Basic types of Error Detection

Chapter 2

2.1 Types of Error Detection Codes

The following are the basic types of error detection methods

i)	Parity Check	-	User only for short messages
(ii)	Block Sum Check	-	User to verify the information in the memories in a given page.

Block Parity

In block parity horizontal and vertical parities will be formulated separated as shown below

Here the row will be formulated in odd parity while the column will be formulated in even parity and the block parity is formulated with the resultant of vertical and horizontal parities.

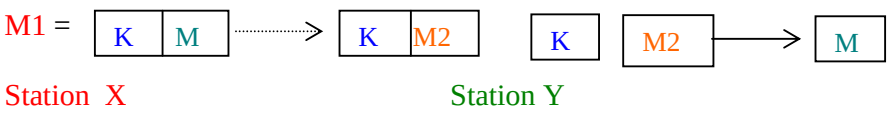
```
          11011 : 1   Row – Odd
          01101 : 0
          10010 : 1
          11001 : 0
          10001 : 1
Column    01100 : 1
  Even          Block Parity
```

(iii) Cyclic Redundancy code – Error detection code uses for long messages

(iv) Block codes, Convolution codes, Hamming codes, Golay, Reed – Solemn etc are used for error detection and correction.

Except above (iv), all other codes do not have the capability of error correction.

2.2 Concept of Error Correction

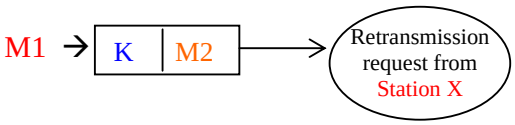


Case 1

As shown above error detection code will correct the received message M2 that is in error to M. To achieve this more bits should be appended to M shown as K in figure. Hence more bandwidth and power is required at the transmitter. This kind of application is necessary where the information transmitted cannot be repeated. For example telephone conversation or broadcasting.

This method is called forward error correction method.

Case 2



At station Y, check the K bits, and if they are not correct the message M2 will be discarded and station Y will request station X to retransmit the message,

This application does not need more bits to be appended as K, hence good bandwidth and less power could be used at the transmitter. However this method can be adopted only in a bi directional transmission. This method is used very widely in telephone signaling information transmission where retransmission of the message is possible and in packet switching networks.

This is called Backward Error Correction method (BEC) or Automatic Repeat Request. (ARQ).

Constraints

The above method requires an additional field appended to the message M1 to maintain a sequence numbering of messages. Hence sequence control field has to be appended, which will give two basic information.

(i) The transmitted message – sequence number
(ii) The last correctly received sequence number (from station Y).

When transmitting a message a sequence control field will contain the respective message number, also in the sequence control field will contain additional information with regard to a message received from the other station (whether it is correctly received or not).