**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

1. Working of below network devices:
   * Repeater
   * Modem((DSL and ADSL)
   * Hub
   * Bridge
   * Switch
   * Router
   * Gateway

# Hub and Switch

|  |  |  |
| --- | --- | --- |
| No. | Hub | Switch |
| 1 | Operates at Layer 1 (Physical) | Operates at Layer 2 (Data Link) |
| 2 | Broadcasts data to all ports | Forwards data to specific ports |
| 3 | No MAC address learning | Learns and stores MAC addresses |
| 4 | Less efficient, causes collisions | More efficient, no collisions |
| 5 | Half-duplex communication | Full-duplex communication |

# Switch and Router

|  |  |  |
| --- | --- | --- |
| No. | Switch | Router |
| 1 | Operates at Layer 2 (Data Link) | Operates at Layer 3 (Network) |
| 2 | Uses MAC addresses for routing | Uses IP addresses for routing |
| 3 | Connects devices in a LAN | Connects multiple networks |
| 4 | Does not provide NAT or DHCP | Provides NAT, DHCP, and firewall |
| 5 | Faster for local traffic | Slower due to complex routing |

# Router and Gateway

|  |  |  |
| --- | --- | --- |
| No. | Router | Gateway |
| 1 | Routes data between networks | Connects different protocols |
| 2 | Uses IP addresses | Translates between protocols |
| 3 | Operates at Layer 3 | Can operate at multiple layers |
| 4 | Typically, hardware-based | Can be hardware or software |
| 5 | Focuses on packet forwarding | Focuses on protocol conversion |

# Working of below network devices:

1. **Repeater**
   * A repeater regenerates and amplifies weak signals to extend the range of a network. It operates at the Physical Layer (Layer 1) and does not filter or interpret data.
2. **Modem (DSL and ADSL)**
   * A modem modulates digital data into analog signals for transmission over telephone lines (DSL) and demodulates incoming analog signals back into digital data. ADSL (Asymmetric DSL) provides faster download speeds than upload speeds.
3. **Hub**
   * A hub is a basic networking device that connects multiple devices in a LAN. It broadcasts incoming data to all connected devices, operating at the Physical Layer (Layer 1).
4. **Bridge**
   * A bridge connects two LAN segments and filters traffic based on MAC addresses. It operates at the Data Link Layer (Layer 2) to reduce collisions by dividing collision domains.
5. **Switch**
   * A switch connects devices in a LAN and forwards data to specific ports based on MAC addresses. It operates at the Data Link Layer (Layer 2) and improves network efficiency by reducing collisions.
6. **Router**
   * A router connects multiple networks and routes data packets based on IP addresses. It operates at the Network Layer (Layer 3) and provides features like NAT, DHCP, and firewall.
7. **Gateway**
   * A gateway connects networks with different protocols or architectures. It translates data between incompatible systems and can operate at multiple layers of the OSI model.