EC6651 Communication Engineering

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Objective

1. To Discuss about Line codes

Line codes-Definition

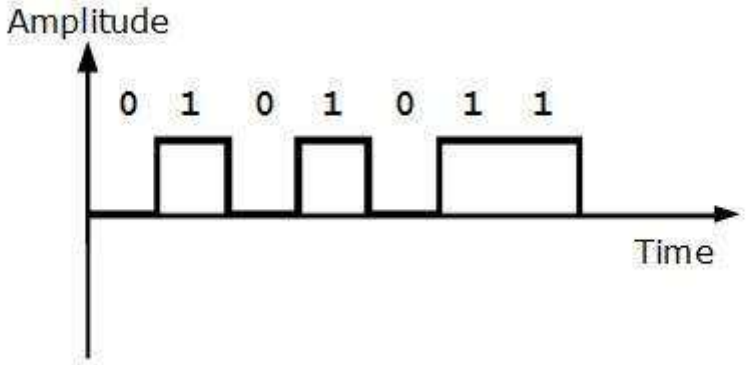
It refers to baseband representation of digital data.

Binary data can be transmitted using a number of different types of pulses. The choice of a particular pair of pulses to represent the symbols 1 and 0 is called Line Coding.

1. Unipolar NRZ

Symbol 1 or binary 1 is represented by transmitting a pulse, whereas symbol 0 is represented by switching off the pulse.

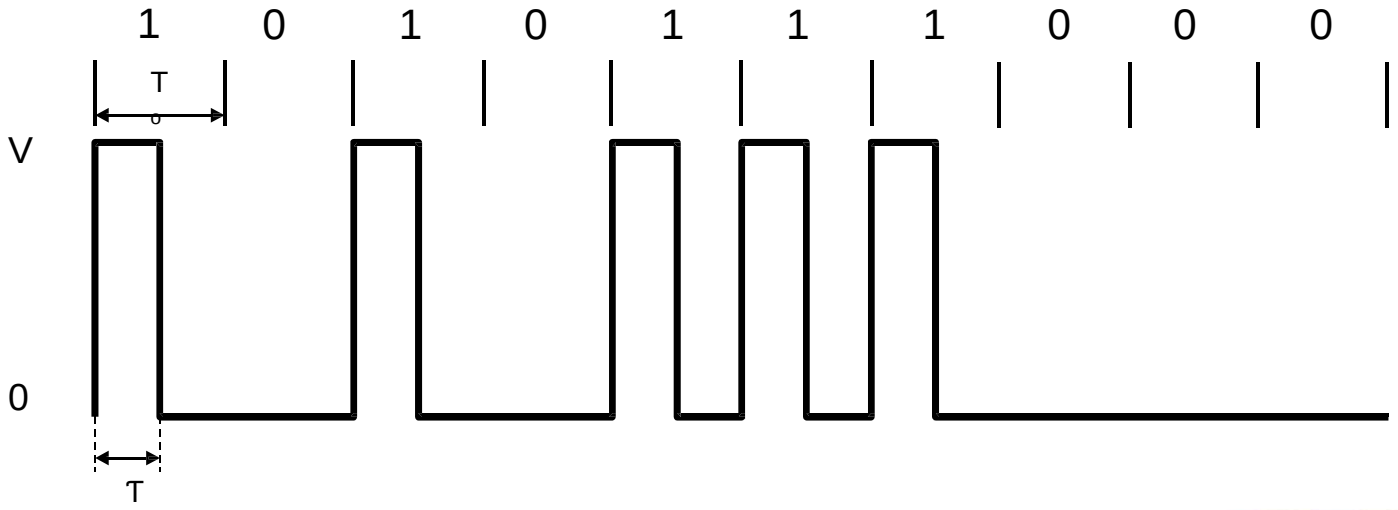
It is called NRZ because the signal does not return to zero at the middle of the bit



