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Data Communication CS601 Lecture No 21

Lecture Prepared By

Muhammad Abid Ali

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CS601 Lecture No 21 Topic 114 to 123

Switching

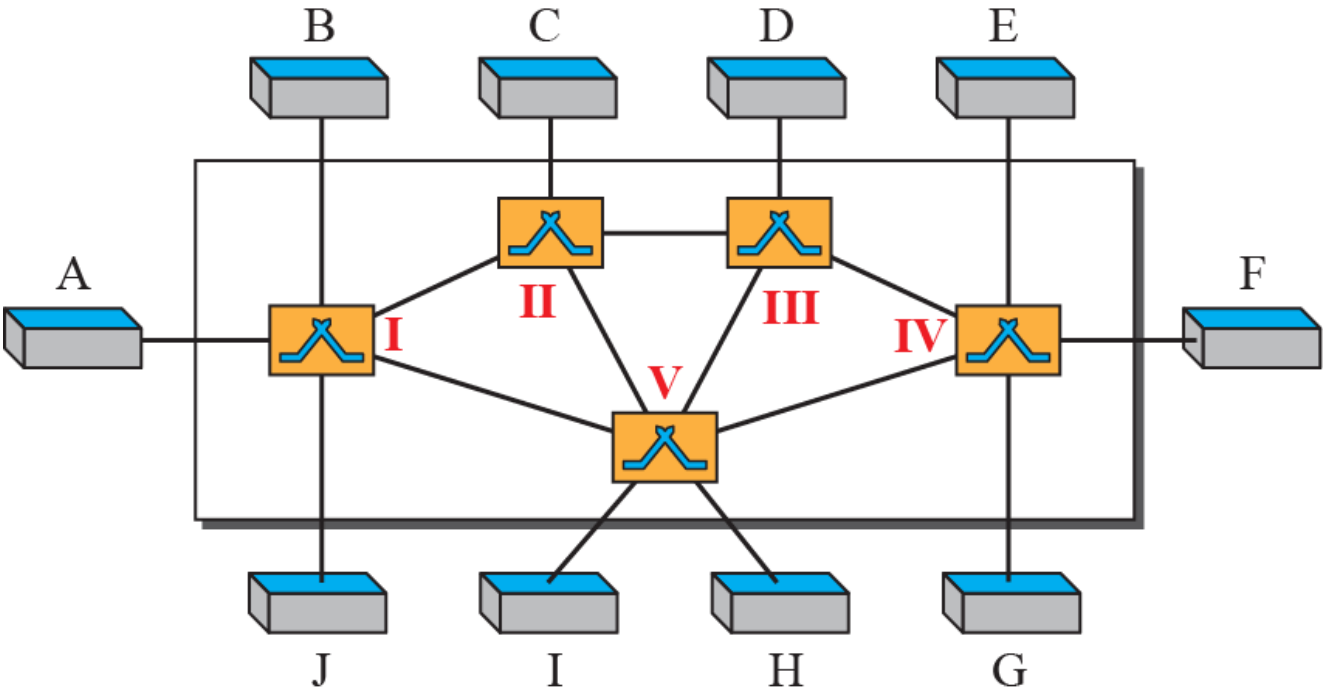
- **A network is a set of connected devices**
- **Problem of how to connect multiple devices to make one-to-one communication possible**

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- **The solution is Switching**
- **Switched network consists of a series of switches**



