Terna Engineering College

Computer Engineering Department
Program: Sem V

PART A
(PART A: TO BE REFFERED BY STUDENTS)

Experiment No.5

A.1 Aim:

Implementation of a LAN Network with the following topologies by using CISCO Packet Tracer.

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A.2 Objective:

Implementation of a LAN Network with the following topologies by using CISCO Packet Tracer.

1. Ring Topology.
2. Star Topology
3. Mesh Topology
4. Tree Topology

A.3 Prerequisite:

- Knowledge about PAN, LAN and NW Elements.
- HW and IP Address concepts.
- Network Topology.
- Concept of Analysis, Design, Simulation and Modelling
- Cisco Packet tracer as simulation tool

A.4 Outcome:
After successful completion of this experiment students will be able to

- Ability to select the proper NW Elements required to design NWs.
- Design of LANs using different topologies.
- Connect the LANs through the switch/hub by addressing the proper addresses.
- To Design an LAN environment to learn various Topologies, messaging and acknowledgements.
- Thorough understanding of DLL.
- Simulate the designed LAN NWs.

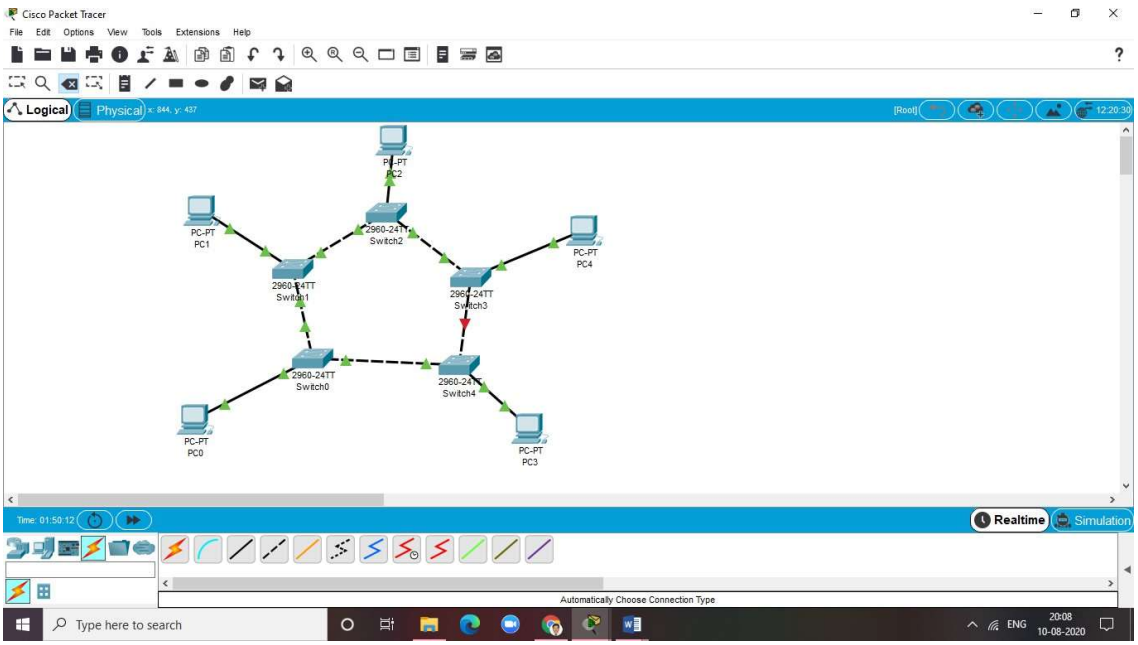
A.5 Theory/Tutorial:

