5 PACKET SWITCHING

THAPAR INSTITUTE
OF ENGINEERING & TECHNOLOGY
(Deemed to be University)

Course: Computer and Communication Networks

Topic: Switching Techniques : Message and Packet Switching

Faculty Name

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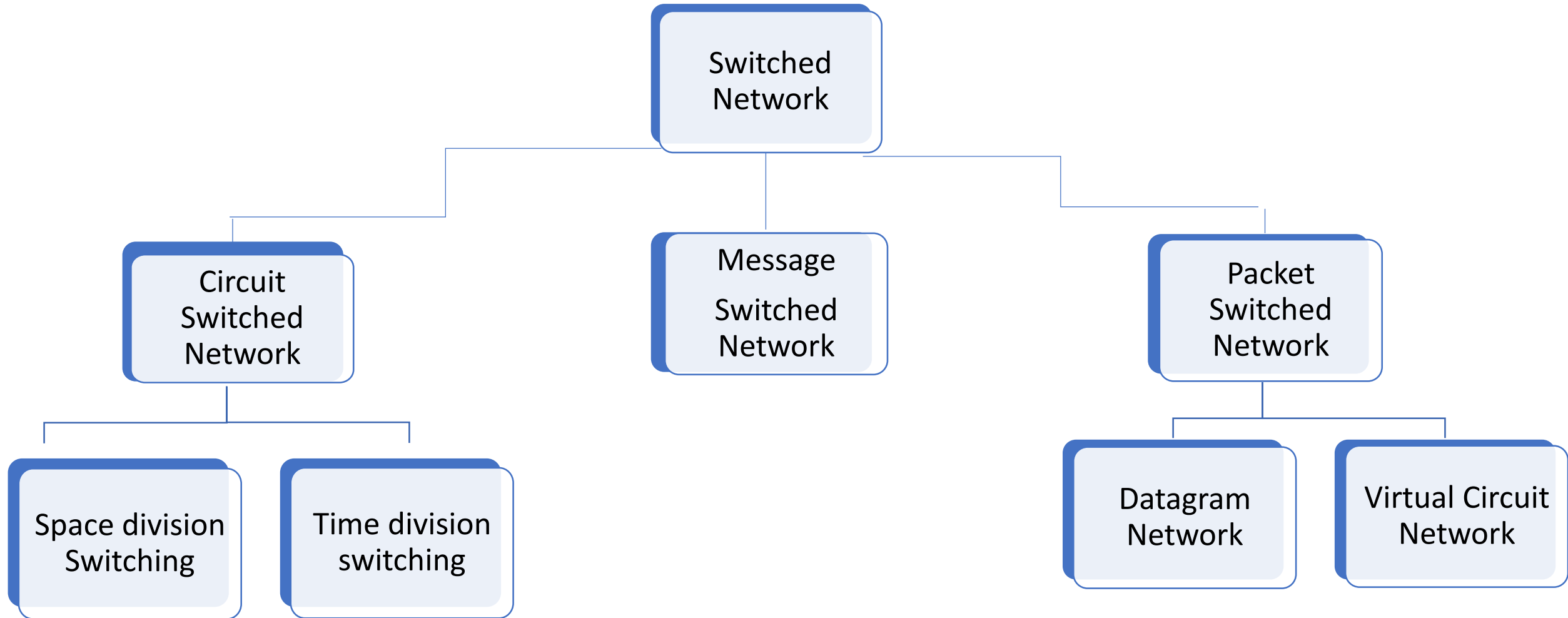### Department of Electronics and Communication Engineering,

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Outline of the lecture

- Taxonomy of switched networks
- Limitations of circuit switched network
- Message Switching
- Advantages and Disadvantages of Message Switching
- Packet Switching
- Advantages and Disadvantages of Packet Switching
- Datagram approach
- Virtual circuit approach

