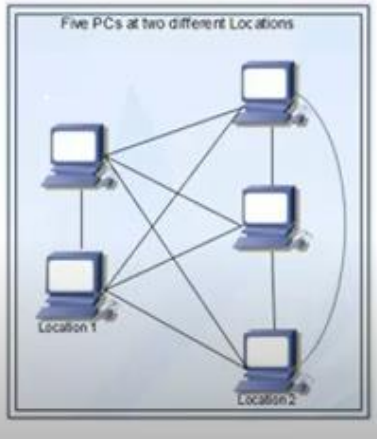
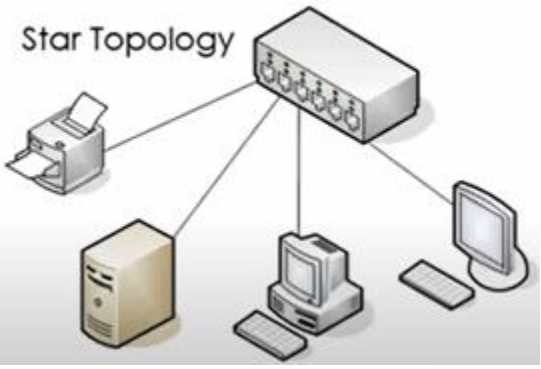
Switching

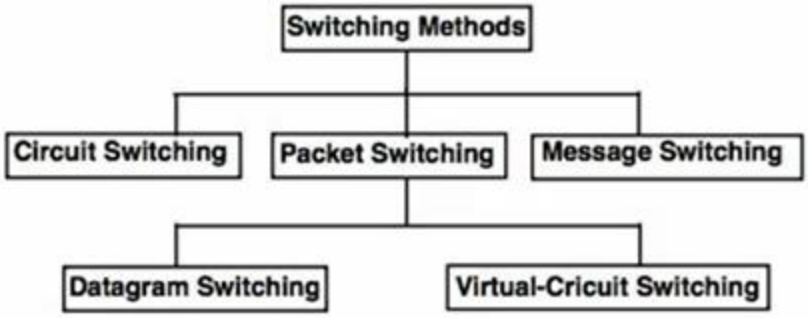
A network consists of many switching devices. In order to connect multiple devices, one solution could be to have a point to point connection in between pair of devices. But this increases the number of connection.



The other solution could be to have a central device and connect every device to each other via the central device which is generally known as **Star Topology**. A switched network is made up of a series of interconnected nodes called switches.

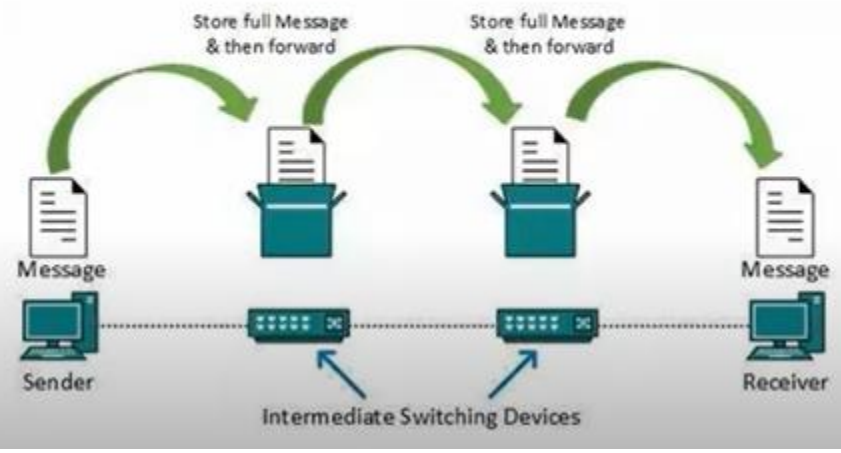


Types of Switching



Types of Switching

Message Switching



- 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.
- The destination address is appended to the message. Message Switching provides a dynamic routing as the message is routed through the intermediate nodes based on the information available in the message.
- Message switches are programmed in such a way so that they can provide the most efficient routes.
- 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.

