Switched Communication Networks

Data Communication Presentation

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OVERVIEW

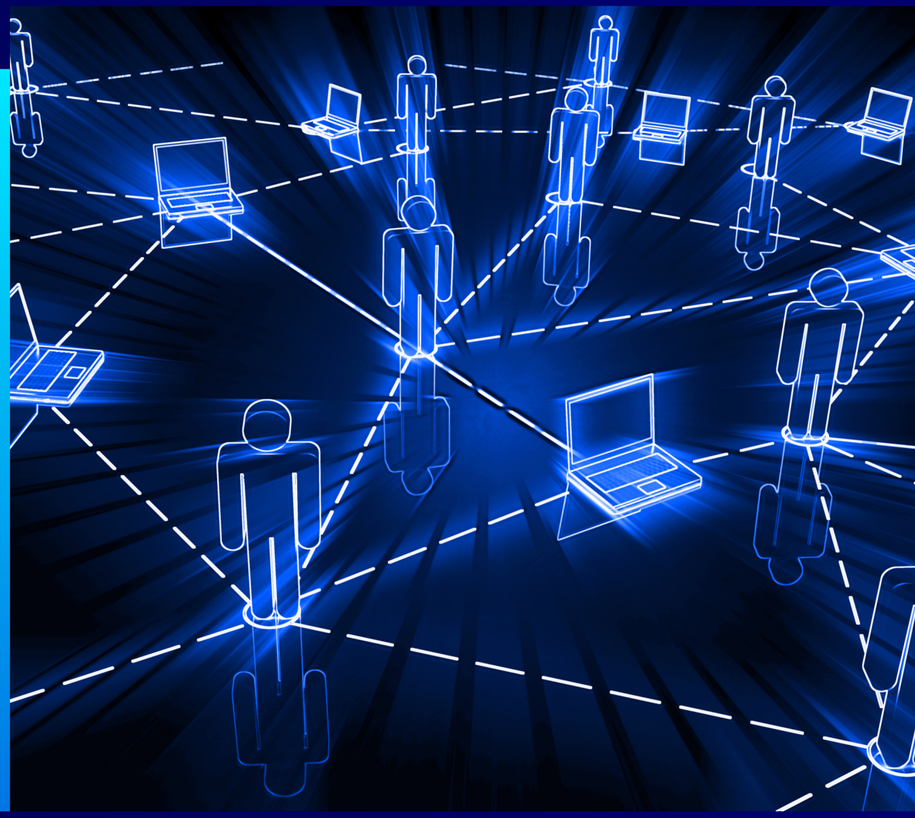
- Computer Network
- Uses of Computer Networks
- Network Connectivity Problem
- Switching
- Connection-Oriented Switched Networks
- Features of Connection-Oriented Switched Network
- Connection-less Switched Networks
- Features of Connectionless Switched Network
- Real-Life Analogy
- Comparison Table
- Summary

WHAT IS A COMPUTER NETWORK?

- A computer network is a system of interconnected computers that exchange data and information.
- Users interact directly with the machines to initiate communication.
- The system does not enforce coordinated behavior among devices.