Unipolar Signalling

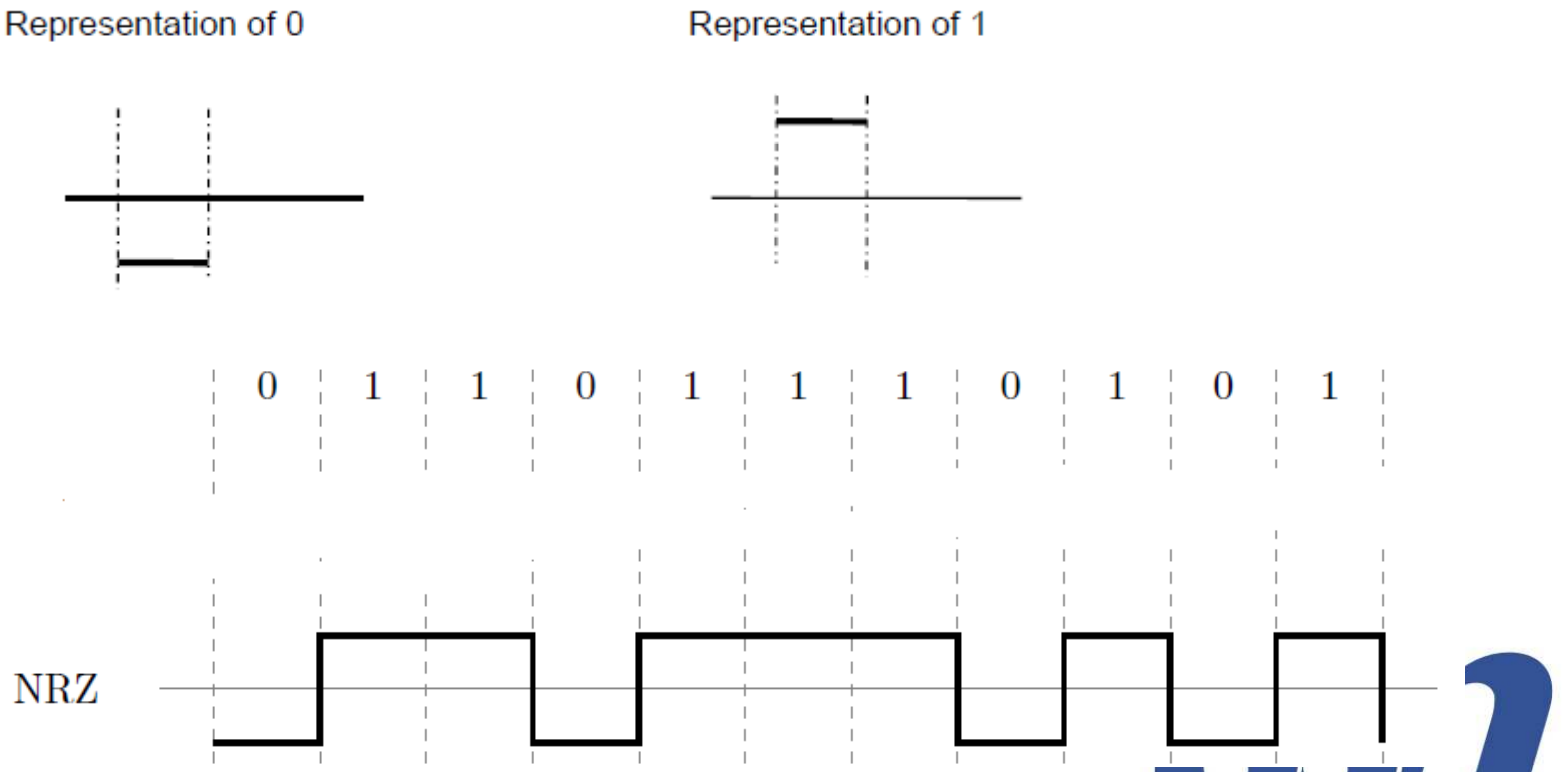
Return to Zero (RZ):

In unipolar RZ the duration of the MARK pulse (T) is **less** than the duration (T_o) of the symbol slot. Typically RZ pulses fill only the first half of the time slot, returning to zero for the second half.



