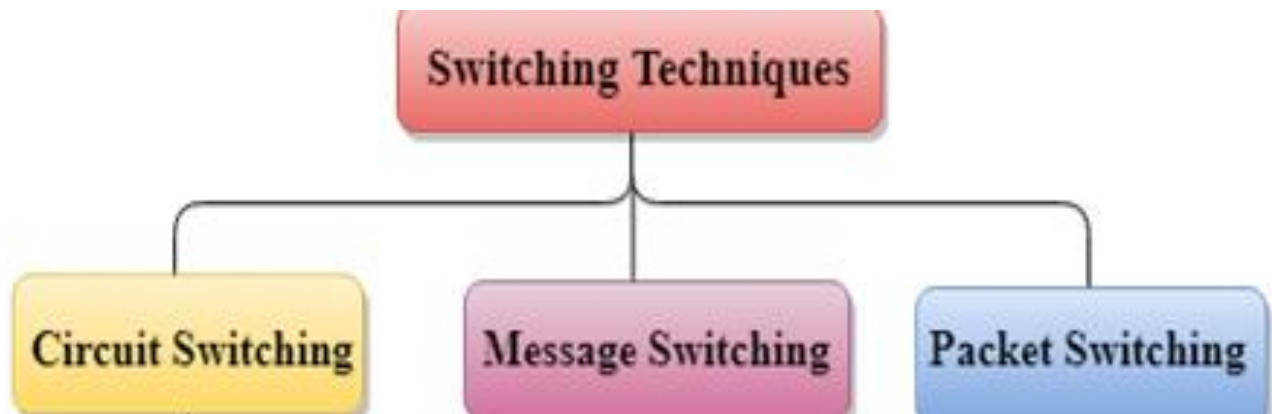# Switching Techniques

Introduction

- In large networks, there may be more than one paths for transmitting data from **sender** to receiver.

- Selecting a path that data must take out of the available options is called **switching**.

Circuit Switching

- 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.
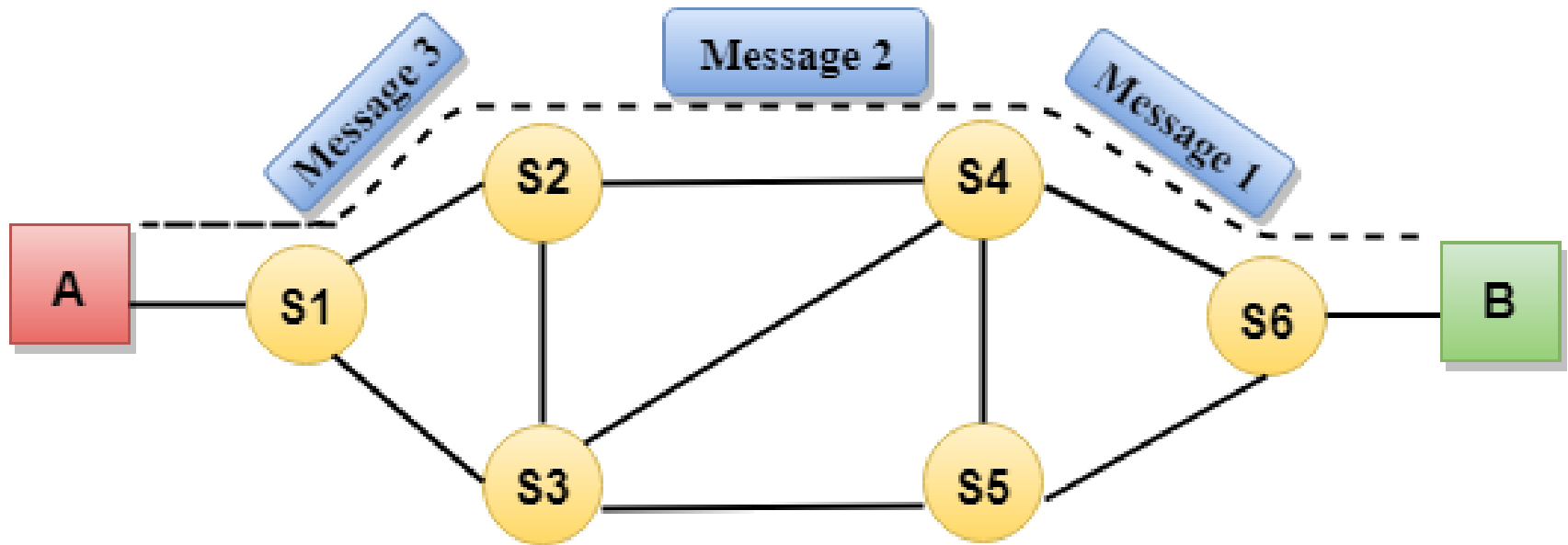
Circuit Switching

- In 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

- 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.

