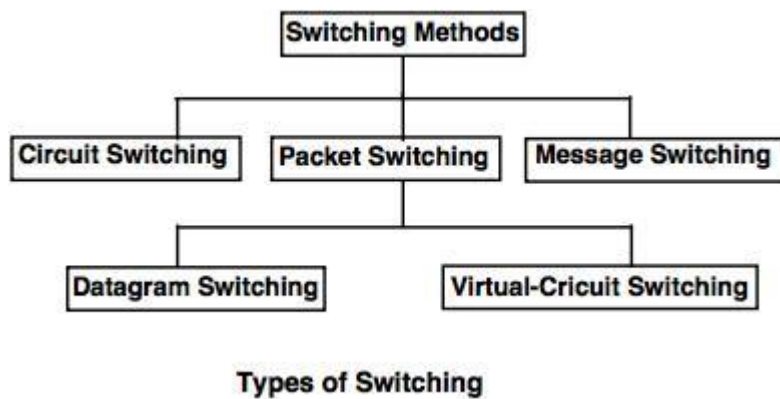For data transfer, different types of switching methods are available. **Following figure shows the types of switching:**

Types of Switching

Circuit Switching

- Circuit switched network consists of a set of switches connected by physical links.
- In circuit switched network, two nodes communicate with each other over a dedicated communication path.
- There is a need of pre-specified route from which data will travel and no other data is permitted.
- Before starting communication, the nodes must make a reservation for the resources to be used during the communication.
- In this type of switching, once a connection is established, a dedicated path exists between both ends until the connection is terminated.

Fig: Circuit Switching
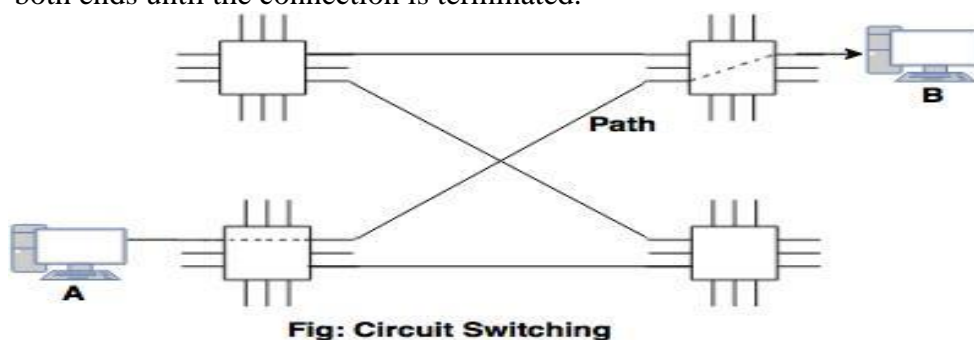
- The end systems, such as telephones or computers are directly connected to a switch.
- When system A needs to communicate with system B, system A needs to request a connection to system B that must be accepted by all switches as well as by B itself.

- This is called as **setup phase** in which a circuit is reserved on each link, and the combination of circuits or channels defines a dedicated path.
- After the establishment of the dedicated circuit, the data transfer can take place.
- After all data has been transferred, the circuit is torn down.

Packet Switching

- In packet switching, messages are divided into packets of fixed or variable size.
- The size of packet is decided by the network and the governing protocol.
- Resource allocation for a packet is not done in packet switching.
- Resources are allocated on demand.
- The resource allocation is done on first-come, first-served basis.
- Each switching node has a small amount of buffer space to hold packets temporarily.
- If the outgoing line is busy, the packet stays in queue until the line becomes available.
  Packet switching method uses two routing methods:

1. Datagram Packet Switching

- Datagram packet switching is normally implemented in the network layer.
- In datagram network, each packet is routed independently through the network.
- Each packet carries a header that contains the full information about the destination.
- When the switch receives the packet, the destination address in the header of the packet is examined; the routing table is consulted to find the corresponding port through which the packet should be forwarded.
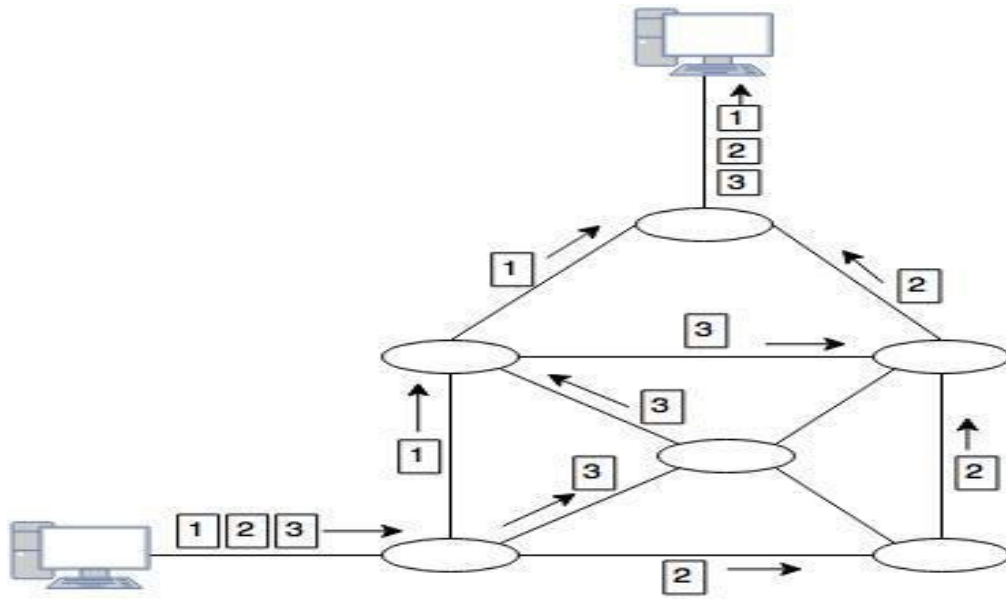
Fig: Datagram Packet Switching