1. Steps to create LAN

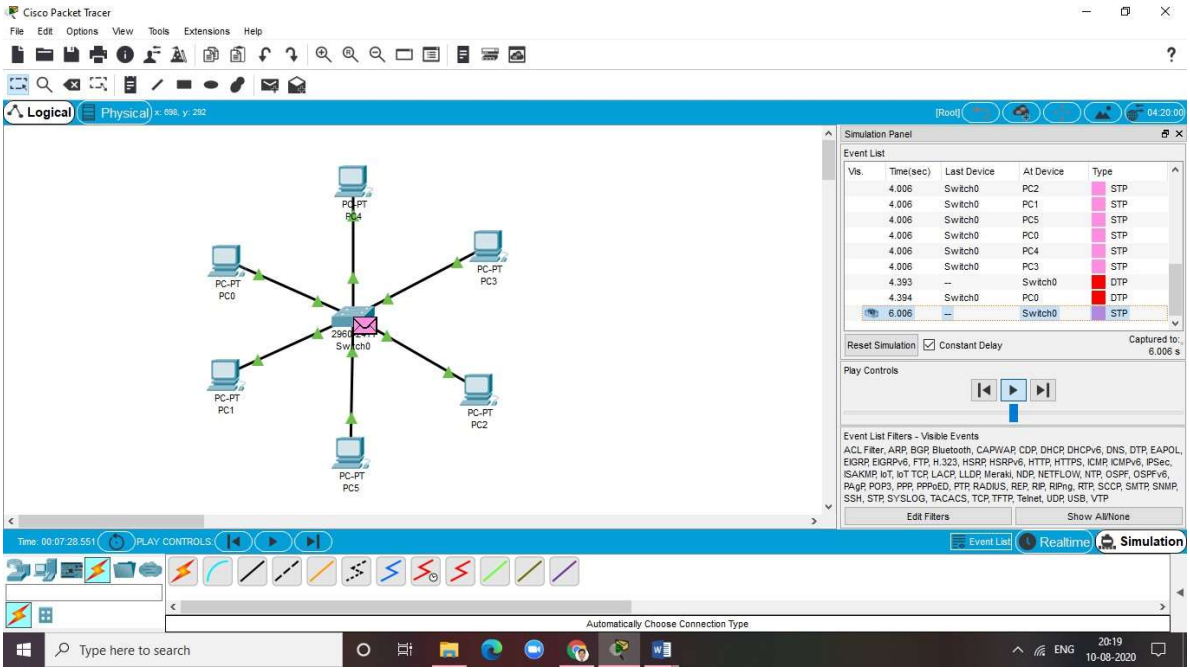
Cisco Packet Tracer is an application designed to be able to simulate a network before actually doing the network development, and also can be used for simulation research in a network.

Create a LAN network using an Access Point consisting of 4-6 PCs and Hub/switches.

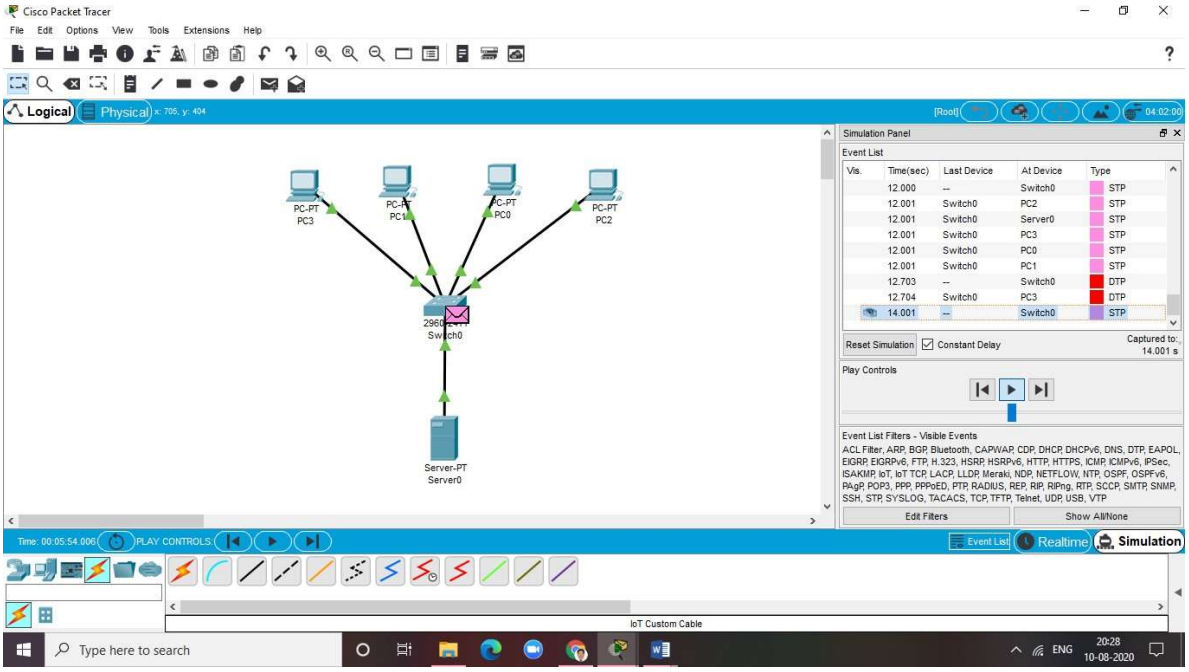
- LAN using Ring Topology as below.



