Types of Network Devices

Common network device list:

- Repeater.
- Hub.
- Bridge.
- Router.
- Gateway.
- Switch.

A repeater operates at the physical layer.
Repeater is to regenerate the signal over the same network before the signal becomes too weak or corrupted

A hub is basically a multiport repeater.
A hub connects multiple wires coming from different branches.
Hubs cannot filter data, so data packets are sent to all connected devices.

A bridge operates at the data link layer.
A bridge is a repeater, with add on the functionality of filtering content by reading the MAC addresses of source and destination. It is also used for interconnecting two LANs working on the same protocol.

A router is a device like a switch that routes data packets based on their IP addresses. The router is mainly a Network Layer device. Routers normally connect LANs and WANs together.

A gateway, as the name suggests, is a passage to connect two networks together that may work upon different networking models.

A switch is a multiport bridge with a buffer and a design that can boost its efficiency(a large number of ports imply less traffic) and performance. A switch is a data link layer device. The switch can perform error checking before forwarding data.

Features of Switches

A switch operates in the data link layer of the OSI model.
It uses MAC addresses to send data packets to selected destination ports.
It uses packet switching technique to receive and forward data packets.
It is supports unicast, multicast and broadcast communications.
Transmission mode is full duplex.
Switches are active devices, equipped with network software and network capabilities.
Switches can perform some error checking before forwarding data to the destined port.
The number of ports is higher – 24/48.

Types of Switches

UN-managed Switch
These are inexpensive switches commonly used in home networks and small businesses. They can be set up by simply plugging in to the network, after which they instantly start operating.

Managed Switch
These are costly switches that are used in organisations with large and complex networks, since they can be customized to augment the functionalities of a standard switch.

LAN Switch
Local Area Network (LAN) switches connects devices in the internal LAN of an organization. They are also referred as Ethernet switches or data switches.

PoE Switch
Power over Ethernet (PoE) switches are used in PoE Gogabit Ethernets. PoE technology combine data and power transmission over the same cable so that devices connected to it can receive both electricity as well as data over the same line.

Switching technique is used to connect the systems for making one-to-one communication.

Circuit switching is a switching technique that establishes a dedicated path between sender and receiver.
In the Circuit Switching Technique, once the connection is established then the dedicated path will remain to exist until the connection is terminated.
A complete end-to-end path must exist before the communication takes place.
Circuit switching is used in public telephone network. It is used for voice transmission.
Fixed data can be transferred at a time in circuit switching technology.

3 Phases of Circuit Switching

Circuit establishment
Data transfer
Circuit Disconnect

Message Switching is a switching technique in which a message is transferred as a complete unit and routed through intermediate nodes at which it is stored and forwarded.
In Message Switching technique, there is no establishment of a dedicated path between the sender and receiver.
Message Switching provides a dynamic routing as the message is routed through the intermediate nodes based on the information available in the message.
Each and every node stores the entire message and then forward it to the next node.
This type of network is known as store and forward network.
Message switching treats each message as an independent entity.

The packet switching is a switching technique in which the message is sent in one go, but it is divided into smaller pieces, and they are sent individually.
The message splits into smaller pieces known as packets and packets are given a unique number to identify their order at the receiving end.
Every packet contains some information in its headers such as source address, destination address and sequence number.
All the packets are reassembled at the receiving end in correct order.
If any packet is missing or corrupted, then the message will be sent to resend the message.
If the correct order of the packets is reached, then the acknowledgment message will be sent.

There are two approaches to Packet Switching

Datagram Packet switching
Virtual Circuit Switching

Datagram Packet switching is a packet switching technology in which packet is known as a datagram, is considered as an independent entity.
Each packet contains the information about the destination and switch uses this information to forward the packet to the correct destination.
The packets are reassembled at the receiving end in correct order.
In Datagram Packet Switching technique, the path is not fixed.
Intermediate nodes take the routing decisions to forward the packets.
Datagram Packet Switching is also known as connectionless switching.

Virtual Circuit Switching is also known as connection-oriented switching.
In the case of Virtual circuit switching, a preplanned route is established before the messages are sent.
Call request and call accept packets are used to establish the connection between sender and receiver.
In this case, the path is fixed for the duration of a logical connection.