NETWORKING THEORY
ASSIGNMENT - 2

VARIOUS ENCODING TECHNIQUES :-

ENCODING :-

Encoding is the process of converting the data or a given sequence of characters, symbols, alphabets etc., into a specified format for the secured transmission of data. Decoding is the reverse process of encoding which is to extract the information from the converted format.

ENCODING TECHNIQUES :-

Analog data to Analog Signals :- The Modulation techniques such as amplitude modulation, frequency modulation and phase modulation of analog signals, fall under this category.

Analog data to digit Signals :- This process can be termed as digitization which is done by pulse code modulation PCM.

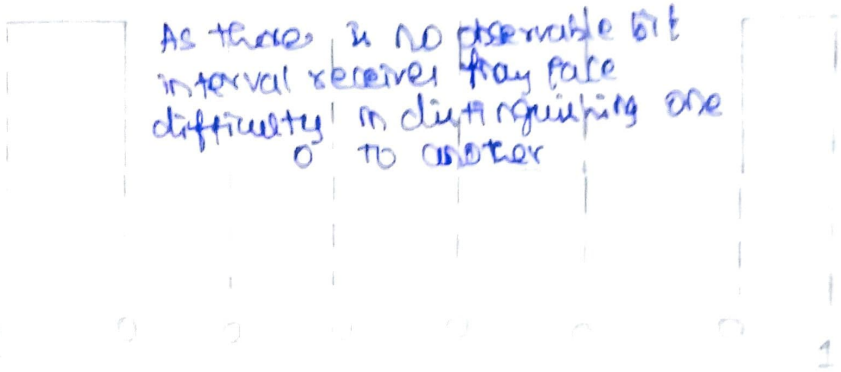
Digital data to Analog Signals :- The Modulation techniques such as Amplitude Shift keying, frequency Shift keying, phase Shift keying etc.

Digital data to Digital Signals :- There are several ways to map digital data to digital Signals.

Non Return to Zero NRZ :

NRZ codes has 1 for high voltage level and 0 for low voltage level. The main behaviour of NRZ codes is that the voltage level remains constant during bit interval. The end or start of a bit will not be indicated and it will maintain the same voltage state, If the value of the previous bit and the value of the present bit are same.

NRZ CODING :-



There are two variations in NRZ. They are

(*) NRZ - L [NRZ - LEVEL]

(*) NRZI - I [NRZ - INVERTED]

NRZ - L [NRZ - LEVEL] :-

There is a change in the polarity of the signal, only when the incoming signal changes from 1 to 0. Or from 0 to 1. It is the same as NRZ, however, the first bit of the input signal should have a change of polarity.

NRZ - I [NRZ - INVERTED]

If a 1 occurs at the incoming signal, then there occurs a transition at the beginning of the bit interval. For a 0 at the beginning incoming signal, there is no transition at the beginning of the bit interval.

(ii) Bi - Phase Encoding :-

The signal level is checked twice for every bit time, both initially and in the middle. Hence, the clock rate is double the data transfer rate and thus the modulation rate is also doubled. The clock is taken from the signal itself. The bandwidth required for this coding is greater.

There are two types (*) Biphase Manchester
(*) Differential Manchester

Bi-phase Manchester :-

In this type of coding, the transition is done at the middle of the bit interval. The transition for the resultant pulse is from high to low in the middle of the interval, for the input bit 1 while the transistor is from low to high for the input bit 0.

Differential Manchester :-

In this type, of coding, there always occurs a transition in the middle of the bit interval. If there occurs a transition at the beginning of the bit

interval, then the input bit is 0. If no transition occurs at the beginning of the bit interval, then the input bit is 1.

(iii) Block Coding

among the types of block coding, the famous one are 4B/5B encoding and 8B/6T encoding. The number of bits are processed in different manners, in both of these processes.

4B/5B encoding :- In manchester encoding, to send the data, the clock's with double speed is required rather than NRZ. coding. Here as the name implies, 4 bits of code is mapped with 5 bits, with a minimum number of 1 bits in the group.

The clock synchronization problem in NRZ-I encoding is avoided by assigning an equivalent word of 5 bits in the place of each block of 4 consecutive bits. These 5 bits are predetermined in a dictionary.

8B/6T Encoding :-

We have used two voltage levels to send a single bit over a signal. But if we use more than 3 voltage levels, we can send more bits per signal.

For example, If 6 voltage levels are used to represent 8 bits on a single signals, then such encoding is termed as 8B/6T encoding. Here in this method, we have as many as 729 3^6 combinations for signal and 256 2^8 combinations for bits.