Taxonomy of switched networks

Reference: 1. Ferouzan, Behrouz A., Data Communications and Networking, 2. Stallings William, Data and Computer Communication
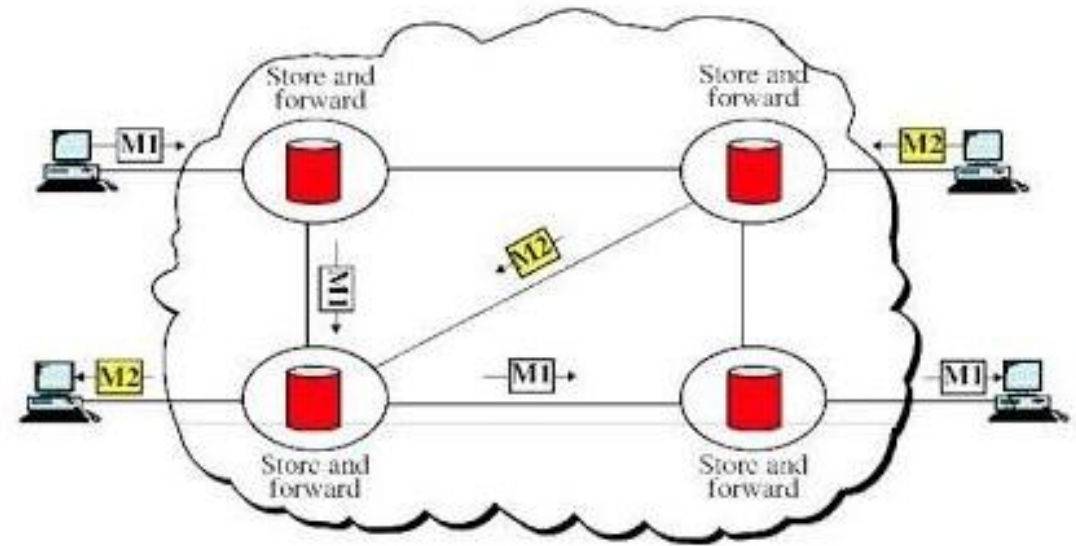
Limitation Of Circuit Switching

- Since the connection is dedicated it cannot be used for any other data transmission even if the channel is free.

- It is inefficient in terms of utilization of the system resource. As it is allocated for the entire conversation, we can't use the resource for other connection.

- More bandwidth is required for the dedicated channels .

- Establishment of physical links between senders and receivers takes huge time prior to the actual data transfer.

- As a dedicated path has to be established for each connection, circuit switching is more expensive.

- Even if there is no transfer of data, the link is still maintained until it is terminated by users. By this channel remains ideal for a long time thereby making circuit switching inefficient.

Message Switching

- Data routed source to destination with one hope at a time.

- No dedicated path in between any two communication devices

- Each message is an independent unit and includes its own destination source address by its own.

- Each intermediate device receive the message and store it until the next device is ready to receive it.

- *Store and Forward Switching.*

Reference: 1. Ferouzan, Behrouz A., Data Communications and Networking, 2. Stallings William, Data and Computer Communication 3. www.quora.com

- *Advantages of Message Switching* **:-**
- Channel efficiency and better usage of bandwidth
- Traffic congestion can be reduced.
- Message priorities can be established due to store-and-forward technique.
- Message broadcasting can be achieved with the use of broadcast address appended in the message.
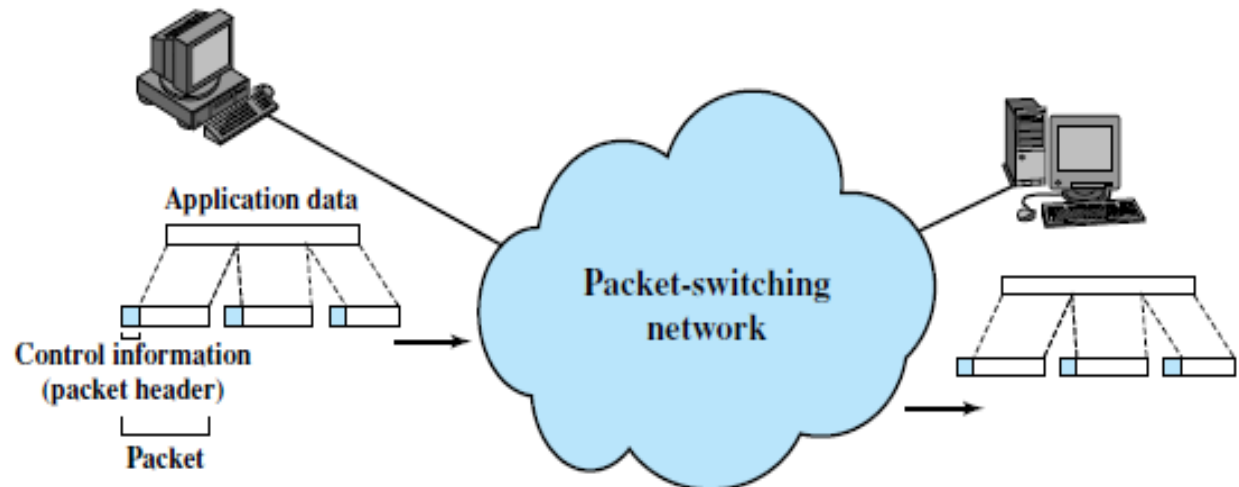- This technique is still employed in adhoc sensor network, military network, satellite communication.

