# Experiment 3

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1. **Aim**: Implement Bus, Ring and Mesh topologies. Assign IP Address and subnet mask to each computer and run the ping command to check the reachability of the systems. Send message between source and destination and observe the flow of the messages.

2. **Objectives:**
   a) To design and implement Bus, Ring and Mesh and hybrid network topologies.
   b) To configure IP addressing and subnet masks for each node in network.
   c) To verify network connectivity and reachability by using the ping command.
   d) To simulate and observe message flow between source and destination nodes across different topologies.

3. **Apparatus used:** Packet tracer

4. **Theory:**

**4.1. Bus Topology:** All computers connect to a single central cable, called the bus. Data travels along this shared bus to reach its destination.

- **Advantage:**
  - Simple and cost effective to implement and expand.
- **Disadvantage:**
  - Performance worsens as more devices are added.
  - Failure in main cable disrupts the entire network.

**4.2. Ring Topology:** Each computer connects to two other, forming a circular network. Data moves in one direction around the ring.

- **Advantage:**
  - Predictable data transmission with fewer collisions.
  - Equal resource success for all devices.

- **Disadvantage:**
  - Network disruption if any connection fails.
  - More complex to troubleshoot and expand.

**4.3. Mesh Topology:** Every device connects to every other device, creating multiple paths for data. Can be full or partial mesh.

- **Advantage:**
  - High redundancy and reliability with multiple data paths.
  - Efficient data transmission.
- **Disadvantage:**
  - Expensive and complex due to extensive cabling.
  - Hard to manage in larger networks.

**4.4. Hybrid Topology:** Combines different topologies, such as star, bus and mesh to create a scalable network.

- **Advantage:**
  - Flexible and scalable optimizing performance and cost.
- **Disadvantage:**
  - Complex design and management.
  - Higher cost from integrating multiple topologies.

**4.5. Star Topology:** All computers connect to a single central hub or switch. Data from any device has to go from this hub.

- **Advantage:**
  - Easy to install and manage.
  - Faults in individual nodes do not affect the entire network.
- **Disadvantage:**
  - Require more cabling than bus or ring topologies.
  - Hub failure disrupts the whole network.

**5. Implementation:**

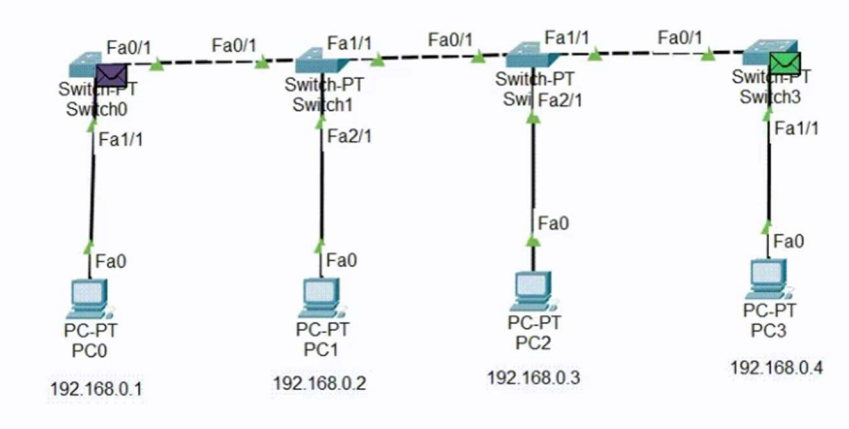
1. Launch cisco packet tracer on your system.
2. Set up the workspace by opening a project and familiarizing with tools and devices.
3. Add network devices. Drag and drop the number of PCs, switches, routers and other devices into the workspace. Position devices according to the target

topology.