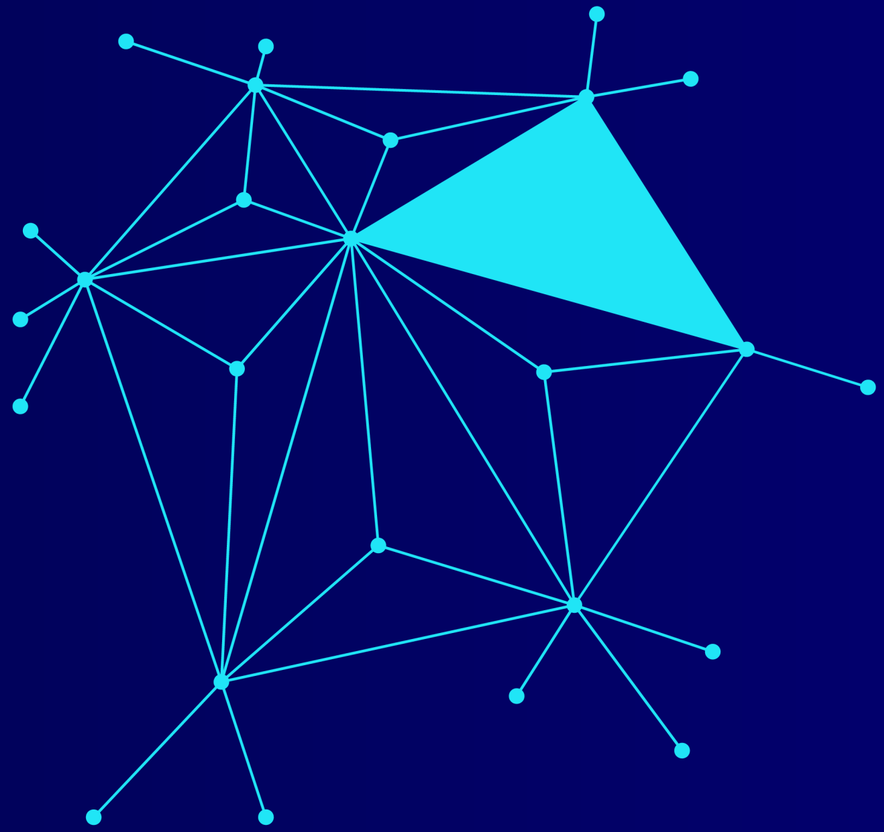
USES OF COMPUTER NETWORKS

1. Business Applications
    - Resource Sharing (programs, data, equipment)
    - E-commerce
2. Home Applications
    - Remote information access
    - Communication (email, chat)
    - Entertainment (streaming, gaming)



