Experiment 2.1

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Branch: CSE **Section/Group: 808/B**
Semester: 4th **Date of Performance:**
Subject Name: Computer Networks **Subject Code: 21CSH-256**

Aim:- Implement different network topologies like Star, Bus with the help of packet tracer or NS2 software.

S/W Requirement :- Cisco Packet Tracer

Theory:

1. **Topology:** Topology defines the structure of the network of how all the components are interconnected to each other. There are two types of topology: physical and logicaltopology.

2. **Star Topology:** Star topology is an arrangement of the network in which every node is connected to the central hub, switch or a central computer. The central computer is known as a server, and the peripheral devices attached to the server are known as clients.

2.1) Features:

1.) Centralized topology: In a star topology, all devices are connected to a central hub or switch, which acts as a central point for the network.

2.) Easy to manage: Star topology is easy to manage as the central hub or switch can be used to monitor and troubleshoot the network. Any issues with a device can be easily identified and isolated, making it easy to maintain and repair the network.

3.) Scalability: A star topology is easily scalable as new devices can be added to the network by simply connecting them to the central hub or switch.

2.3) Advantage:

1.) Easy to troubleshoot.

2.) Scalability

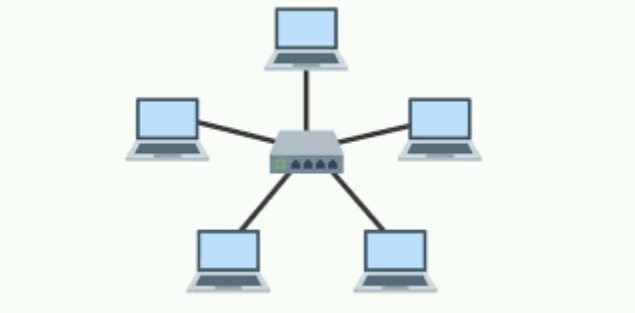
3.) Reliability

4.) Centralized network

5.) No point-to-point connections

2.4) Disadvantage:

1) High cost: Implementing a switch or router may have a higher price, especially when using a switch or router as the central network device.
2) Everything depends on the central device: The central network device determines the performance and number of nodes the network can handle.
3) High maintenance: Hub requires more resources and regular maintenance because it's the central system of the star.
4) Immobile network system**:** Although wireless star topology systems are available today, most still depend on wired connections. That means the fixed length of the cable restricts the movements of individual workers.
    - Number of Lines := Number of device connected to the system.



