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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 a broadcast type transmission.	While switch is a Unicast, multicast and broadcast type transmission.
2	there is only one collision domain in hub.	different ports have own collision domain in switch.
3	Hub cannot be used as a repeater.	switch can be used as a repeater.
4	Hubs are Cheaper as compared to switch.	Switches are Expensive as compared to HUB.
5	Hub is a half duplex transmission mode. (here half duplex means the devices on the network can either send or receive data at the same time)	While switch is a full duplex transmission mode. (here full duplex means the devices on the network can send and receive data at the same time)

Switch and Router

No.	Switch	Router
1	Switch needs at least single network is to connect.	Router needs at least two networks to connect.
2	In the switch the data is sent in the form of frame.	In the router the data is sent in the form of packets.
3	there is not any chance of collision in full duplex switch.	There is less collision in the router.
4	Switch Uses MAC addresses to send data within a network.	Router Uses IP addresses to route data between different networks.

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5	Operates at the Data Link layer (Layer 2) of the OSI model.	Operates at the Network layer (Layer 3) of the OSI model.
6	Switch Connects devices within the same network(e.g. many laptops connected in the lane).	Router Connects multiple networks (e.g. Home network connected to the internate).

Router and Gateway

No.	Router	Gateway
1	Router operates at the Network layer (Layer 3) of the OSI model.	Gateway can operate at multiple layers, often up to the Application layer (Layer 7).
2	Router uses IP addresses to route data between networks.	Gateway uses protocol conversion to communication between dissimilar networks.
3	Router does not modify data.	Gateway modifies data to ensure compatibility between networks.
4	Router sends data in the form of packets.	Gateway converts data between different formats to make networks compatible.
5	Router Provides features like NAT (Network Address Translation) and firewall for security.	Gateway has advanced data filtering for security.

Working of below network devices:

1. Switch
   - A switch connects devices like computers and printers in a single network. It receives data, called frames, and sends them only to the intended device using MAC addresses. This makes the network faster by avoiding unnecessary data sharing.
   - It reduces network traffic and prevents data collisions in full-duplex mode. Switches are commonly used in homes and offices for local networks.

2. Router
   - A router connects two or more networks, like our home Wi-Fi to the internet. It takes data packets and sends them to the correct destination using IP addresses.
   - It shares internet connections with multiple devices using NAT and provides security with firewalls. Routers are used in homes, schools, and offices for internet connectivity.

3. Gateway
   - A gateway connects networks with different protocols, like Wi-Fi to a mobile network. It translates data so the networks can communicate, working at multiple layers, including the application layer.

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- Gateways are used in complex setups like smart homes to connect devices to the internet. They may also filter or secure data during translation.

4. Repeater
   - A repeater boosts weak network signals to extend the range of a network. It receives data signals, strengthens them, and sends them further. This helps devices far from the source stay connected.
   - Repeaters are used in large homes or offices to improve Wi-Fi or wired network coverage.

5. Hub
   - A hub connects multiple devices in a single network, like computers in an office. It sends received data to all connected devices, not just the intended one. This can slow down the network due to extra traffic.
   - Hubs are simple and used in small, basic networks.

6. Bridge
   - A bridge connects two parts of the same network to improve performance. It filters data by checking MAC addresses and only sends it to the needed part. This reduces network traffic and congestion.
   - Bridges are used in larger networks to separate busy areas.

7. Modem(DSl and ADSL)
   - A modem connects your home network to the internet by converting digital data to analog signals and vice versa. DSL and ADSL modems use telephone lines to provide internet access. They allow devices like computers to access the internet.
   - Modems are common in homes for broadband connections.