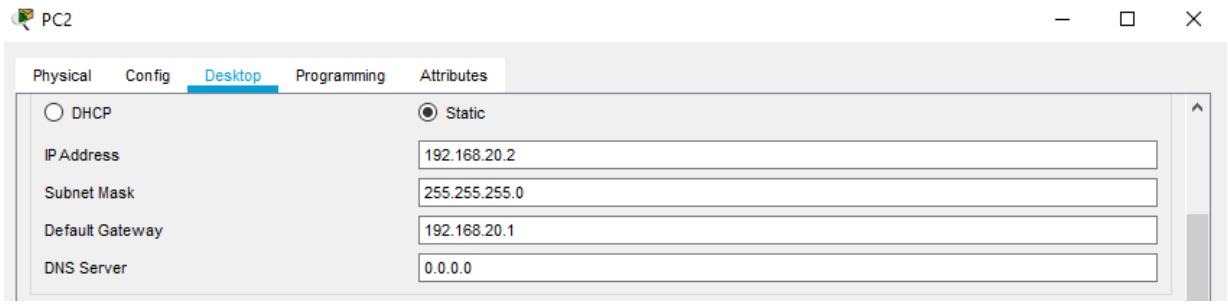
SR NO	NETWORK	MASK	NEXT HOP
1	192.168.20.0	255.255.255.0	14.0.0.1
2	192.168.10.0	255.255.255.0	14.0.0.1
3	13.0.0.0	255.0.0.0	14.0.0.1

B] Show device configuration (ip address, mask and gateway address) of at least one system from every LAN.

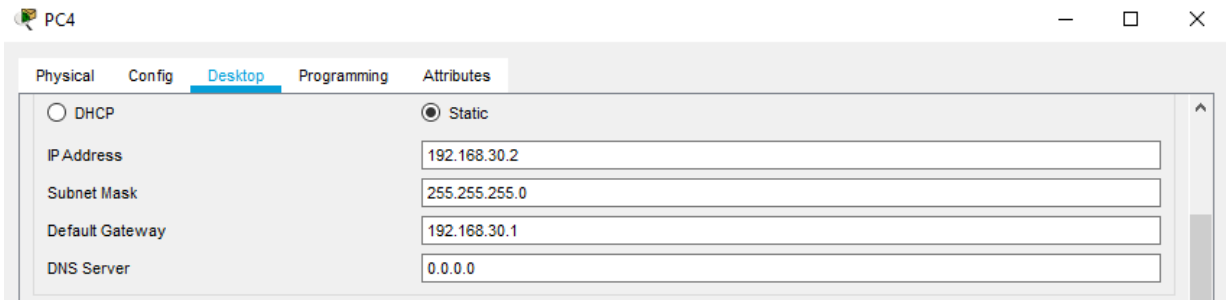
LAN1 [PC1]



LAN2 [PC2]



LAN3 [PC4]



D] Decide Source device and Destination device and path from source to destination.

SOURCE : PC1
DESTINATION : PC5

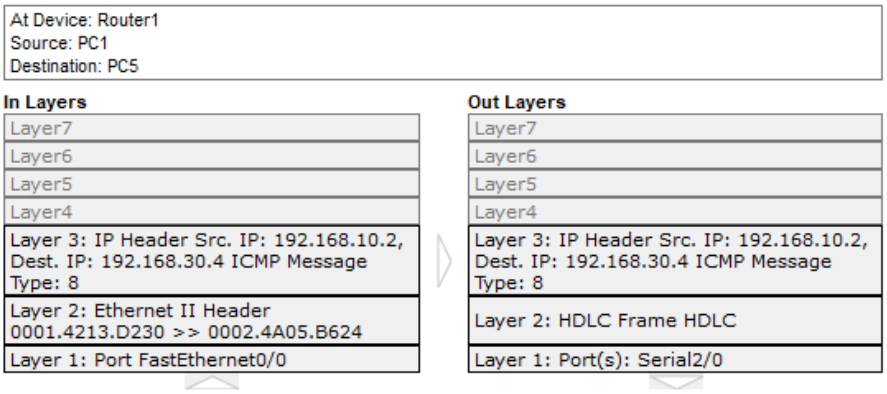
Fire	Last Status	Source	Destination	Type	Color	Time(sec)	Periodic	Num	Edit
	In Progress	PC1	PC5	ICMP		0.000	N	0	(edi

