Experiment No: 06

Name of the Experiment: Design and Implementation of ~~topology~~, network topology.

Objectives:

→ To understand and implement a given topology.

→ To analyze the performance and characteristics of the topology.

→ To identify the advantages and limitations of the chosen topology.

→ To apply theoretical ~~knowledge~~ knowledge to practical implementation.

Theory:-

Topology refers to the arrangement of elements in a system, such as computers in a network or components in a circuit. The choice of topology affects performance, scalability, fault tolerance, and efficiency. Common types include:

Network topology: Bus, Star, Ring, Mesh, Tree, Hybrid.

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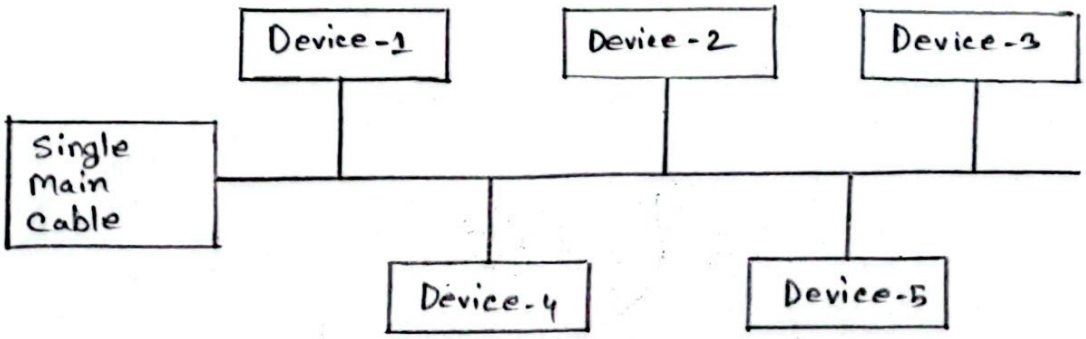
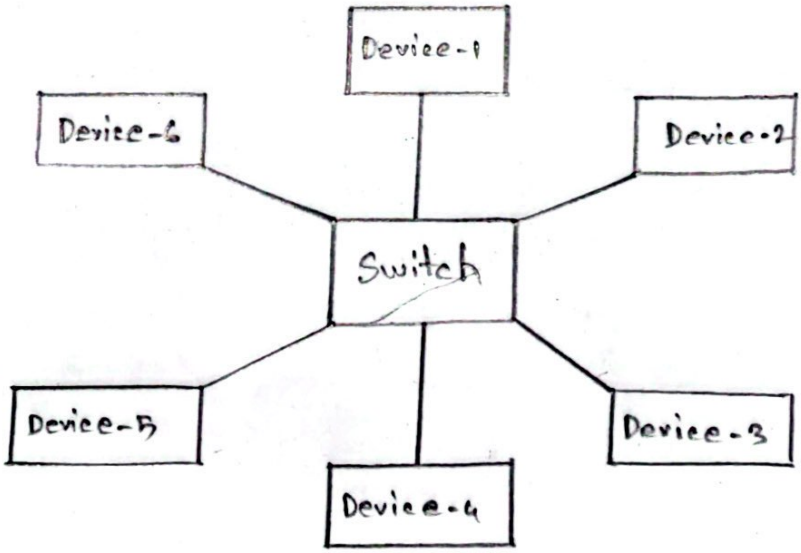
Block Diagram:

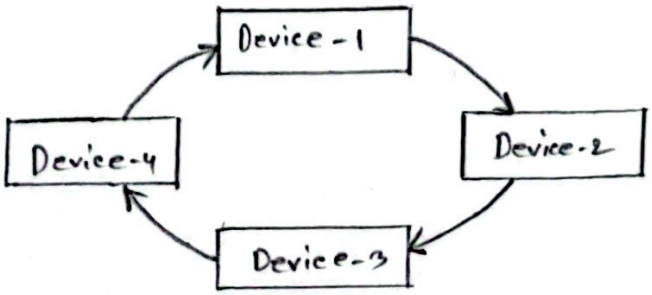
Bus Topology:



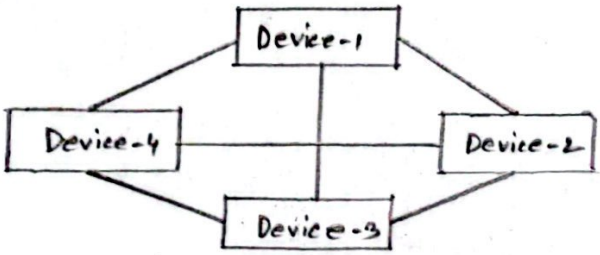
Star topology:



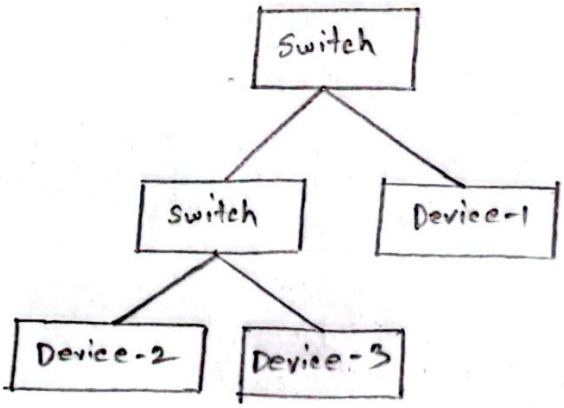
Ring Topology:



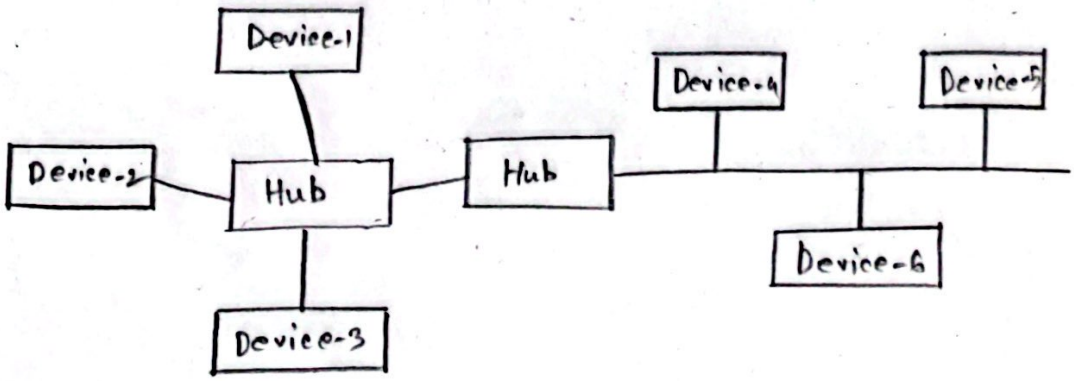
Mesh Topology:



Tree Topology:



Hybrid Topology:



3.4

Apparatus:

(1) Router
(2) Switch
(3) Cabling
(4) Computing Devices
(5) Network Interface card (NIC)

Procedures:

(1) Requirements Analysis & planning.
(2) Designing the topology.
(3) Gather all ~~requirement~~ required apparatus (hardware, and Software)
(4) Install router, switches and access points in designated physical locations.
(5) Cabling & physical Installation.
(6) Device configuration:
    (i) Configure the router/firewall with WAN settings, security policies and NAT.
    (ii) Set up switch for VLANs (if needed) and assign proper port configurations.
    (iii) Configure Ip addresses.
    (iv) Set up wireless access point.
(6) Testing & Troubleshooting.
(7) Documentation.

Precautions:

→ Use proper ESD(Electrostatic Discharge) precautions when handling network cards and switchs.

→ Ensure cables are not kinked or stretched; label each cable for easier troubleshooting.

→ Change default passwords, apply firmware updates, and configure firewalls correctly.

→ Implement backup power supply (UPS) and redundant network paths to minimize downtime

Result:

Upon completion of the implementation:

→ Connectivity: All devices within the network could communicate with each other and access the internet.

→ Performance: Network performance tests showed minimul latency and high throughput consistent with the expected bandwidth.

→ Scalability: The use of a star topology allowed easy addition of new devices by connecting them to the central switch.

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→ Security: The configuration of firewalls, VLANs, and proper access controls helped secure the network from external and internal threats

→ Monitoring: Ongoing network monitoring confirmed the network's stability and reliability during typical operations.

Discussion:

Advantages observed:

- → Ease of management
- → Scalability
- → Security.

Potential Limitations:

- → Single point of failure
- → cost

Future improvements:

- → Redundancy Enhancements
- → Advanced Monitoring
- → Regular Maintenance.