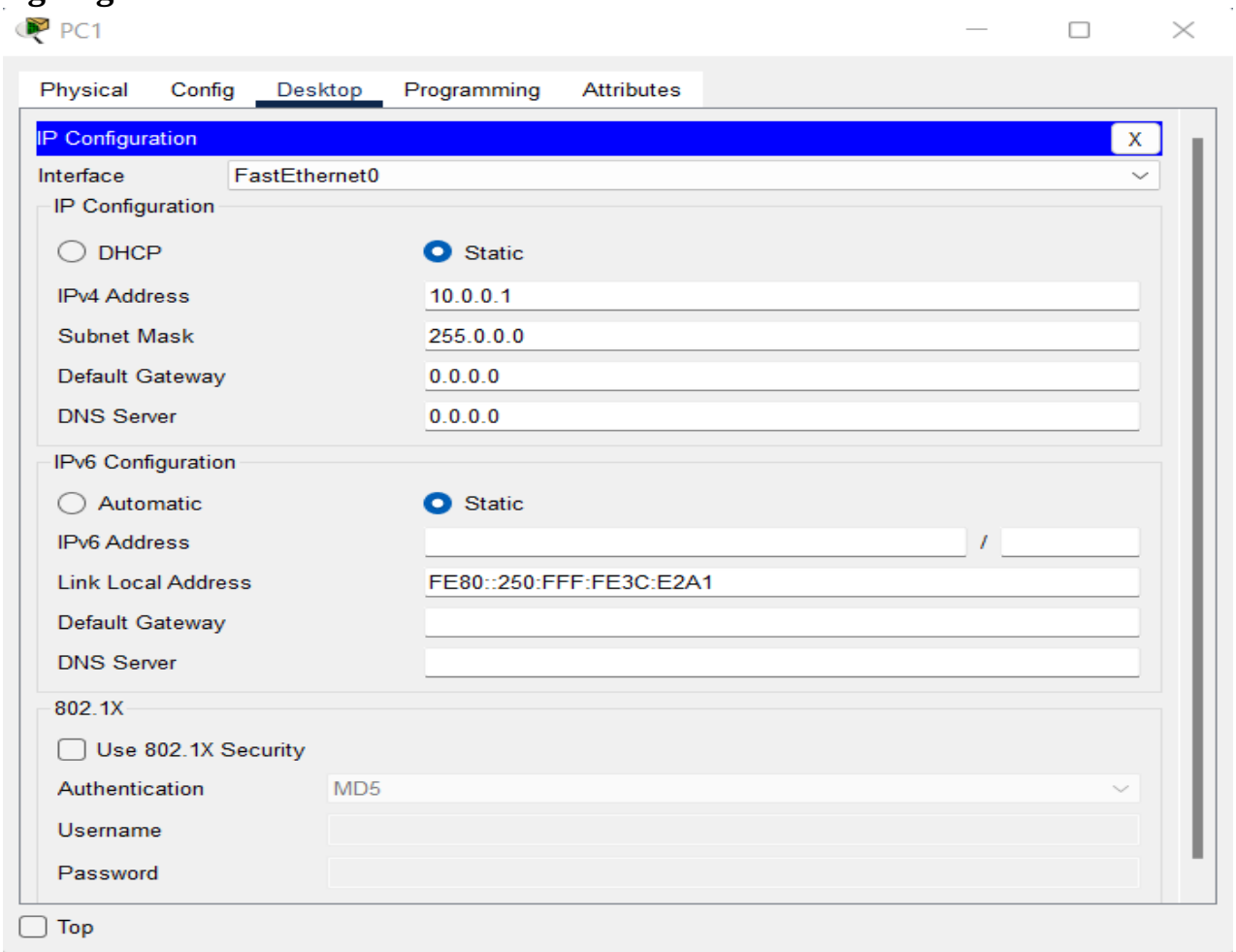
Procedure:

a) Star Topology

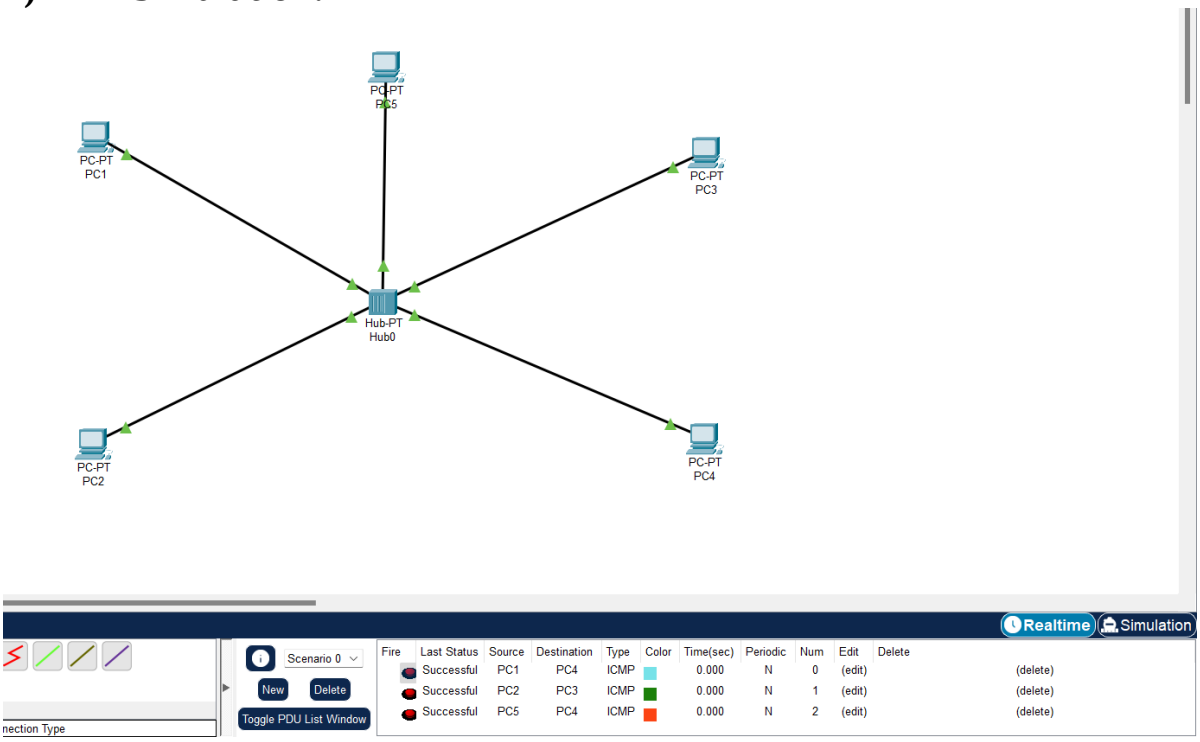
1. Attach required devices Hub in the packet tracer software.
2. Assign IP address to devices. E.g:(10.0.0.1)
3. Select source and destination and drop packet from source to destination.
4. Go to Simulation mode and click capture/Play.
5. Simulation will start and packet will only be accepted by destination.

