

Computer Networks

Error Control Methods PART 1

Error Handling Methods

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graph TD; A[Error Handling Methods] --> B[Error Detection]; A --> C[Error Correction];
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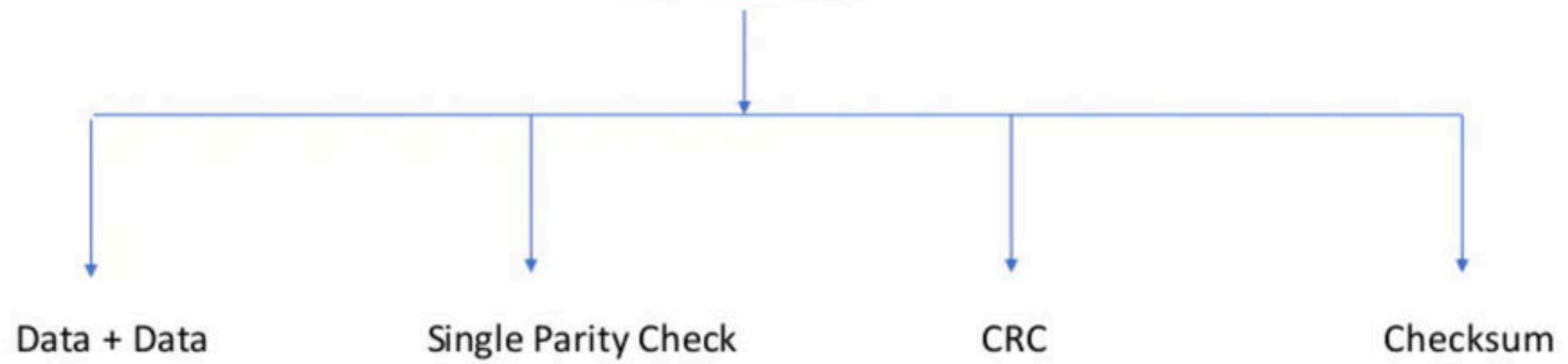
Error Detection

Error detection is a technique that is used to check if any error occurred in the data during the transmission.

Error Correction

Error Correction is a technique that is used to correct error occurred in the data by its own during the transmission.

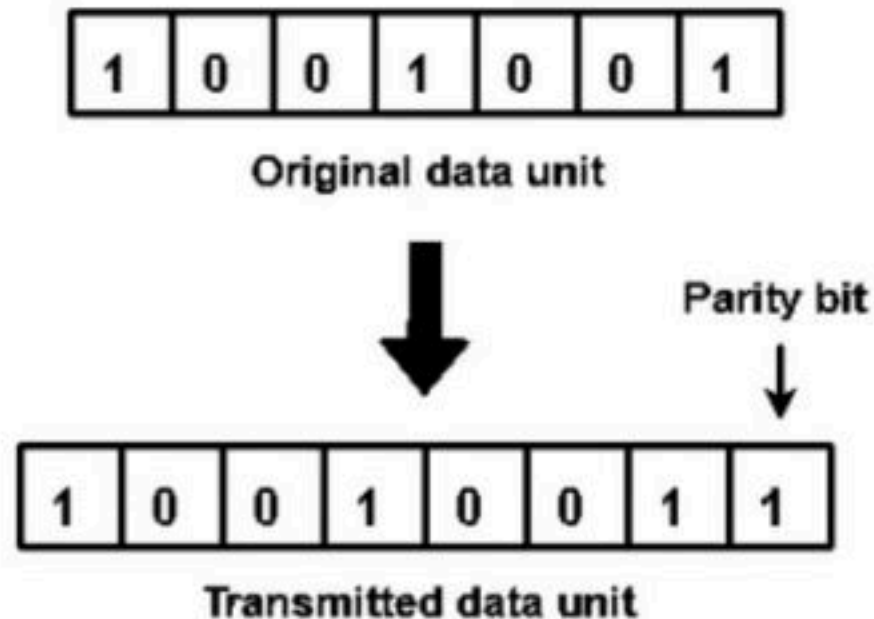
Error Detection



Single Parity Check-

In this technique,

- One extra bit called as **parity bit** is sent along with the original data bits.
- Parity bit helps to check if any error occurred in the data during the transmission.



Limitation-

- This technique can not detect an even number of bit errors (two, four, six and so on).
- If even number of bits flip during transmission, then receiver can not catch the error.

Cyclic Redundancy Check-

- Cyclic Redundancy Check (CRC) is an error detection method.
- It is based on binary division.

Cyclic Generator-

Data to be sent : 1 0 1 1 0 1 1

CRC generator: 1 1 0 1

CRC generator is 4 bits

There for sender appends 3 bits of 0's to the data

Note: if CRCG= n bits then bits to be appended in data is (n-1) 0's

SENDER'S SIDE

1 1 0 1 1 0 1 1 0 0 0

Appended 0's

1 1 0 1

0 1 1 0 0 1 1 0 0 0

Go on applying XOR

1 1 0 1 1 0 1 1 0 0 0

Appended 0's

1 1 0 1

0 1 1 0 0 1 1 0 0 0

1 1 0 1

0 0 0 1 1 1 0 0 0

Go on applying XOR

1 1 0 1 1 0 1 1 0 1 1 0 0 0

Appended 0's

1 1 0 1

0 1 1 0 0 1 1 0 0 0

1 1 0 1

0 0 0 1 1 1 0 0 0

1 1 0 1

0 0 0 0 0 1 1 0 0

Go on applying XOR

1 1 0 1 | 1 0 1 1 0 1 1 0 0 0

Appended 0's

1 1 0 1

0 1 1 0 0 1 1 0 0 0

1 1 0 1

0 0 0 1 1 1 0 0 0

1 1 0 1

0 0 0 0 0 1 1 0 0

1 1 0 1

0 0 0 0 0 0 0 0 1

CRC

Go on applying XOR

DATA SENT : 1 0 1 1 0 1 1 0 0 1

RECEIVER'S SIDE

$$\begin{array}{r} \underline{1101} \overline{) 1011011001} \\ \underline{1101} \\ 0110011001 \\ \underline{1101} \\ 000111001 \\ \underline{1101} \\ 000001101 \\ \underline{1101} \\ 0000000 \underline{000} \end{array}$$

Go on applying XOR

CRC IS 0, DATA RECEIVED IS RIGHT!

Computer Networks

Error Control Methods PART 2

CHECKSUM

CHECK SUM
To verify Addition

DATA TO BE SENT

SUPPOSE WE ARE USING 8 BIT CHECKSUM

00001000	00001100	00001010	00010000	00000011	00000001	00000010	00000111
8	8	8	8	8	8	8	8

ENCODE EACH 8 BITS INTO A DECIMAL NUMBER

00001000	00001100	00001010	00010000	00000011	00000001	00000010	00000111
8	12	10	32	3	1	2	7

ADDING ALL WE GET 75
CHECKSUM = -75

CHECKSUM

CHECK SUM
To verify Addition

DATA TO BE SENT

SUPPOSE WE ARE USING 8 BIT CHECKSUM

00001000	00001100	00001010	00010000	00000011	00000001	00000010	00000111
8	8	8	8	8	8	8	8

ENCODE EACH 8 BITS INTO A DECIMAL NUMBER

00001000	00001100	00001010	00010000	00000011	00000001	00000010	00000111	CHECKSUM
8	12	10	32	3	1	2	7	-75

ADDING ALL WE GET 75
CHECKSUM = -75