**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

1. Working of below network devices:
   * Switch
   * Router
   * Gateway

# Hub and Switch

|  |  |  |
| --- | --- | --- |
| No. | Hub | Switch |
| 1 | Hub is operated on Physical layer. | Switch is operated on Data link layer. |
| 2 | Hub is Broadcast Devices. | Switch is Multicast Device. |
| 3 | Hub sends data in the form of binary bits. | Switch sends data in form of frames. |
| 4 | Hub only works in half duplex. | Switch works in full duplex. |
| 5 | Hub does not store any mac address or IP address. | Switch store MAC address. |

# Switch and Router

|  |  |  |
| --- | --- | --- |
| No. | Switch | Router |
| 1 | Switch is operated on Data link layer. | Router work on Network Layer of OSI Model. |
| 2 | Switch is Multicast Device. | Router is routing device use to create route for transmitting data packets. |
| 3 | Switch sends data in form of frames. | Router sends data in the form Packets. |
| 4 | Switch is use to connect devices in the same network. | Router is use to connect two or more different network. |
| 5 | Switch store MAC address. | Router stores IP address. |

# Router and Gateway

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| --- | --- | --- |
| No. | Router | Gateway |
| 1 | Routes data packets between networks. | Acts as a bridge between different network protocols. |
| 2 | Operates at Layer 3 (Network Layer) of the OSI model. | Operates at multiple layers (including Layer 3 and above) of the OSI model. |
| 3 | Connects different networks (e.g., home network to the internet). | Connects networks with different protocols or architectures. |
| 4 | Works with IP addresses. | Can work with IP addresses and other protocol-specific addresses. |
| 5 | Performs Network Address Translation (NAT) for address mapping. | Can handle protocol translation and data format conversion. |

# Working of below network devices:

1. **Switch :-** A switch connects multiple devices (computers, printers, servers) within a Local Area Network (LAN). Switch is operated on Data link layer. Each device connected to the switch has a unique MAC address. The switch learns and stores these MAC addresses in a table, mapping them to the corresponding ports. When a device sends data, the switch receives the data packet through one of its ports. The switch forwards the data packet directly to the specific port associated with the destination MAC address.
2. **Router :-** A router connects multiple networks, such as a home network to the internet or different local networks within an organization. When a device sends data to another network, the router receives the data packet. The router examines the destination IP address in the data packet to determine the best route. The router consults its routing table, which contains information about various network paths and their associated metrics. Based on the routing table and protocols, the router selects the most efficient path for the data packet. The router manages traffic to ensure efficient data flow, avoid congestion, and maintain network security.
3. **Gateway :-** A gateway connects different networks that use different protocols, acting as a translator between them. When data is sent from one network to another with a different protocol, the gateway receives the data packet. The gateway converts the data packet from the protocol used in the sending network to the protocol used in the receiving network. If needed, the gateway translates addresses (such as IP addresses) to make sure the data can be properly routed in the destination network. After converting the protocol and translating addresses, the gateway forwards the data packet to the destination network.