



# **SNS COLLEGE OF TECHNOLOGY COIMBATORE**



**AN AUTONOMOUS INSTITUTION**

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Approved by AICTE New Delhi & affiliated to the Anna University, Chennai

## **DEPARTMENT OF MCA**

**Course Name : 19CAT603 - DATA COMMUNICATION AND  
NETWORK**

**Class : I Year / I Semester**

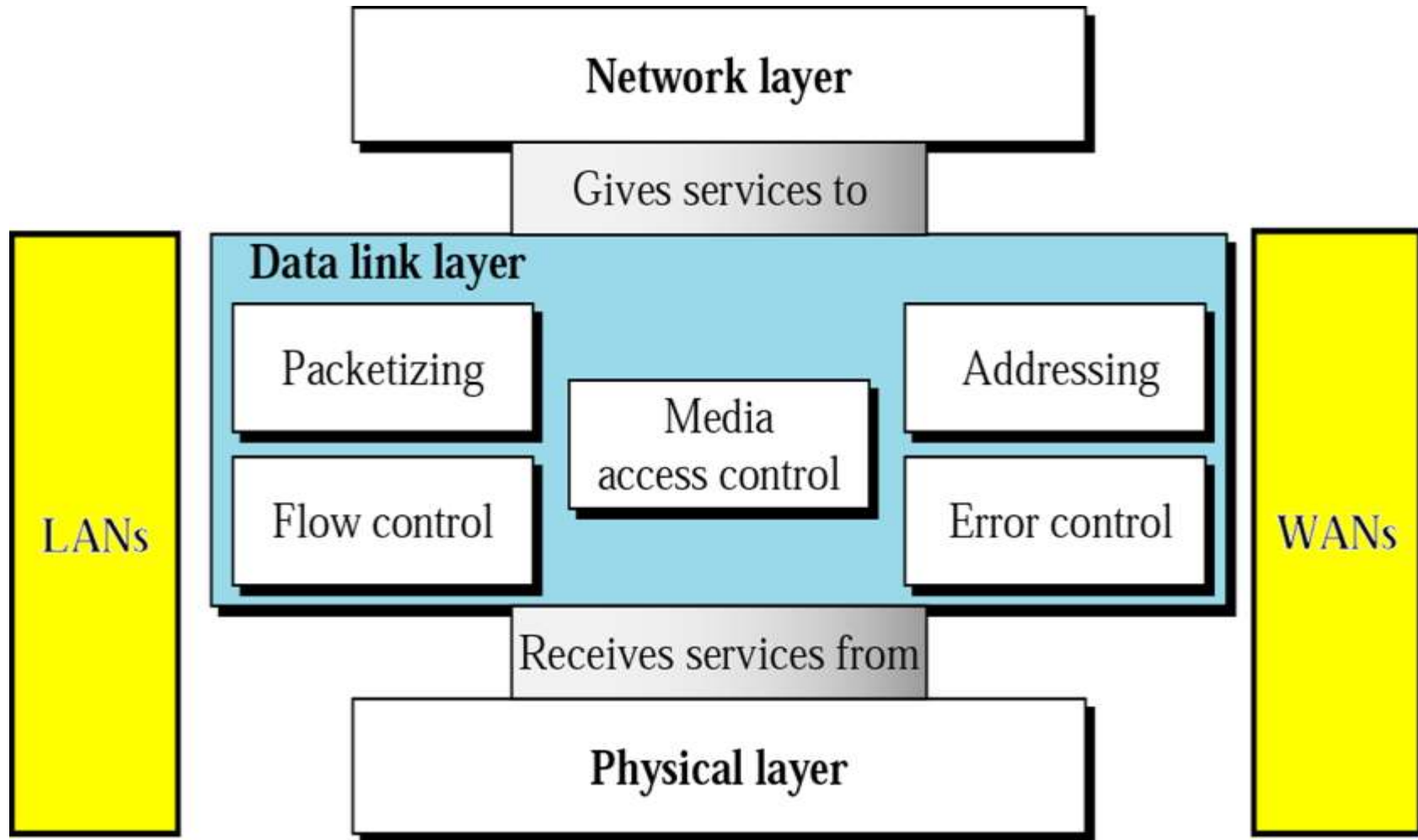
**Unit II - ERROR CONTROL AND DATA LINK PROTOCOLS**

