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What is Switching?

In computer networking, **Switching** is the process of transferring data packets from one device to another in a network, or from one network to another, using specific devices called **switches**. A computer user experiences switching all the time for example, accessing the Internet from your computer device, whenever a user requests a webpage to open, the request is processed through switching of data packets only.

Switching takes place at the Data Link layer of the OSI Model. This means that after the generation of data packets in the Physical Layer, switching is the immediate next process in data communication. In this article, we shall discuss different processes involved in switching, what kind of hardware is used in switching, etc.

What is a Network Switching?

A switch is a dedicated piece of computer hardware that facilitates the process of switching i.e., incoming data packets and transferring them to their destination. A switch works at the Data Link layer of the OSI Model. A switch primarily handles the incoming data packets from a source computer or network and decides the appropriate port through which the data packets will reach their target computer or network.

A switch decides the port through which a data packet shall pass with the help of its destination MAC(Media Access Control) Address. A switch does this effectively by maintaining a switching table, (also known as forwarding table).

A network switch is more efficient than a network Hub or repeater because it maintains a switching table, which simplifies its task and

reduces congestion on a network, which effectively improves the performance of the network.

How Does a Network Switch Works?

Process of Switching

The switching process involves the following steps:

Frame Reception: The switch receives a data frame or packet from a computer connected to its ports.

- **MAC Address Extraction:** The switch reads the header of the data frame and collects the destination MAC Address from it.
- **MAC Address Table Lookup:** Once the switch has retrieved the MAC Address, it performs a lookup in its Switching table to find a port that leads to the MAC Address of the data frame.
- **Forwarding Decision and Switching Table Update:** If the switch matches the destination MAC Address of the frame to the MAC address in its switching table, it forwards the data frame to the respective port. However, if the destination MAC Address does not exist in its forwarding table, it follows the flooding process, in which it sends the data frame to all its ports except the one it came from and

records all the MAC Addresses to which the frame was delivered. This way, the switch finds the new MAC Address and updates its [forwarding table](#).

- **Frame Transition:** Once the destination port is found, the switch sends the data frame to that port and forwards it to its target computer/network.

Types of Switching

There are three types of switching methods:

- [Message Switching](#)
- [Circuit Switching](#)
- [Packet Switching](#)

    - Datagram Packet Switching
    - Virtual Circuit Packet Switching
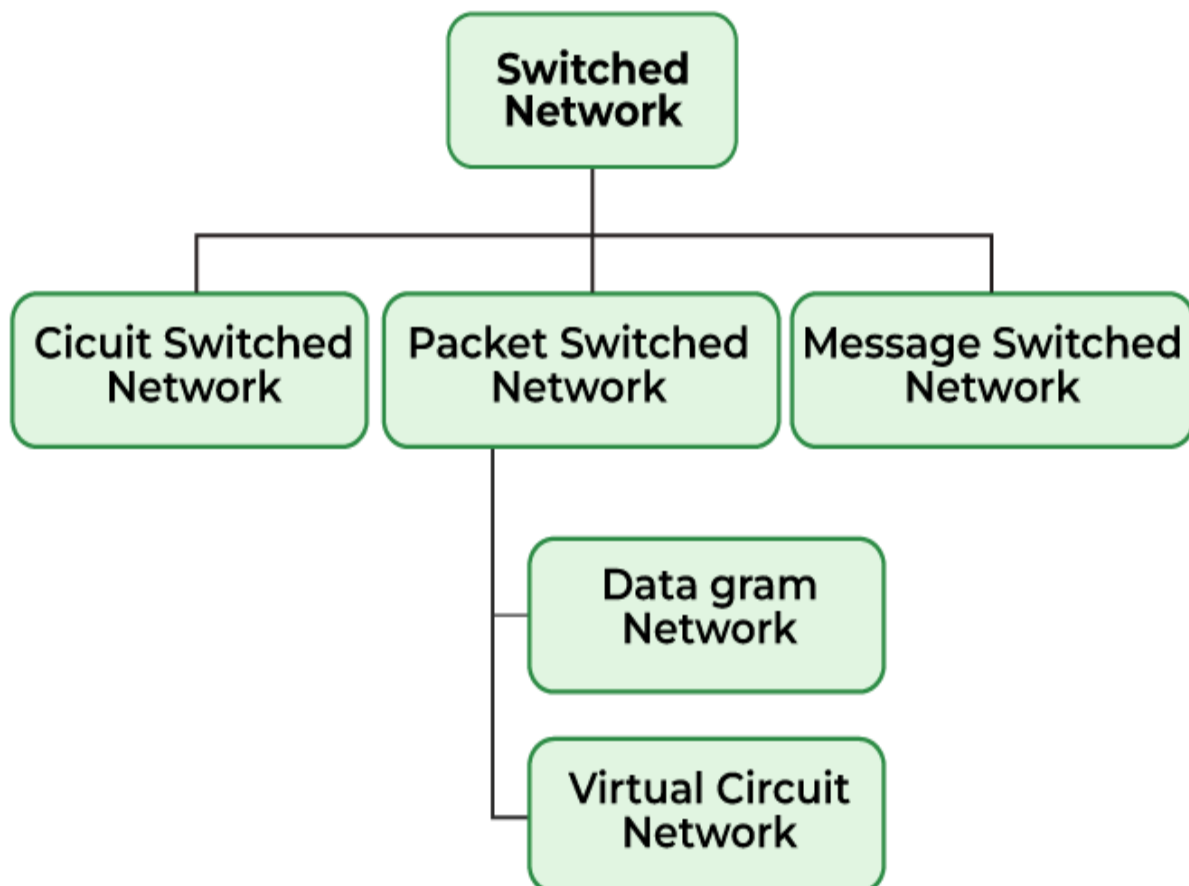
Let us now discuss them individually:

Message Switching: This is an older switching technique that has become obsolete. In message switching technique, the entire data block/message is forwarded across the entire **network** thus, making it highly inefficient.

Circuit Switching: In this type of switching, a connection is established between the source and destination beforehand. This connection receives the complete bandwidth of the network until the data is transferred completely.
This approach is better than **message switching** as it does not involve sending data to the entire network, instead of its destination only.

Packet Switching: This technique requires the data to be broken down into smaller components, data frames, or **packets**. These **data frames** are then transferred to their destinations according to the available resources in the network at a particular time.
This switching type is used in modern computers and even the Internet. Here, each data frame contains additional information about the destination and other information required for proper transfer through network components.

Datagram Packet Switching: In Datagram **Packet switching**, each data frame is taken as an individual entity and thus, they are processed separately. Here, no connection is established before data transmission occurs. Although this approach provides flexibility in data transfer, it may cause a loss of data frames or late delivery of the data frames.

Virtual-Circuit Packet Switching: In **Virtual-Circuit** Packet switching, a logical connection between the source and destination is made before transmitting any data. These logical connections are called virtual circuits. Each data frame follows these logical paths and provides a reliable way of transmitting data with less chance of data loss.

Conclusion

In this article, we discussed the process of switching to Computer Networking. We explained the physical devices required for switching. We looked at the steps involved in the process of switching and learned about different types of switching methods.

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