

**Date: 17 / 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 a broadcast type transmission.	While switch is a Unicast, multicast and broadcast type transmission.
2	Hub is a half duplex transmission mode.	While switch is a full duplex transmission mode.
3	Hub cannot be used as a repeater.	While switch can be used as a repeater.
4	Hacking of systems attached to hub is complex.	Hacking of systems attached to switch is little easy.
5	Cheaper as compared to switch.	Expensive as compared to HUB.

### **Switch and Router**

No.	Switch	Router
1	While it works in data link layer.	It works in network layer.
2	Switch needs at least single network is to connect.	Router needs at least two networks to connect.
3	Switch is an expensive device than <u>hub</u> . but cheaper than router.	Router is a relatively much more expensive device than switch.
4	Switch it is not compatible with NAT.	Router is compatible with NAT.
5	Switch there is no collision taking place in full duplex switch.	There is less collision taking place in the router.

## **Router and Gateway**

<b>No.</b>	<b>Router</b>	<b>Gateway</b>
<b>1</b>	It supports the dynamic routing.	It does not support dynamic routing.
<b>2</b>	A router operates on layer 3 and layer 4 of the OSI model.	A gateway operates upto layer 5 of the OSI model.
<b>3</b>	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.
<b>4</b>	It is hosted on only the dedicated applications.	It is hosted on dedicated applications, physical servers or virtual applications.
<b>5</b>	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.

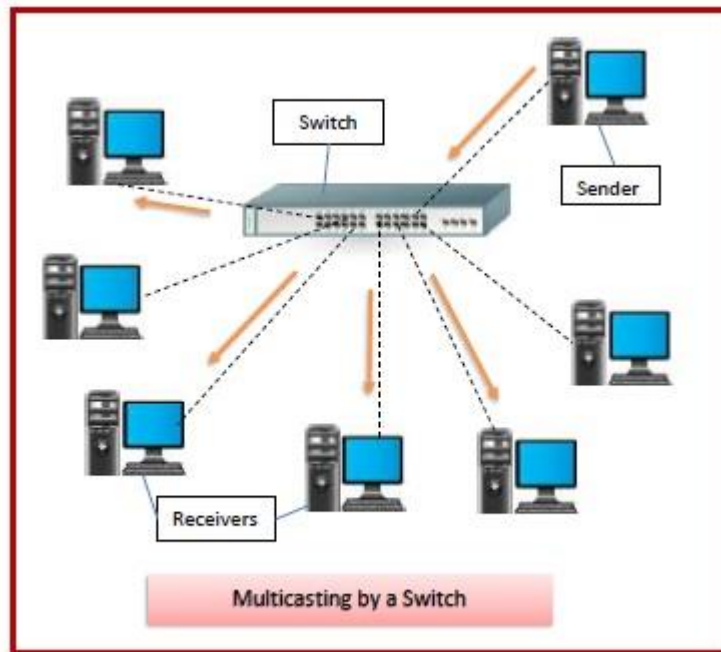
## **Working of below network devices:**

### **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 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.

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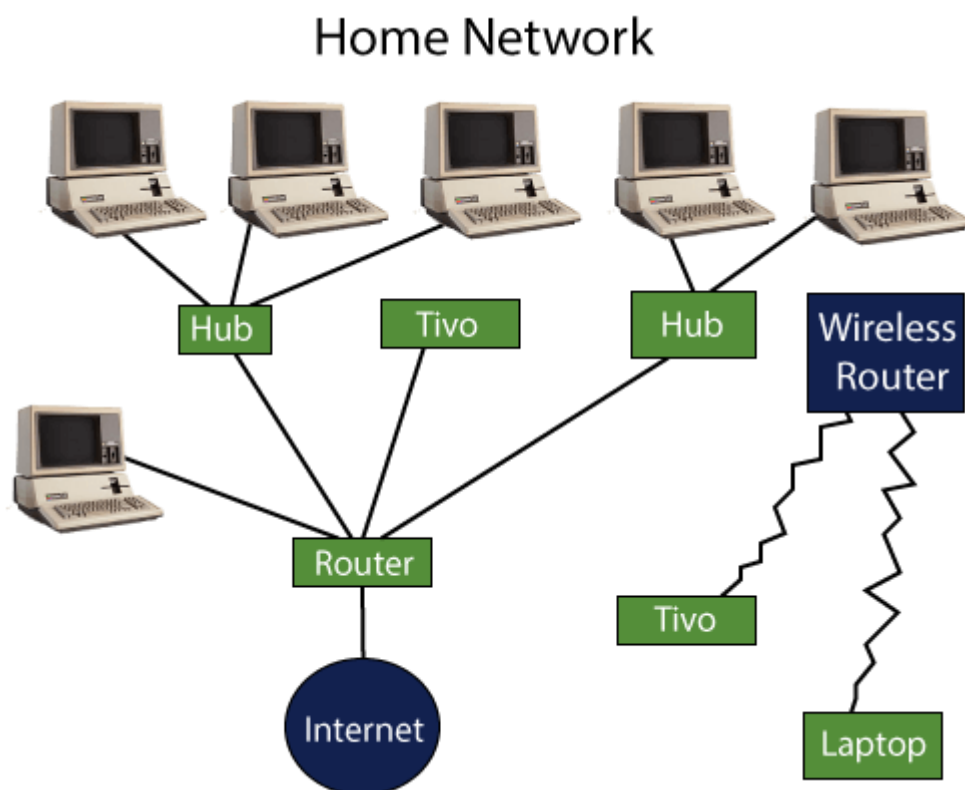
- Switches are active devices, equipped with network software and network management capabilities.
- Switches can perform some error checking before forwarding data to the destined port.
- The number of ports is higher – 24/48



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## 2. Router

- Consider a router as an air traffic controller and consider data packets as planes flying to various airports (or networks).
- Each packet must be directed as quickly as possible to its destination, just as each plane has a distinct destination and travels a distinct route.
- A router assists in guiding data packets to their intended IP address, just like an air traffic controller ensures that aircraft reach their destinations without getting lost or experiencing significant disruptions in a route.
- An internal routing table, which is a list of routes to different network destinations, is used by a router to effectively direct packets.
- In order to determine the destination of a packet, the router first scans its header. Then, it consults the routing table. Forward packet to next packet.



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### 3. Gateway

- The user end's application made a request for a certain amount of data via its portal to the gateway. For example, A smart door made a request for the data type: "password" and send this request to the gateway.
- The gateway sends this request for a password to the server.
- The server receives the request and search for the data type: "password" for a certain "id" and made the data "password" transfer to the gateway.
- The data is then sent to the smart door interface where it is matched with the data entered for data type: "password." If these two data matches, then the door gets unlocked.