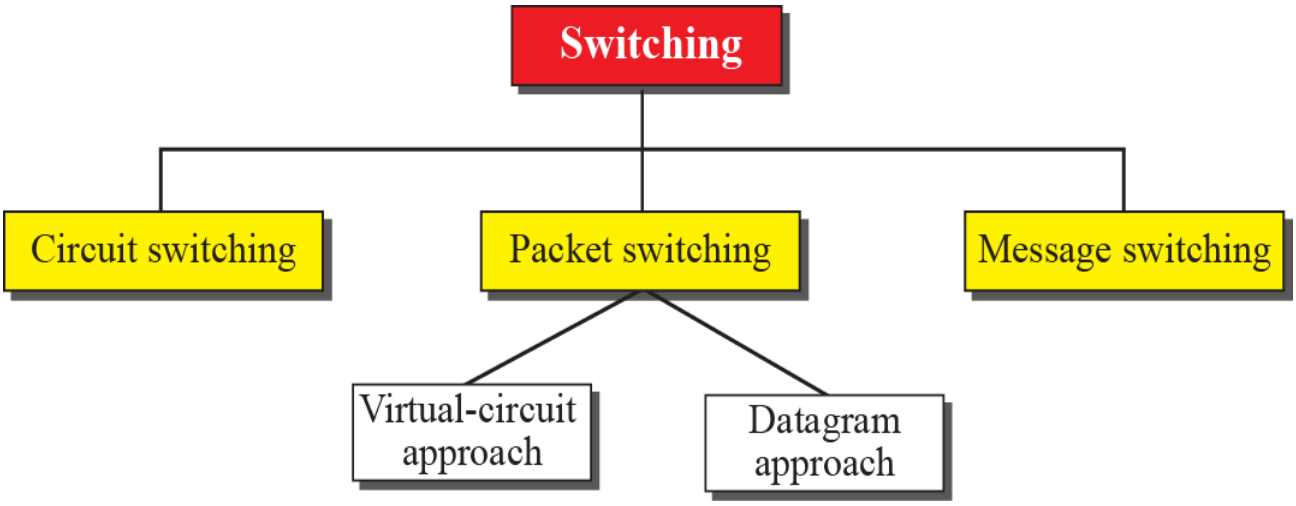
Three Methods of Switching

- **Three Methods:**
  - ✓ **Circuit Switching**
  - ✓ **Packet Switching**
  - ✓ **Message switching**

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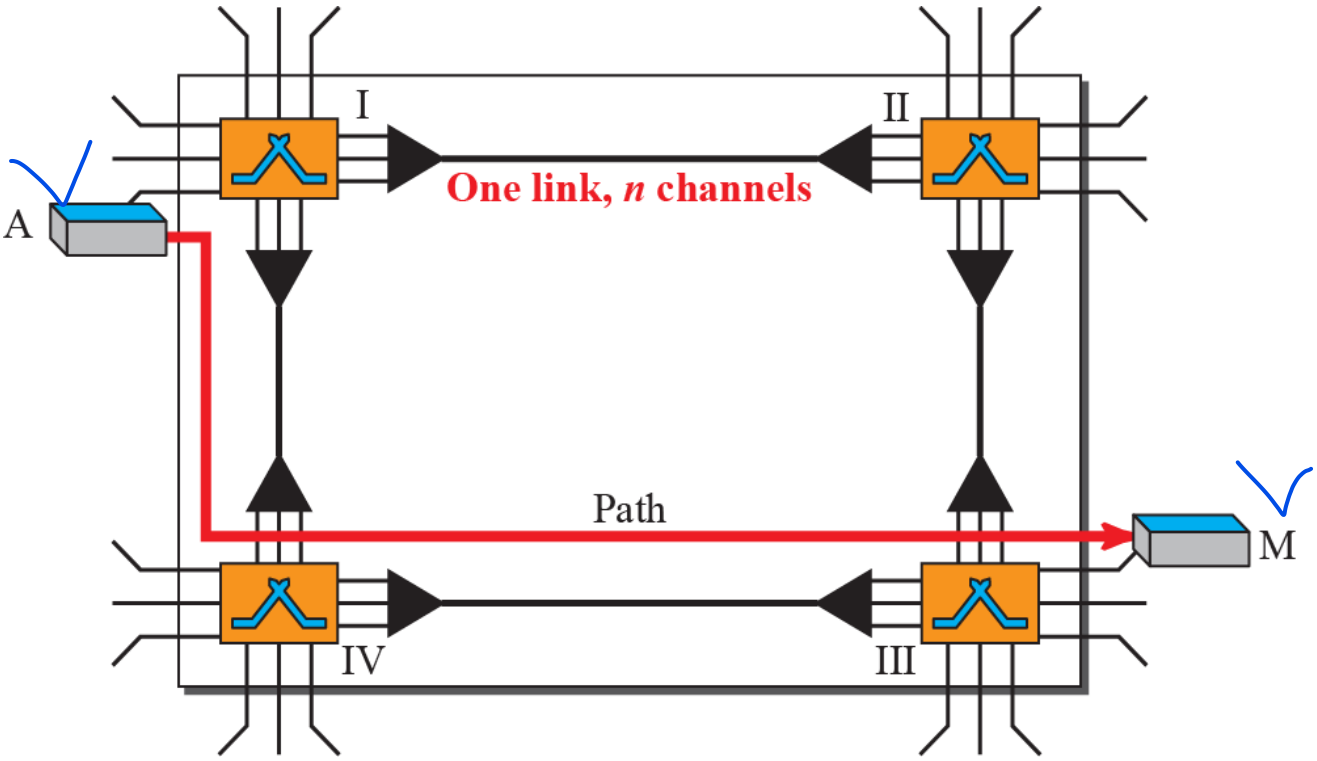
Circuit-switched Networks

