RUBY SPRING FIELD COLLEGE

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Subject: Computer

What is Star Topology?

Star topology is a common network configuration where all end devices (like computers, printers, or servers) are connected directly to a central device, such as a switch or hub. This central device acts as a hub for data transmission, forwarding packets between connected devices. It's widely used in local area networks (LANs) due to its simplicity and ease of management.

Key Points of Star Topology

- **Centralized Management**: All traffic passes through the central device, making it easier to monitor and troubleshoot.
- **Scalability**: Easy to add or remove devices without disrupting the entire network.
- **Reliability**: Failure of one peripheral device doesn't affect others, but if the central device fails, the whole network goes down (single point of failure).
- **Performance**: Reduces data collisions compared to bus topology, especially when using a switch instead of a hub.
- **Cabling**: Requires more cable than bus topology but less than full mesh; typically uses twisted-pair Ethernet cables.
- **Common Use Cases**: Home networks, small offices, or enterprise LANs.
- **Advantages**: Simple installation, better isolation of faults, supports higher speeds.
- **Disadvantages**: Higher cost due to central device and cabling; dependency on the hub/switch.

Steps to Achieve Star Topology in Cisco Packet Tracer

Cisco Packet Tracer is a simulation tool for designing and testing networks. Here's how to set up a basic star topology using a switch as the central device.

1. **Open Cisco Packet Tracer**: Launch the application and create a new blank project.
2. **Add the Central Device**: From the "Network Devices" section, select a switch (e.g., Switch-PT or 2960-24TT). Drag it to the workspace. This will serve as the hub of the star.
3. **Add End Devices**: From the "End Devices" section, drag multiple PCs (e.g., 4-6 PCs) onto the workspace. These represent the peripheral nodes.
4. **Connect the Devices**:
    - Select the "Connections" tool (lightning bolt icon).
    - Choose "Copper Straight-Through" cable.
    - Connect one end to a FastEthernet port on a PC and the other to an available port on the switch.
    - Repeat for all PCs. The connections should radiate out from the switch like spokes on a wheel.
5. **Assign IP Addresses**:
    - Click on each PC, go to the "Desktop" tab, then "IP Configuration."
    - Assign static IPs in the same subnet, e.g.:
        - PC0: IP 192.168.1.2, Subnet Mask 255.255.255.0, Gateway 192.168.1.1 (if needed).
        - PC1: IP 192.168.1.3, Subnet Mask 255.255.255.0.
        - Continue incrementing for others.
    - No IP is needed on the switch for basic Layer 2 operation.

6. **Test the Network**:
    - Use the "Simulation" mode to observe packet flow.
    - From one PC's Command Prompt, ping another PC (e.g., ping 192.168.1.3).
    - Check for successful replies to verify connectivity.
    - Optionally, send a PDU (Protocol Data Unit) between devices to simulate data transfer and view the MAC address table on the switch (use show mac-address-table in CLI mode).

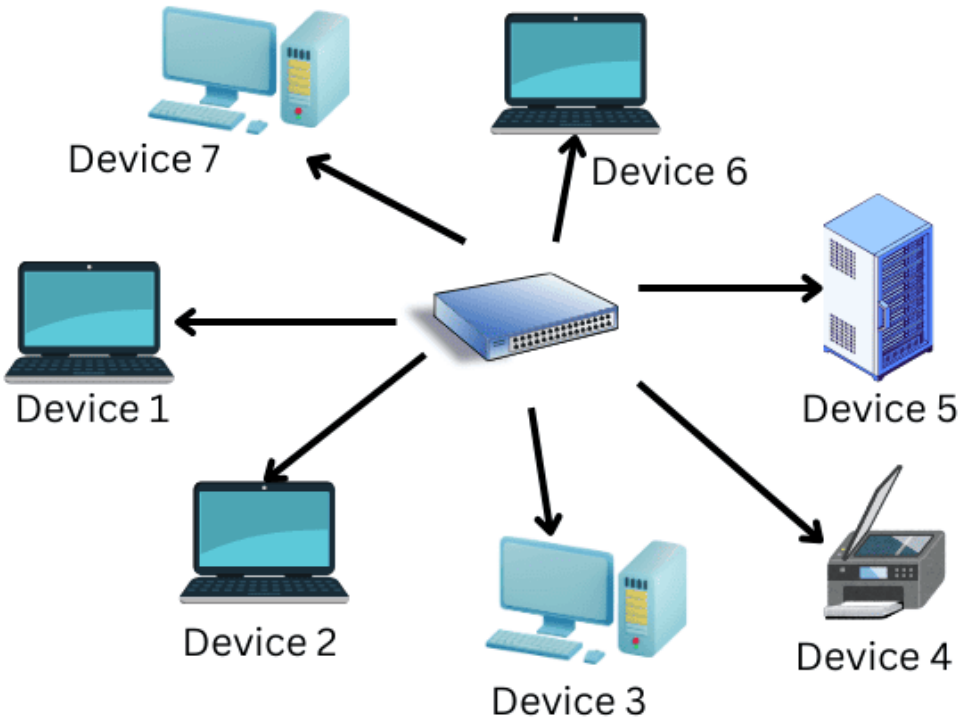
If using a hub instead of a switch, the process is similar, but hubs broadcast traffic to all ports, leading to potential collisions.

Example Scenario

Imagine a small office with 5 computers and a printer. The switch is placed in a central server room. Each computer connects to the switch via Ethernet cables running through walls. An employee on PC1 sends a print job to the printer (connected as another end device). The switch forwards the data directly to the printer's port, ensuring efficient communication without broadcasting to all devices. If PC2's cable fails, only PC2 is isolated—the rest of the network remains operational. This setup can be expanded by adding more devices to unused switch ports.

Diagram of Star Topology in Cisco Packet Tracer

Here's a visual representation of a star topology setup:



Star Topology in Computer Networks Explained