Output-

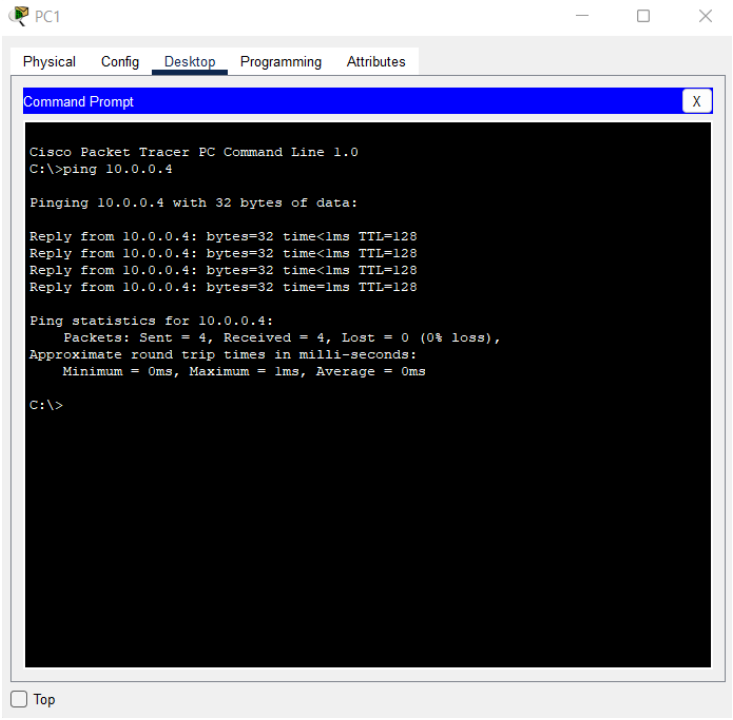
i) Assigning IP- Address to each device



ii) Simulation:



iii) Pinging PC 4 from PC 1



3.) Bus Topology: Bus topology is a type of computer network topology in which all the devices are connected to a single cable called the "bus". The data flows in both directions on the bus, and all devices receive the data, but only the intended device processes the data. It is a simple and cost-effective topology.

3.1) Features of bus topology:

1) Linear topology: In a bus topology, all devices are connected to a single cable called the "bus," which runs in a linear fashion throughout the network.
2) Easy to install: Bus topology is easy to install as it requires only one cable to connect all devices in the network.
3) Cost-effective: Bus topology is a cost-effective option as it requires less cabling and hardware compared to other network topologies.
4) Limited scalability: Bus topology has limited scalability as the number of devices that can be added to the network is limited by the length of the cable and the number of devices that can be supported by the network.

