EX.NO: 02	Study of various networking and intermediate devices
DATE: 15/02/2024	

Aim

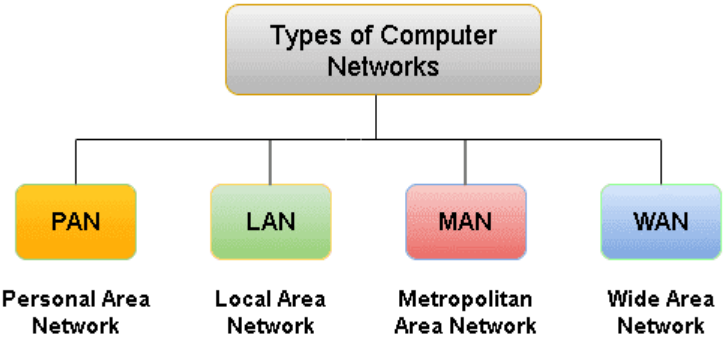
To understand the functioning and differences between hubs, switches, routers, gateways, and modems in a network environment.

Software Required

- Cisco Packet Tracer (or similar network simulation software)
- Ubuntu Linux (for router configuration and routing protocols)

Theory

Types of Computer Networks



1. Personal Area Network (PAN)

- Covers a small area, typically within a few meters.
- Used for connecting personal devices like smartphones, tablets, and laptops.
- Can be wired or wireless (WPAN).
- Common technologies include Bluetooth, WiFi, and Zigbee.

2. Local Area Network (LAN)

- Covers a small geographical area, such as a home, office, or school.
- Used for sharing resources like files, printers, and games.

- Can be wired or wireless (WLAN).
- Common technologies include Ethernet, WiFi, and Powerline.

3. Metropolitan Area Network (MAN)

- Covers a larger area than LAN, typically within a city or a small region.
- Used for connecting multiple LANs and sharing resources.
- Common technologies include fiber optics, leased lines, and Metro Ethernet.

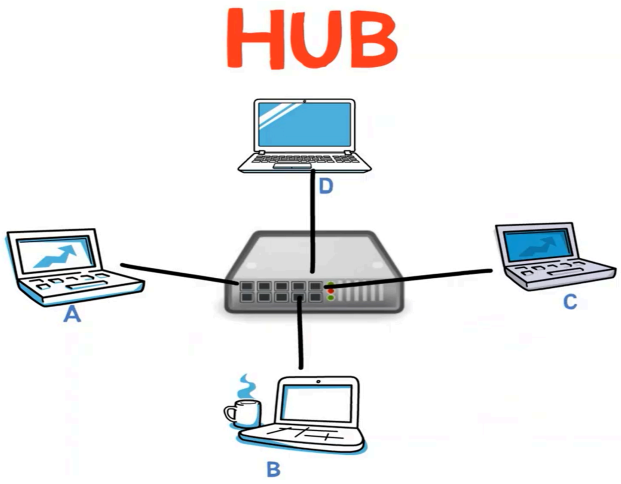
4. Wide Area Network (WAN)

- Covers a large geographical area, such as a country or a continent.
- Used for connecting multiple LANs and MANs.
- Common technologies include leased lines, satellite, and IP/MPLS.

Types of Networking Devices

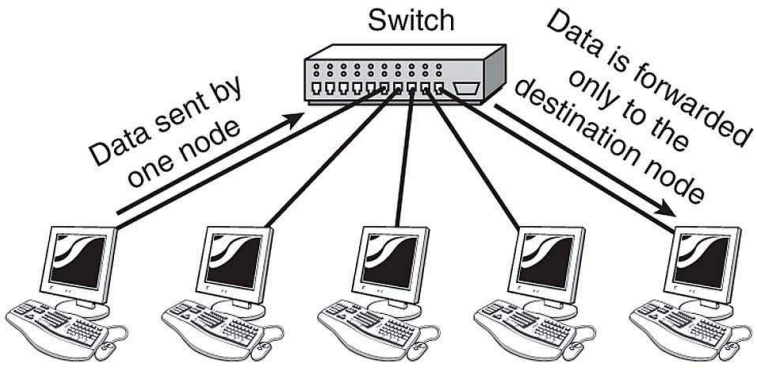
Hubs

- Hubs are multiport repeaters that connect multiple wires coming from different branches.
- Hubs do not filter data, so data packets are sent to all connected devices.
- Hubs operate at the physical layer and do not have intelligence to find the best path for data packets.