- Communication through circuit switching has 3 phases:
  - Circuit establishment
  - Data transfer
  - Circuit Disconnect

Circuit Switching

Advantages Of Circuit Switching

- In the case of Circuit Switching technique, the communication channel is dedicated.

- It has fixed bandwidth.

Disadvantages Of Circuit Switching

- It takes a long time to establish a connection approx 10 seconds during which no data can be transmitted.

- It is more expensive than other switching techniques as a dedicated path is required for each connection.

- It is inefficient to use because once the path is established and no data is transferred, then the capacity of the path is wasted.

- In this case, the connection is dedicated therefore no other data can be transferred even if the channel is free.
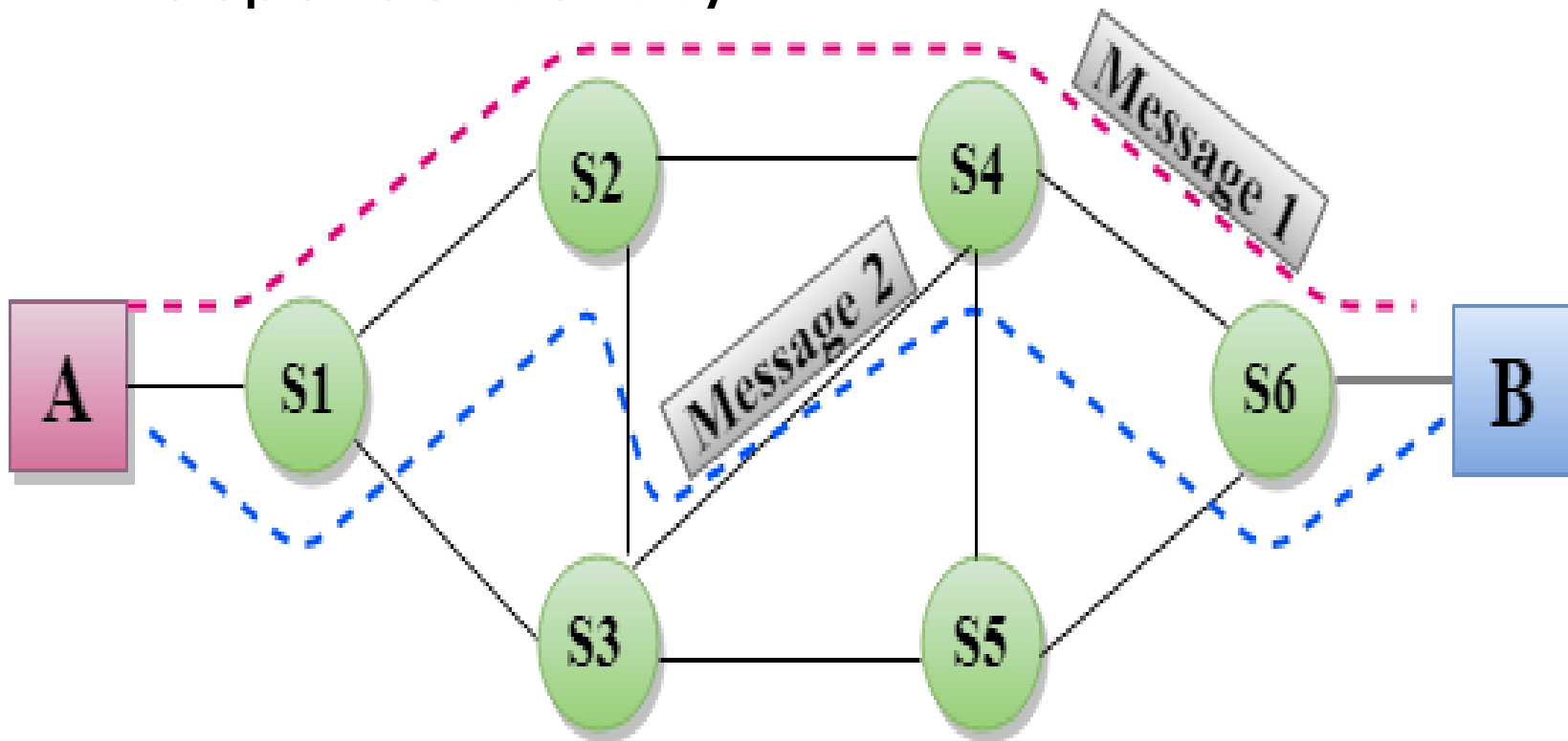
Message Switching

- In message switching, end users communicate by sending and receiving *messages* that included the entire data to be shared.