3.2) Advantage:

1. Easy to install: Bus topology requires only one cable to connect all devices, which simplifies the installation process.
2. Cost-effective: It is a cost-effective option for small businesses or organizations with limited budgets.
3. Easy to extend: It is easy to extend the network by adding new devices or cables to the existing network.
4. Less cabling: Bus topology requires less cabling than other network topologies, making it a good option for small networks.
5. Simple network layout: Bus topology is a simple network layout and easy to understand.

3.3) Disadvantage:

1. Limited scalability: The number of devices that can be added to the network is limited by the length of the cable and the number of devices that can be supported by the network.
2. Susceptible to collisions: Bus topology is susceptible to collisions when two devices attempt to transmit data at the same time, which can result in data loss or corruption.
3. Difficult to troubleshoot: It can be difficult to troubleshoot problems on a bus topology network as the failure of a single device or cable can affect the entire network.
4. Lower data transfer rate: The data transfer rate of bus topology is lower compared to other topologies as all devices share the same cable.
5. Security: It can be difficult to secure data on a bus topology network as all devices have access to the data flowing on the bus.

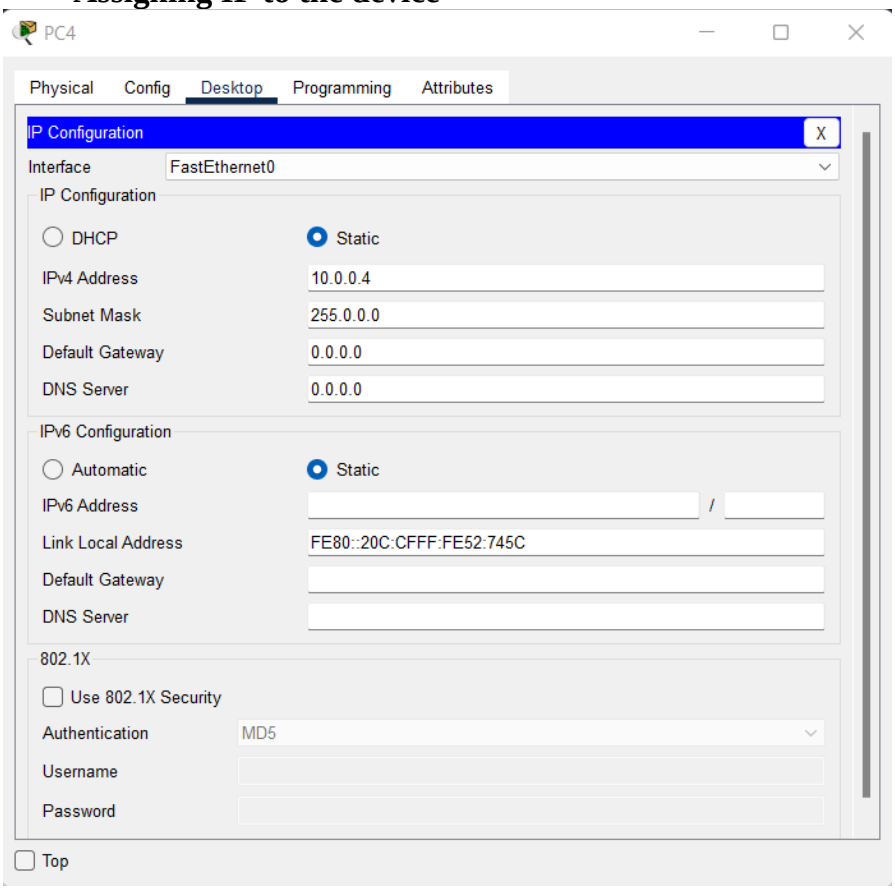
- Number of wires in Bus topology = Number of device + 1 (Backbone wire)

3.4) Procedure:

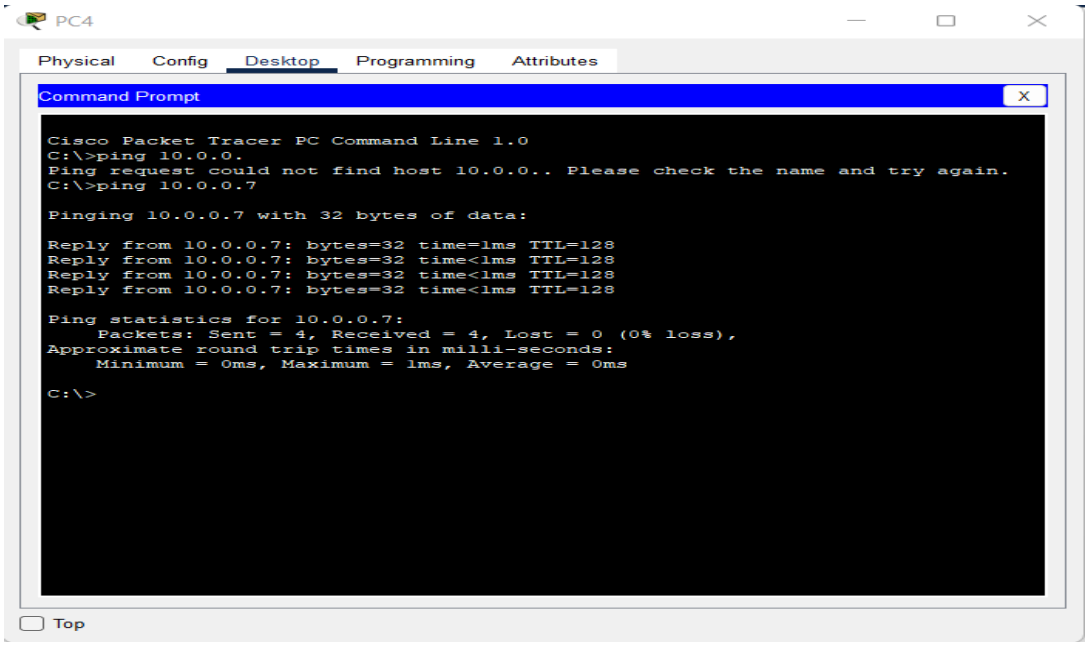
1. Attach required devices Switch in the packet tracer software.
2. Connect the switches with each other as shown in figure.
3. Assign IP address to devices . E.g: (10.0.0.1)
4. Select source and destination and drop packet from source to destination.
5. Go to Simulation mode and click capture/Play.
6. Simulation will start and packet will only be accepted by destination.
7. Ping the IP of other devices to check the connection between them.