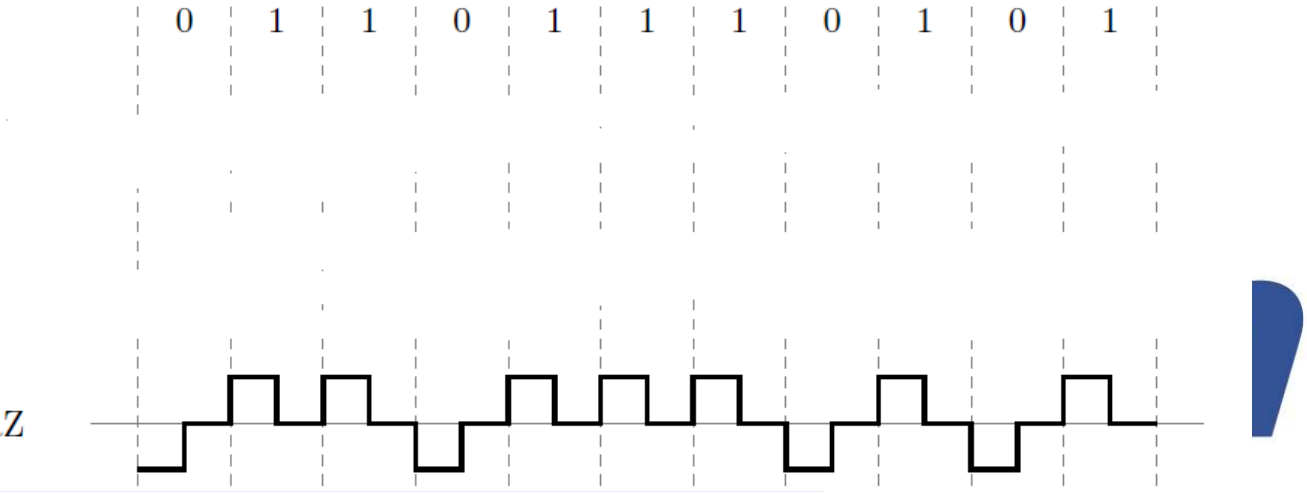
2. Polar NRZ

- *Bit 0* is mapped to a negative amplitude
- *Bit 1* is mapped to a positive amplitude



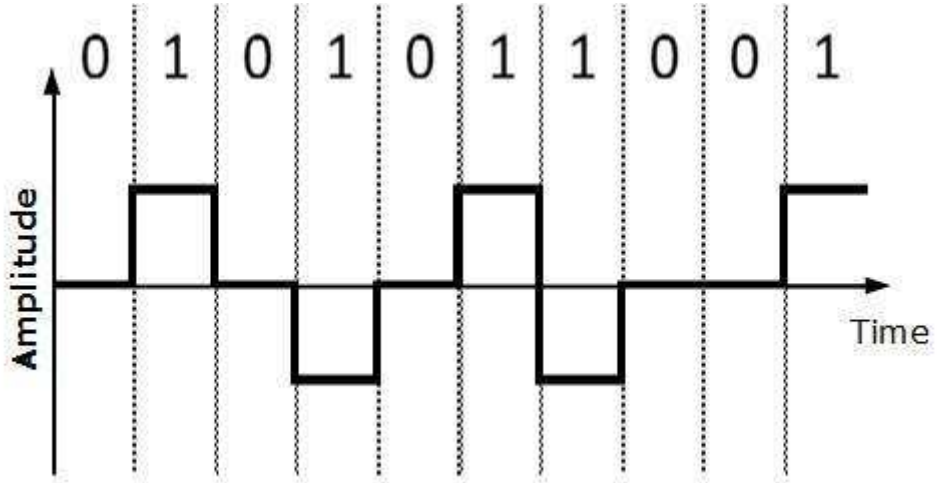
3. Polar RZ

- A bit 0 is mapped to a negative amplitude −A for the first half of the symbol duration followed by a zero amplitude for the second half of the symbol duration.
- A bit 1 is mapped to a positive amplitude +A for the first half of the bit duration followed by a zero amplitude for the second half of the bit duration.



