**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

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

# Hub and Switch

|  |  |  |
| --- | --- | --- |
| No. | Hub | Switch |
| 1 | Works on Layer 1 (Physical). | Works on Layer 2 (Data Link). |
| 2 | Broadcasts to all devices. | Send to specific device. |
| 3 | No MAC Address learning. | Learns and stores MAC address. |
| 4 | Less efficient, more traffic. | More efficient, fewer collisions. |
| 5 | For small, simple networks. | For large, complex networks. |

# Switch and Router

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| No. | Switch | Router |
| 1 | Works on Layer 2 (Data Link). | Works on Layer 3 (Network). |
| 2 | Connects devices in a LAN. | Connects different networks. |
| d | Uses MAC addresses. | Uses IP addresses. |
| 4 | No NAT. | Provides NAT and IP assignment. |
| 5 | No routing. | Supports routing. |

# Router and Gateway

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| No. | Router | Gateway |
| 1 | Connects and routes between networks. | Connects different networks and protocols. |
| 2 | Works for similar networks. | Works between different types of networks. |
| 3 | Uses IP for routing. | Converts protocols and packets. |
| 4 | Used inside networks. | Entry or exit point of networks. |
| 5 | Works at network layer. | Works at all OSI layers. |

# Working of below network devices:

1. Repeater
   * A repeater gets a weak signal and makes it strong again so it can travel a longer distance.
   * It cleans the signal by removing noise and makes it stronger, so data can travel farther without losing quality.
   * Operates at OSI Layer 1.
2. Modem ((DSL and ADLS))
   * A modem changes digital signals from a computer into analog signals to send over telephone lines, and changes analog signals back into digital signals.
     1. DSL provides high-speed internet using telephone lines without affecting phone calls.
     2. ADSL gives faster download speeds than upload speeds, ideal for home use.
3. Hub
   * A hub is a basic networking device that connects multiple computers in a LAN.
   * It broadcasts data to all ports without filtering, causing collisions.
   * Works at Layer 1.
4. Bridge
   * A bridge connects two different LAN segments and filters traffic based on MAC addresses.
   * It reduces network traffic by dividing a LAN segments.
   * Operates at Layer 2.
5. Switch
   * A switch is an advanced version of a hub.
   * It learns MAC addresses and sends data to specific devices, reducing traffic and improving speed.
   * It operates at Layer 2 and sometimes at Layer 3.
6. Router
   * A route connects networks and sends data to correct destination using IP addresses.
   * It also provides NAT, DHCP, and firewall services.
   * Operates at Layer 3.

1. Gateway
   * A gateway connects two networks that use different protocols.
   * It translates communication between different systems and often acts as a firewall or proxy server.
   * Operates at all layers of OSI model.