Output-

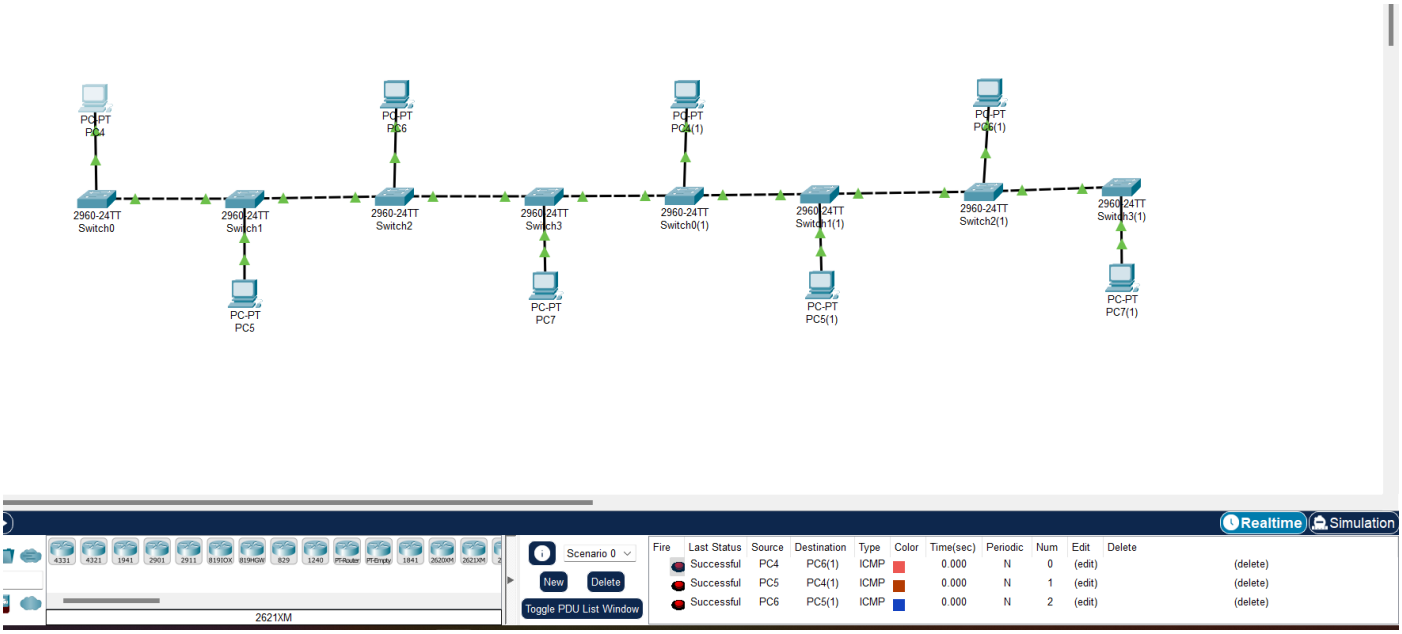
i) Assigning IP to the device



ii) Pinging a device from another device on the same topology.



iii) Bus topology:



Results: Simulated Star and Bus Network topologies.

Experiment 2.2

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Branch: CSE **Section/Group: 808/B**
Semester: 4th **Date of Performance:**
Subject Name: Computer Networks **Subject Code: 21CSH-256**

Aim:- Implement Mesh Topology with the help of packet tracer or NS2 software.

S/W Requirement :- Cisco Packet Tracer

Theory:

1. **Topology:** Topology defines the structure of the network of how all the components are interconnected to each other. There are two types of topology: physical and logical topology.

2. **Mesh Topology:** The Mesh technology is an arrangement of the network in which computers are interconnected with each other through various redundant connections. There are multiple paths from one computer to another computer. The Internet is an example of the mesh topology.

Features of Mesh Topology:

1.Fully connected.

2.Robust.

3.Not flexible.

2.1)Procedure:

1. First, open the Cisco packet tracer desktop and select the devices given below.
2. Connect the devices as shown in figure below to obtain mesh topology.
3. Assign IP address to devices. E.g: (10.0.0.1)
4. Select source and destination and drop packet from source to destination.
5. Go to Simulation mode and click capture/Play.

6. Simulation will start and packet will only be accepted by destination.
7. Use ping command to check connection between different devices.

2.2) Advantage:

1. Redundancy: Mesh topology provides redundancy as there are multiple paths for data to reach its destination. If one path fails, data can be routed through another path, ensuring that the network remains operational.
2. Scalability: Mesh topology is highly scalable as new devices can be added to the network easily, and the network can be expanded as needed.
3. High data transfer rate: Mesh topology provides high data transfer rates as devices can communicate with each other simultaneously.
4. Security: Mesh topology is more secure than other topologies as data is transmitted through dedicated links between devices, reducing the risk of data interception or tampering.
5. Fault detection: Mesh topology makes it easy to detect faults and isolate them. Each device can act as a router, allowing for easier identification of faulty devices.