**Topic I – Error Detection and Correction**



# Position of the data-link layer

02.12.2021

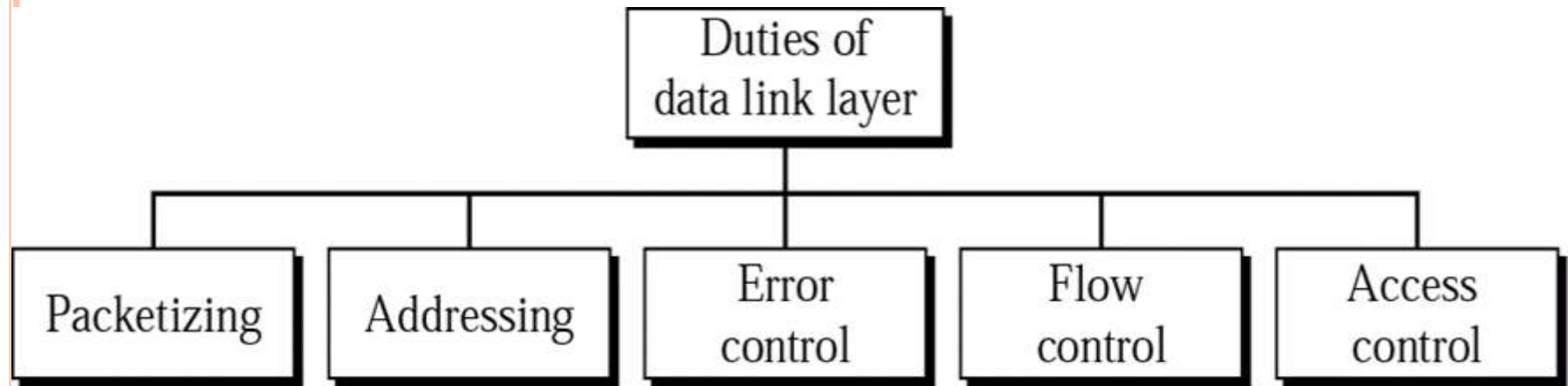




# Data link layer duties



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# Error Detection and Correction