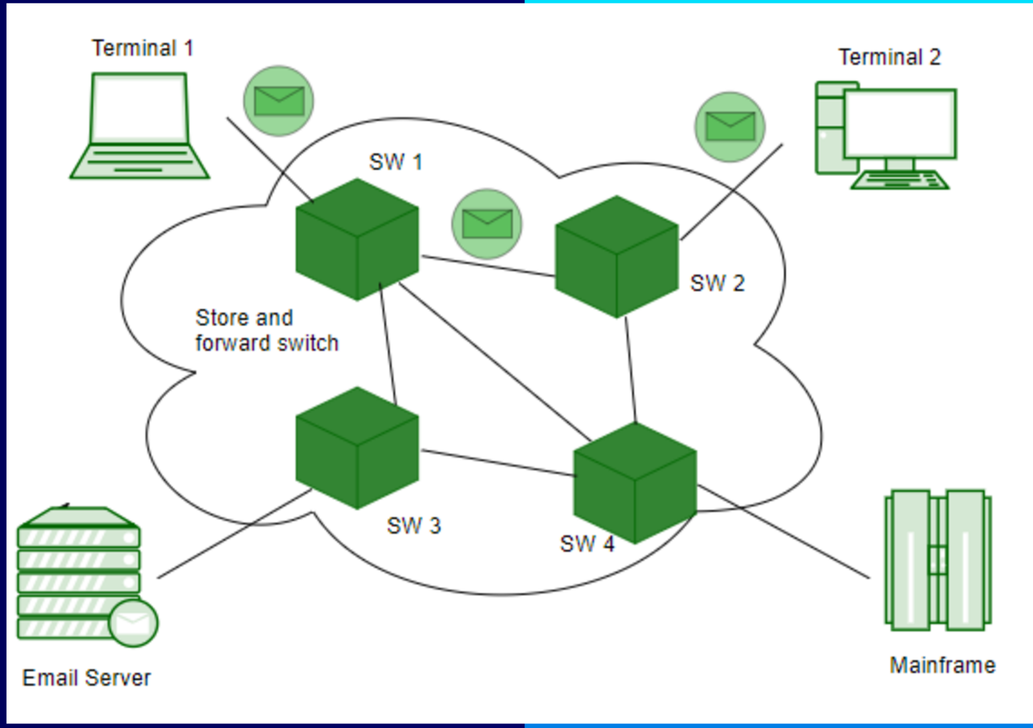
NETWORK CONNECTIVITY PROBLEM

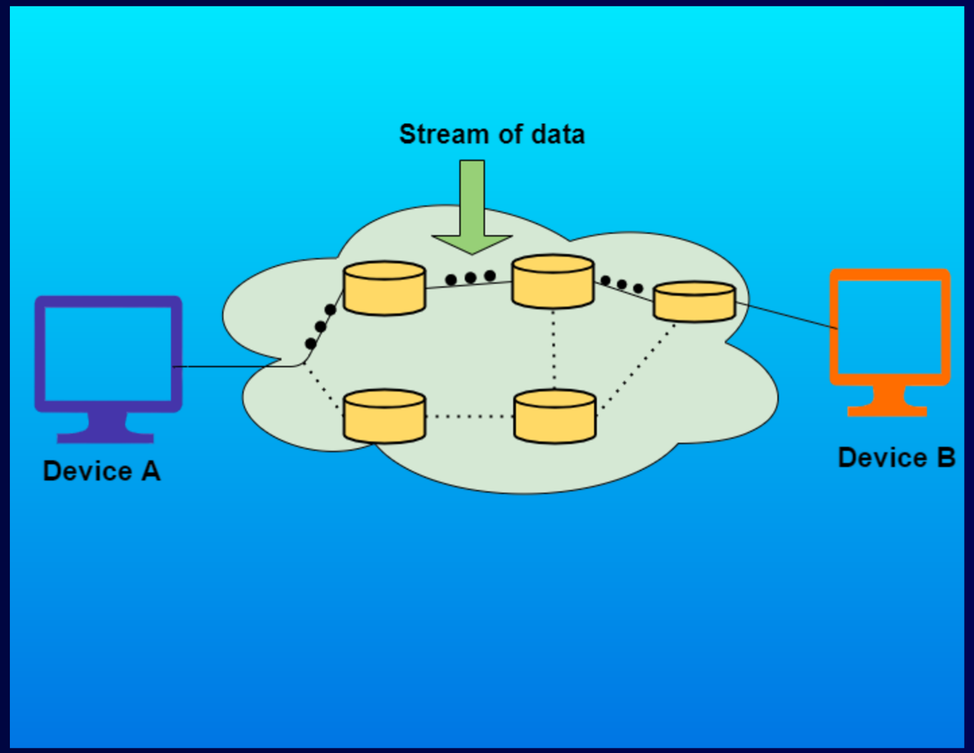
- When many devices are involved, connecting each pair directly (mesh topology) is impractical.
- Star topology connects devices via a central hub but still requires high infrastructure.
- Problems:
  - Costly
  - Idle links
  - Media limitations



SWITCHING:-

- Inorder to overcome the limitations of switched network is introduced:-
- A switched network uses devices called switches to temporarily link devices.
- Switches establish dynamic paths between devices.
- Two types of services provided in switched networks:
  - Connection-Oriented Switched Network
  - Connectionless Switched Network





CONNECTION-ORIENTED SWITCHED NETWORKS

These networks establish a path before sending data. All packets follow the same route. The types of connection-oriented switched networks are:

1. Circuit Switching
2. Virtual Circuit Packet Switching
3. Message Switching (partially connection-oriented)

Circuit Switching

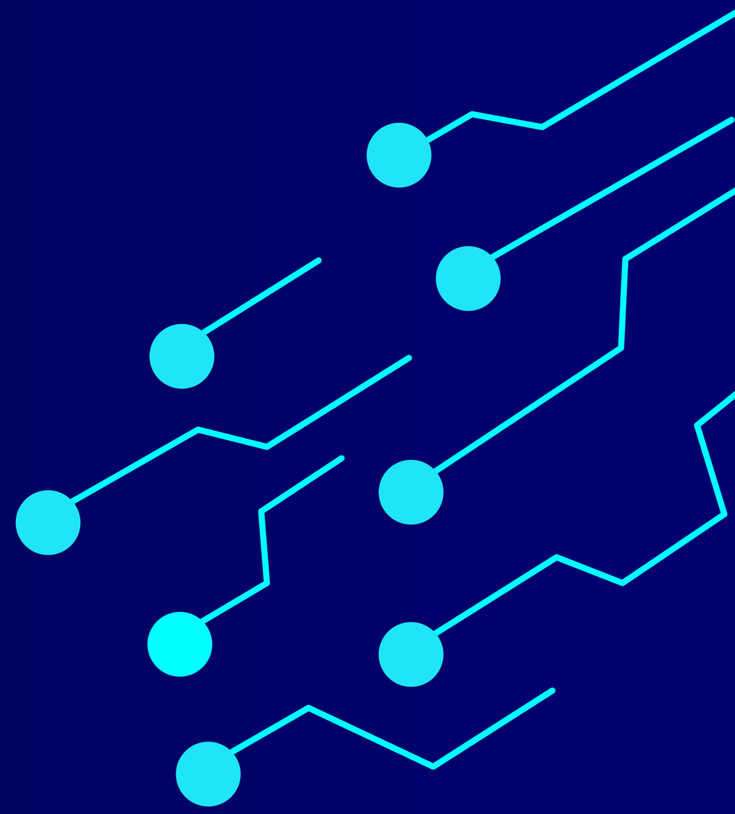
- A dedicated physical path is set up.
- Example: Traditional telephone network.

