

PROGRAMMING ASSIGNMENT REPORT FILE

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0.1 TO IMPLEMENT CYCLIC REDUNDENCY CHECK

Language used :

C++

Input :

32 Bit(or more) data , Number of hops in Binary Symetric Channel(BSC) , Crossover Probability for BSC.

Procedure :

Data bits are tokenised into **16 bit dataword** and are indivisually divided(modulo-2 division) by CRC-8 divisor to get remainder out of division. The resulting remainder is appended to dataword to obtain code word which is send to reciever.

Code word then transmits through **binary symetric channel**,in which errors are induced with crossover probability p , in each bit .

At reciever side, modulo-2 division of recieved codeword is done with CRC-8 divisor. If remainder called **syndrome** is all 0,then there is no error(high probability) in recieved codeword,otherwise if remainder is non zero,then error is there in recieved codeword and it is discarded.

Inferences :

Following table represents probabability of a error type to be detected by our CRC.

ERROR TYPE	PROBABILITY OF DETECTION
Single Bit Error	1
Two isolated single bit error	1
Odd no. of errors	1
Burst error with length < 9	1
Burst error with length $= 9$	0.993
Burst error with length > 9	0.997

NOTE: If after tokenizing data into 16 bit Datawords, if one of resulting dataword has less than 16 bits then the program append '0' bit to beginning of that dataword to make it to 16 bit , in order to to be encoded using same program code as for other 16 bit dataword.

References :

1. www.wikipedia.in
2. Data Communications and Networking by B. A. Forouzan

0.2 TO IMPLEMENT 7 BIT HAMMING CODE

Introduction :

Hamming codes are a family of **linear error-correcting codes**. Hamming codes can detect up to two-bit errors or correct one-bit error.

Hamming codes are perfect codes, that is, they achieve the highest possible rate for codes with their block length and *minimum hamming distance* of three.

Language Used:

C++

Input :

4 bit dataword

Procedure :

Value of a Parity bit in Hamming code is found out by **XOR**'ing all bit values of respective data positions e.g. for Parity bit P0 , data in position 1, 3 and 5 are XOR'ed , and resulting bit is saved as value of that parity bit.

In this manner , 7 bit Hamming Code is obtained which is send to reciever . Errors are induced in hamming code during transmission.

At reciever end , Even parity of each parity bit is verified using XOR , if parity comes out to be Odd , positions of that parity bits are added to get the exact position of errorised bit.

To get back original data , value of errorised data is flipped .

References :

1. www.wikipedia.in
2. Data Communications and Networking by B. A. Forouzan