## Types of Errors Detection Correction

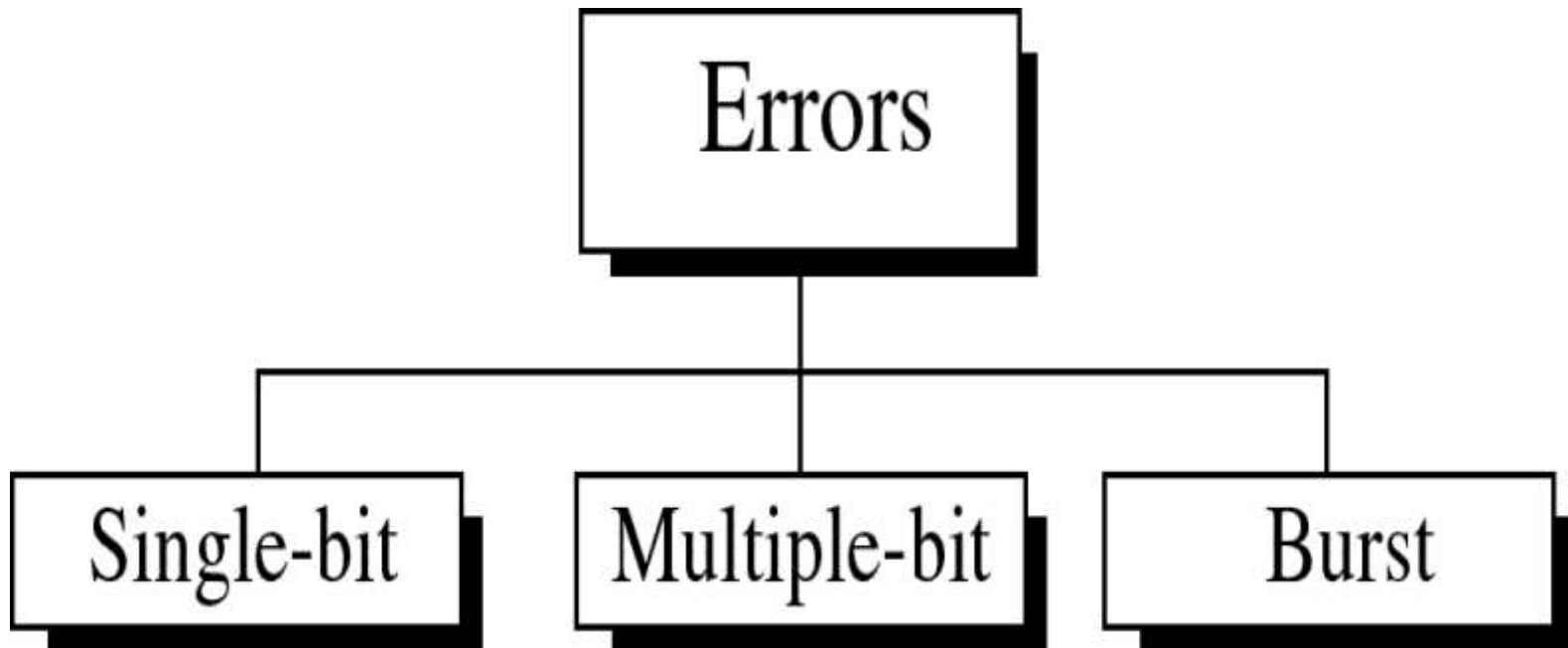
- Networks must be able to transfer data from one device to another with complete accuracy.
- Data can be corrupted during transmission.
- For reliable communication, errors must be detected and corrected.
- **Error detection and correction** are implemented either at the **data link layer** or the **transport layer** of the OSI model.





# Type of Errors

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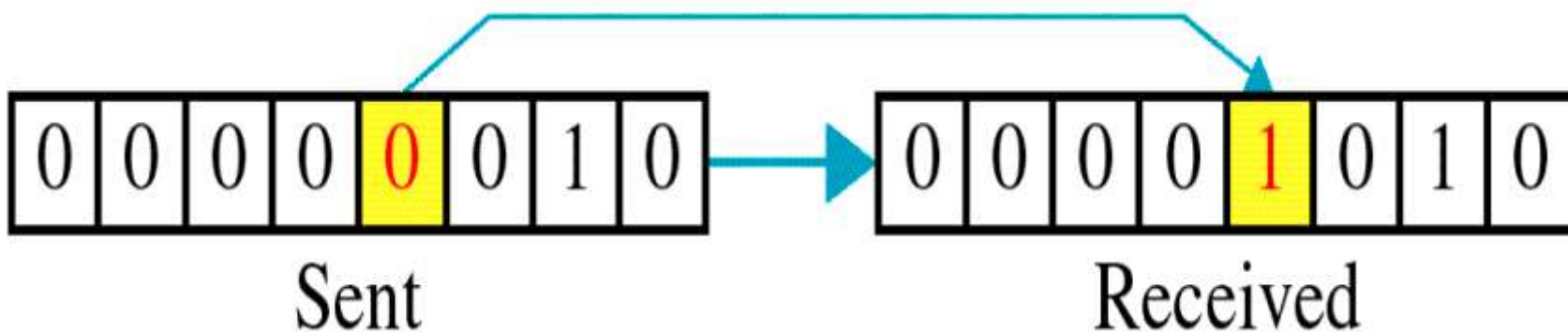


# Single-bit error



In a single-bit error, only 1 bit in the data unit has changed.