- Messages are the smallest individual unit.

- there is no establishment of a dedicated path between the sender and receiver.

- The destination address is appended to the message.

Message Switching

- 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

- Message switching treats each message as an independent entity.

Advantages Of Message Switching

- Traffic congestion can be reduced because the message is temporarily stored in the nodes.

- Message priority can be used to manage the network.

- The size of the message which is sent over the network can be varied. Therefore, it supports the data of unlimited size.

Disadvantages Of Message Switching

- The message switches must be equipped with sufficient storage to enable them to store the messages until the message is forwarded.

- The Long delay can occur due to the storing and forwarding facility provided by the message switching technique

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.
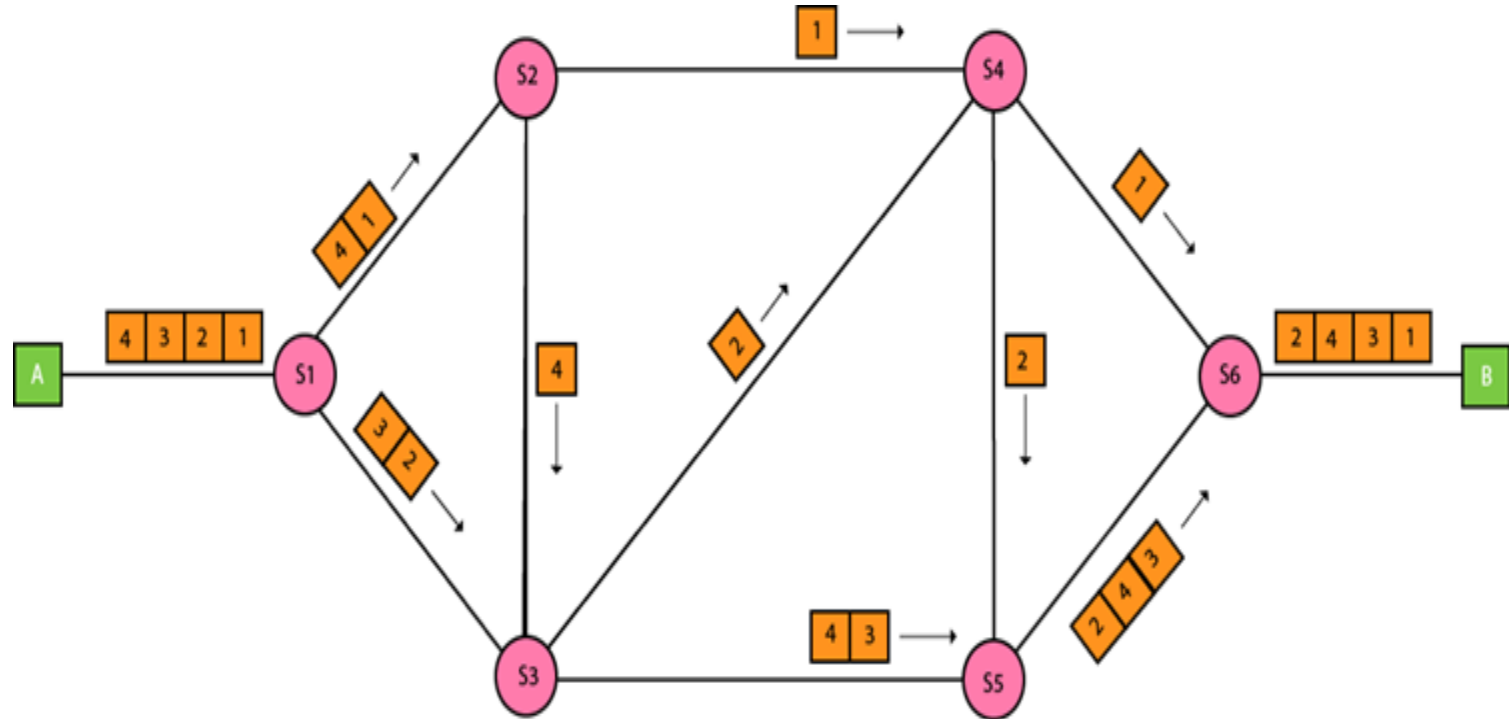
Packet Switching

- 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.

Packet Switching

- 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 Of Packet Switching:

- **Cost-effective:**
- **Reliable**
- **Efficient**

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.