Computer Network Protocols
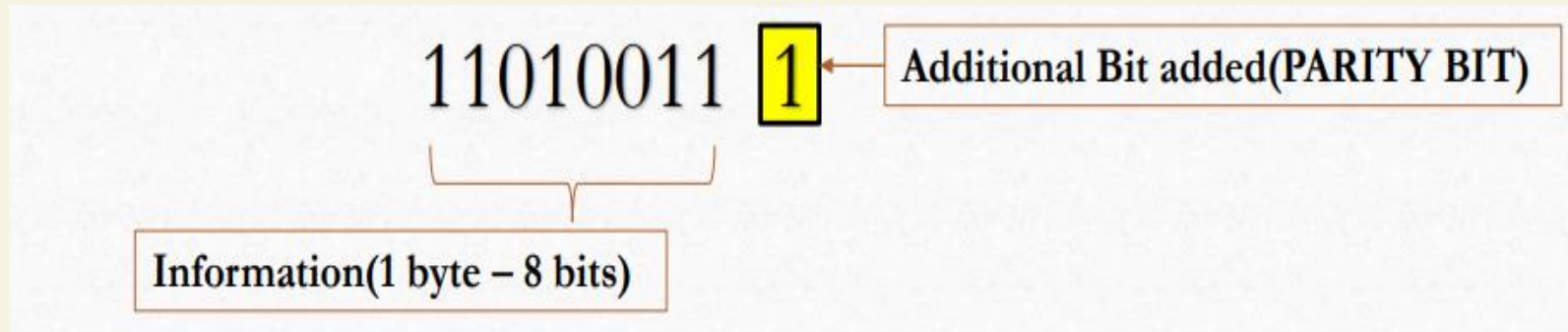# Data Link Layer
Lesson - 4

كلية المستقبل الجامعة
قسم هندسة تقنيات الحاسوب
المرحلة الرابعة

By

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Single Parity Check (VRC)

1. In Single parity check, a parity bit is added to every data unit so that the total number of **1**s is **even** or **odd**.

$$11010011 \boxed{1} \leftarrow \text{Additional Bit added(PARITY BIT)}$$

Information(1 byte – 8 bits)

2. There are **two ways** to generate a Single parity bit: One is called **Even parity** and the other is **Odd parity** .

How Is The Even Parity Bit Generated?

Total number of '1's should be EVEN.

If the byte that we want to transmit is (10101101) for example
Then
Step 1: *count the number of 1's in the byte (answer is 5)*
Step 2: *compute the parity value*
*Since the total number of 1's is 5 then the even parity bit is **1** and the value will be (101011011)*
*If the number of 1's is already even the parity bit will be **0**.*

How Is The ODD Parity Bit Generated?

Total number of '1's should be odd.

If the byte that we want to transmit is (10101100) for example
Then
Step 1: count the number of 1's in the byte (answer is 4)
Step 2: compute the parity value
Since the total number of 1's is 4 then the odd parity bit is **1** and the value will be (101011001)
If the number of 1's is already odd the parity bit will be **0**.

Single Parity Check (VRC) Example

Suppose the sender wants to send the word *world*. In ASCII the five characters are coded as

1110111   1101111   1110010   1101100   1100100

The following shows the actual bits sent in case **Even parity** is used:

1110111**0**   1101111**0**   1110010**0**   1101100**0**   1100100**1**

Now suppose the word world in Example 1 is received by the receiver without being corrupted in transmission.

