Ex a linear delta modulator is designed to operate on a speach signal limited to 3.4kHz. The specifications of the modulaor ar

1. The sampling rate $f_s = 10 f_{Nyquist}$
2. $\Delta = 100mV$

* The modulator is tested with 1kHz sinusoidal signal

Determine the maximum amplitude of test signal that prevents slope overload

Solution

The maximum Amplitude of the test signal that prevents slope overload is given by

$$A \leq \frac{\Delta}{2\pi f_m T_s}$$

$$\leq \frac{\Delta f_s}{2\pi f_m}$$

$$A \leq \frac{0.1\,(10 * 2(3.4K\omega))}{2\pi K 10^3}$$

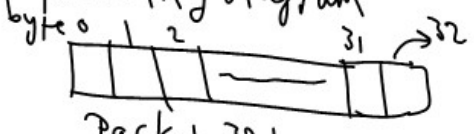
$$\leq 1.08V$$

Error detection and correction

* usually data are sent through the communication link serially
* However during transmission data will be subjected to noise known as additive white Gaussian noise, intersymbol interference and many other sources of noise
* The noise will cause some bits to be received with error
* However most receivers are equiped with error detection and error correction codes
* In this course, cyclic redundancy checksum will be studied as an example on error detection scheme while Hamming will be considered as an example on error detection and correction scheme

Cyclic Redundancy check sum CRC

* CRC is an error detection technique that can detect errors without correcting them
* If an error is detected, then asks the transmitter to retransmit the packet of data that contain errors
* The CRC works by summing all the bytes within a packet and put the sum in the final byte of the packet as illustrated by the following diagram



* The contents of byte 32 is equal to the $\sum_{i=0}^{31} byte(i) \% 256$
* To detect errors the receiver does exactly the same operation which is made in the transmitter (i.e. the receiver implement $x = \sum_{i=0}^{31} bytes(i) \% 256$
* The receiver compare x with byte number 32
* If $x = byte32_{received}$ then there is no error

  else

  If $x \neq byte32$, then there is an error, the receiver asks the transmitter to transmit the packet again