Packet Switching(Virtual Circuit)

- A logical (virtual) path is established.
- Packets follow the same path.
- Example: TCP over IP, Frame Relay.

Message Switching

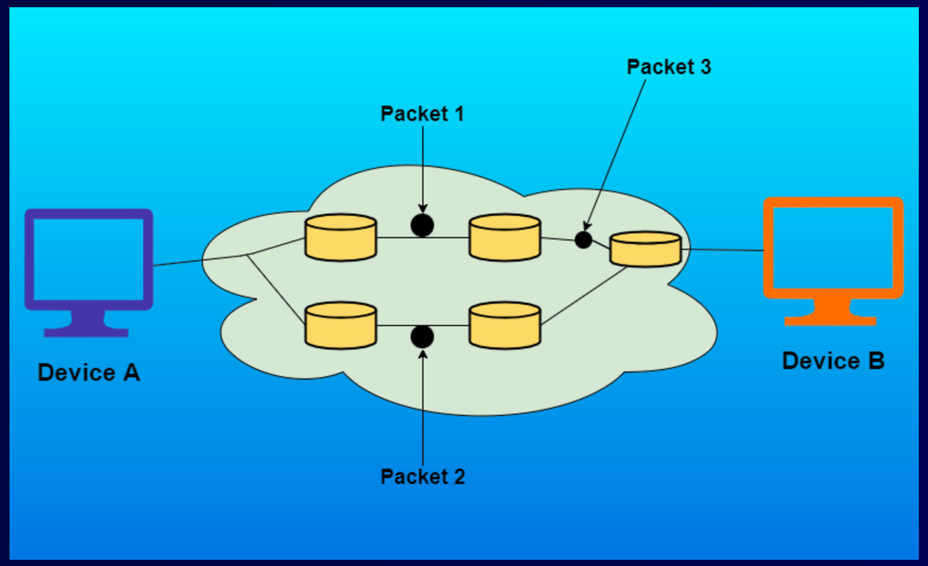
- Entire messages are stored and forwarded.
- No need for a physical path, but messages are treated as a whole.
- Example-email



FEATURES OF CONNECTION-ORIENTED SWITCHED NETWORK:

- Requires connection setup before data transfer
- Ensures reliable and ordered delivery
- Uses a fixed path for communication
- Reserves network resources during transmission

CONNECTIONLESS SWITCHED NETWORKS



These networks do not set up a path before data transfer. Each packet travels independently.The types of connectionless switched networks are:-

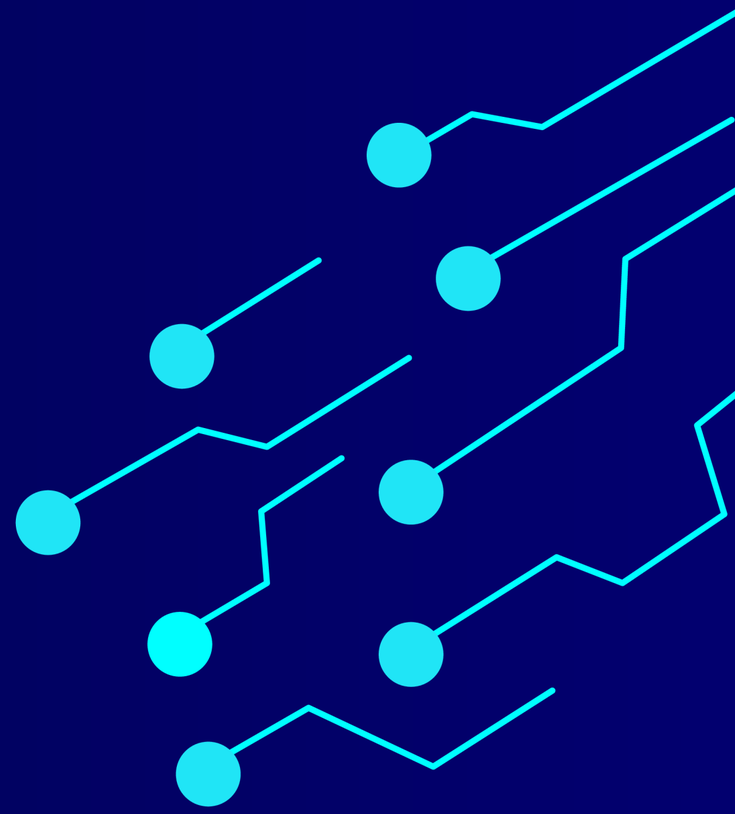
1. Datagram Packet Switching
2. Broadcast Networks (in limited cases)

Datagram Packet Switching

- Packets (datagrams) take different paths.
- No guarantee of order or delivery.
- Example: IP (Internet Protocol), UDP.

