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1. Distinguish between data rate and signal rate:
 - Data rate: used to defines the number of data element send in 1s. if we increase the data rate our speed of transmission is increase the same.
 - Signal rate: is the number of signal element send in 1s. If we increase the data signal rate the bandwidth requirement is increase the same.
2. Parallel transmission:
 - Advantage of Parallel:
 - o It offers fast data communication between devices compare to serial interface.
 - o High Speed
 - o Match to underlying hardware
 - o Data is sent much faster as parallel transmission can increase the transfer speed by a factor of n over the serial transmission.
 - o A huge amount of data is to be transmitted over connection lines
 - o Parallel transmission can send information from computer to printer.
 - Disadvantage of Parallel:
 - o Expensive
 - o Limited shorter distances
 - o transmission of n communication lines is requires to transmit the data stream and for this n number of wires mush be require
 - o It uses more wires compare to serial interface and hence it is costly and a bit complex to implement.

Serial transmission:

- Advantage of Serial:
 - o It uses less number of conducting wires, hence reduces cost of the interface.
 - o It supports long distance data communication.
 - o It uses less number of wires often only one, this leads to simple interface between transmitting and receiving devices or ICs. It is easy to implement.
- Disadvantage of Serial:
 - o It uses less number of lines for transmission between devices. Hence it supports slower speed of transmission.
 - o It occupys overhead of about 20% other than useful information. This leads to wastage of bandwidth meant for data trasmission for useless stuff.

Differences between parallel and serial transmission is:

- Bit transaction
 - o Serial transmission only one bit at one clock.
 - o Parallel transmission eight bits at one clock pulse.
- Cost Efficient:
 - o Serial: low cost requires
 - o Parallel: more cost requires

- Performance
 - Serial lower than Parallel transmission (single and eight bits)
- Preference
 - Serial: long distance
 - Parallel: short distance
- Complexity
 - Serial less complex than Parallel transmission (single link and multiple link)

3. NRZ-L schema

