# Experiment - 1: Familiarization of Network Devices

**Aim:** To study the following network devices in detail: Repeater, Hub, Switch, Bridge, Router, Gateway

**Apparatus (Software):** No software or hardware is required for this experiment.

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## Theory:

In data communication and networking, network devices play a crucial role. They are considered as nodes in a graph, responsible for connecting computers or other electronic devices. These devices facilitate the sharing of files, resources, and even internet connections across systems.

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## Repeater

Functions

1. A repeater is a networking device that helps to amplify and regenerate signals to increase the reach of a network
2. Repeaters help overcome distance-related limitations by strengthening the strength and quality of the signal.

Features of Repeaters:

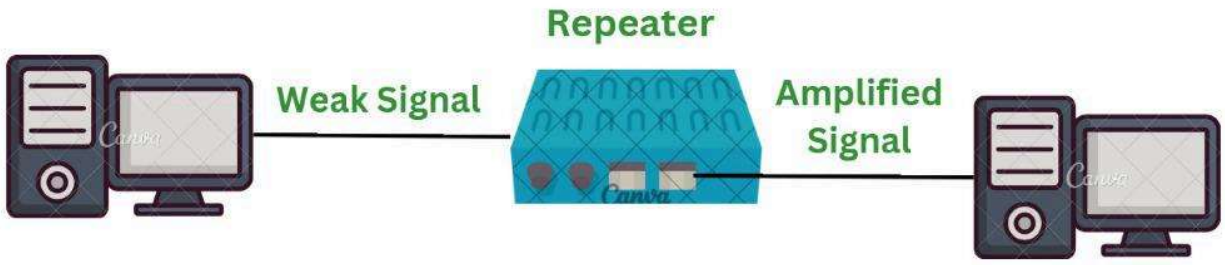
1. Can be used with both digital and analog signals.
2. Can regenerate the signal without modifying the original signal.
3. Helps us to extend our network range.
4. They help to reduce the data loss and errors.

Types of Repeaters: We have divided repeaters in 3 categories that are

1. According to the type of signal
    a. Analog Repeater
    b. Digital Repeater
2. According tot type of connected network
    a. Wires Repeater
    b. Wireless Repeater
3. According to Domain of LAN Network

Advantages of Repeater

1. Better performance: Since they are not always dependent on processing overheads, they help to improve the performance.
2. Cost Effective: More cost effective as compared to other networks.
3. Extend the network: Help to extend available networks for transmission of data.
4. No physical barriers: They help to improve strength of signals even in large distances.




https://www.geeksforgeeks.org/repeaters-in-computer-network/

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## Hub

1. A hub is a multiport repeater.
2. A hub connects multiple wires coming from different branches.
3. Hubs cannot store the routing table to store data of ports
4. do not have the intelligence to find out the best path for data packets which leads to inefficiencies and wastage.

Features of Hub:

1. supports half-duplex transmission
2. high data transmission rate to different devices.
3. It can detect collisions in the network and send the jamming signal to each port.

