Date: 21/07/2023

Lab Practical #03:

Study of different network devices in detail.

Practical Assignment #03:

1. Give difference between below network devices.
   - Hub and Switch
   - Switch and Router
   - Router and Gateway
2. Working of below network devices:
   - Switch
   - Router
   - Gateway

Hub and Switch

No.	Hub	Switch
1	Hub is operated on Physical layer of OSI model.	While switch is operated on Data link layer of OSI Model.
2	Hub is a broadcast type transmission.	While switch is a Unicast, multicast and broadcast type transmission.
3	Hub cannot be used as a repeater.	While switch can be used as a repeater.
4	Hub have 4/12 ports.	While switch can have 24 to 48 ports.
5	Cheaper as compared to switch.	Expensive as compared to HUB

Switch and Router

No.	Switch	Router
1	While the main objective of switch is to connect various devices simultaneously.	The main objective of router is to connect various networks simultaneously.
2	While it works in data link layer.	It works in network layer.
3	While switch is used by only LAN.	Router is used by LAN as well as MAN.
4	While through switch data is sent in the form of frame.	Through the router, data is sent in the form of packets
5	Switch is an expensive device than hub. but cheaper than router.	Router is a relatively much more expensive device than switch.

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Router and Gateway

No.	Router	Gateway
1	It is a hardware device which is responsible for receiving, analyzing and forwarding the data packets to other networks.	It is a device that is used for the communication among the networks which have a different set of protocols.
2	It supports the dynamic routing.	It does not support dynamic routing.
3	A router operates on layer 3 and layer 4 of the OSI model.	A gateway operates upto layer 5 of the OSI model.
4	The main function of a router is routing the traffic from one network to the other.	The main function of a gateway is to translate one protocol to the other.
5	The additional features provided by a router are Wireless networking, Static routing, NAT, DHCP server etc.	The additional features provided by a gateway are network access control, protocol conversion etc.

Working of below network devices:

1. Switch

- Switches are networking devices operating at layer 2 or a data link layer of the OSI model. They connect devices in a network and use packet switching to send, receive or forward data packets or data frames over the network.
- A switch has many ports, to which computers are plugged in. When a data frame arrives at any port of a network switch, it examines the destination address, performs necessary checks and sends the frame to the corresponding device(s).It supports unicast, multicast as well as broadcast communications.

- Features of switch:

- A switch operates in the layer 2, i.e. data link layer of the OSI model.
- It is an intelligent network device that can be conceived as a multiport network bridge.
- It uses MAC addresses (addresses of medium access control sublayer) to send data packets to selected destination ports.
- It uses packet switching technique to receive and forward data packets from the source to the destination device.
- It is supports unicast (one-to-one), multicast (one-to-many) and broadcast (one-to-all) communications.
- Transmission mode is full duplex, i.e. communication in the channel occurs in both the directions at the same time. Due to this, collisions do not occur.
- Switches are active devices, equipped with network software and network management capabilities.
- Switches can perform some error checking before forwarding data to the destined port.
- The number of ports is higher – 24/48

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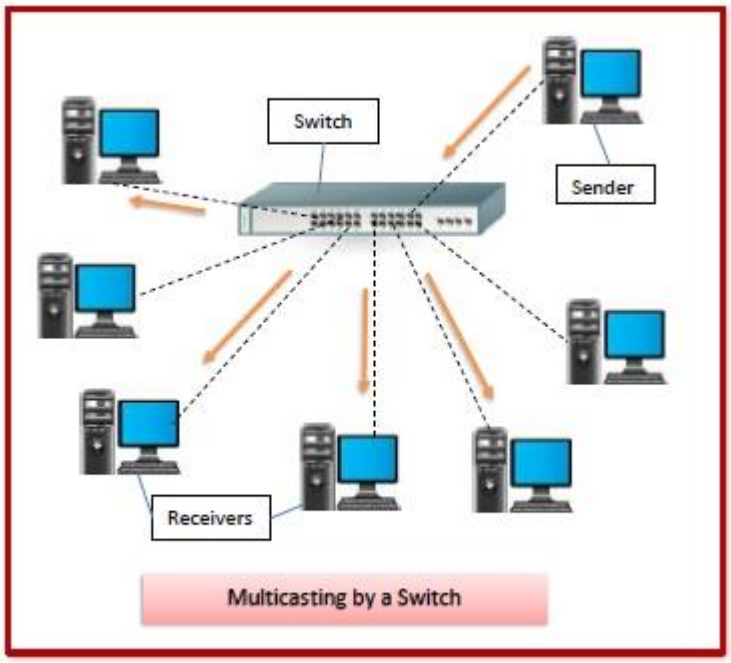

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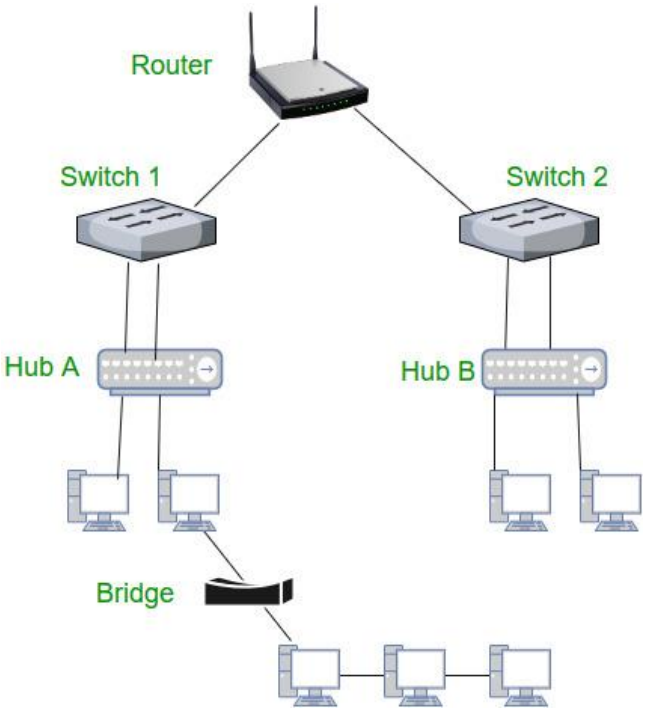
2. Router

- A router is a device like a switch that routes data packets based on their IP addresses. The router is mainly a Network Layer device. Routers normally connect LANs and WANs and have a dynamically updating routing table based on which they make decisions on routing the data packets. The router divides the broadcast domains of hosts connected through it.



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3. Gateway

- A gateway, as the name suggests, is a passage to connect two networks that may work upon different networking models. They work as messenger agents that take data from one system, interpret it, and transfer it to another system. Gateways are also called protocol converters and can operate at any network layer. Gateways are generally more complex than switches or routers. A gateway is also called a protocol converter.