Unipolar (NRZ)

Advantages

- Simplicity in implementation.
- Doesn't require a lot of bandwidth for transmission.

Disadvantages

- Presence of DC level (indicated by spectral line at 0 Hz).

$$\text{DC component} = \frac{1}{2} * 0 + \frac{1}{2} * a$$

$$= a/2$$

- Contains low frequency components. Causes "Signal Droop" .
- Does not have any error correction capability.
- High probability of error

Euclidien distance between symbol 1 and 0 is 'a'

- Does not possess any clocking component for ease of synchronisation.

Unipolar(RZ)

Advantages

- Simplicity in implementation.
- Presence of a spectral line at symbol rate which can be used as symbol timing clock signal.

Disadvantages

- Presence of DC level (indicated by spectral line at 0 Hz).
- Continuous part is non-zero at 0 Hz. Causes “Signal Droop”.
- Does not have any error correction capability.
- Occupies twice as much bandwidth as Unipolar NRZ.
- Is not Transparent

Polar (NRZ)

- Advantages:
  - Simplicity in implementation.
  - No DC component.

$$\text{DC component} = \frac{1}{2} * -a + \frac{1}{2} * a$$

$$= 0$$

  - Less probability of error

  Euclidien distance between symbol 1 and 0 is '2a'(-a to a)
- Disadvantages:
  - Requires high power

  In polar symbol 1 is represented by '+a', symbol 0 is represented by '-a', so signal range is from –a to +a.
  - Continuous part is non-zero at 0 Hz. Causes "Signal Droop".
  - Does not have any error correction capability.
  - Does not posses any clocking component for ease of synchronisation.
  - Is not transparent.

Polar RZ

- Advantages:
  - Simplicity in implementation.
  - No DC component.
- Disadvantages:
  - Continuous part is non-zero at 0 Hz. Causes “Signal Droop”.
  - Does not have any error correction capability.
  - Does not posses any clocking component for easy synchronisation. However, clock can be extracted by rectifying the received signal.
  - Occupies twice as much bandwidth as Polar NRZ.

Bipolar NRZ

- Advantages:
  - No DC component.

$$\text{DC component} = \frac{1}{2} * 0 + \frac{1}{4} * -a + \frac{1}{4} * +a$$

$$= 0$$

  - Occupies less bandwidth than unipolar and polar NRZ schemes.
  - Does not suffer from signal droop (suitable for transmission over AC coupled lines).
  - Possesses single error detection capability.

Transmitted bits	1	1	0	1	1	0	1	1
Transmitted amplitude	+a	-a	0	+a	-a	0	+a	-a
Received amplitude with error	+a	-a	0	+a	+a	0	+a	-a

- Disadvantages:
  - Does not possess any clocking component for ease of synchronisation.
  - Is not Transparent.
  - It requires high memory

Bipolar(RZ)

- Advantages:
  - No DC component.
  - Occupies less bandwidth than unipolar and polar RZ schemes.
  - Does not suffer from signal droop (suitable for transmission over AC coupled lines).
  - Possesses single error detection capability.
  - Clock can be extracted by rectifying (a copy of) the received signal.
- Disadvantages:
  - Is not Transparent.

Manchester

- Advantages:
  - No DC component.
  - Does not suffer from signal droop (suitable for transmission over AC coupled lines).
  - Easy to self synchronization.(can obtain the timing information even if error occurs during transmission of long series of 1’s and 0’s)
  - Is Transparent.
- Disadvantages:
  - Because of the greater number of transitions it occupies a significantly large bandwidth(PSD of Manchester occupies double the bandwidth of other coding techniques)
  - Does not have error detection capability.