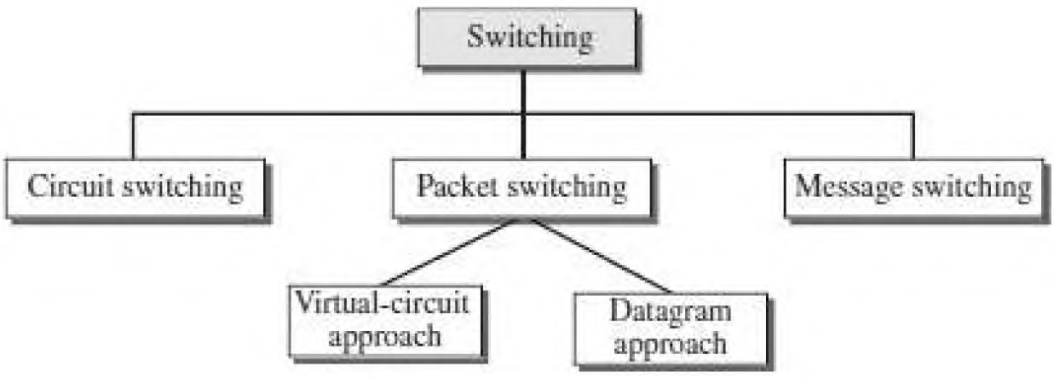
Switching: Packet Switching - Internet protocol - IPV4 – IP Addressing – Subnetting - IPV6, ARP,RARP, ICMP, DHCP

## Switching

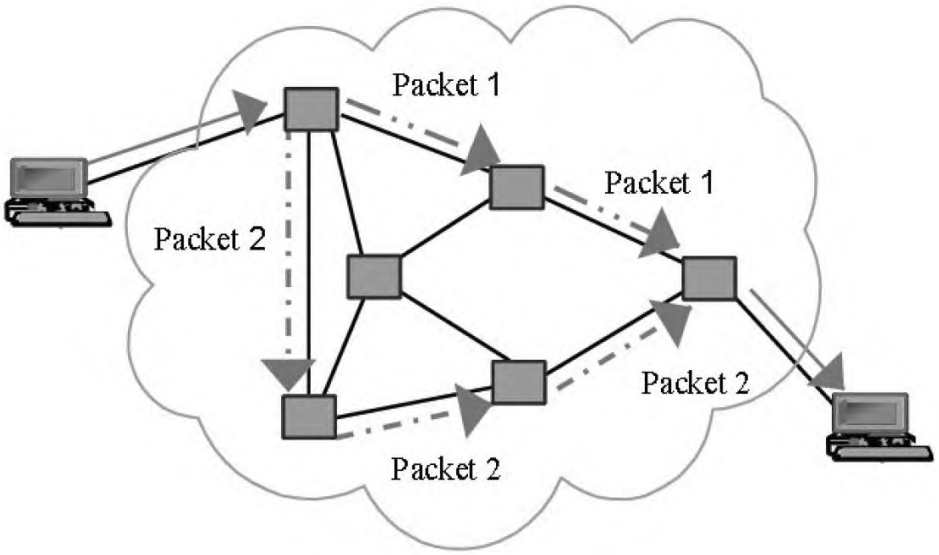
- The technique of transferring the information from one computer network to another network is known as **switching**.
- Switching in a computer network is achieved by using switches.
- A switch is a small hardware device which is used to join multiple computers together with one local area network (LAN).
- Switches are devices capable of creating temporary connections between two or more devices linked to the switch.
- Switches are used to forward the packets based on MAC addresses.
- A Switch is used to transfer the data only to the device that has been addressed. It verifies the destination address to route the packet appropriately.
- It is operated in full duplex mode.

### Types of Switching Techniques



## 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.




***Advantages of Packet Switching*:**

- **Cost-effective:** In packet switching technique, switching devices do not require massive secondary storage to store the packets, so cost is minimized to some extent. Therefore, we can say that the packet switching technique is a cost-effective technique.

- **Reliable:** If any node is busy, then the packets can be rerouted. This ensures that the Packet Switching technique provides reliable communication.
- **Efficient:** Packet Switching is an efficient technique. It does not require any established path prior to the transmission, and many users can use the same communication channel simultaneously, hence makes use of available bandwidth very efficiently.

**Disadvantages of Packet Switching:**

- Packet Switching technique cannot be implemented in those applications that require low delay and high-quality services.
- The protocols used in a packet switching technique are very complex and requires high implementation cost.
- If the network is overloaded or corrupted, then it requires retransmission of lost packets. It can also lead to the loss of critical information if errors are nor recovered.