- *Disadvantages of Message Switching* :-
- Message switching is not compatible with interactive applications.
- Store-and-forward devices are expensive.
- Does not deal with out of order packet.
- Entire process is slow, not used for fast MODEM network.
- Retransmission of full message.

Packet Switching

- A longer message is broken up into short messages.

- There is no resource reservation; resources are allocated on demand.

- Transmit data hop by hop.

- Every packet contains control information in header.

- Reordering of packet to retrieve original information..

Application data

Control information
(packet header)
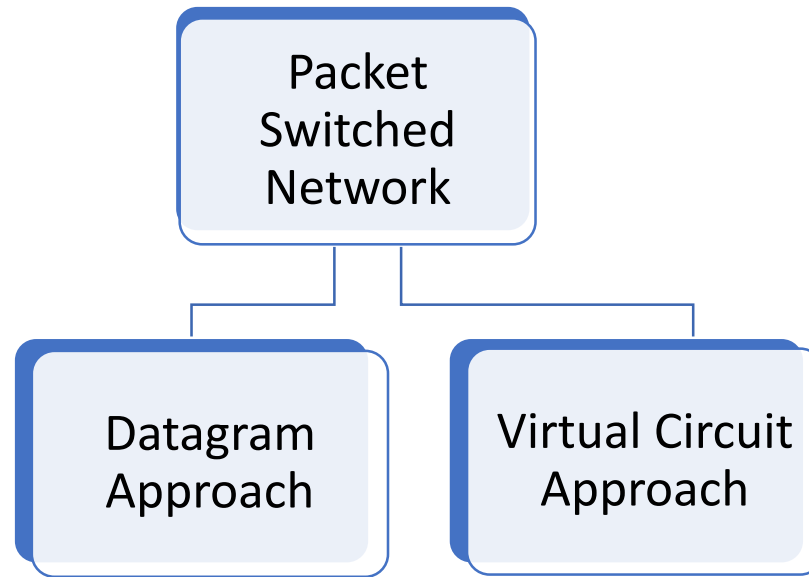
Packet

Packet-switching
network

- *Advantages*
  - Reliable and efficiency is greater.
  - Data-rate conversion is possible.
  - Usage of better bandwidth.
  - Faster than message switching
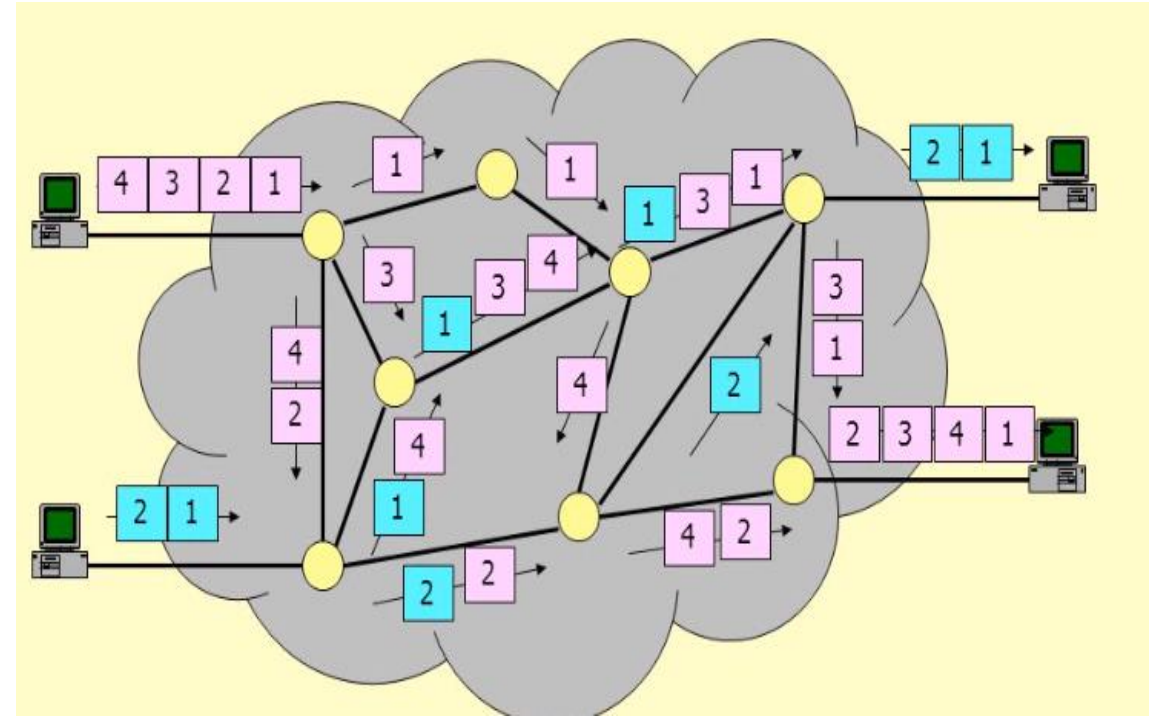
- *Disadvantages*
  - Movement of packets is not synchronous therefore not suitable for voice calls.
  - Complexity is high.
  - Sequencing of packets
  - Needs additional and secure protocols to protect the data,

