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| **Experiment No: 02** | |
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| **Title** | [Study and Configure Bus, Mesh, Ring and Star Network Topologies in Cisco Packet Tracer](https://lms.sitpune.edu.in/mod/assign/view.php?id=7204) |
| **Theory (short)** | **Network topology is the interconnected pattern of network elements. A network topology may be physical, mapping hardware configuration, or logical, mapping the path that the data must take in order to travel around the network.** |
| **Procedure** | **open the packet tracer**  1. **drag and drop pc and switch icons 2pc and 1 switch respectively** 2. **now connect them with connections** 3. **right click on pc 1 and input the IP address and the same for pc 2 by changing the last digit of IP address** 4. **then add simple PDU to pc 1 and 2** 5. **click on stimulation** |
| **Output Screenshots** | bus topology 1      Star Topology 1    mesh topology 1    Ring Topology 1 |
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| **Observation** | The analysis and design of multiple network topologies (Bus, Mesh, Ring, and Star) in Cisco Packet Tracer revealed that each topology has distinct strengths and weaknesses that impact network performance and dependability. |
| **Self-assessment Q&A** | **1.Troubleshooting a Bus Topology Issue in Packet Tracer**  **Scenario:** One of the five computers in a bus topology is unable to communicate with the others.  **Steps to Troubleshoot:**   1. **Check Physical Connections:**    * Ensure all computers are connected to the central bus cable.    * Verify no loose or damaged cables. 2. **Check Network Interface Cards (NICs):**    * Ensure the NIC on the non-communicating computer is enabled and functioning. 3. **Check IP Configuration:**    * Verify correct IP address and subnet mask.    * Ensure no IP conflicts.    * Use ping to test connectivity. 4. **Check Terminators:**    * Ensure terminators are properly installed at both ends of the bus cable to prevent signal reflection. 5. **Check for Collision Issues:**    * Observe network traffic for excessive collisions. 6. **Check Software Configuration:**    * Ensure firewall settings are not blocking traffic.    * Verify correct network settings.   **Possible Reasons for the Problem:**   * Faulty or loose cable connections. * Disabled or malfunctioning NIC. * Incorrect IP configuration. * Missing or improperly connected terminators. * Excessive network collisions. * Firewall or software configuration issues.   By following these steps in Packet Tracer, you can identify and resolve the issue with the non-communicating computer. 2.In Packet Tracer, bus and mesh topologies exhibit different levels of fault tolerance:**Bus Topology**: This topology connects all devices to a single central cable. If the central cable fails, the entire network goes down. It's less fault-tolerant because a single point of failure can disrupt the whole network.**Mesh Topology**: In this topology, each device is connected to multiple other devices. This redundancy means that if one connection fails, there are alternative paths for data to travel. It is much more resilient to failures as it can maintain network functionality even if multiple connections or devices fail.**Summary**: The mesh topology is more fault-tolerant than the bus topology because it has multiple paths for data and can continue operating even when some connections fail. **3.Bus Topology**:   * **Scalability**: Limited. Adding more devices can slow down the network due to increased data collisions and signal degradation along the bus. Performance issues arise as more devices are added. * **Factors Limiting Scalability**: The central cable can become a bottleneck, and there are limits to how long the bus can be before signal degradation occurs. Additionally, network management becomes complex with more devices.   **Mesh Topology**:   * **Scalability**: Better. Each device connects to multiple others, so performance remains stable even with additional devices. * **Factors Limiting Scalability**: High cost and complexity. Adding more devices requires more cables and connections, which can be expensive and challenging to manage.   **Summary**: Mesh topologies scale better due to their redundancy and multiple paths, while bus topologies face performance and management challenges as more devices are added.  **4.Star Topology**:   * **Scalability**: Good. Devices connect to a central hub or switch, making it relatively easy to add new devices without disrupting the network. * **Factors Limiting Scalability**: Performance and cost. The central hub or switch can become a bottleneck if it cannot handle the increased traffic from many devices. The cost of additional hubs or switches can also rise.   **Ring Topology**:   * **Scalability**: Moderate. Devices are connected in a circular fashion, and adding new devices requires breaking the ring to insert the new device, which can disrupt the network. * **Factors Limiting Scalability**: Performance can degrade with more devices due to increased latency and traffic. Network management becomes more complex, and the risk of network-wide failure increases if a single connection breaks.   **Summary**: Star topologies handle scalability better due to easy device addition and centralized management, while ring topologies face challenges with performance and network interruptions as more devices are added. |
| **Conclusion** | In this experiment, I learnt a lot new thinks about the packet tracer. How to use the tracer to stimulate the different types of topologies for easy experience |