# NIELIT Gorakhpur

Introduction:

- A switched network consists of a series of interlinked nodes, called switches. Switches are devices capable of creating temporary connections between two or more devices linked to the switch. In a switched network, some of these nodes are connected to the end systems (such as computers or telephones etc) and others are used only for routing. Figure shows a switched network.
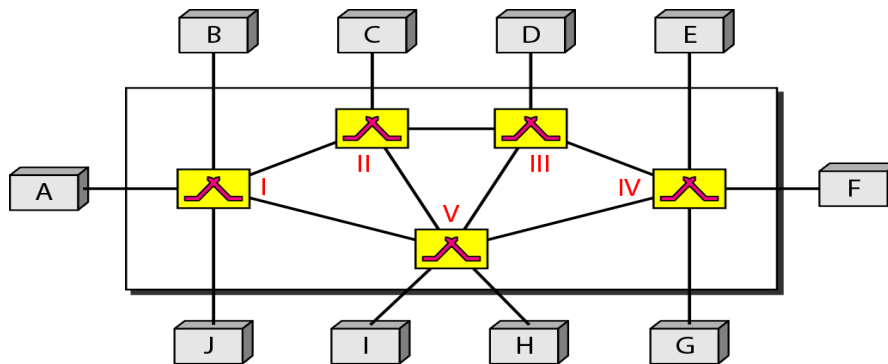

The end systems (communicating devices) are labelled A, B, C, D, and so on, and the switches are labelled I, II, III, IV, and V. Each switch is connected to multiple links.

Categories of Switched Network:
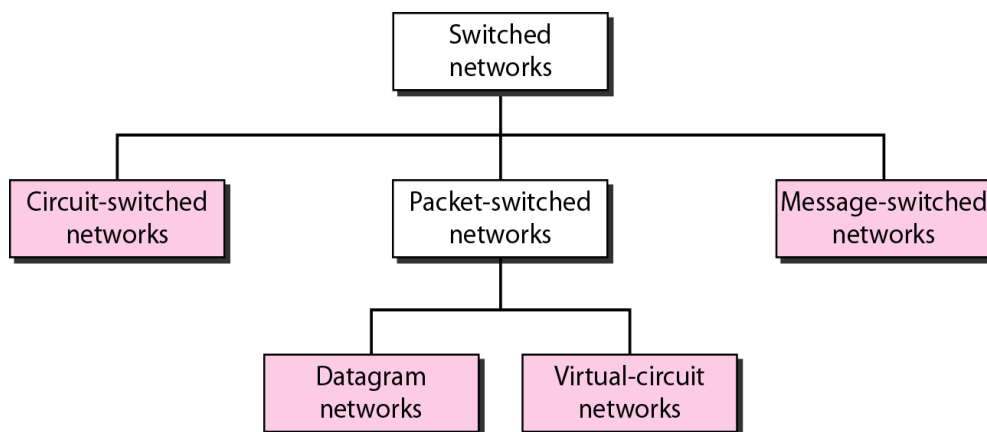
Circuit-Switched Networks:

- It takes place on physical layer.
- A circuit-switched network consists of a set of switches connected by physical links in which each link is divided into n channels (by using FDM or TDM).
  Figure shows a circuit-switched network with four switches and four links. Each link is divided into *n (n* is 3 in the figure) channels.
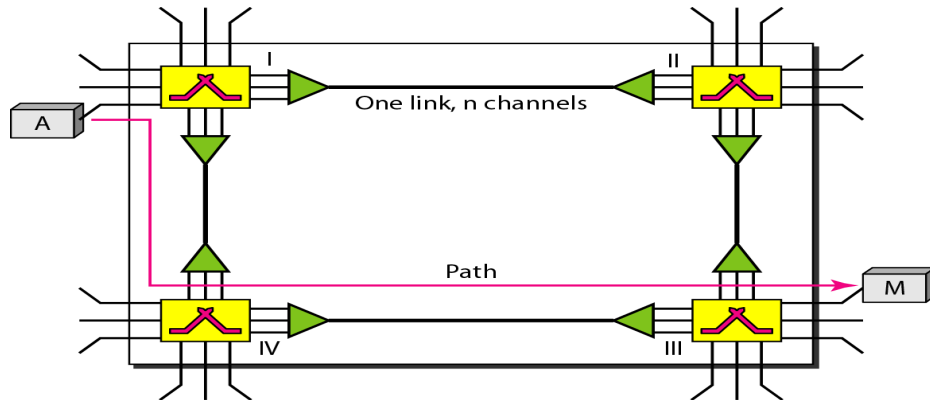
- The actual communication in circuit switched network requires **three** phases:
    1) **Setup Phase**: In this phase dedicated channels are created between the switches before starting the communication.
    (For example, in the figure, system A needs to connect to system M, it sends a setup request that includes the address of system M, to switch I. Switch I finds a dedicated channel between itself and switch IV. Switch I then sends the request to switch IV, which finds a dedicated channel between itself and switch III. Switch III informs system M of system A's intention at this time. To making a connection, an acknowledgment from system M needs to be sent in the opposite direction to system A. After system A receives this acknowledgment then the connection established.)
    2) **Data Transfer Phase**: After the establishment of the dedicated circuit (channels), the two parties can transfer data.
    3) **Teardown Phase**: When one of the parties needs to disconnect, a signal is sent to each switch to release the resources.

Performance:
- **Low Efficiency:** The circuit-switched networks are not so efficient because resources are allocated during the entire duration of the connection and these resources are unavailable to other connections at the same duration.
- **Minimal Delay:** The delay in this type of network is minimal because the resources are allocated for the entire duration of the connection.

Example:
Switching at the physical layer in the traditional telephone network uses the circuit-switching approach.

Exercises:

1. **What do you understand by switching techniques? Define circuit switched network.**
2. **Discuss the phases involved in circuit switched network. Explain the performance of circuit switched network on the basis of efficiency and delay.**