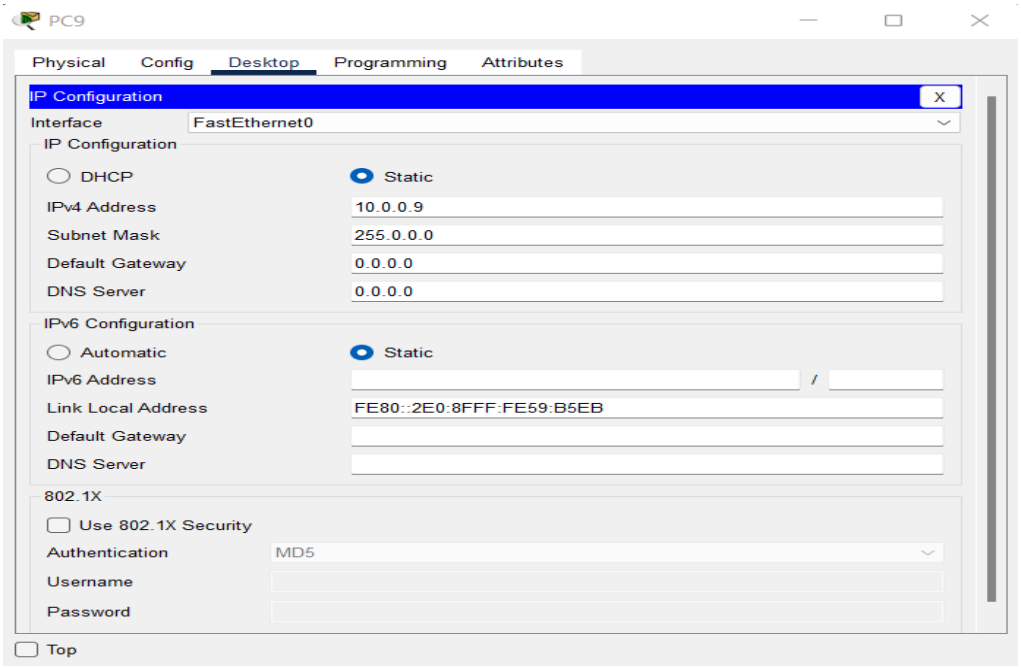
2.3) Disadvantage

1. Complexity: Mesh topology is complex to implement and maintain due to the large number of cables and devices required.
2. Cost: Mesh topology is expensive as it requires a large number of cables and devices to be installed.
3. Difficult to troubleshoot: Mesh topology can be difficult to troubleshoot as there are multiple paths for data to travel, making it hard to locate and isolate faults.
4. High redundancy: Although redundancy is an advantage, it can also be a disadvantage in mesh topology, as it leads to an increased number of cables and devices, resulting in higher costs.

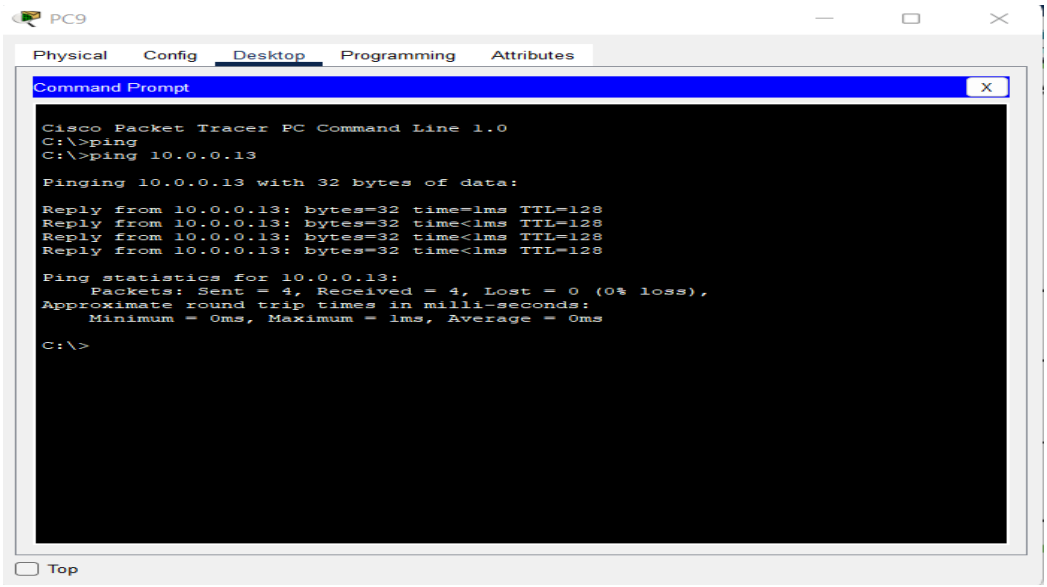
- Number of wires in Mesh = **n (n − 1) / 2**
- Here n is number of device connected to the topology.