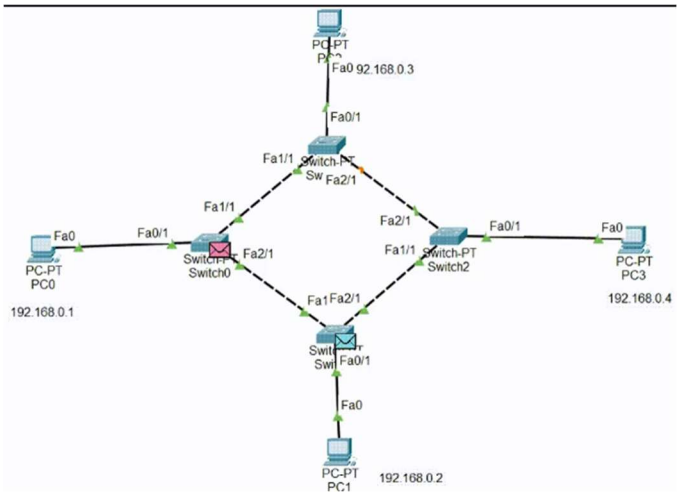
4. Use appropriate cables (straight, coaxial, cross-over) to connect the devices according to the chosen topology.
5. Assign IP Address and subnet masks by clicking on each PC, navigate to desktop and select IP Configuration.
6. Open command prompt on each PC. Use ping command to test connectivity between both devices.
7. Use the simple PDU tool to simulate sending message or packet from source PC to a destination PC.
8. Save the packet tracer project.
9. Export topology diagrams and settings as required.

## 6. Output:

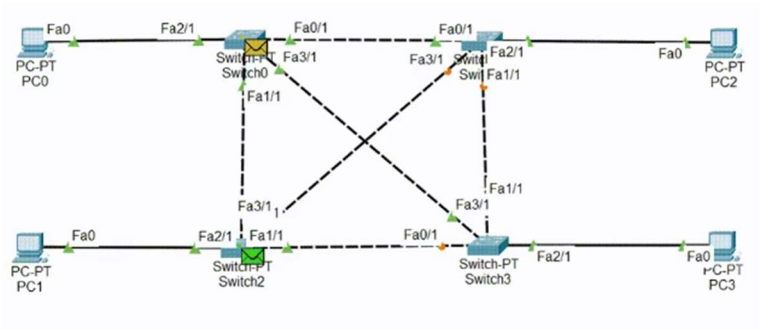
**i)** Bus Topology



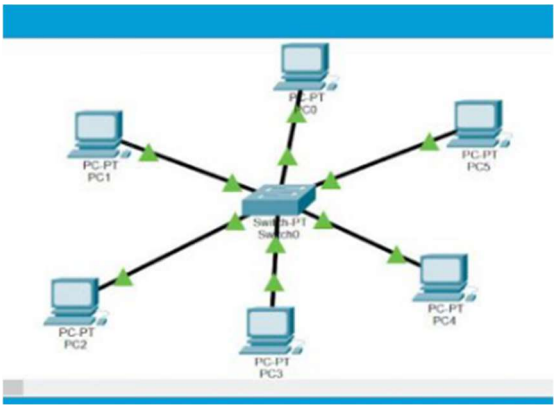

**ii)** Ring Topology



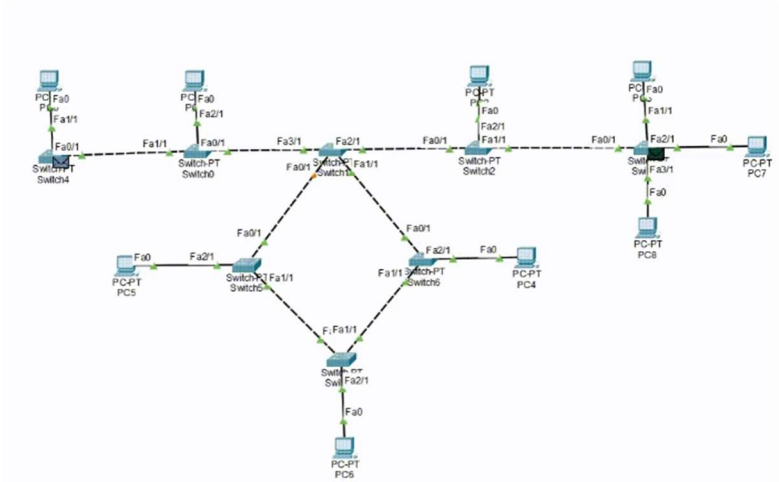
**iii)** Mesh Topology




**iv)** Star Topology




**v)** Hybrid Topology



7. **Learning Outcome:**
   - Acquired comprehensive understanding of different network topologies such as Ring, Mesh, Star and Hybrid including their structure and functionality.
   - Learnt to use Cisco packet tracer to simulate different network designs.
   - Gain practical skills in configuring network devices and analysing their connectivity.
   - Effectively implemented and set up topologies with correct IP address and subnet masks for each device.