PATH : PC1 -> Switch0 -> Router1 -> Router2 -> Router3 -> Router4 -> Router5 -> Switch2 -> PC5

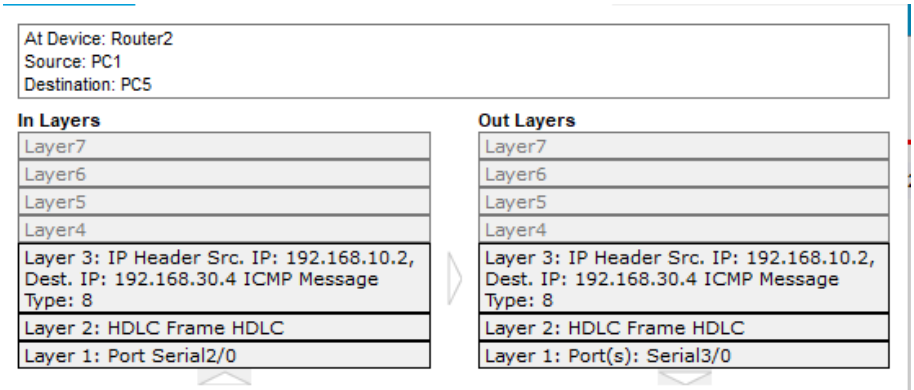
Vis.	Time(sec)	Last Device	At Device	Type
	0.000	--	PC1	ICMP
	0.001	PC1	Switch0	ICMP
	0.002	Switch0	Router1	ICMP
	0.003	Router1	Router2	ICMP
	0.004	Router2	Router3	ICMP
	0.005	Router3	Router4	ICMP
	0.006	Router4	Router5	ICMP
	0.007	Router5	Switch2	ICMP
	0.008	Switch2	PC5	ICMP
	0.008	Switch2	PC6	ICMP
	0.008	Switch2	PC4	ICMP
	0.009	PC5	Switch2	ICMP
	0.010	Switch2	Router5	ICMP
	0.011	Router5	Router4	ICMP
	0.012	Router4	Router3	ICMP
	0.013	Router3	Router2	ICMP
	0.014	Router2	Router1	ICMP
	0.015	Router1	Switch0	ICMP
	0.016	Switch0	PC1	ICMP

E] Show the content of source mac dest mac, source port dest port, source ip dest ip for every hop in the path from source to destination.

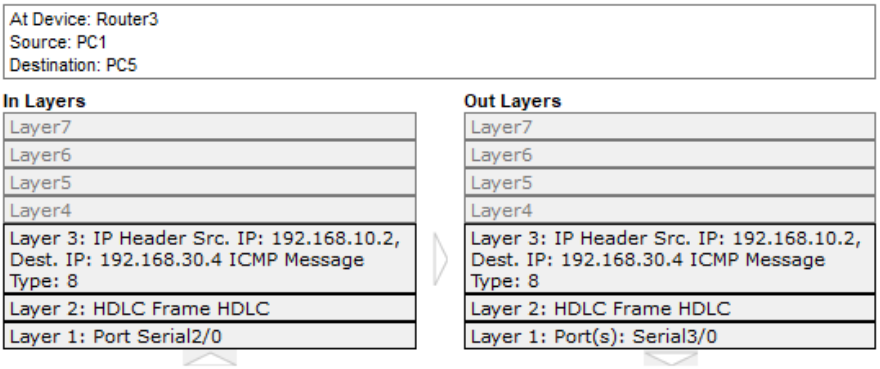
ROUTER 1[Hop 1]