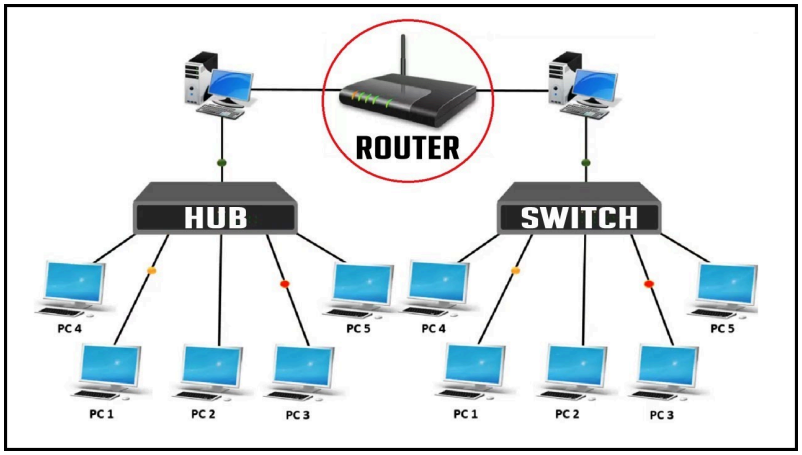
Switches

- Switches are multiport network devices that improve network efficiency and communication between hubs, routers, and other network devices.
- Switches operate at the data link layer and gather information from incoming packets to forward them to the appropriate destination.
- Switches have separate collision domains for each port, allowing for dedicated bandwidth for each connected device.



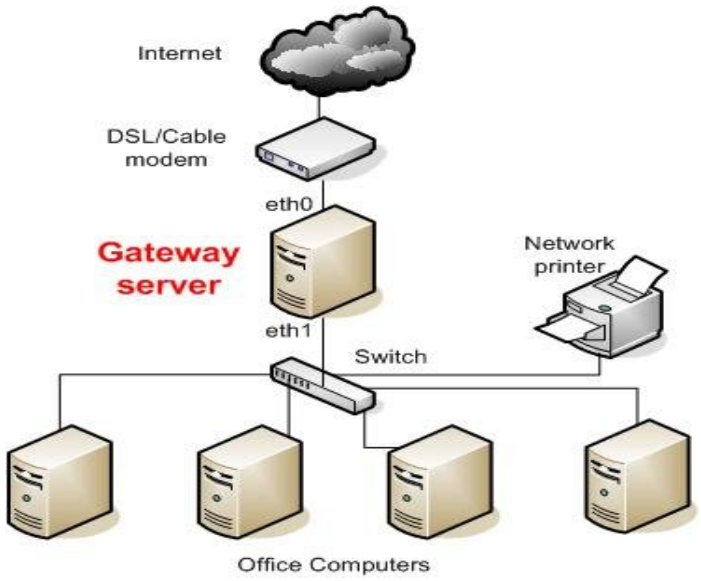
Routers

- A router is a device that connects two or more packet-switched networks or subnetworks
- Routers operate at the network layer and connect LANs and WANs together.
- Routers have a dynamically updating routing table based on which they make decisions on how to forward data packets.



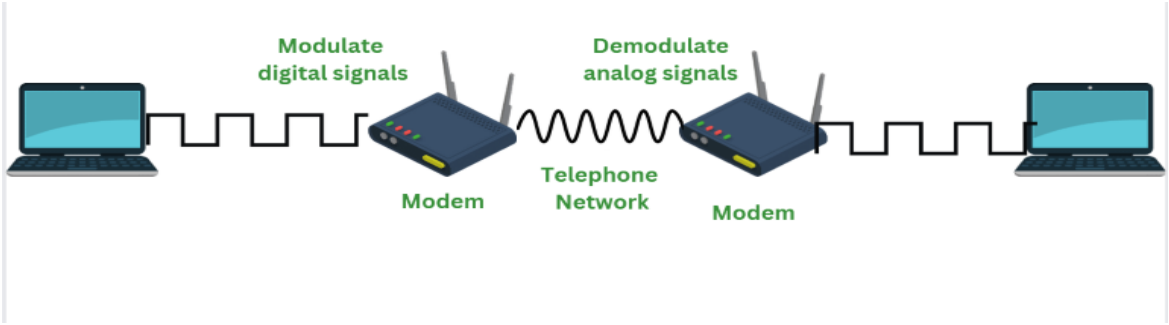
Gateways

- Gateways are devices that connect two networks that may work upon different networking models.
- Gateways operate at any network layer and can translate information between different network data formats or network architectures.
- Gateways are generally more complex than switches or routers.



Modems

- A modem is a network device that both modulates and demodulates analog carrier signals (called sine waves) for encoding and decoding digital information for processing.
- It can be used for different types of connections, such as dial-up, DSL, cable, and satellite. Dial-up modems were the first type of modems used for internet connectivity. DSL modems use standard telephone lines to provide high-speed internet access. Satellite modems use satellite communication to provide internet access in remote areas.



Conclusion

By understanding the differences between hubs, switches, routers, gateways, and modems, you will be able to make informed decisions about which device to use in specific network scenarios.