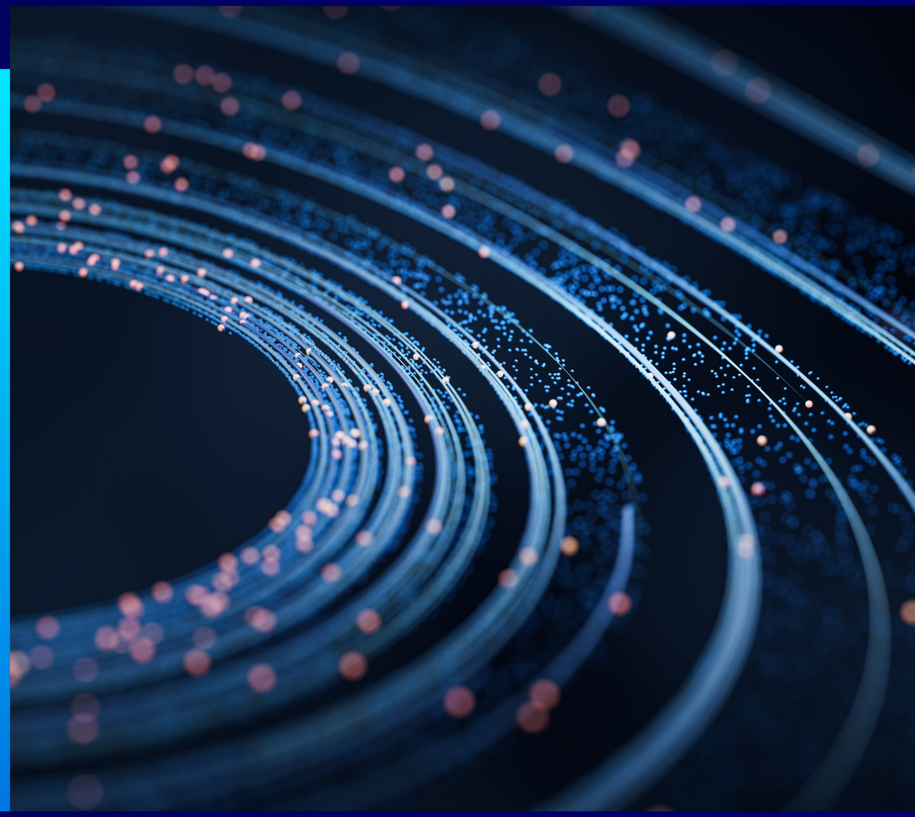
. Broadcast Networks

- Messages sent to all devices
- All receivers check if the message is meant for them.
- Used in LANs (Local Area Networks) like Ethernet.



FEATURES OF CONNECTION-LESS SWITCHED NETWORK:

- No connection setup needed
- Packets are sent independently
- Delivery is not guaranteed or ordered
- Different paths may be used for each packet



REAL-LIFE ANALOGY

- Connection-Oriented = Phone Call
  - (You dial, get connected, talk, and hang up)
- Connectionless = Postal System
  - (Send letters independently, may or may not arrive)

COMPARISON TABLE

Feature	Connection-Oriented	Connectionless
Setup Required	Yes	No
Path	Fixed (same)	Dynamic (different)
Delivery Guarantee	Yes	No
Order of Packets	Maintained	Not maintained
Reliability	High	Low
Overhead	High	Low
Speed	Slower (setup delay)	Faster
Example	TCP, Phone calls	UDP, Postal service

CONCLUSION

In summary, switched networks help efficiently manage data transfer by using either connection-oriented or connectionless methods. Connection-oriented networks ensure reliable delivery by setting a fixed path, while connectionless networks offer faster transmission without setup. Choosing the right type depends on the need for speed, reliability, and how data is handled.

ANY QUESTIONS?

THANK YOU!