11101110   11011110   11100100   11011000   11001001

The receiver counts the 1s in each character and comes up with even numbers (6, 6, 4, 4, 4). The data are **accepted**.
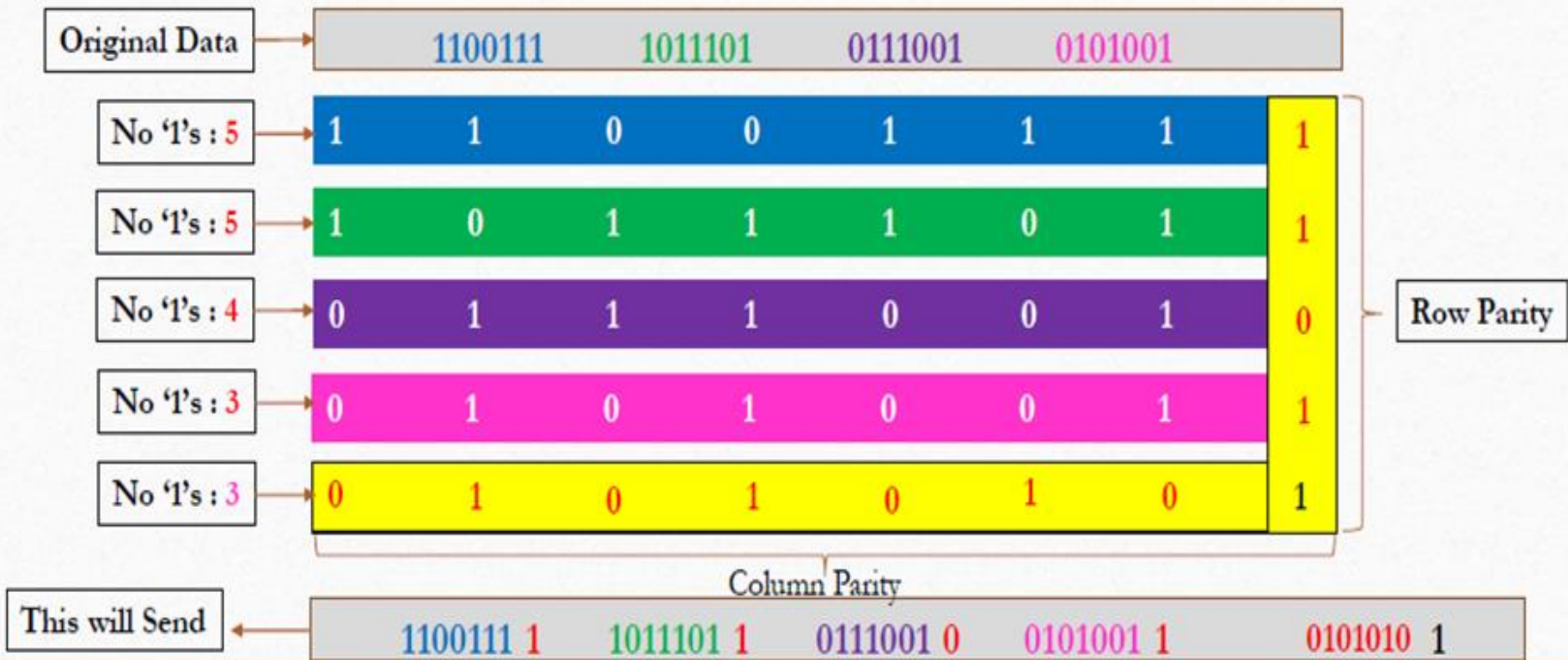
Now suppose the word world in Example 1 is corrupted during transmission.

11111110   11011110   11101100   11011000   11001001

The receiver counts the 1s in each character and comes up with even and odd numbers (7, 6, 5, 4, 4). The receiver knows that the data are **corrupted**, discards them, and asks for retransmission.

Two Dimensional Parity Check (LRC)

Two Dimensional Parity Generation
Even Parity Concept

Original Data	1100111	1011101	0111001	0101001	

								Row Parity
No '1's : 5	1	1	0	0	1	1	1	1
No '1's : 5	1	0	1	1	1	0	1	1
No '1's : 4	0	1	1	1	0	0	1	0
No '1's : 3	0	1	0	1	0	0	1	1
No '1's : 3	0	1	0	1	0	1	0	1

Column Parity

This will Send	1100111 1	1011101 1	0111001 0	0101001 1	0101010 1

End Of Lesson 4

Thanks For Listening