Output-

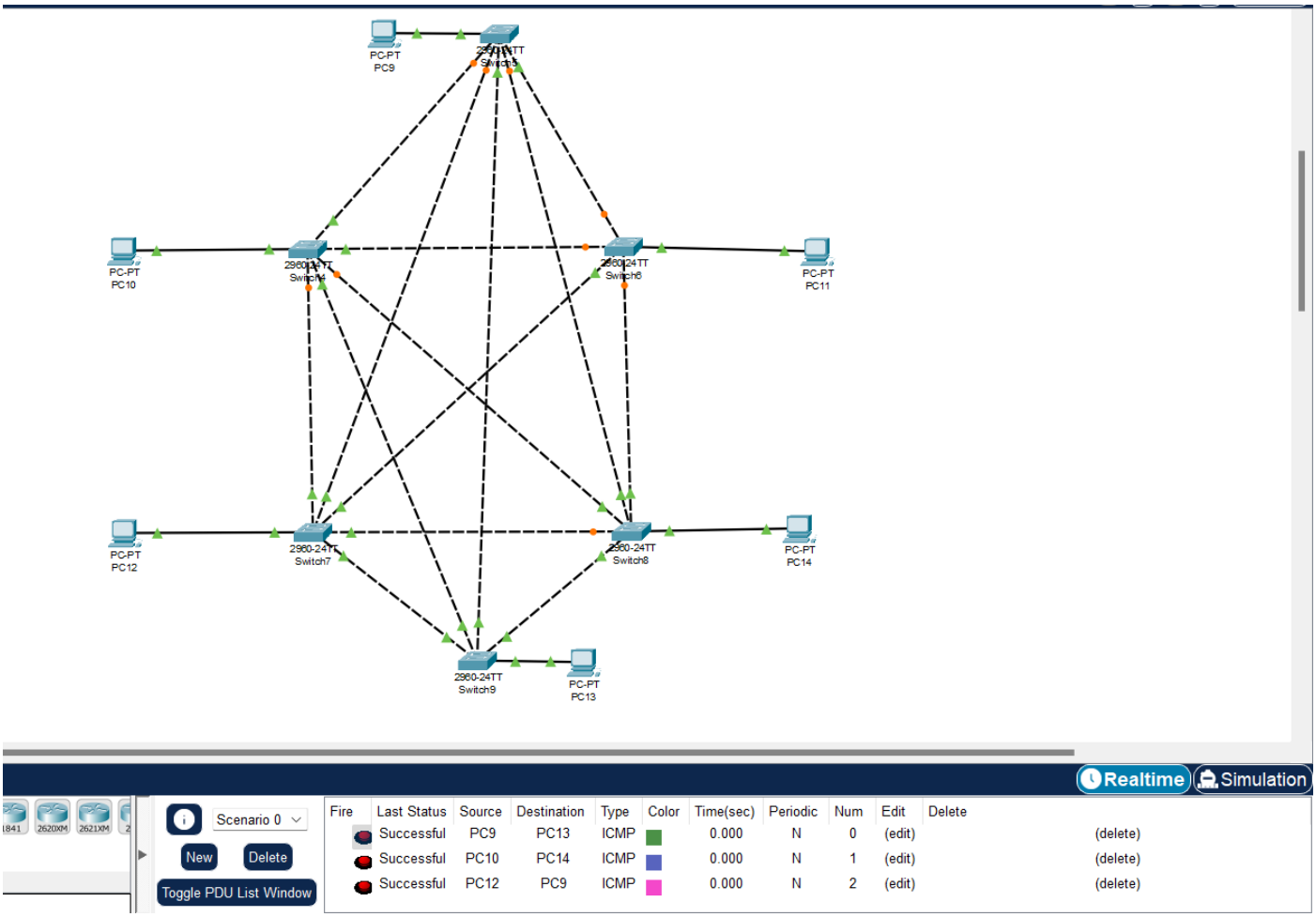
i) Assigning IP to all the system.



ii) Pinging another pc from a pc connected to the same network.



iii) 6 Node Mesh Topology.



Results: Simulated Mesh Topology.