- **A set of switches connected by physical links**
- **A connection between two stations is a dedicated path made of one or more links**
- **Each connection uses only one dedicated channel on each link**
- **Each link is normally divided into n channels by using FDM or TDM**

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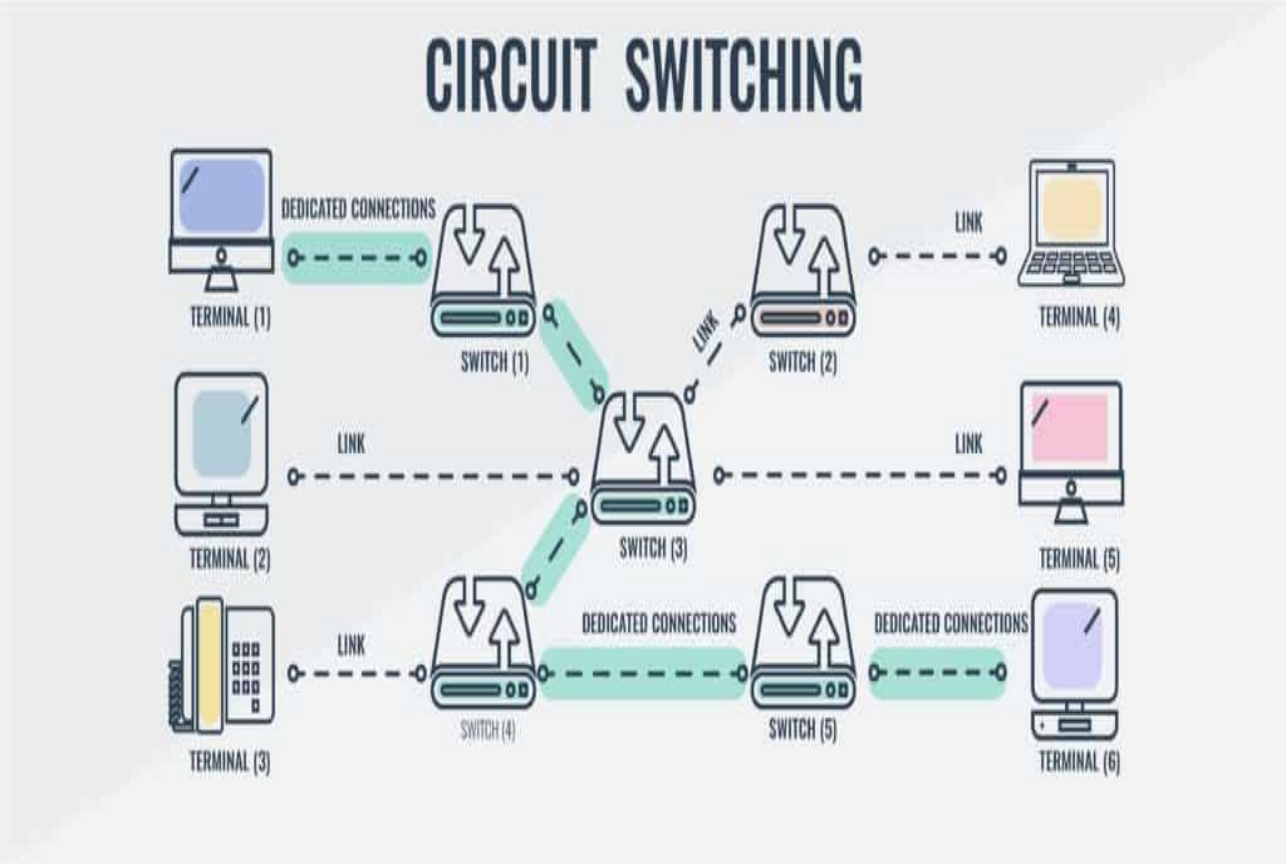
Which is a good example of a circuit-switched network?

Circuit switching is used for connections that must be continuous for long periods of time, such as long-distance communication. **Traditional telephone systems -- i.e., landlines --** are an example of a technology that uses circuit switching. Dial-up network connections.