**APPROACHES OF PACKET SWITCHING**

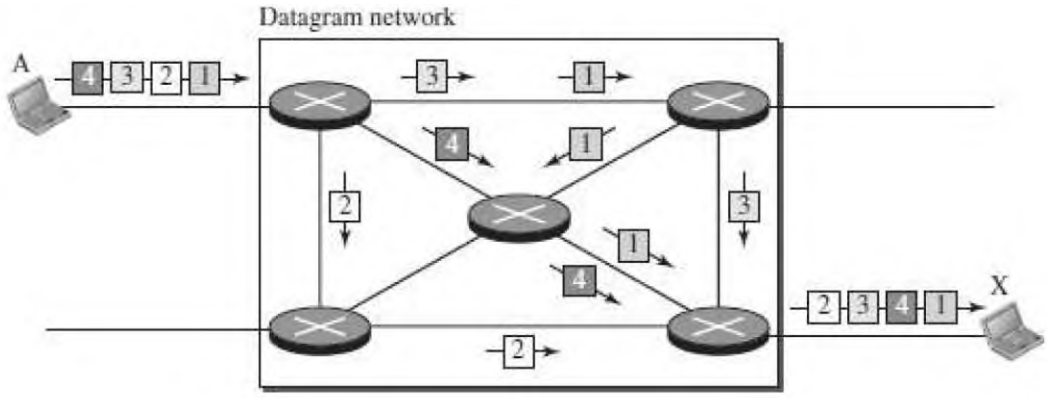
There are two approaches to Packet Switching:

1. Datagram Packet switching
2. Virtual Circuit Switching

## Datagram Packet switching

- It 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.
- There are no setup or teardown phases.
- Each packet is treated the same by a switch regardless of its source or destination.

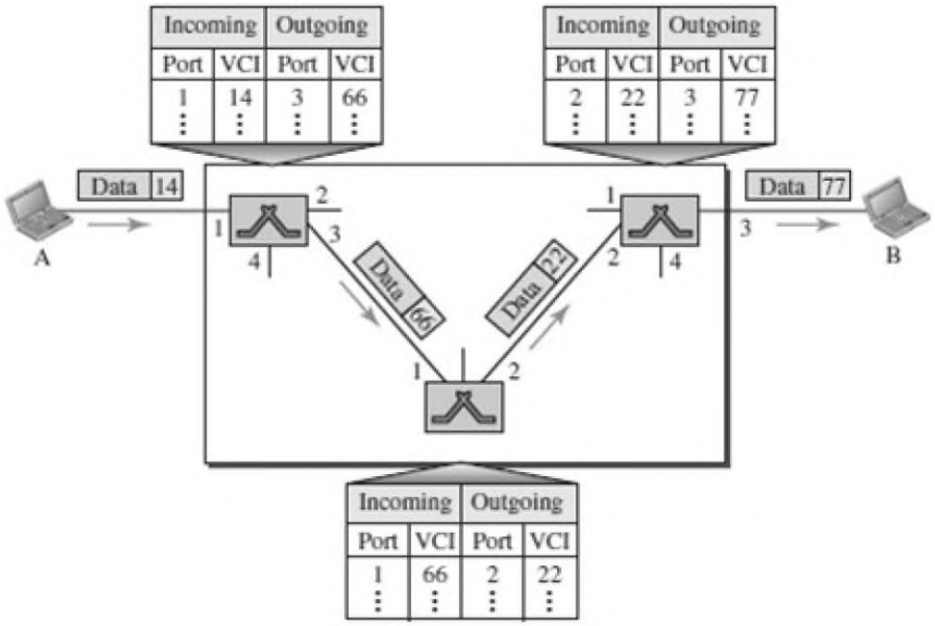



## Virtual Circuit Switching

- Virtual Circuit Switching is also known as connection-oriented switching.
- In the case of Virtual circuit switching, a virtual connection 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.

***Example :***

Source A sends a frame to Source B through Switch 1, Switch 2 and Switch 3.




| **PACKET SWITCHING** | |
|---|---|
| **Virtual Circuit Switching** | **Datagram Switching** |
| Connection oriented | Connection less |
| Ensures in order delivery | Packets may be delivered out of order |
| No reordering is required | Reordering is required |
| A dedicated path exists for data transfer | No dedicated path exists for data transfer |
| All the packets take the same path | All the packets may not take the same path |
| Resources are allocated on demand using 1st packet | No resources are allocated |
| Dynamic Bandwidth | Dynamic bandwidth |
| Reliable | Unreliable |
| Less overheads | Higher overheads |
| Implemented at data link layer | Implemented at network layer |
| Provides better efficiency than circuit switched systems | Provides better efficiency than message switched systems |
| Examples- X.25, Frame relay | Example- Internet |

## Internet protocol

- Internet Protocols are a set of rules that governs the communication and exchange of data over the internet.
- Both the sender and receiver should follow the same protocols in order to communicate the data.
- The internet and many other data networks work by organizing data into small pieces called packets.
- Each large data sent between two network devices is divided into smaller packets by the underlying hardware and software.