

Error Detection Codes: Whenever a message is transmitted, it may get scrambled by noise or data may get corrupted. To avoid this, we use error-detecting codes which are additional data added to a given digital message to help us detect if an error occurred during transmission of the message. A simple example of error-detecting code is **parity code**.

Parity Code: Parity code is nothing but a single bit code that is added to the original bit stream (original data) in order to make the total count of 1's either ODD or EVEN. Due to this mechanism, entire parity code system is categorized into the following two types:

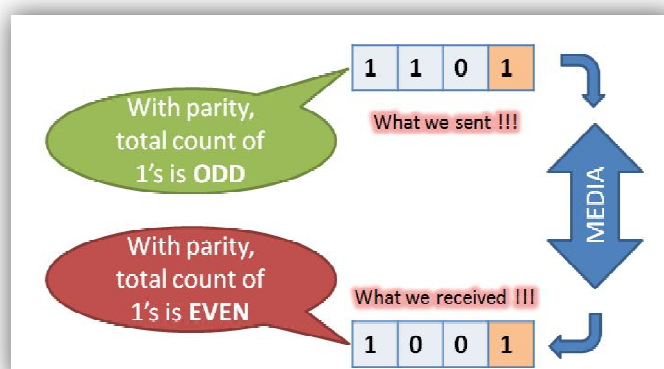
- Odd Parity: In order to make count of 1's ODD.
- Even Parity: In order to make count of 1's EVEN.

The following table shows both the EVEN Parity and ODD Parity bits for a 3-bit data-word:

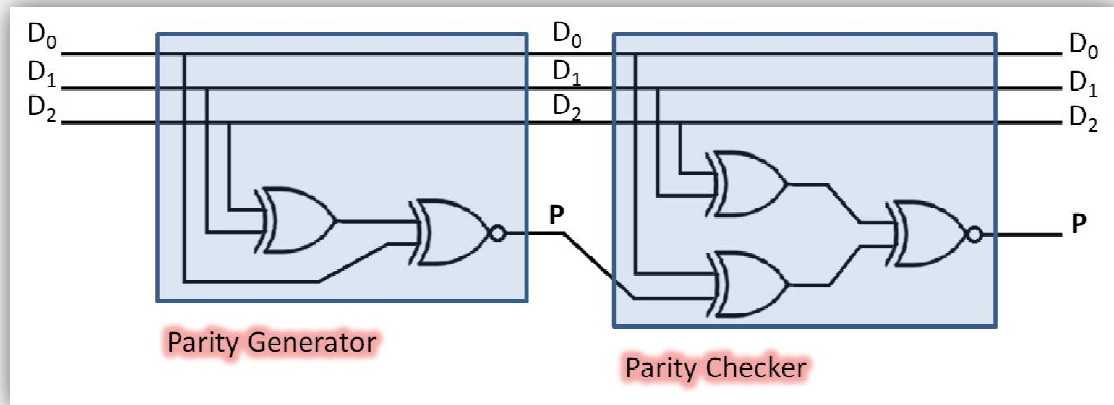
Data	Odd P	Even P
000	1	0
001	0	1
010	0	1
011	1	0
100	0	1
101	1	0
110	1	0
111	0	1

NOTE: Though we have both the mechanisms, ODD and EVEN parity but mostly ODD parity is used.

Following diagram shows how parity mechanism works for detecting one bit error in a three bit data. The count of 1 in original data was even, we appended an additional 1 to make the count of 1's ODD. On the receiver's end, count of 1 was found even. This shows there is error in the received data.



Parity Generator and Checker Circuit: Parity Generator Circuit uses a combination of nested XOR and XNOR gates to compute the ODD Parity bit while Parity Checker Circuit uses the same combination on the receiver's end to check for that ODD Parity.



Here in this circuit, suppose we put (101) as the three bit data ($D_0D_1D_2$). By going through the gates, we find that the P generated is 1.

Now, the data along with parity is (1011) which is given to the checker. Again the gates are processed and the final P tells the answer. If it is 0, there is no error. If it is 1, there is error in the data.

Assignment:

- 1.** What do you understand by Parity checking?
- 2.** Draw the circuit of Parity generator and checker mechanism.