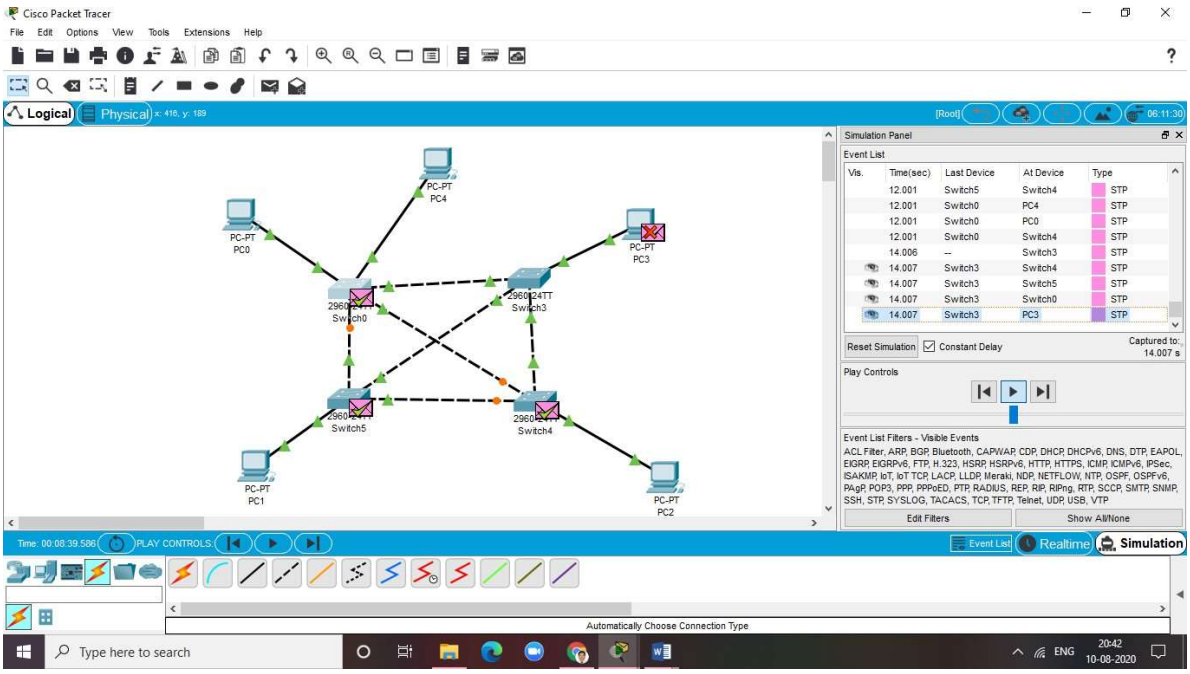
- Create LAN using Star Topology



- Create LAN using Tree Topology



- Create LAN using Mesh Topology



References:

- https://www.youtube.com/watch?v=Er3X-X3fkZU&t=12s
- https://www.youtube.com/watch?v=TNczCm9fbj8
- https://www.youtube.com/watch?v=QxB-CBS1bbU
- https://www.youtube.com/watch?v=cXZedUwvP-A