0 changed to 1





# Error Detection and Correction

**Single bit errors** are the **least likely** type of errors in serial data transmission because the noise must have a very short duration which is very rare. However this kind of errors can happen in parallel transmission.

## **Example:**

- If data is sent at 1Mbps then each bit lasts only  $1/1,000,000$  sec. or  $1 \mu\text{s}$ .
- For a single-bit error to occur, the noise must have a duration of only  $1 \mu\text{s}$ , which is very rare.

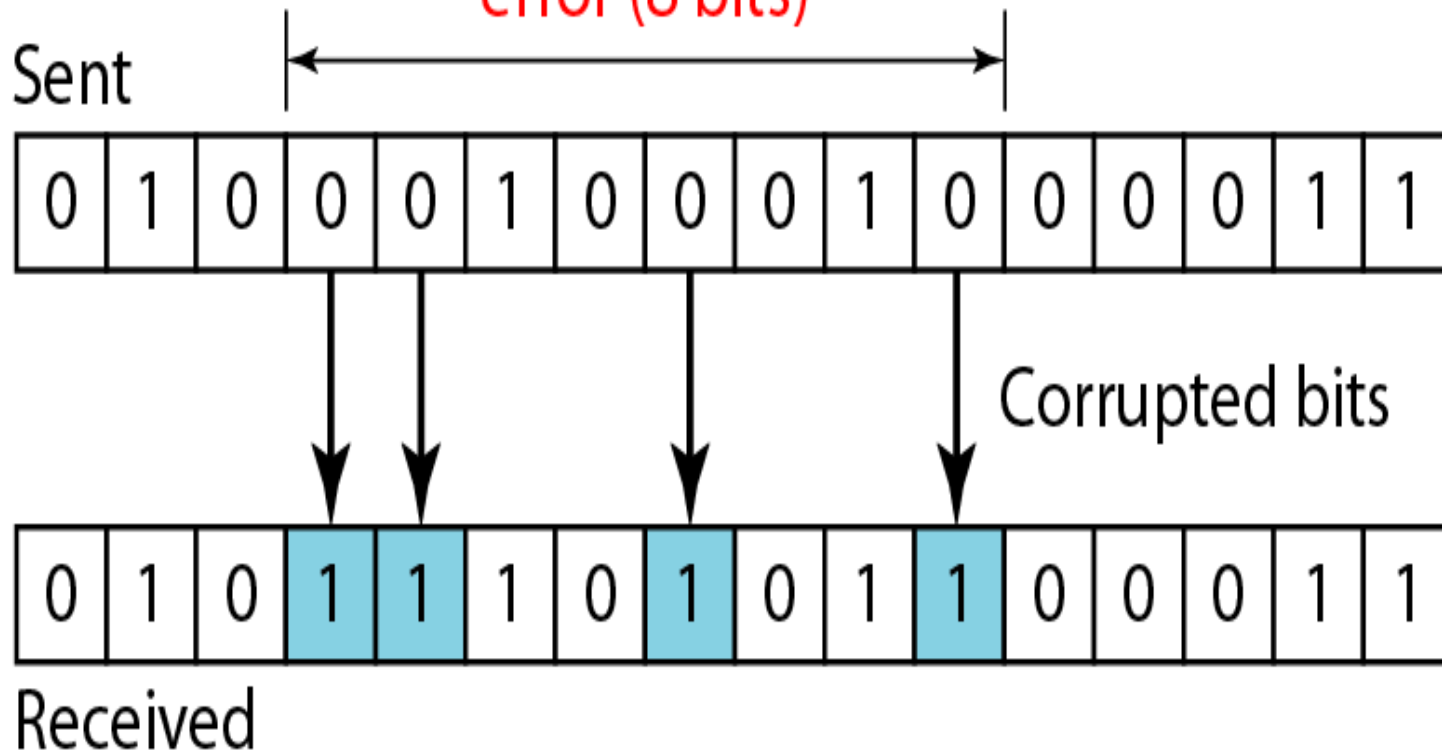




# Burst error of length 8

A burst error means that 2 or more bits in the data unit have changed.