Reference: 1. Ferouzan, Behrouz A., Data Communications and Networking, 2. Stallings William, Data and Computer Communication 3. www.quora.com

Two Approaches

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          ┌─────────────┐
          │   Packet    │
          │  Switched   │
          │   Network   │
          └──────┬──────┘
        ┌────────┴────────┐
┌───────┴──────┐  ┌───────┴───────┐
│  Datagram    │  │ Virtual Circuit│
│  Approach    │  │   Approach     │
└──────────────┘  └───────────────┘
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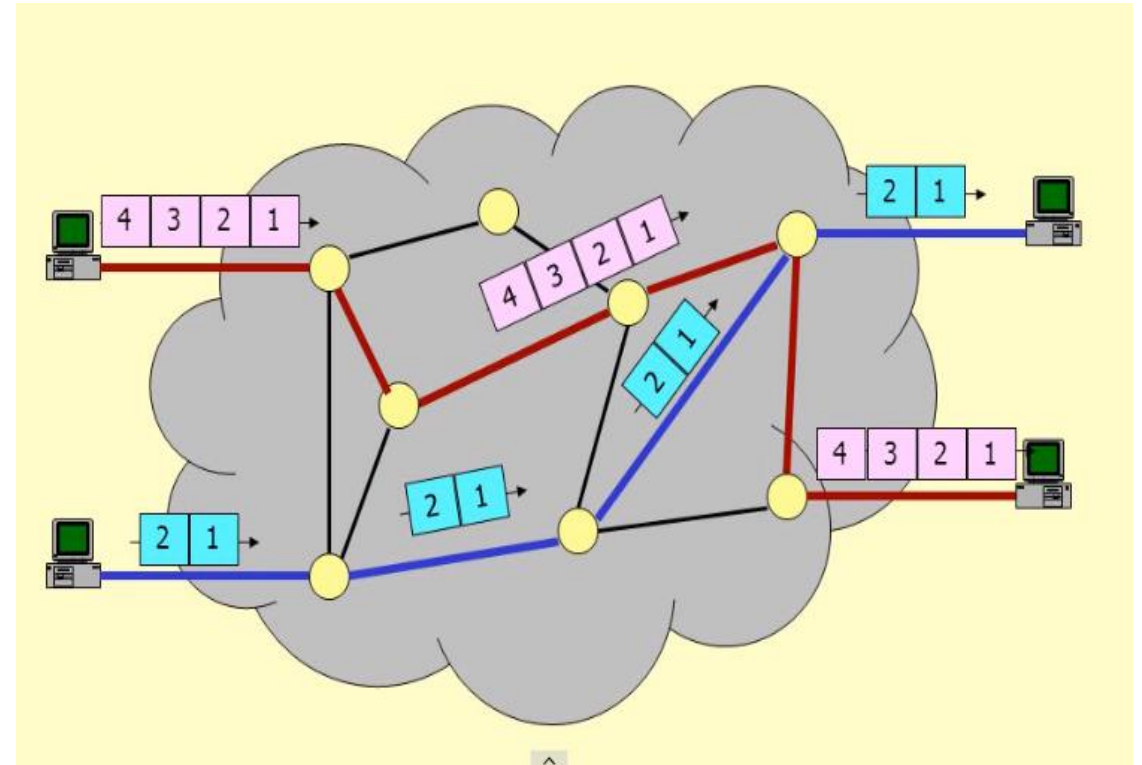
Datagram Approach

- Each packet is treated independently, with no reference to packets that have gone before.

- No need to connection set up.

- Datagram switching is normally done at the network layer.

- Not follow pre-established route.

- Packets might arrived in different sequence.

- Packet may go missing.

- If node is crashed, all quest packets are lost.

Virtual Circuit Switching

- Connection appears to be dedicated physical circuit.

- There are setup and teardown phases in addition to data transfer phase.

- Data are packetized and each packet carries an address in the header.

- Packet are delivered in order

- It is normally implemented in the data link layer,

Reference: 1. Ferouzan, Behrouz A., Data Communications and Networking, 2. Stallings William, Data and Computer Communication 3. www.slide player.com