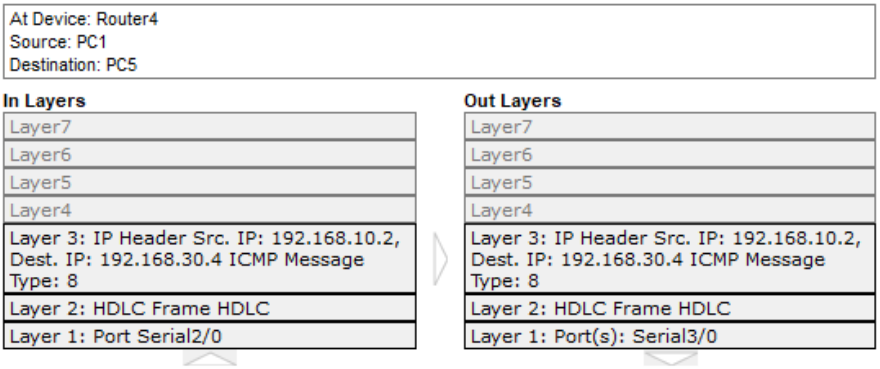
ROUTER 2 [Hop 2]



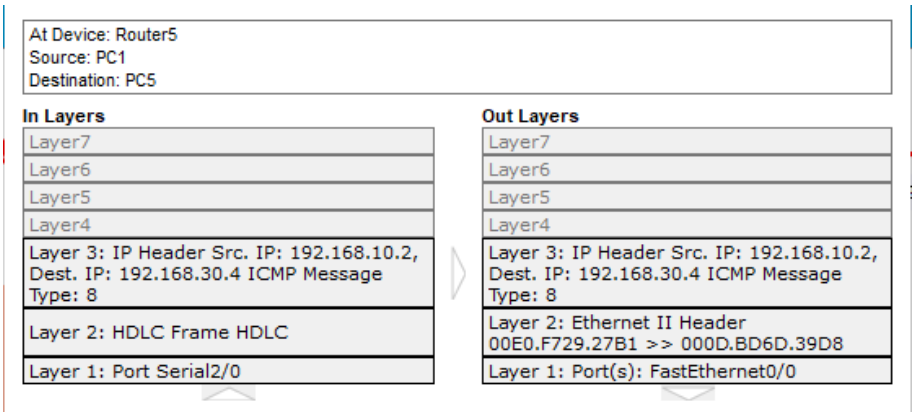
ROUTER 3 [Hop 3]



ROUTER 4 [Hop 4]



ROUTER 5 [Hop 5]



F] Explain hop to hop delivery, source to destination and end to end delivery.

Hop to Hop Delivery

Hop-to-hop Delivery involves not only the source and destination node, but rather some or all of the intermediate nodes as well, it allows data to be forwarded even if the path between source and destination is not permanently connected during communication.

Source to Destination Delivery

In Source to Destination Delivery Source and Destination Device are Communication Directly without any host or any other networking in between.

End to End Delivery

The end-to-end Delivery is a design framework in computer networking. In networks designed according to this principle, application-specific features reside in the communicating end nodes of the network, rather than in intermediary nodes, such as gateways and routers, that exist to establish the network.

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Q.2.

OSI Model	TCP/IP Model
• It is developed by ISO.	It is developed by ARPANET.
• OSI provides a clear distingues between interfaces, services & protocol.	TCP/IP doesn't have any clear distingues points between services interface, & protocols.
• OSI refers to open system interconnection.	TCP refers to transmission control protocol.
• OSI uses the network layer to define routing standards & protocol.	TCP/IP uses only for internet layer.
• In the OSI model the transport layer is only connection oriented.	A layer of the TCP/IP model is both connection oriented & connection less.
• In the OSI model the data link & physical are seperate layer.	In TCP, Physical & data link are both combined as single host to network layer.
- Minimum size of header is 5 byte.	20 byte.

