Ex.No:04	Study of Network Topologies
Date : 20/12/24	

Objective(s):

To design and implement network topologies using Cisco Packet Tracer

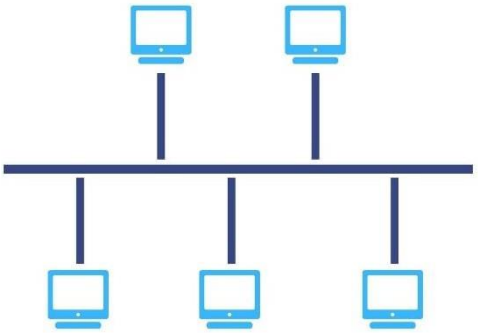
Introduction:

Network topology is the geometric representation of relationship of all the links connecting the devices or nodes. Network topology represent in two ways one is physical topology that define the way in which a network is physically laid out and other one is logical topology that defines how data actually flow through the network. In this lab, we will discuss how to design bus, star and mesh topology network and provide interfacing and simulation between end points using packet tracer software.

Theoretical Background:

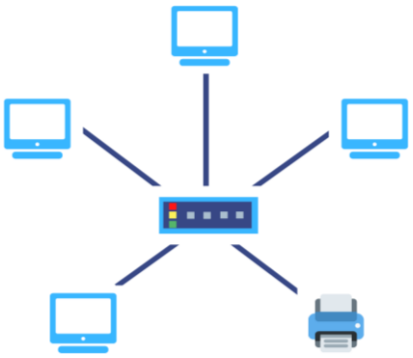
Bus Topology

In local area network, it is a single network cable runs in the building or campus and all nodes are connected along with this communication line with two endpoints called the bus or backbone. In other words, it is a multipoint data communication circuit that is easily control data flow between the computers because this configuration allows all stations to receive every transmission over the network. For bus topology we build network using three generic pc which are serially connected with three switches using copper straight through cable and switches are interconnected using copper cross over cable.

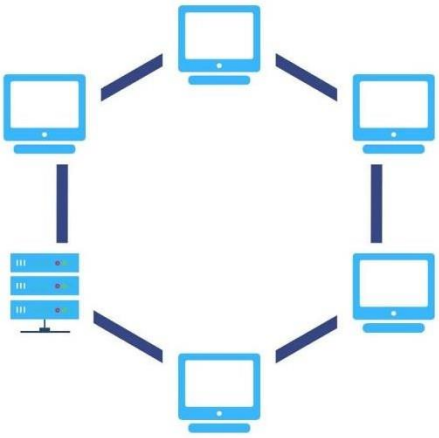


Star Topology

In star topology, all the cables run from the computers to a central location where they are all connected by a device called a hub. It is a concentrated network, where the end points are directly reachable from a central location when network is expanded. Ethernet 10 base T is a popular network based on the star topology. For star topology we build network using five generic pc which are centrally connected to single switch 2950-24 using copper straight through cable.



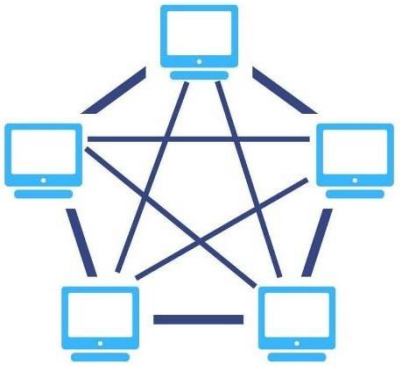
RING TOPOLOGY



As we mentioned earlier, the ring topology is similar to a daisy chain topology but with the loop closed so that the nodes are arranged in a ring or circle. Each node has exactly two peers and the data travels in one direction passing through each intermediate node on the ring until it reaches the destination node. Data can be made to pass in both directions by adding a second connection between the network nodes, creating a dual ring topology.

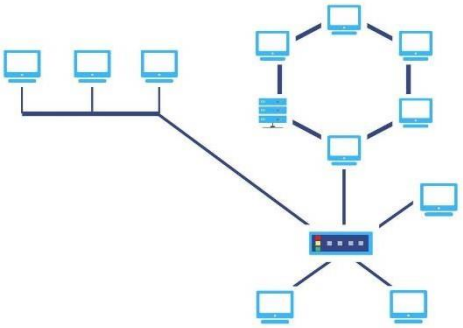
In a ring topology, an electrical "token" circulates around the network. Any node that wants to transmit data has to wait until it has possession of the token.