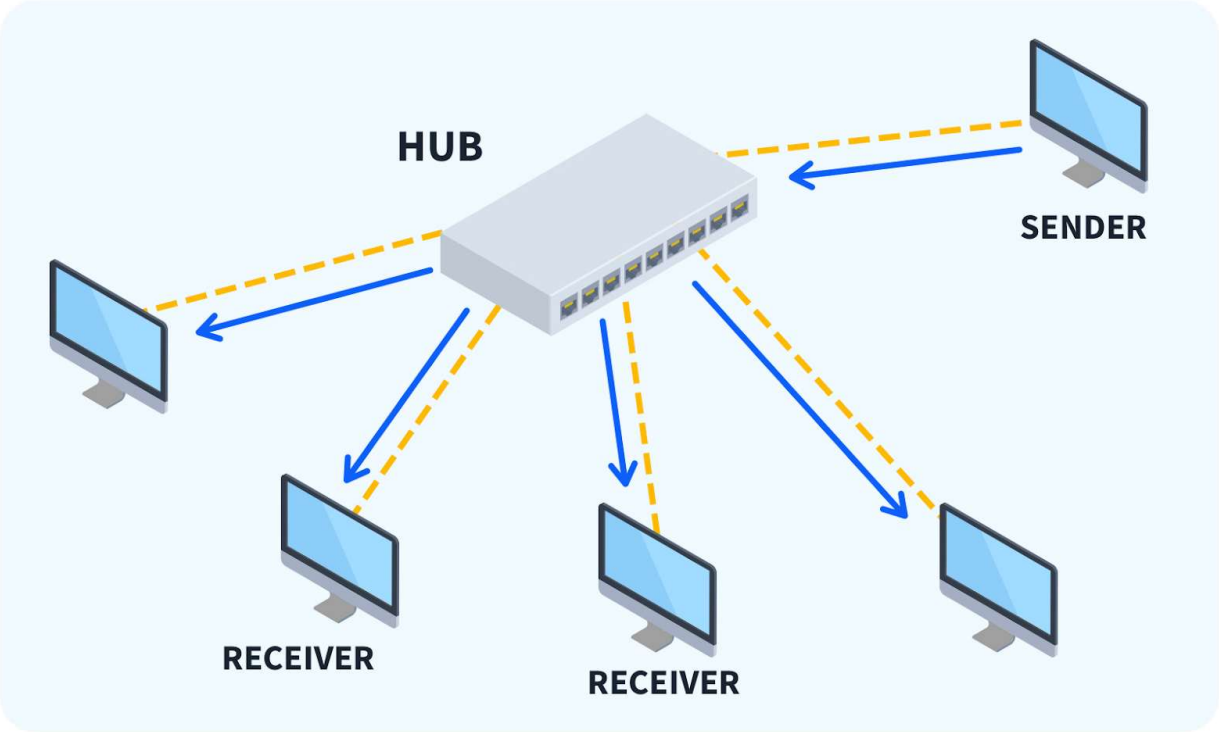
Types of Hub:

1. Active Hub:
    a. Have the power of regenerating.
    b. Expensive in comparison to passive hubs.
2. Passive Hub:
    a. Passive hubs are simply used to connect signals from different network cables as they do not have any computerised element.
    b. They do not perform any kind of processing or signal regeneration process.
3. Intelligent Hub:

    a. They are smarter than both the other hubs.
    b. They can monitor network traffic and configuration of ports.

Advantages of a Hub

1. Simple and Cost-Effective:
    a. Hubs are easy to set up.
    b. Hubs are cheaper than advanced devices.
2. Centralized Connectivity: Provides a simple way to connect multiple devices in a LAN.
3. Signal Amplification: Active hubs can regenerate signals to reduce data loss over longer distances.

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## Switches

Feature of Switches:

1. Performs the work of error checking before we are forwarding the packets.
2. Sends data only to the addressed device.
3. Serves as a connectivity point in ethernet.
4. They help to improve efficiency of data transmission.

Types of Switch:

1. Virtual Switches

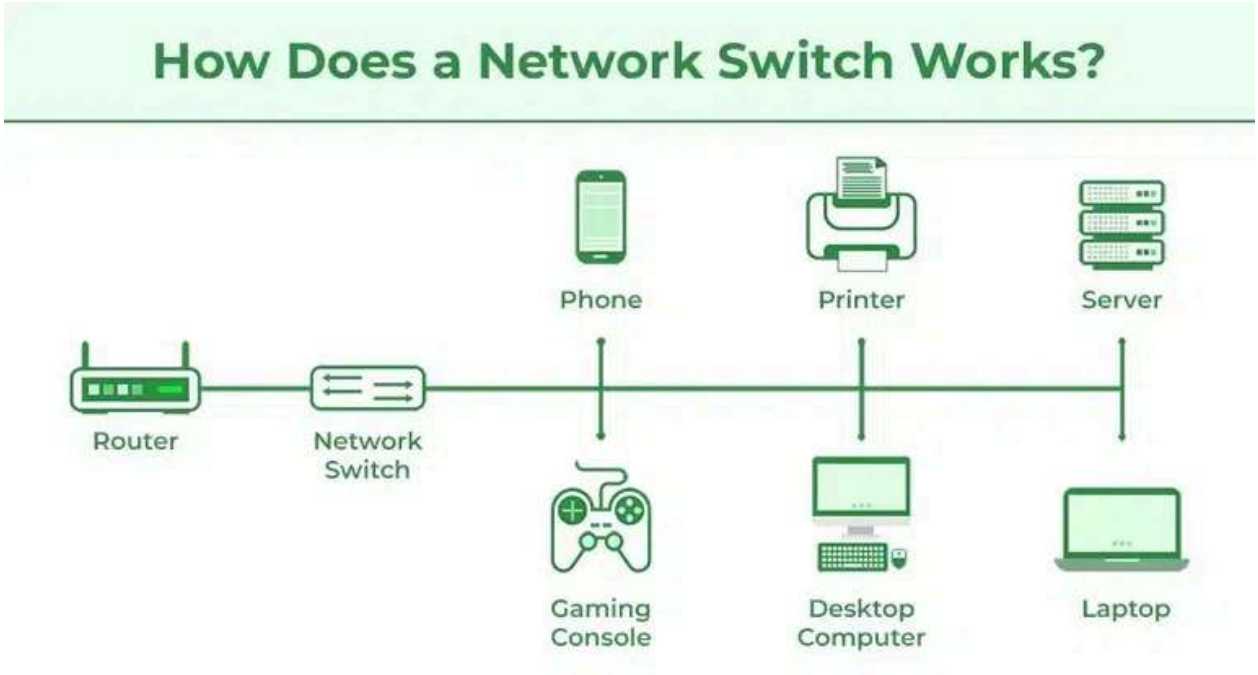
2. Routing Switches
3. Unmanaged Switches
4. Managed Switches
5. Smart Switches
6. Stackable Switches.

Advantages of Switch:

1. Efficient Data Forwarding
2. Collision-Free Communication
3. Full-Duplex Communication
4. Improved Security

Disadvantages of Switch:

1. Higher Cost
2. Limited to LANs
3. Cannot Prevent Broadcast Storms
4. More power consumption.

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## Bridge

1. Used to connect multiple LAN's with a large LAN.
2. They are physical devices but they are operated on OSI model data.
3. Also known as Layer of 2 Switches.

4. Examine incoming traffic whether to filter it or forward it.
5. Help to improve performance.

Features:

1. Helps to bridge connection between 2 things.
2. It work to connect many signal hat allow function to work s signal network.
3. Operates within a limited geographical area and is generally used for small to medium-sized networks.
4. Bridges do not guarantee collision-free communication

Type of bridges:

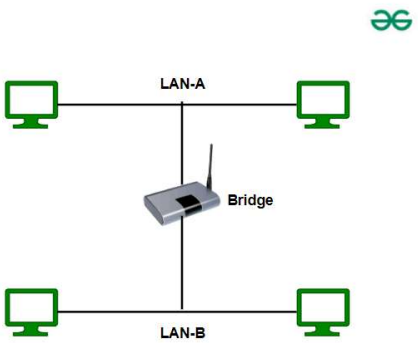
1. Transparent Bridges
2. Source Routing Bridge
3. Translational Bridge
4. Remote Bridge

Advantages:

1. Traffic Segmentation
2. Cost effective: More affordable the switches or routers.
3. Increased Bandwidth
4. Expandability
5. Improved Security

Disadvantages:

1. Limited to Small Networks
2. No Advanced Features
3. Slower Performance
4. Increased Latency
5. Loop Issues

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## Router

1. It  forwards data packets between computer networks.
2. It checks for the best path to which the data packet should reach to its destination.
3. Routers have firewall and other security features to protect the network from unauthorized access.
4. It allows administrators to quickly identify and resolve problems.