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Q:3 Hub

A Hub is a networking device that allows you to connect multiple pcs to a single network. It is used to connect segment of a LAN, A hub store various ports, so when a packet act arrives at port, it is copied to various other ports, Hub works as a common connection point for device in a network.

-> Active Hub
Passive Hub

Switch

A Network switch is a Networking device that connects various devices together on a single computer network, it may also be used to route information in the form of electronic date sent over networks, since the process of linking networks segments is also called bridging switching usually refferred to as bridging device.

-> Managable Switch
-> UnManagable Switch

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Q.4. Bridge

A bridge operates at data link layer. A bridge is repeater with add on the functionality of filtering content by reading the MAC address of source & destination.

-> It is also used for interconnecting two lanes working on the same protocol it has a single input & single output port, thus making it a 2 port devices.

-> Transparent Bridge
- These one bridge in which the system are completely unaware of the bridges existence ie whether or not a bridge is added or deleted from the network reconfigured of the station is unnecessary. These bridge forwarding & bridge learning.

-> Source routing Bridge
- In these bridges, routing operates is performed by source station & the frame specifies which route to follow. The host can discover frame by sending a special frame called discovery frame, which operates through the entire network using all possible path to destination.

-> Router

It is a virtual interconnecting device that is designed to receive, analyze & forward data packets between computer networks. It examines a destination IP address of a given data packet, & it uses the headers & forwarding table to decide the best way to transfer the packets, these are some popular companies that developed routers.
Such are Cisco, Nortel, HP, 3com, W-link.

A router is used in LAN & WAN.
- It shares Informations with other routers in networking.
- It uses the routing protocol to transfer data across a network.

8.5 Topology

A Network Topology is the arrangement with which Computer system or network device are connected to each other.

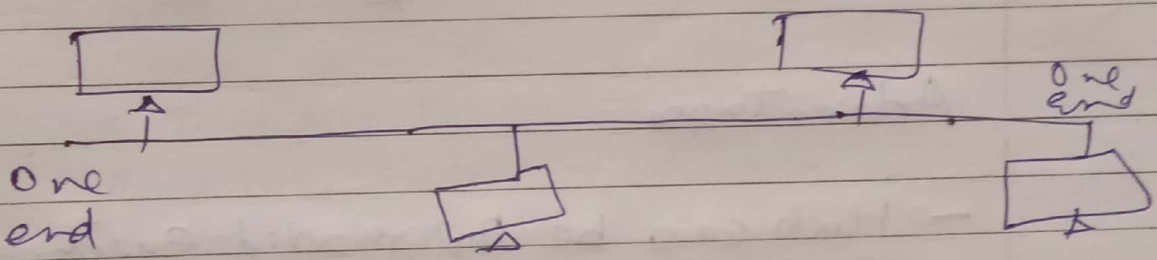
Topology may define both logical & Physical aspect of the network. Both logical & physical topologies could be same or different in a same

network.

-> Bus
-> Star
-> Mesh
-> Ring

Bus Topology

- It is a network types in which every computer & network devices is connected to single cable where it has exactly two end points then it is called linear Bus Topology



Advantages

- Cost Effective
- Less Cable Requirement
-> Used in Small Network
-> Easy to Understand
-> Easy to Expand

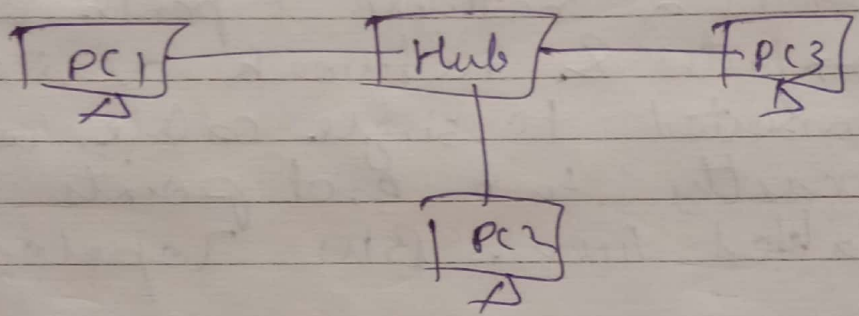
Disadvantages

-> whole Network fails when Cable fails.
-> Cable has limited length.