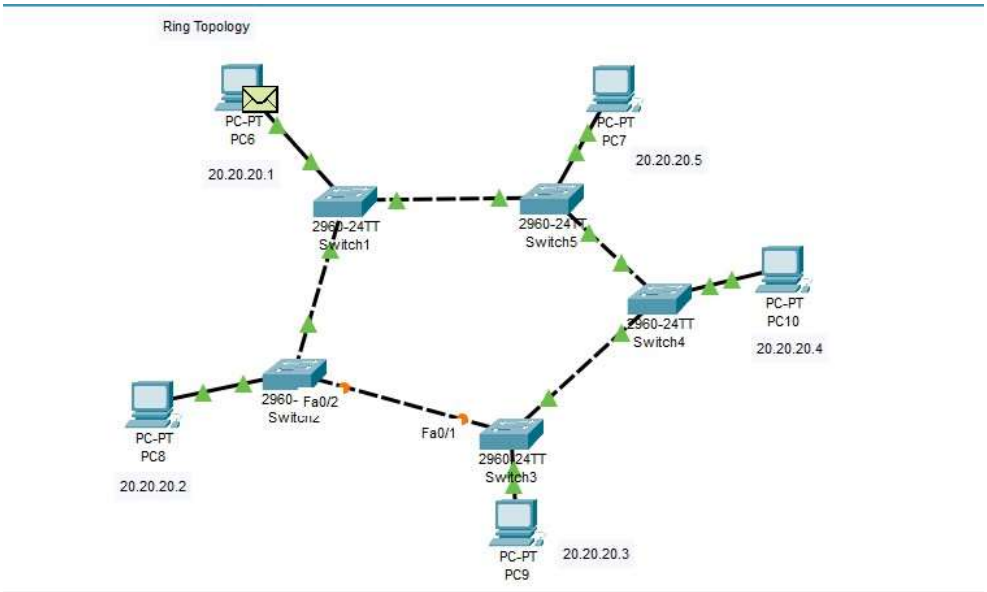
PART B

(PART B : TO BE COMPLETED BY STUDENTS)

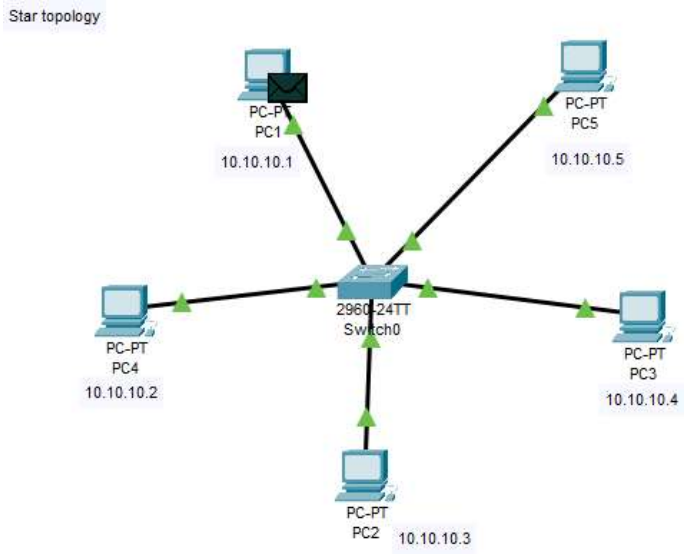
Roll No. A11	Name: Khan Mohammad TAQI
Class : T.E A	Batch : A1
Date of Experiment:	Date of Submission:
Grade :	

B.1 Document created by the student:

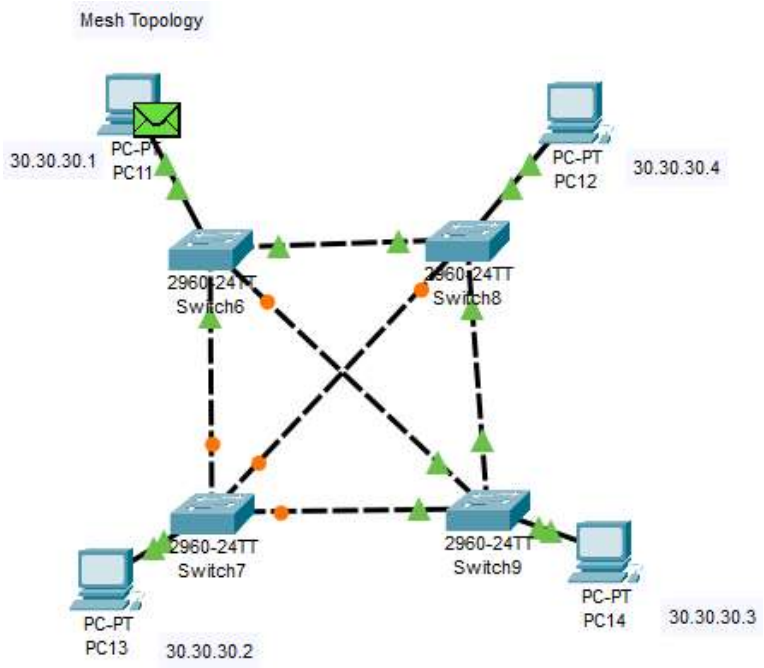
Ring Topology



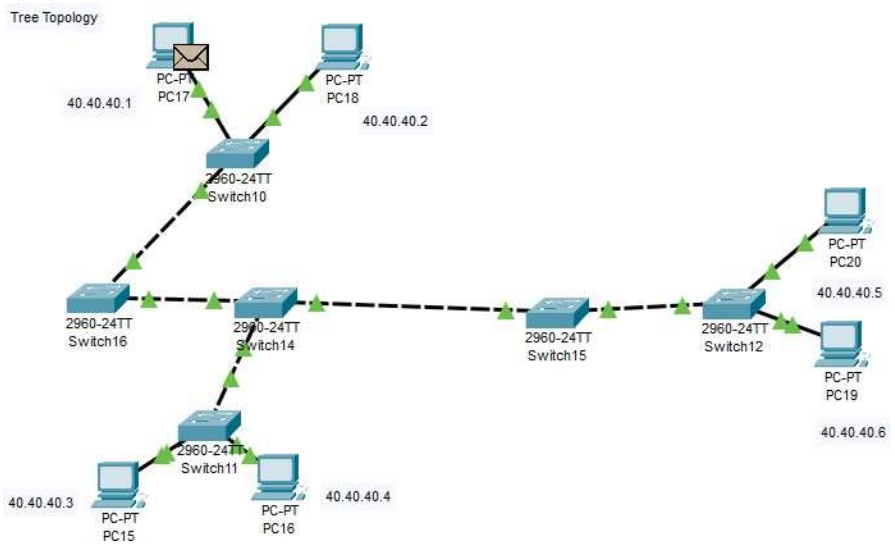
Star Topology



Mesh Topology

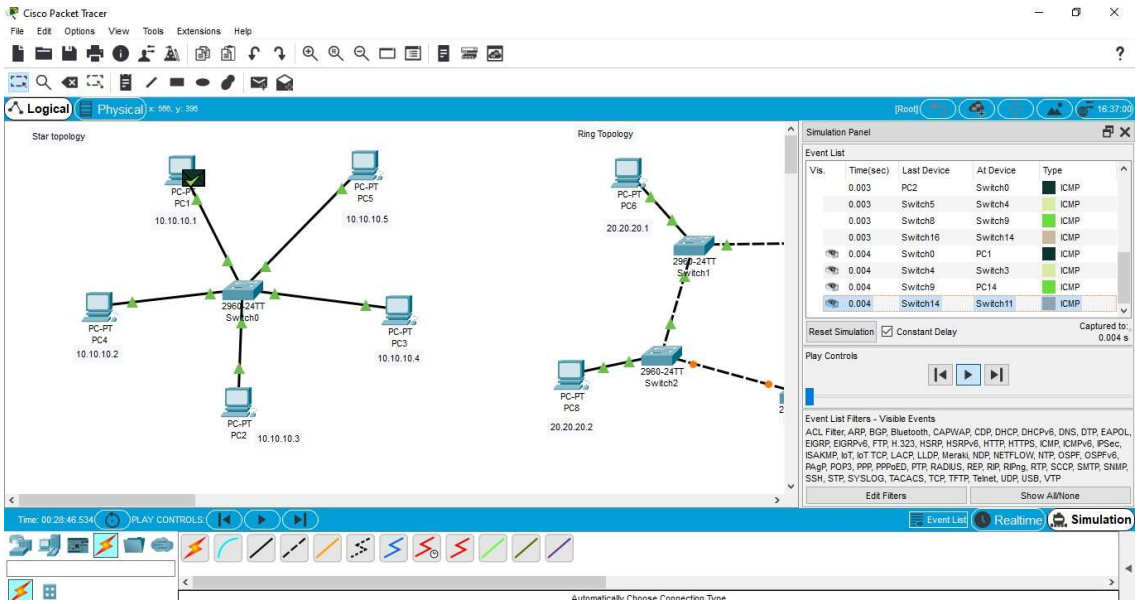