Length of burst error (8 bits)



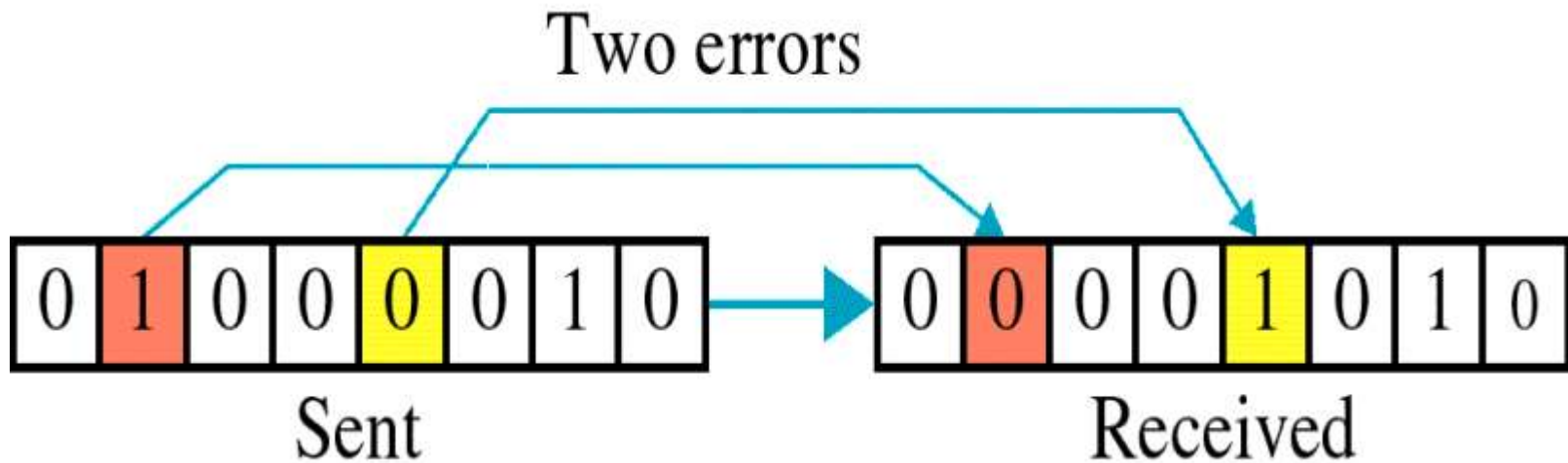




# Two Errors

Two bits error

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# Burst errors

The term **burst error** means that two or more bits in the data unit have changed from 1 to 0 or from 0 to 1.

**Burst errors does not necessarily mean that the errors occur in consecutive bits**, the length of the burst is measured from the first corrupted bit to the last corrupted bit. Some bits in between may not have been corrupted.





# Burst errors

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- **Burst error is most likely to happen in serial transmission** since the duration of noise is normally longer than the duration of a bit.
- The number of bits affected depends on the data rate and duration of noise.

## *Example:*

- If data is sent at rate = 1Kbps then a noise of 1/100 sec can affect 10 bits.  $(1/100 * 1000)$
- If same data is sent at rate = 1Mbps then a noise of 1/100 sec can affect 10,000 bits.  $(1/100 * 10^6)$



# Reference

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1. <https://www.geeksforgeeks.org/types-transmission-media/>
2. <https://www.javatpoint.com/guided-transmission-media>
3. <https://www.geeksforgeeks.org/performance-of-a-network/>