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Three Phases in a Circuit Switched Network

- **The actual communication in a circuit-switched network requires 3 phases:**
  - ✓ **Connection Setup**
  - ✓ **Data Transfer**
  - ✓ **Connection Teardown**

Efficiency of a Circuit-Switched Network

- **Not as efficient as packet switching because resources are allocated during the entire duration of the connection and these resources are unavailable to other connections**

Efficiency of a Circuit-Switched Network

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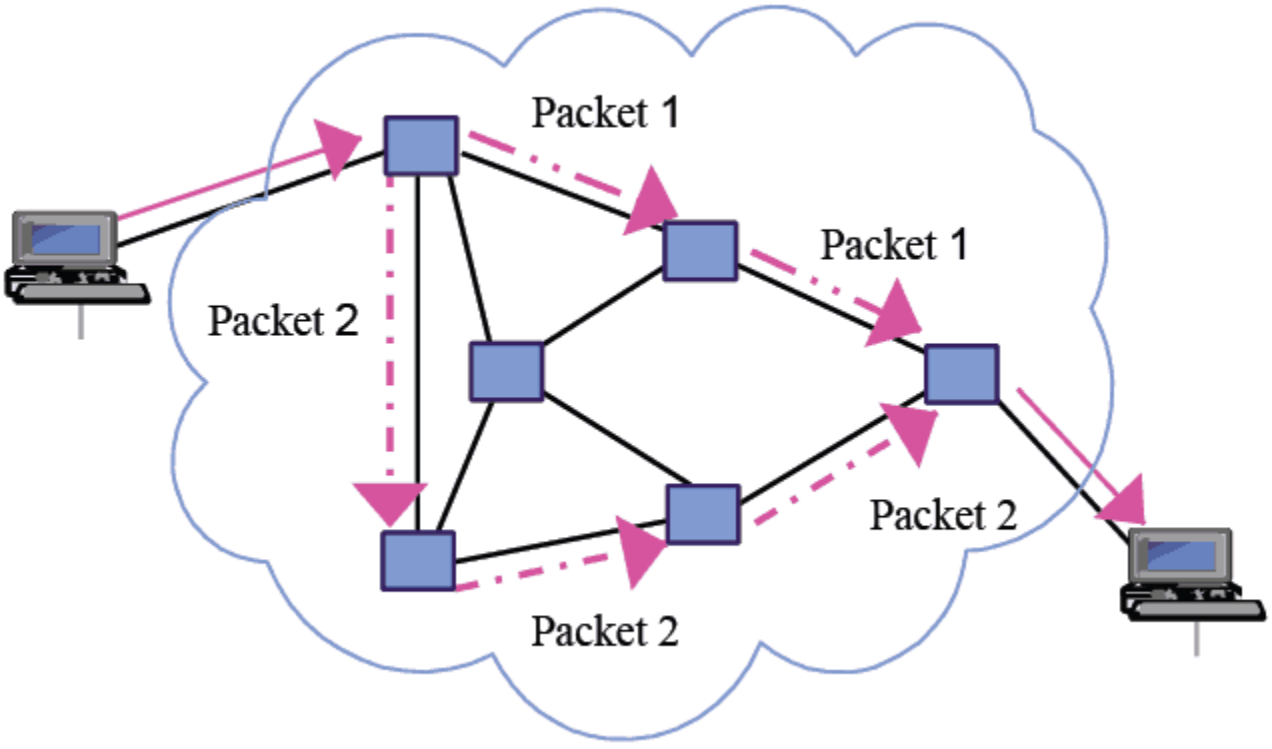
- **In a telephone network, people normally terminate the communication when they have finished their conversation**
- **Data Network is an issue**

Delay in a Circuit-Switched Network

- **Circuit switched networks have low efficiency but minimal delay**
- **Data is not delayed at each switch; the resources are allocated for the duration of the connection**