Tree Topology

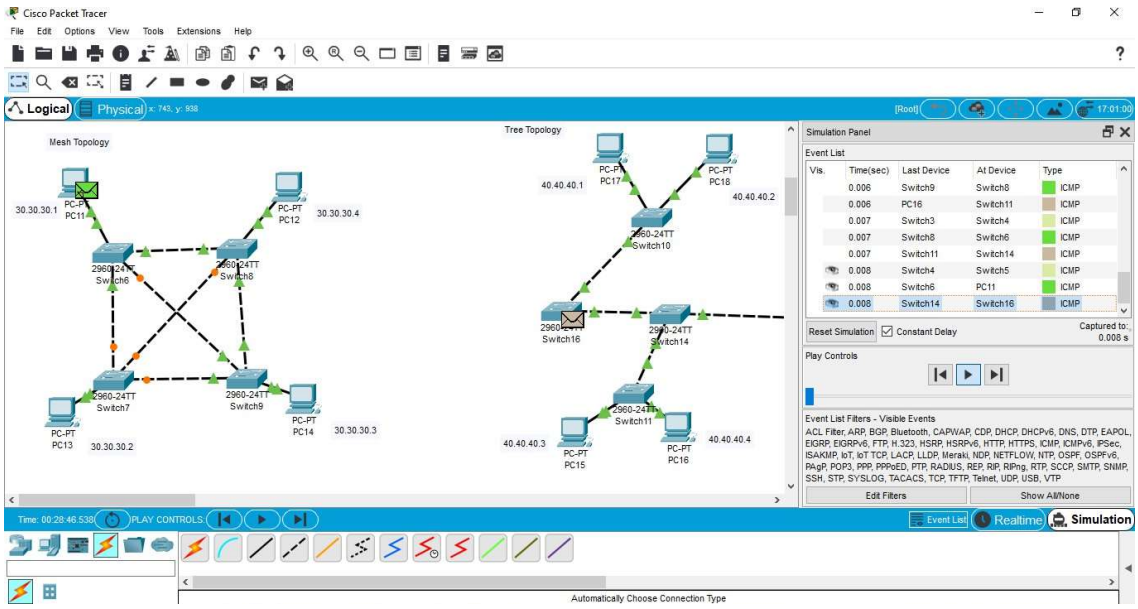


B.2 Perform the experiment as suggested above add the following documents.

