**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 | Sends data to all devices. | Sends data to the specific device. |
| 2 | Works on layer 1(physical). | Works on layer 2(Data Link). |
| 3 | Less secure (anyone can see all data). | More secure (data goes only to intended device). |
| 4 | Slower network performance. | Faster than Hub. |
| 5 | No filtering data. | Filters and manages data. |
| 6 | Does not use MAC addresses | Uses MAC address table to forward data. |

# Switch and Router

|  |  |  |
| --- | --- | --- |
| No. | Switch | Router |
| 1 | Connect devices within a same network. | Connect difference networks together. |
| 2 | Sends data within LAN. | Sends data between LANs or to internet. |
| 3 | Forwards data using MAC addresses. | Forwards data using IP addresses. |
| 4 | Works on Data Link Layer (Layer 2). | Works on Network layer (Layer 3). |
| 5 | Example: connects pc in home. | Example: connects home to the internet. |
| 6 | Deals with frames**.** | Deals with Packets**.** |

# Router and Gateway

|  |  |  |
| --- | --- | --- |
| No. | Router | Gateway |
| 1 | Connect one network to other networks. | Connects different type of networks. |
| 2 | Works at network layer. | Can work on all OSI layers. |
| 3 | Smarter than switch. | Smarter than router. |
| 4 | Mainly used in Ip-based networks. | Converts data between different protocols. |
| 5 | Example: connects home to internet. | Example: connects Ip networks to VoIP with the **public telephone network.** |

# Working of below network devices:

* Switch

1. A switch connects devices in a local network (LAN).
2. It receives data (frames) from one device.
3. It checks the MAC address inside the data.
4. It remembers which MAC address is on which port.
5. It sends the data only to the correct device, not to everyone.
6. This makes the network faster, safer, and more efficient.

* Router

1. A router connects different networks.
2. It receives data from one network.
3. It checks the destination IP address in the packet.
4. It decides the best path to send the data.
5. Then it forwards the data to the correct network or device.
6. It can also do NAT, firewall, and filtering for security.
7. This makes communication between networks possible and secure**.**

* Gateway

1. A gateway connects two different networks that use different protocols.
2. It converts data formats so both networks can understand.
3. It checks and forwards data between networks.
4. Works as a translator between different systems.
5. This makes communication possible between networks that normally cannot talk.

* Repeater

1. A repeater boosts weak signals in a network.
2. It receives a weak or corrupted signal.
3. It amplifies (boosts) and cleans the signal.
4. And sends it forward without changing the data.
5. Works only at the Physical Layer (Layer 1) of OSI model.
6. This makes data travel longer distances without loss.

* Modem

1. A modem connects your network to the internet.
2. It converts digital signals to analog and vice versa.
3. This lets your devices communicate with the internet.
4. Without a modem, you cannot access the internet through phone lines.
5. Works at both Physical Layer (Layer 1) and Data Link Layer (Layer 2) of OSI model.

* Hub

1. A hub connects multiple devices in a network.
2. It receives data from one device.
3. It sends the data to all devices, not just the target.
4. Only the right device uses the data, others ignore it.
5. This causes more traffic, collisions, and less security.
6. Works only at the Physical Layer (Layer 1) of OSI model.

* Bridge

1. A bridge connects two LANs.
2. It receives data from one side.
3. It checks the MAC address to know where to send.
4. It forwards data only if needed to the other LAN.
5. It connects two networks and sends only needed data.
6. It reduces unnecessary traffic and improves performance.
7. Works at the Data Link Layer (Layer 2) of OSI model.

* DSL/ADSL

1. DSL/ADSL uses a phone line for internet.
2. You can use phone and internet together.
3. A modem is used to connect.
4. It sends and receives data.
5. ADSL gives higher download speed than upload speed.