Packet Switching

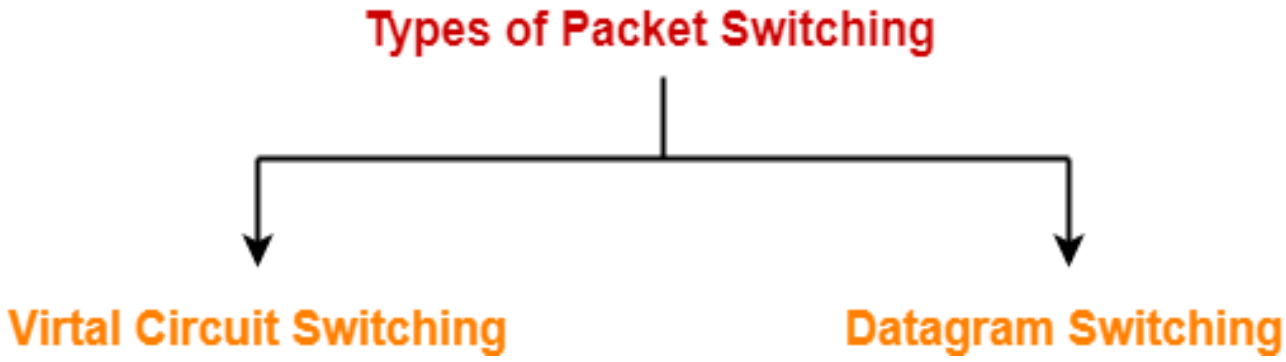
- **If the message is going to pass through a packet-switched network, it needs to be divided into packets of fixed or variable size**
- **The size of the packet is determined by the network and the governing protocol**



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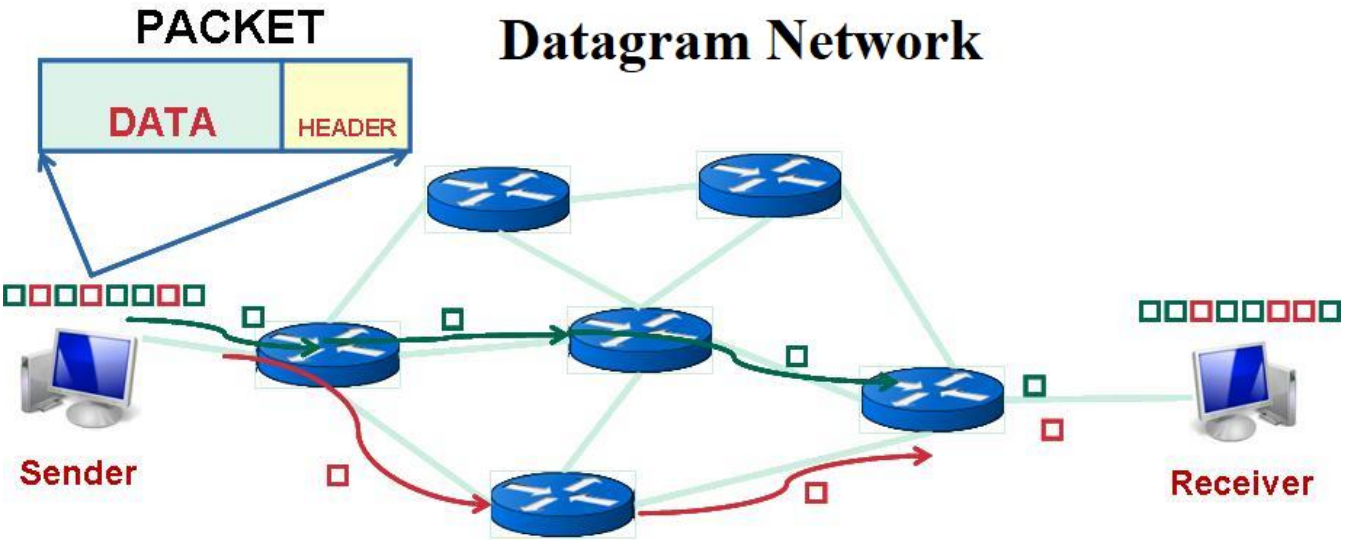
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Datagram Networks

- **Each packet is treated independently of all others.**
- **Even if a packet is part of a multi-packet transmission, the network treats it as though it existed alone**
- **Packets are referred to as datagrams**