Features:

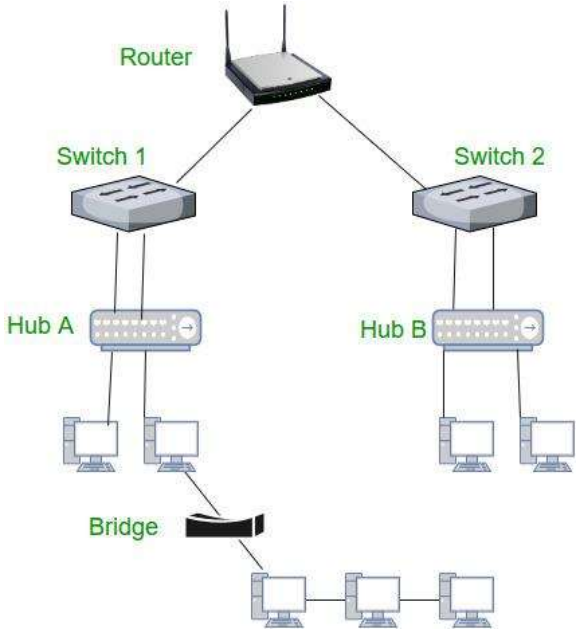
1. Support dynamic routing protocol.
2. Connects different types of networks and ensures seamless communication.
3. Provides security to protect the network from cyberthreats.

Advantages of Router:

1. Easy connection
2. Security
3. Support Dynamic Routing
4. Filtering of Packets

Disadvantages of Router:

1. It is slow in speed.
2. It is expensive in comparison to other tools.
3. Transition times are not always accurate.
4. Dynamic routing is used by rotors which leads to bandwidth shortage.




https://www.geeksforgeeks.org/introduction-of-a-router/

## Gateway

1. It is a connecting point that help to connect with different networks.
2. Monitors both incoming and outgoing traffic.
3. Gateways are also known as protocol converters.

Types of GateWay:

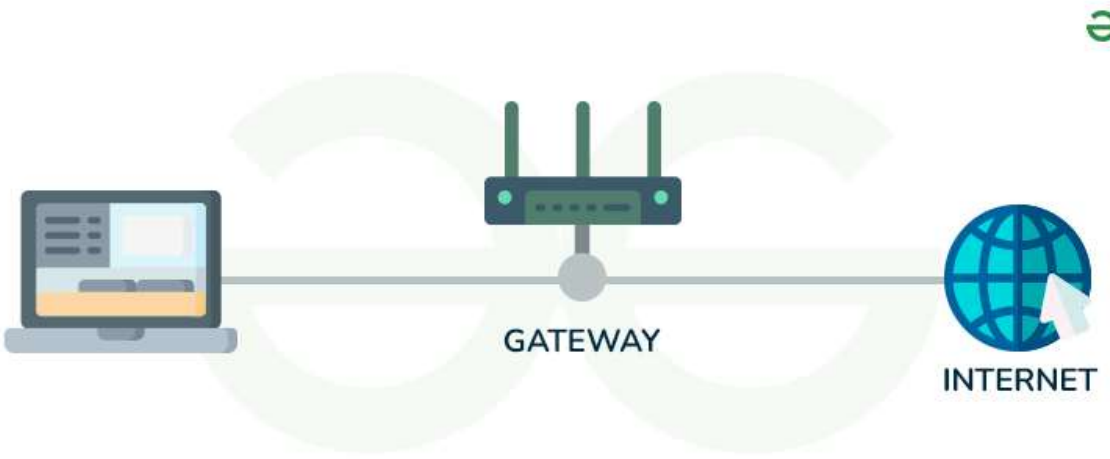
1. On basis of direction of flow of data
    a. Unidirectional
    b. Bidirectional
2. Based on Functionality
    a. Email Security Gateway
    b. Cloud Storage GateWay
    c. Network Gateway
    d. IoT Gateway

Advantages of Gateway:

1. Helps to connect two different networks.
2. Don't allow harmful things to get in the network.
3. Provide security from risks.

Disadvantages of GateWay:

1. Implementation cast is high
2. Hard to manages




Introduction of Gateways

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