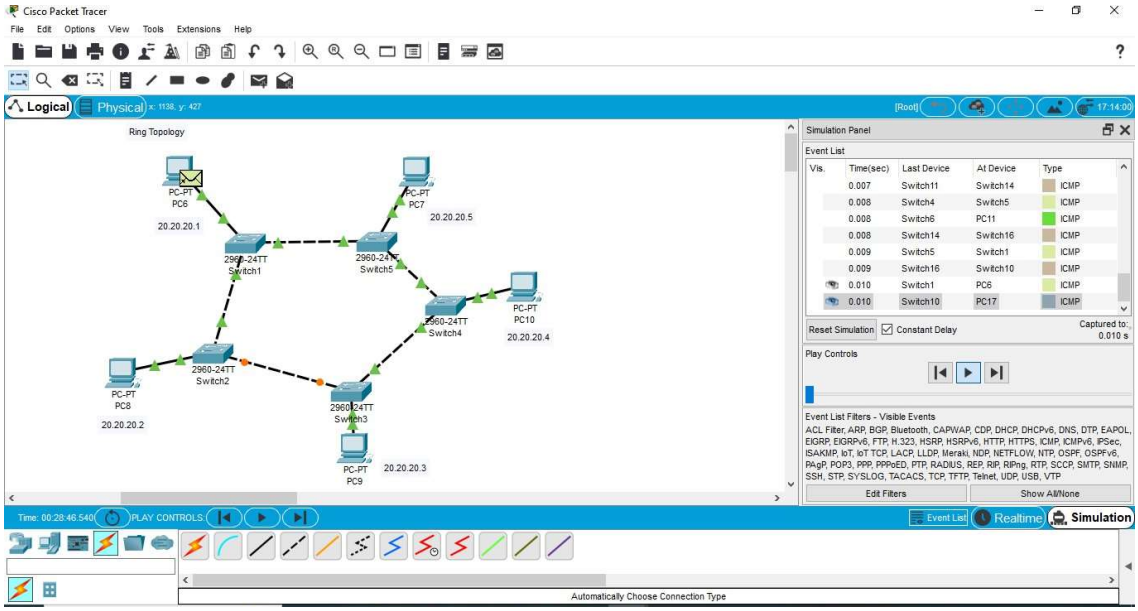
Ring Topology



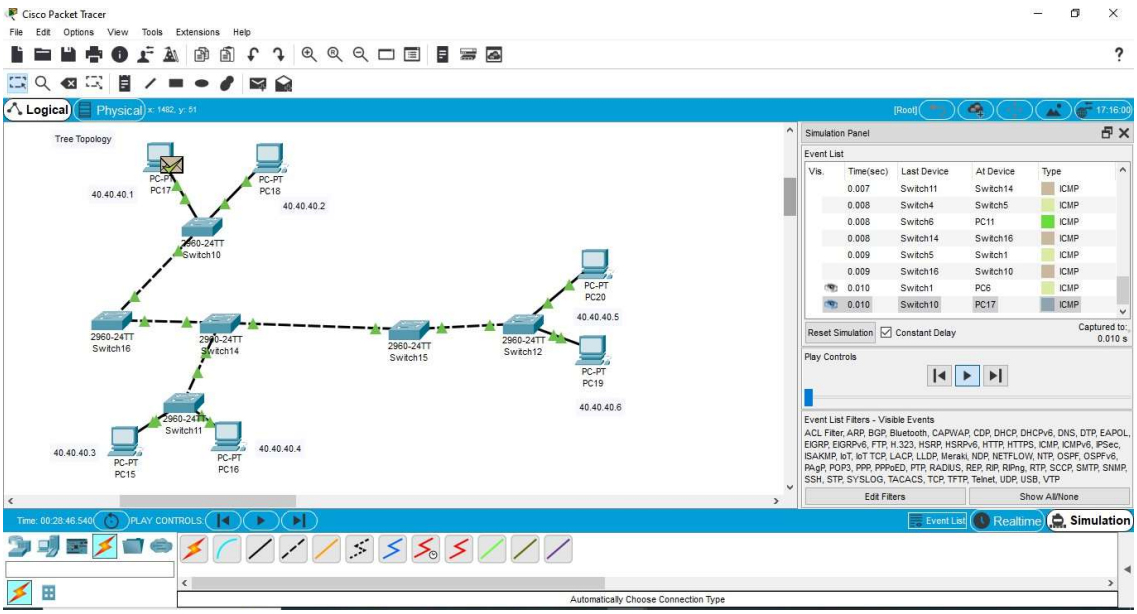
Star Topology



Mesh Topology



Tree Topology



B.3 Observations and learning:

During the experiment of implementing a LAN network using Cisco Packet Tracer, several network topologies were explored, including ring, star, mesh, and tree. Each topology demonstrated unique characteristics in terms of network design, data flow, and fault tolerance. The ring topology showed a sequential data transmission method, highlighting its vulnerability to single points of failure, whereas the star topology provided a centralized structure that simplifies network management but risks network failure if the central hub fails. The mesh topology exhibited robust fault tolerance due to multiple pathways between devices, enhancing network reliability. Finally, the tree topology integrated elements of both star and bus topologies, showing hierarchical data flow and efficient management for larger networks. Overall, the experiment allowed for the practical application of networking principles such as IP addressing, network elements selection, and LAN design, reinforcing the understanding of data link layer (DLL) protocols and the significance of choosing appropriate topologies based on specific networking needs.