2. Virtual Circuit Packet Switching

- Virtual circuit packet switching is normally done at the data link layer.
- Virtual circuit packet switching establishes a fixed path between a source and a destination to transfer the packets.
- It is also called as **connection oriented network.**
  A source and destination have to go through three phases in a virtual circuit packet switching:

    I. Setup phase
    ii. Data transfer phase
    iii. Connection release phase

- A logical connection is established when a sender sends a setup request to the receiver and the receiver sends back an acknowledgement to the sender if the receiver agree.
- All packets belonging to the same source and destination travel the same path.
- The information is delivered to the receiver in the same order as transmitted by the sender.
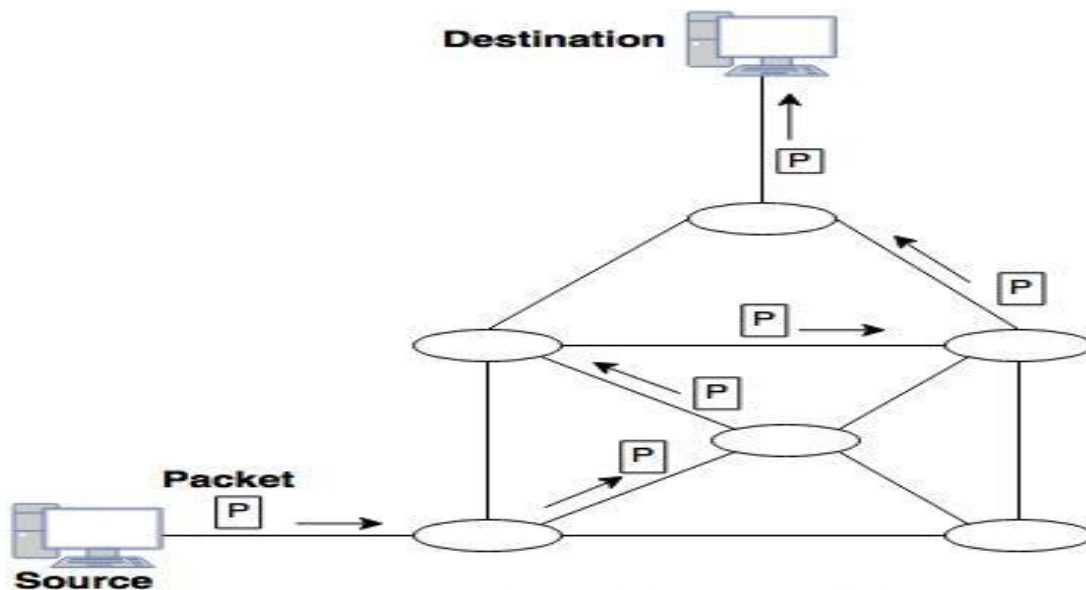
Fig: Virtual Circuit Packet Switching

Message Switching

- In message switching, it is not necessary to establish a dedicated path between transmitter and receiver.
- In this, each message is routed independently through the network.
- Each message carries a header that contains the full information about the destination.
- Each intermediate device receives the whole message and buffers it until there are resources available to transfer it to the next hop.
- If the next hop does not have enough resources to accommodate large size message, the message is stored and switch waits.
- For this reason a message switching is sometimes called as **Store and Forward Switching**.
- Message switching is very slow because of store-and-forward technique.
- Message switching is not recommended for real time applications like voice and video.
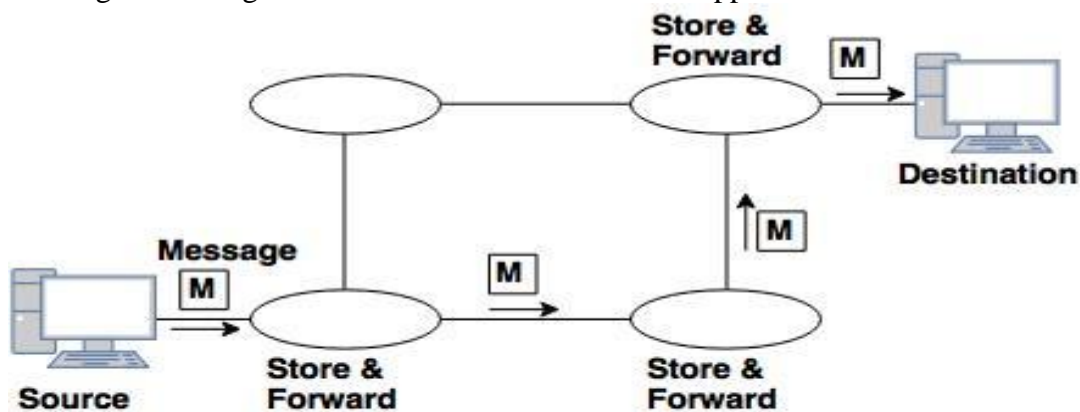

Fig: Message Switching