-> slower than Ring Topology.

* Star Topology

- In this type of topology all the PCs are connected to single hub through a cable. This hub is the central node & all other nodes are connected to the central node.



Advantages

- Hub can be Upgraded easily
- fast Performance
- Easy to Troubleshoot
- Easy to setup & modify

Disadvantages

- Cost of Installation is High
- Expensive to Use
- Performance is based on Hub

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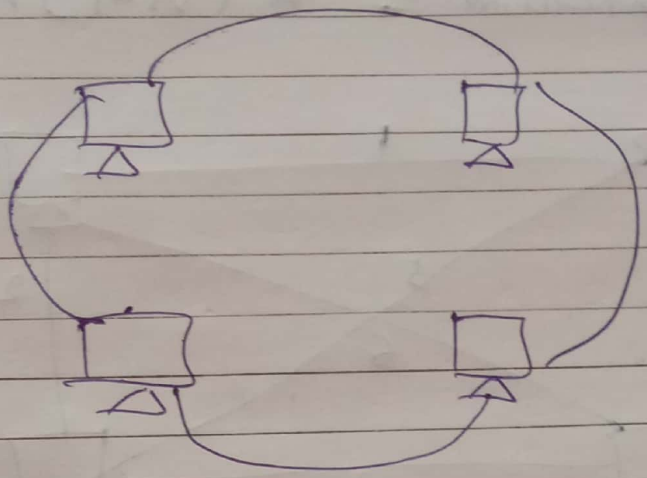
* Ring Topology

- It becomes ring as each computer is connected to another computer with the last one connected to first.



Advantages

- Cost Effective
- Used in small network
- Easy to Expand

Disadvantages

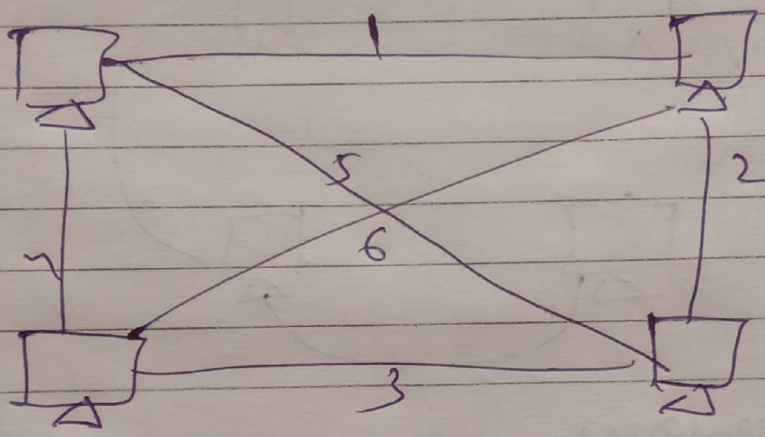
- Cable fails when network fails.
- Cable has limited length.
- Slower than ring topology.

* Mesh Topology

A Mesh Topology can be full mesh topology or partial connected mesh topology.

-> In mesh topology, every computer in the network. The no. of connection in this network can be calculated using the following formulas.

no. of connection = $n(n-1)/2$



n = 4

$\frac{4(3)}{2} = 6.$

Advantages

-> Manage High amount of traffic
-> failure of one does not cause proble.

Disadvantages

- Higher cost.
- Diffiunt in building.
- Chances of Redundant Connection is high.