Message Switching

Advantages:

- More devices share the same channel
- Congestion can be reduced
- Supports message lengths of unlimited size

Disadvantages:

- Not compatible for voice and video
- Costly as store and forward devices are expensive
- Can lead to security issues if hacked
- Not reliable

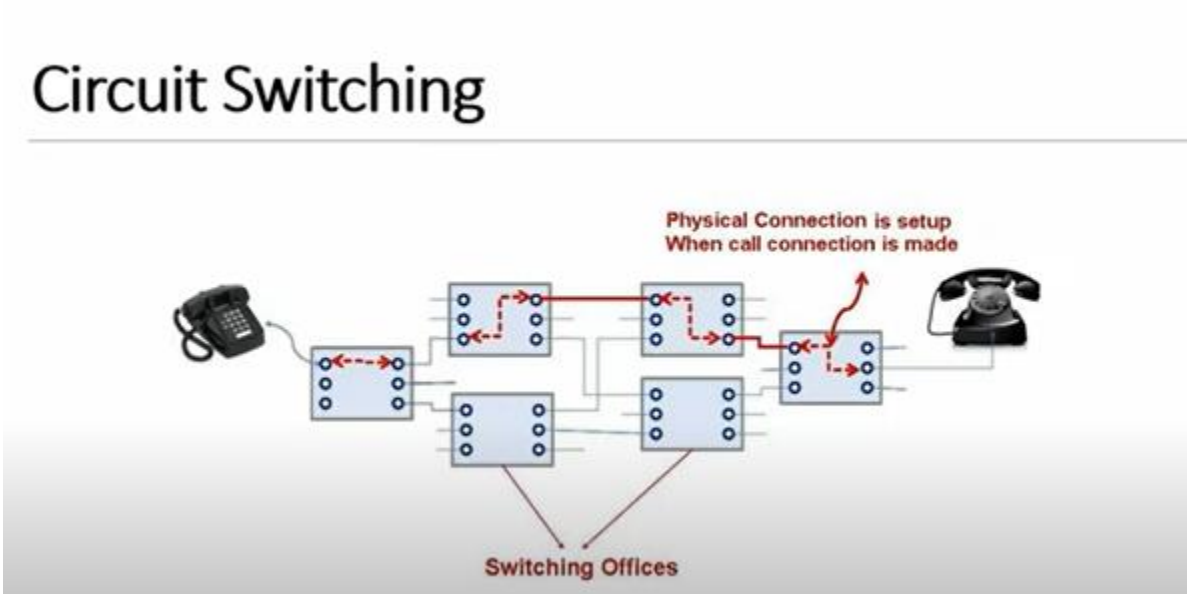
Circuit Switching

Circuit Switching is generally used in the public networks. It come into existence for handling voice traffic in addition to digital data.

After the link has been sets in between the sender and the receiver then the information is forwarded continuously over the provided link.

A dedicated link/path is established across the sender and the receiver which is maintained for the entire duration of conversation.

- 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.
- Circuit switching in a network operates in a similar way as the telephone works.
- A complete end-to-end path must exist before the communication takes place.
- In case of circuit switching technique, when any user wants to send the data, voice, video, a request signal is sent to the receiver then the receiver sends back the acknowledgment to ensure the availability of the dedicated path. After receiving the acknowledgment, dedicated path transfers the data.
- 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.



Circuit Switching

Advantages:

- Guaranteed data rate.
- No waiting time at each switch.
- Suitable for long continuous transmission.

Disadvantages:

- Other nodes cannot use same channel.
- Require more bandwidth.
- Time required to establish a physical link is too long.

Packet Switching

To improve the efficiency of transferring information over a shared communication line, messages are divided into fixed-sized, numbered **packets**

Network devices called routers are used to direct packets between networks

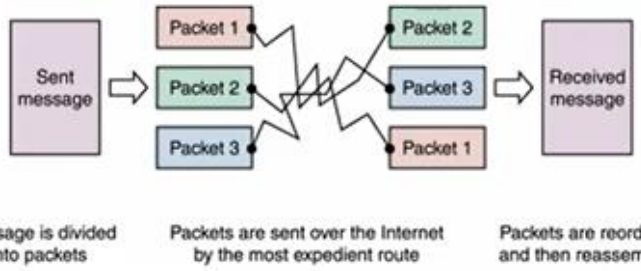


Figure 15.4 Messages sent by packet switching

Packet Switching

- 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.
- Packets will travel across the network, taking the shortest path as possible.
- 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.

Packet Switching

Advantages:

- Efficient use of Network.
- High Data Transmission
- No big memory required
- No dedicated path required
- Suitable for video/voice calls
- Less usage cost

Disadvantages:

- Order mismatch
- Transmission delay
- Packet loss
- Implementation cost
- Security issues