3. Bipolar NRZ or Alternate Mark Inversion (AMI) Codes

- It is also known as Pseudoternary signalling.
- Positive and negative pulses are used alternatively for the transmission of 1s, and no pulses for the transmission of 0s.



BiPolar Signalling

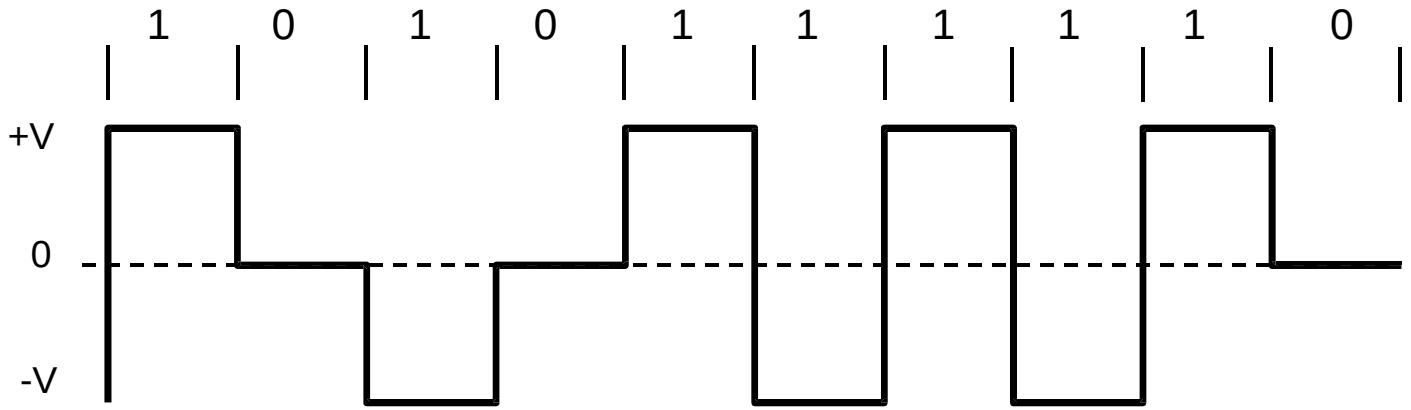


Figure. BiPolar NRZ

BiPolar Signalling

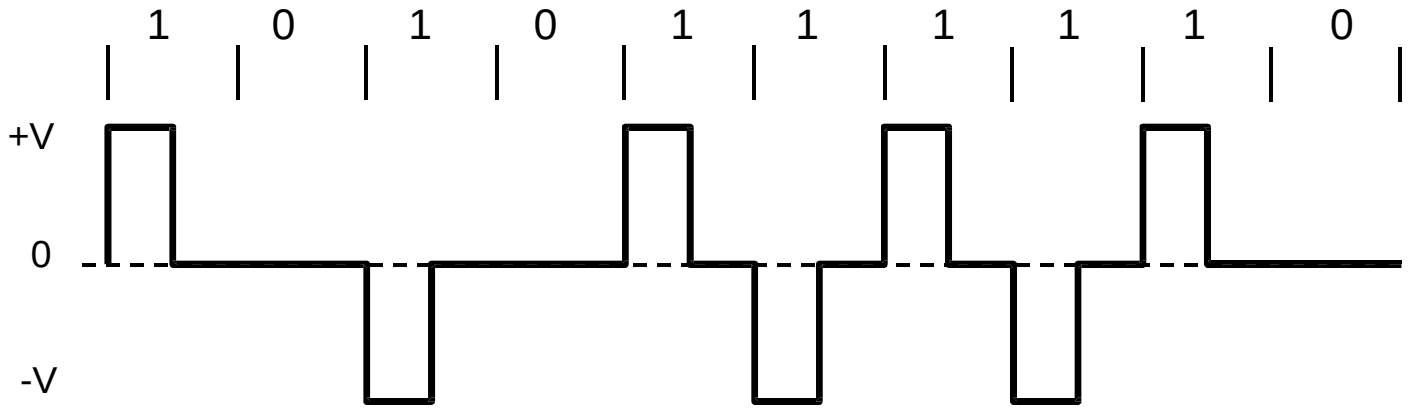
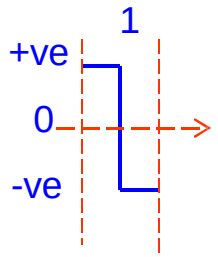