MESH TOPOLOGY



In mesh topology every device has a dedicated point to point link to every other device. The term dedicated stand for link carries traffic only between four devices it connects. It is a well-connected topology; in this, every node has a connection to every other node in the network. The cable requirements are high and it can include multiple topologies. Failure in one of the computers does not cause the network to break down, as they have alternative paths to other computers star topology, all the cables run from the computers to a central location.

Hybrid Topology



Hybrid topology combines two or more topologies. You can see in the above architecture in such a manner that the resulting network does not exhibit one of the standard topologies.

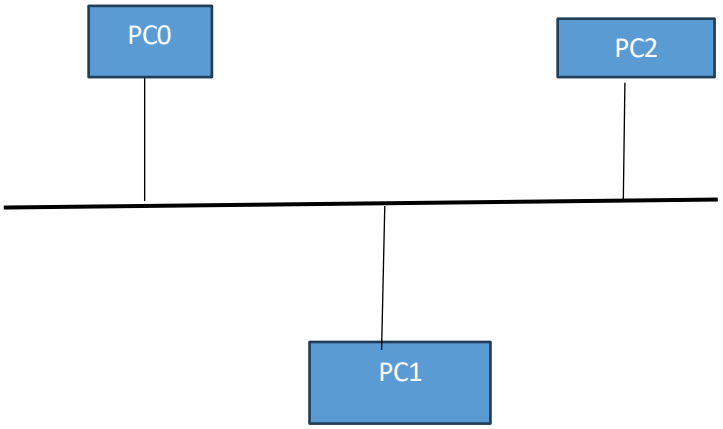
For example, as you can see in the above image that in an office in one department, Star and P2P topology is used. A hybrid topology is always produced when two different basic network topologies are connected.

Design the above mentioned topologies and verify the connectivity.

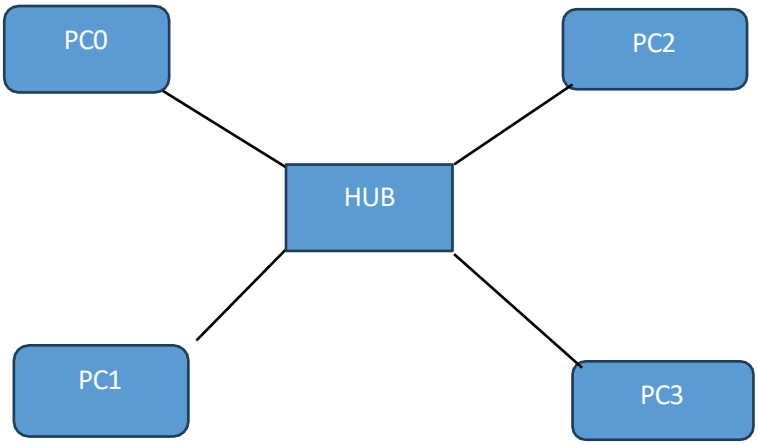
1. **Device Requirements:**
   1. PC
   2. Switch (2950-24 , 2960-24TT)
   3. Cables (copper straight, copper cross-over)

2. **Network Diagram for your experiment (draw the diagram either hand drawing/ms paint or any other drawing tools)**

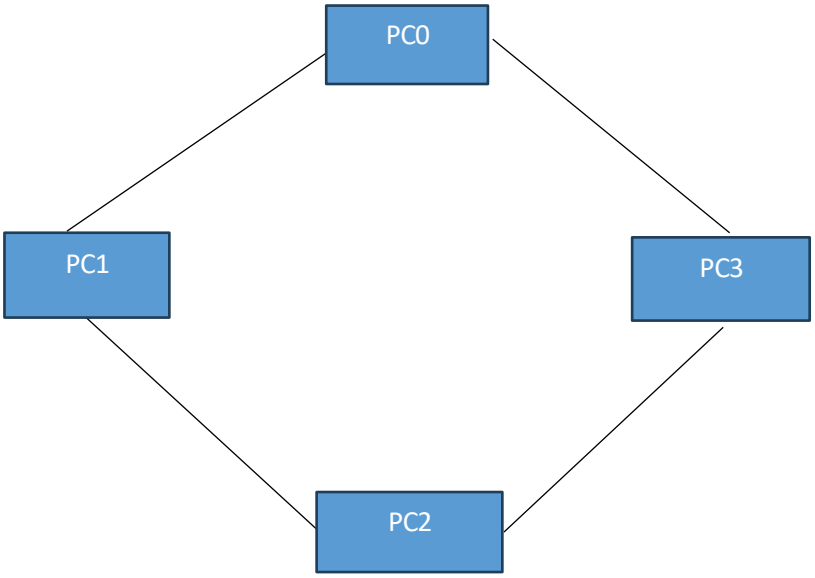
BUS TOPOLOGY:



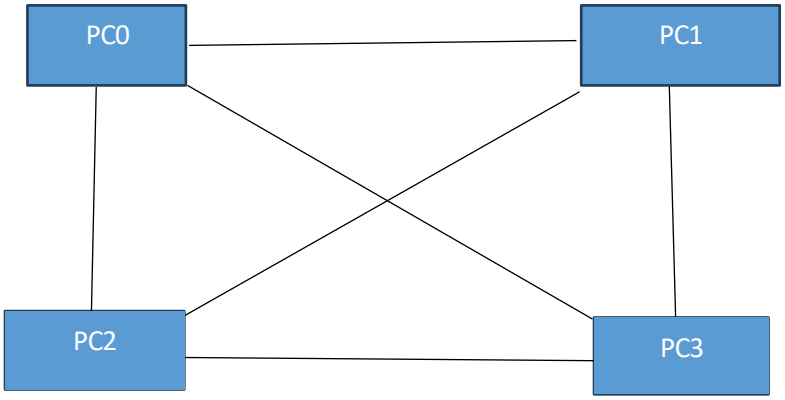
STAR TOPOLOGY:



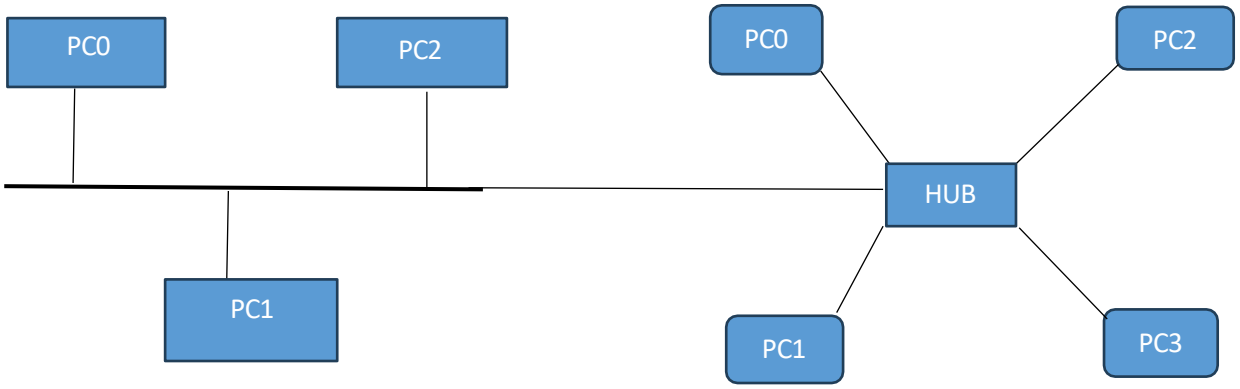
RING TOPOLOGY:



MESH TOPOLOGY

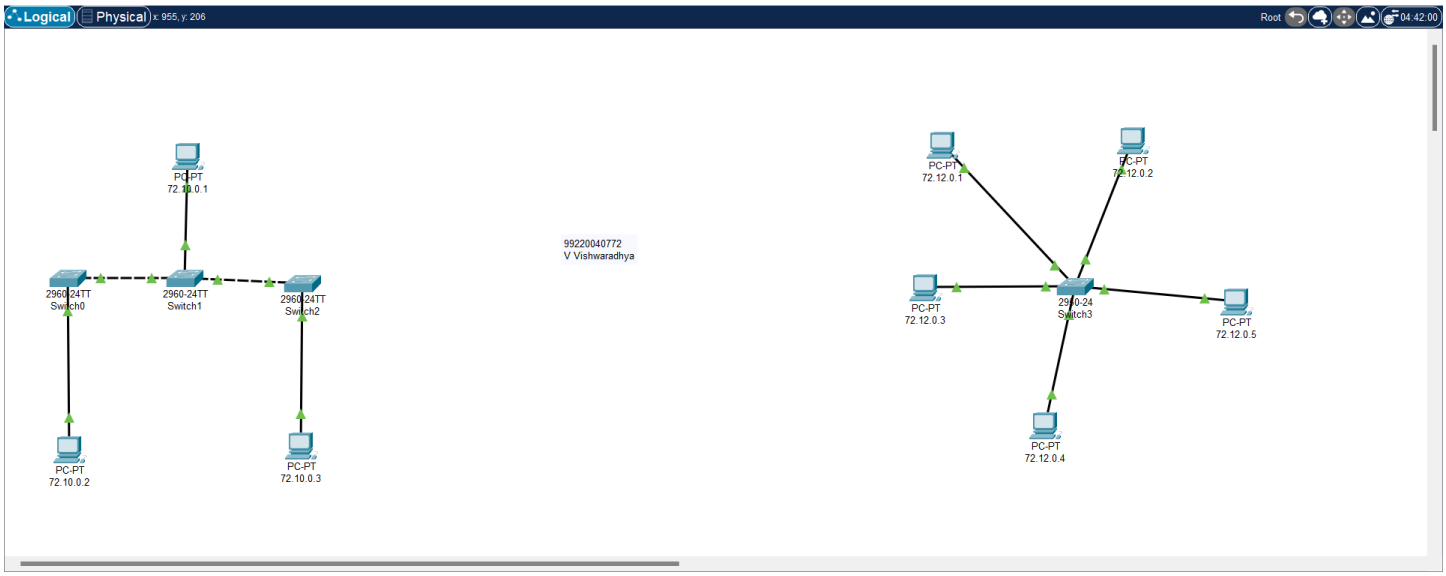


HYBRID TOPOLOGY

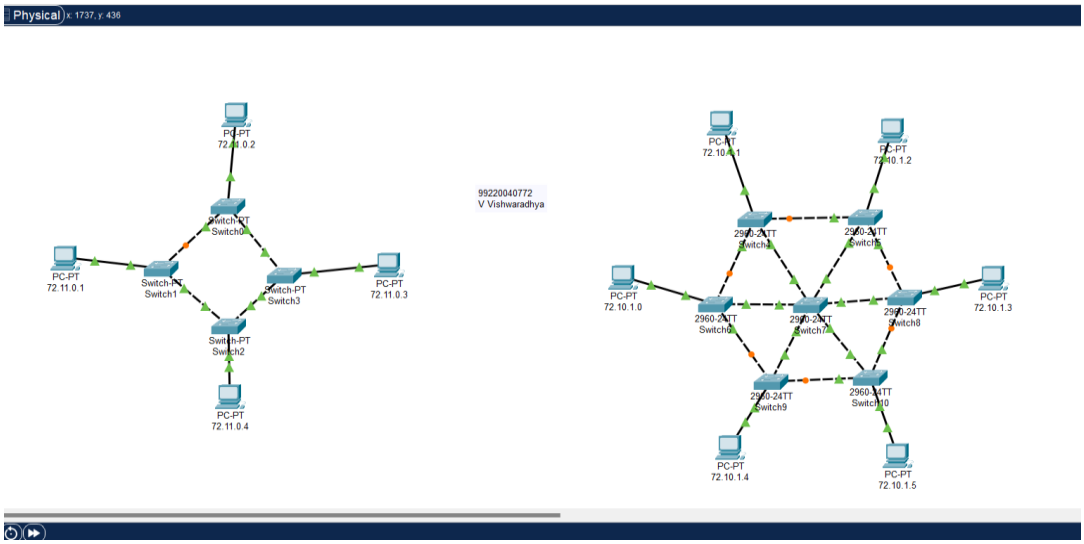


3. Network Diagram (Packet tracer diagram before configuration):

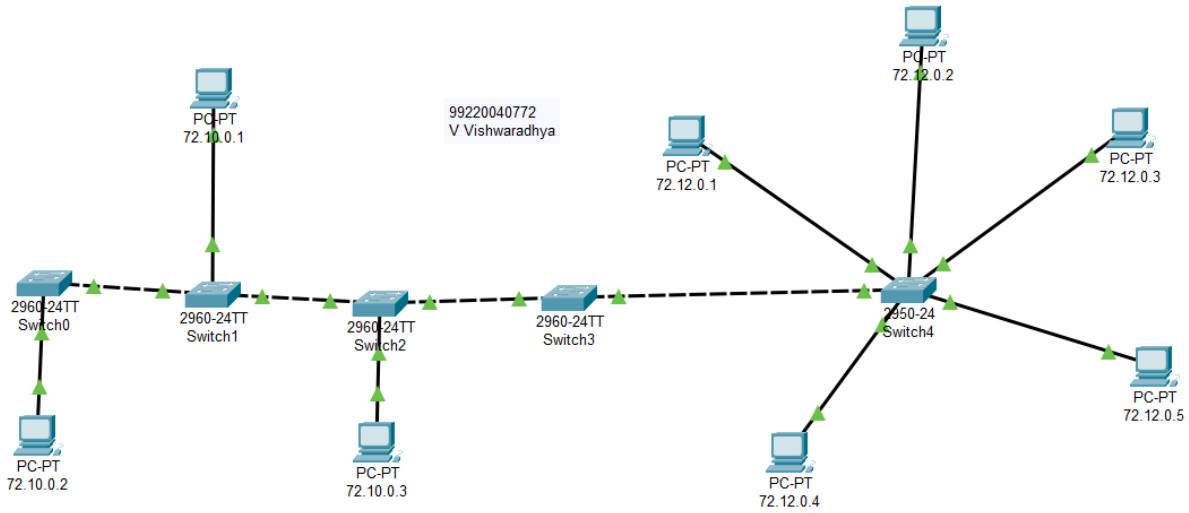
BUS and STAR Topologies:



RING and MESH Topologies:



HYBRID Topology:



4. Configuration details:

BUS TOPOLOGY:

Device Name	Interface Name	IP Address	Subnet mask
PC1	FastEthernet0/1	72.10.0.1	255.0.0.0
PC2	FastEthernet0/2	72.10.0.2	255.0.0.0
PC3	FastEthernet0/3	72.10.0.3	255.0.0.0

STAR TOPOLOGY:

Device Name	Interface Name	IP Address	Subnet mask
PC1	FastEthernet0/1	72.12.0.1	255.0.0.0
PC2	FastEthernet0/2	72.12.0.2	255.0.0.0
PC3	FastEthernet0/3	72.12.0.3	255.0.0.0
PC4	FastEthernet0/4	72.12.0.4	255.0.0.0
PC5	FastEthernet0/5	72.12.0.5	255.0.0.0

RING TOPOLOGY:

PC1	FastEthernet0/1	72.11.0.1	255.0.0.0
PC2	FastEthernet0/2	72.11.0.2	255.0.0.0
PC3	FastEthernet0/3	72.11.0.3	255.0.0.0
PC4	FastEthernet0/4	72.11.0.4	255.0.0.0

MESH TOPOLOGY:

PC1	FastEthernet0/1	72.10.1.0	255.0.0.0
PC2	FastEthernet0/2	72.10.1.1	255.0.0.0
PC3	FastEthernet0/3	72.10.1.2	255.0.0.0
PC4	FastEthernet0/4	72.10.1.3	255.0.0.0
PC5	FastEthernet0/5	72.10.1.4	255.0.0.0
PC6	FastEthernet0/6	72.10.1.5	255.0.0.0

HYBRID TOPOLOGY:

PC1(Star topology)	FastEthernet0/1	72.12.0.1	255.0.0.0
PC2	FastEthernet0/2	72.12.0.2	255.0.0.0
PC3	FastEthernet0/3	72.12.0.3	255.0.0.0
PC4	FastEthernet0/4	72.12.0.3	255.0.0.0
PC5	FastEthernet0/5	72.12.0.3	255.0.0.0
PC1(Bus topology)	FastEthernet0/1	72.10.0.1	255.0.0.0
PC2	FastEthernet0/2	72.10.0.2	255.0.0.0
PC3	FastEthernet0/3	72.10.0.3	255.0.0.0

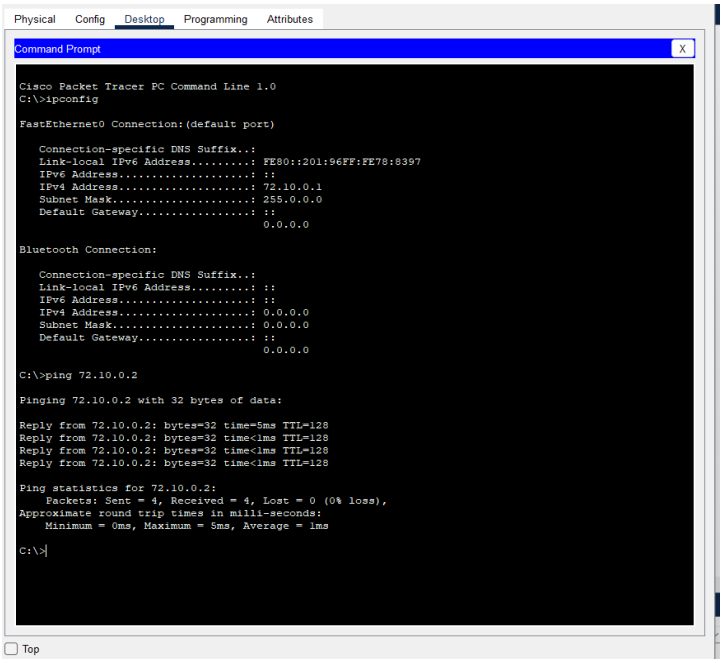
1. **Commands used in each of the diagram (if any):**