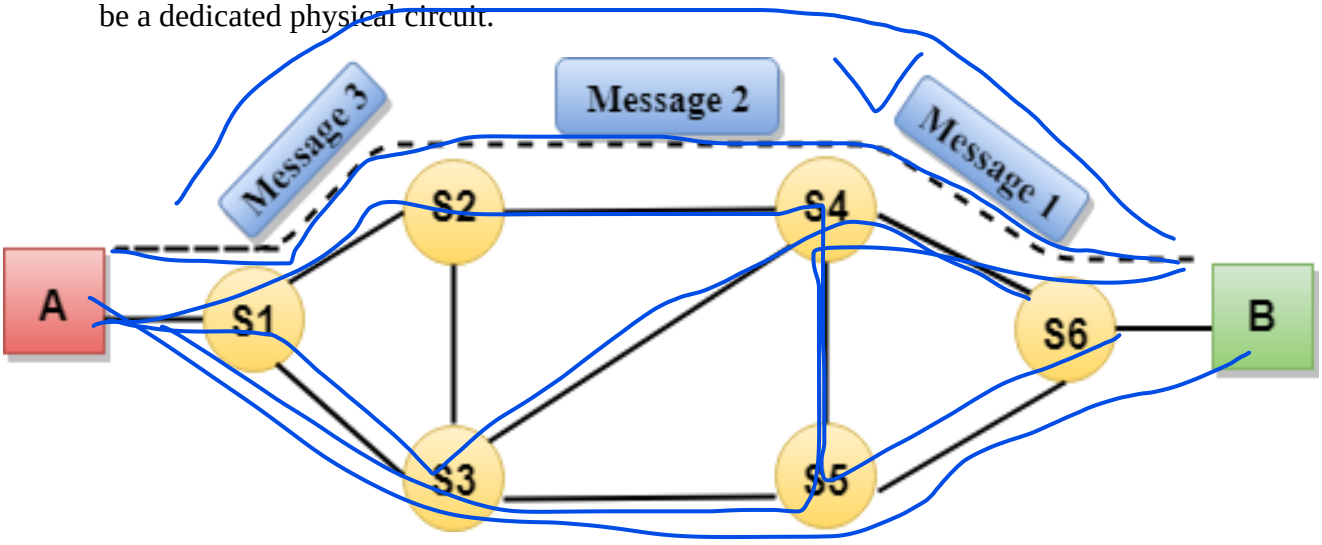
Virtual-Circuit Networks

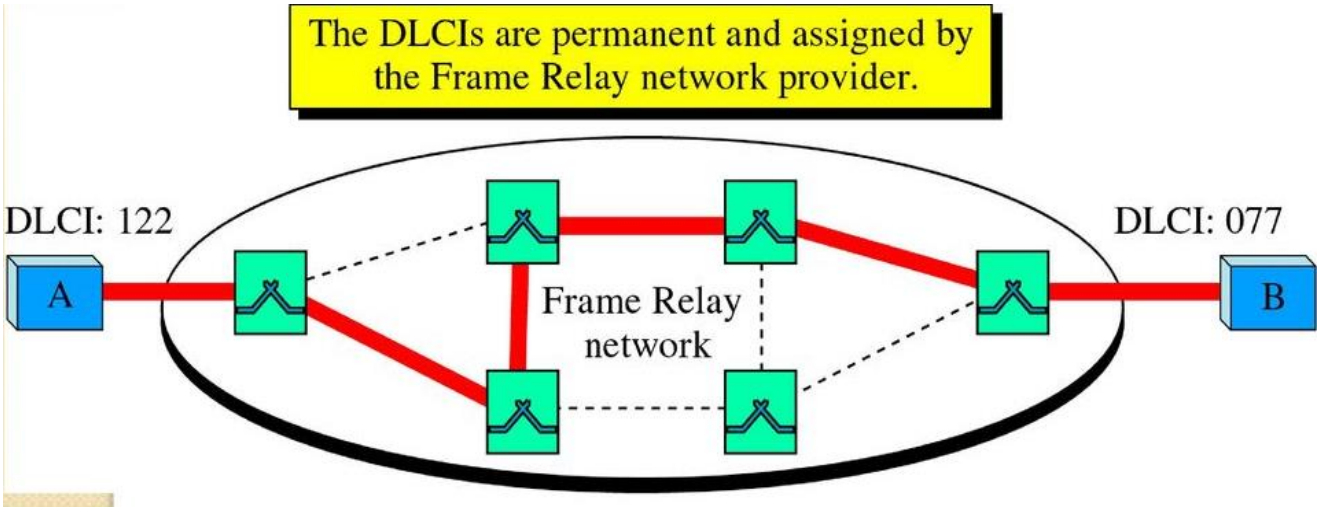
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- **A virtual-circuit network is a cross between a circuit-switched network and a datagram network**
- Virtual circuit switching is **a packet switching methodology whereby a path is established between the source and the final destination through which all the packets will be routed during a call**. This path is called a virtual circuit because to the user, the connection appears to be a dedicated physical circuit.





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Message switching

Message switching is **a network switching technique in which data is routed in its entirety from the source node to the destination node, one hope at a time**. During message routing, every intermediate switch in the network stores the whole message.