Figure. BiPolar RZ

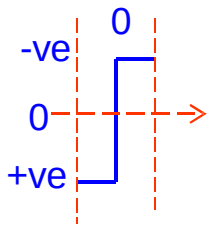
Manchester Signalling

In Manchester encoding , the duration of the bit is divided into two halves. The voltage remains at one level during the first half and moves to the other level during the second half.

A ‘One’ is +ve in 1st half and -ve in 2nd half.

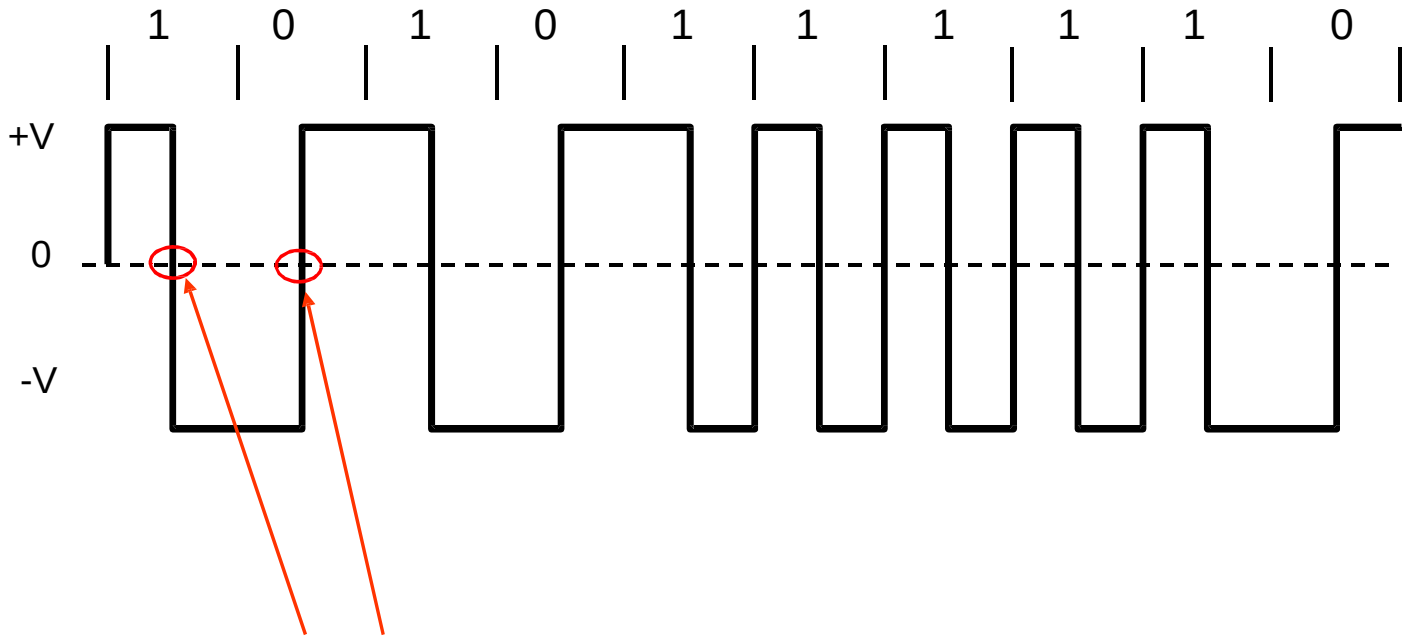


A ‘Zero’ is -ve in 1st half and +ve in 2nd half.



Note: Some books use different conventions.

Manchester Signalling



Note: There is always a transition at the centre of bit duration.

Figure. Manchester Encoding.

4.Manchester Coding

- It is also known as biphase baseband signaling
- Bit 0 is sent by having a mid-bit transition from high to low.
- Bit 1 is sent by having a mid-bit transition from low to high.