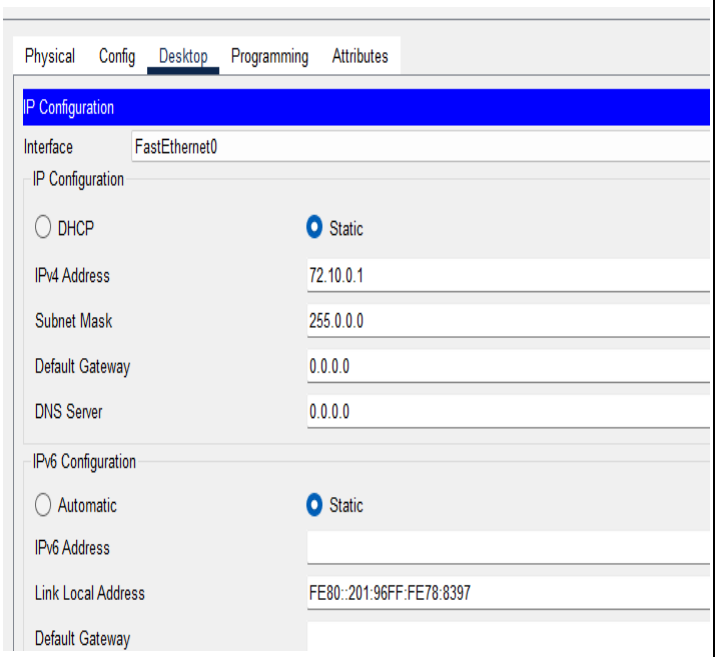
1. ipconfig - display the ip address of particular machine.

2. ping – allow user to test and verify a particular destination IP address exists and can accept requests in network.

