Date: 11/ 06 / 2025

Lab Practical #02:

Study of different network devices in detail.

Practical Assignment #02:

1. Give difference between below network devices.
   - Hub and Switch
   - Switch and Router
   - Router and Gateway
2. Working of below network devices:
   - Repeater
   - Modem(DSL and ADSL)
   - Hub
   - Bridge
   - 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	Hacking of systems attached to hub is complex.	Hacking of systems attached to switch is little easy.
5	In hub, Packet filtering is not provided.	While in switch, Packet filtering is provided.

Switch and Router

No.	Switch	Router
1	The main objective of router is to connect various networks simultaneously.	While the main objective of switch is to connect various devices simultaneously.
2	It works in network layer.	While it works in data link layer.
3	Router is used by LAN as well as MAN.	While switch is used by only LAN.
4	Router needs at least two networks to connect.	Switch needs at least single network is to connect.
5	Through the router, data is sent in the form of packets.	While through switch data is sent in the form of frame.

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Router and Gateway

No.	Router	Gateway
1	It is a hardware device that is responsible for receiving, analyzing, and forwarding data packets to other networks.	It is a device that is used for communication among networks that have a different set of protocols.
2	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.
3	A router operates on layer 3 and layer 4 of the OSI model.	A gateway operates up to layer 5 of the OSI model.
4	It is hosted on only the dedicated applications.	It is hosted on dedicated applications, physical servers, or virtual applications.
5	It is typically used in WANs and LANs.	It is used in various contexts, like the Internet, enterprise networks, and telecommunications.

Working of below network devices:

1. Switch

The Switch is a network device that is used to segment the networks into different subnetworks called subnets or LAN segments. It is responsible for filtering and forwarding the packets between LAN segments based on MAC address.

Switches have many ports, and when data arrives at any port, the destination address is examined first and some checks are also done and then it is processed to the devices. Different types of communication are supported here like unicast, multicast, and broadcast communication.

2. Router

A Router is a networking device that forwards data packets between computer networks. One or more packet-switched networks or subnetworks can be connected using a router. By sending data packets to their intended IP addresses, it manages traffic between different networks and permits several devices to share an Internet connection. Although there are many kinds of routers, the majority of them transfer data between LANs (local area networks) and WANs (wide area networks).

A LAN is a collection of linked devices confined to a certain region. Typically, a LAN needs just one router. In comparison, a WAN is a sizable network dispersed across a sizable geographic area. For example, large organizations and businesses with numerous sites across the nation will require individual LANs for each location, which connect to the other LANs to form a WAN. A WAN frequently requires numerous routers and switches due to its wide distribution.

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3. Gateway

   A gateway is a network connectivity device that connects two different configuration networks. Gateways are also known as protocol converters, because they play an important role in converting protocols supported by traffic on different networks. As a result, it allows smooth communication between two networks. It works as the entry-exit point for a network because all traffic that passes across the networks must pass through the gateway. A gateway monitors and controls all the incoming and outgoing network traffic. Gateways are also known as protocol converters.

4. Repeater
   - A repeater regenerates and amplifies the signal in a network to extend the transmission distance. It operates at the Physical Layer (Layer 1) and does not understand data — it simply boosts the signal to avoid degradation.

5. Modem(DSL and ADSL)
   - A modem (modulator-demodulator) converts digital signals from a computer to analog signals for telephone lines and vice versa.
     i. DSL (Digital Subscriber Line) uses phone lines for internet without interfering with voice calls.
     ii. ADSL (Asymmetric DSL) provides higher download speeds than upload speeds, suitable for home use.

6. Hub
   - A hub is a basic networking device that operates at the Physical Layer (Layer 1). It simply repeats incoming signals to all ports, causing network collisions and reduced efficiency. Hubs are rarely used in modern networks.

7. Bridge
   - A bridge operates at the Data Link Layer (Layer 2). It connects two or more network segments and filters traffic based on MAC addresses. It helps in segmenting networks to reduce collisions and improve performance.