B.4 Conclusion:

The implementation of different LAN topologies using Cisco Packet Tracer provided valuable insights into network design and management. Each topology presents distinct advantages and challenges; therefore, the choice of topology should align with the network's size, scale, and fault tolerance requirements. The star topology is suitable for networks requiring easy management and troubleshooting, while the mesh topology is ideal for environments where network reliability is critical. The ring and tree topologies offer specialized solutions for specific use cases but may require more sophisticated management

strategies to handle their inherent limitations. Through this experiment, students gained practical experience in designing and simulating various LAN environments, understanding the importance of addressing schemes, and enhancing their skills in network analysis, design, and simulation. The knowledge acquired from this experiment lays a solid foundation for further exploration and development in the field of networking.

B.5 Question of Curiosity

(To be answered by student based on the practical performed and learning/observations)

- **Write the answers in our own word.**
- **Small and to the point answers are expected.**
- **Plagiarized answers are discouraged.**

1. **What is CISCO Packet tracer? How one can make use of it learning CN?**

Ans. Cisco Packet Tracer is a network simulation tool that allows users to design, build, and test network configurations virtually. It is useful for learning computer networks because it provides a hands-on, interactive environment where users can practice setting up various network topologies, experiment with different network devices, and observe how data flows through a network, all without the need for physical hardware.

2. **What is simulation? How CISCO Packet tracer help in simulation of NWs?**

Ans. Simulation is the process of creating a virtual model of a real-world system to study its behavior under different scenarios. Cisco Packet Tracer helps simulate networks by allowing users to create virtual networks with various devices and configurations, and then test how these networks operate. This includes simulating data transmission, network performance, and troubleshooting network issues.

3. **What are the different types of end to end devices supported by CISCO packet tracer?**

Ans. Cisco Packet Tracer supports various end-to-end devices including computers (PCs and laptops), servers, IP phones, tablets, and network printers. These devices can be configured and interconnected to simulate a variety of network environments.

4. **What are all the NW elements you will in the CISCO Packet Tracer?**

Ans. In Cisco Packet Tracer, the network elements available include routers, switches, hubs, bridges, wireless access points, repeaters, firewalls, and various end devices such as PCs, servers, and phones. Additionally, the tool supports cables, connectors, and other networking components needed to build and simulate networks.

5. **What are the different types of cables supported by CISCO packet tracer?**

Ans. Cisco Packet Tracer supports several types of cables, including Ethernet cables (straight-through and crossover), fiber optic cables, serial cables, console cables, and coaxial cables. These cables can be used to connect devices in various network setups.

6. **Write the steps to assign static address to the nodes.**

Ans. To assign a static IP address to nodes in Cisco Packet Tracer:

1. Click on the device (PC, server, etc.).
2. Go to the "Desktop" tab.
3. Click on "IP Configuration."
4. Enter the desired IP address, subnet mask, and default gateway in the provided fields.

7. **Can we create Ring topology just using end nodes, ie. Without using switch/hub/router? If Yes then how? If No then why?**

Ans. Yes, a ring topology can be created using end nodes alone, as long as each device has two network interfaces. The devices are connected in a closed loop, where each device is connected to two other devices, forming a ring. This configuration allows data to be passed from one device to the next around the loop.

8. **Can we create LAN without assigning IP address to Switch/Hub? Give reason.**

Ans. Yes, a LAN can be created without assigning an IP address to a switch or hub because these devices operate at Layer 2 (Data Link Layer) of the OSI model, forwarding data based on MAC addresses rather than IP addresses. IP addresses are needed for Layer 3 devices like routers to route traffic between different networks.

9. **Define Packet, Frame, and acknowledgement?**

Ans. Packet: A packet is a formatted unit of data carried by a network at the Network Layer (Layer 3 of the OSI model). It contains the source and destination IP addresses and is used for routing data across networks.

Frame: A frame is a unit of data at the Data Link Layer (Layer 2 of the OSI model). It includes the destination and source MAC addresses, error-checking information, and is used for data transfer within the same network.