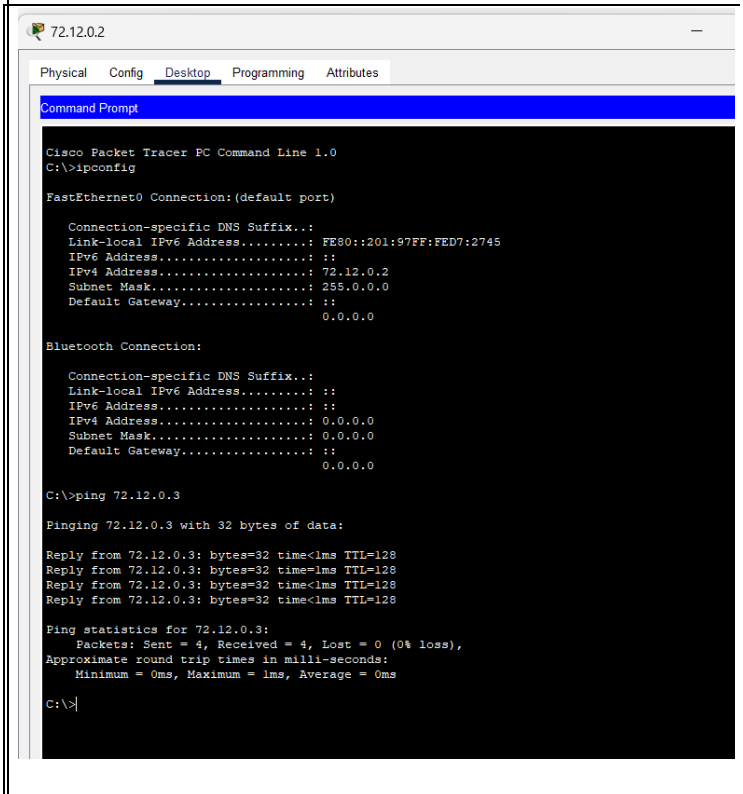
2. Output Diagram (Minimum 3 screenshot

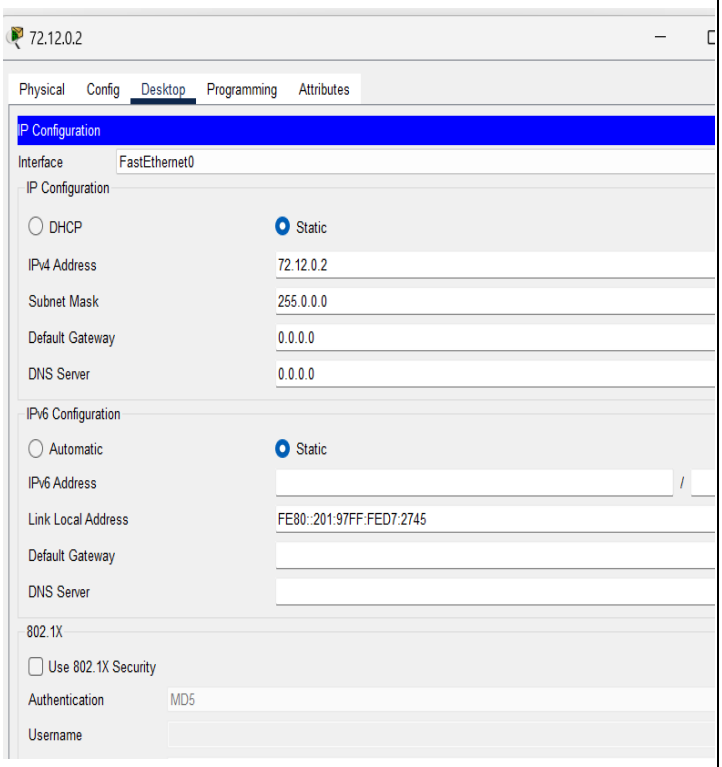
Bus Topology :



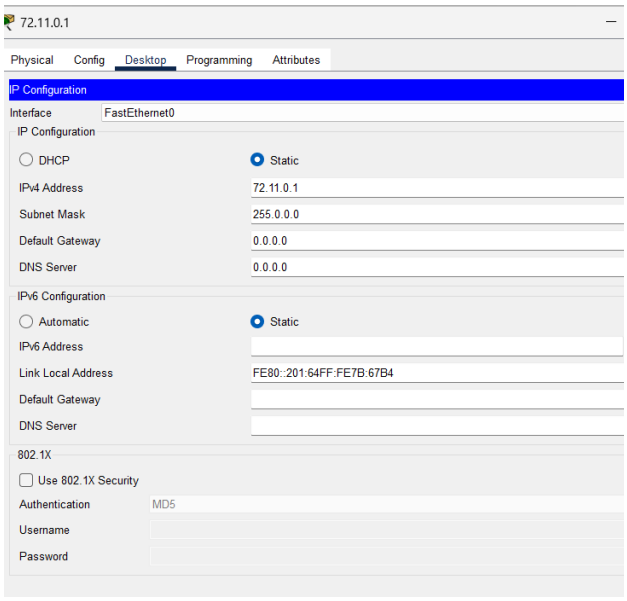


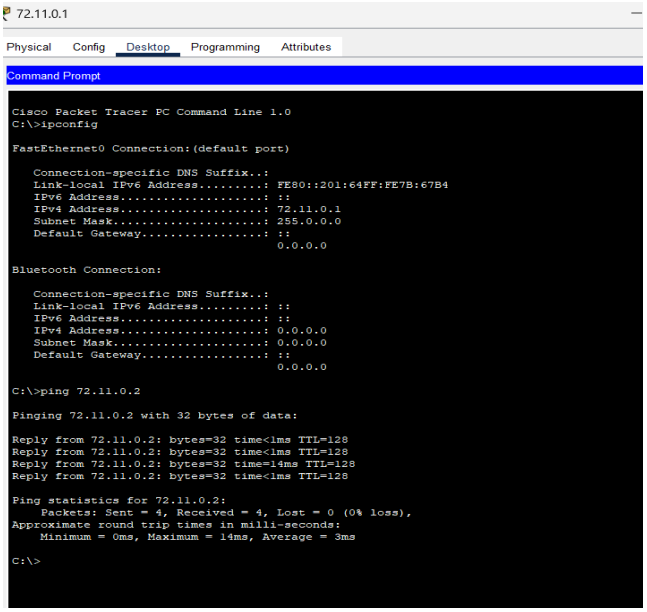
Star Topology:



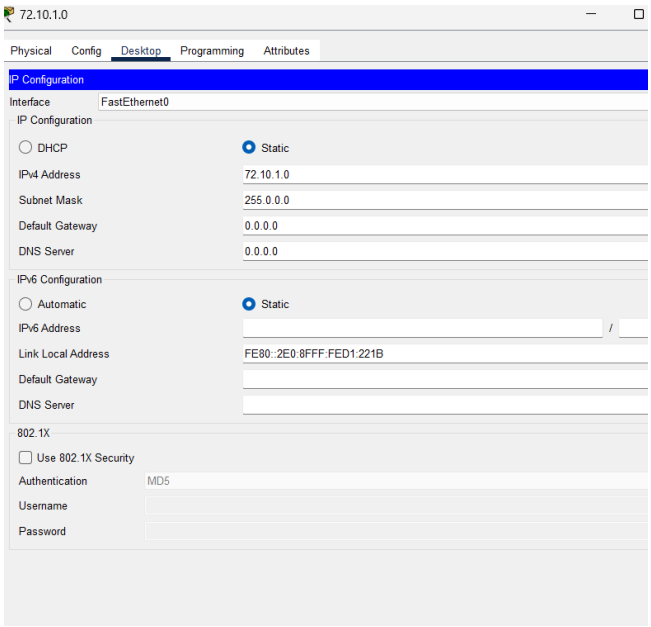


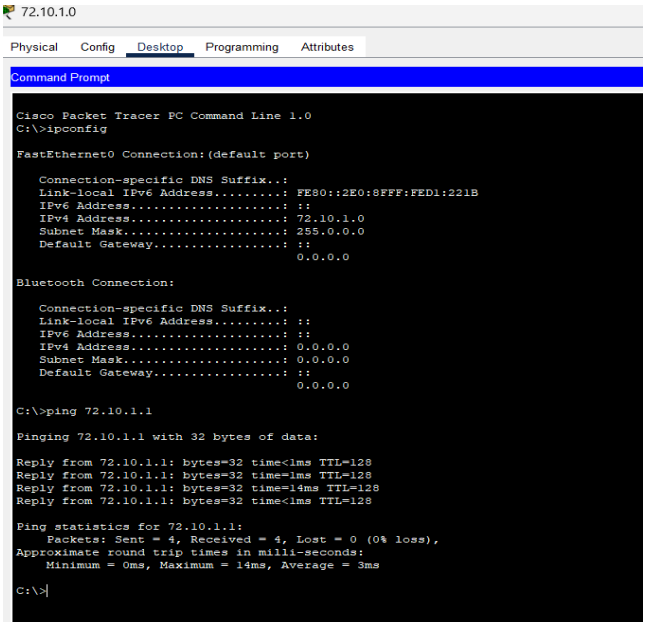
Ring Topology:



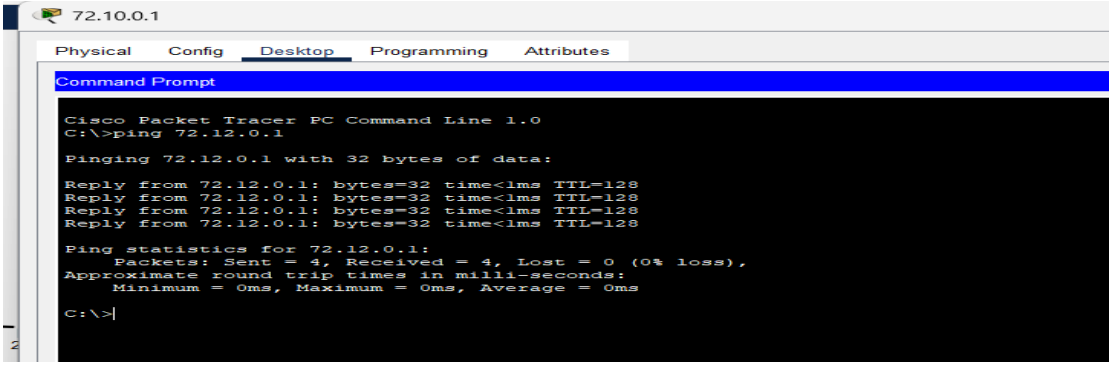


Mesh Topology:





Hybrid Topology:



Google Drive link of the packet tracer file (give view permission):

Link: https://drive.google.com/drive/folders/1-DFh5xxfaHLVznVBbp8ER8YgzbD4dclb?usp=drive_link

CONCLUSION (provide conclusion about this experiment): Thus, the process of designing and implementing network topologies using Cisco Packet Tracer has done successfully.

Rubrics for Experiment Assessment:

Rubrics	Good	Normal	Poor	Marks
Creation of Topology (4)	Created the topology, Identify the proper devices and making the connections **(4)**	Created the topology, Identify the proper devices, making the connections But missing some features **(3)**	Created wrong topology, Failed to Identify the proper devices and making connections **(1)**	
Verify the connectivity (4)	Verified the connectivity in all the levels **(4)**	Verified the connectivity at some levels (only some nodes) **(2)**	Verified the connectivity is not done. **(1)**	
Timely Completion (2)	Completed the lab before the allotted time **(2)**	Completed the lab after the deadline **(1)**	Did not submitted before grading **(0)**	
			Total	