



## Topic: Parity, Checksum, Echo Check

### (a) Parity Check (Odd and Even)

Parity check is a straightforward error detection technique that appends an extra bit, known as the parity bit, to the data. This ensures that the total number of 1s in the data is consistently odd (odd parity) or even (even parity). There are two types of parity checks:

#### i. Parity Byte Check:

The parity bit is incorporated into each byte of data. The recipient device verifies the parity bit to confirm that the number of 1s corresponds to the chosen parity. If the parity is inconsistent, an error is detected. For example, if the data byte is 11010101 (four 1s) and even parity is used, the parity bit is set to 0 to maintain an even number of 1s.

#### ii. Parity Block Check:

Parity bits are combined to create a parity block that encompasses an entire data block. The recipient device examines the parity of the entire block to identify errors. For instance, in a block of 4 bytes with even parity, if the number of 1s in each byte is 4, 3, 4, and 3, the corresponding parity bits would be 0, 1, 0, and 1, respectively.

### (b) Checksum

A checksum is a value derived from the data being transmitted and is sent alongside the data. Upon receipt, the recipient device recalculates the checksum using the same algorithm and compares it to the received checksum. If there is a mismatch between the calculated and received checksums, an error is detected. For example, a simple checksum can be calculated by summing the ASCII values of the characters in a message and transmitting the sum along with the message. The recipient would then compute the sum and verify it against the transmitted checksum.

### (c) Echo Check

In an echo check, the recipient device returns the received data to the sender. The sender then compares the echoed data with the original data. If discrepancies are discovered, the sender retransmits the data. For instance, if a sender transmits "HELLO" and the recipient receives "HELLO" (with a zero instead of an 'O'), the echo check would reveal the discrepancy, and the sender would retransmit the correct message.

