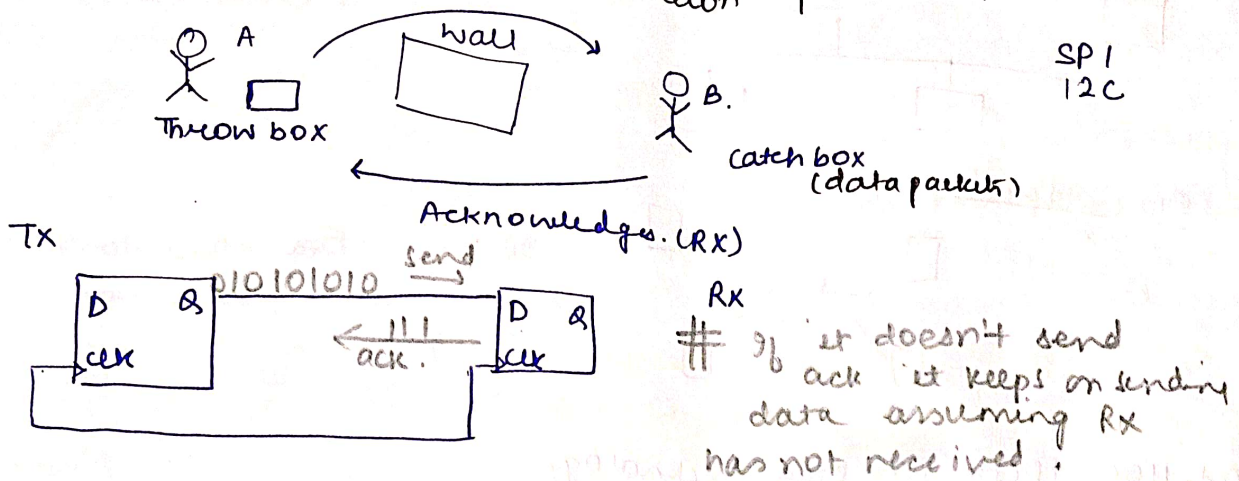


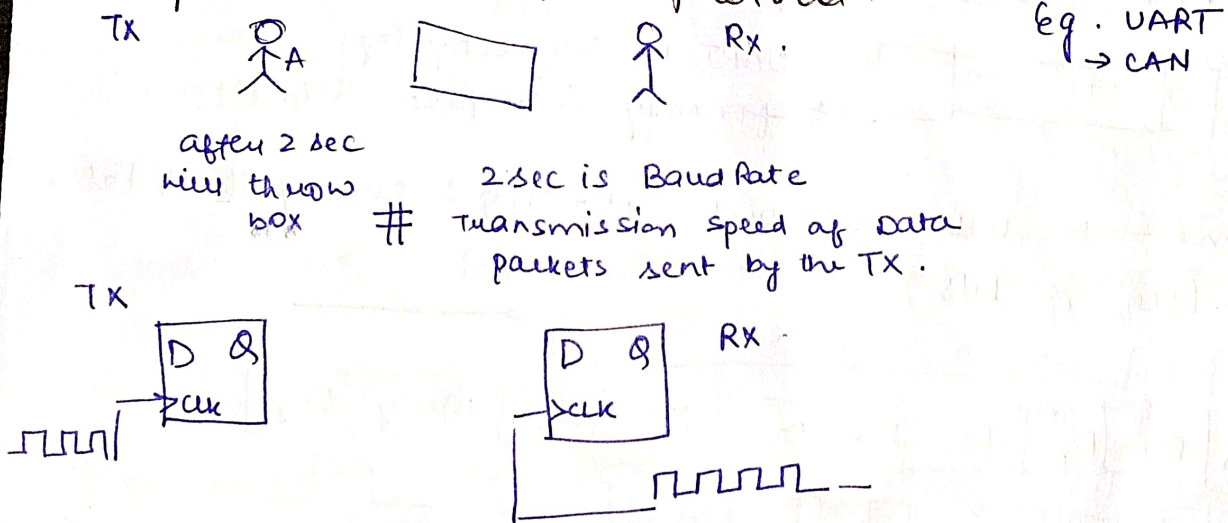
Types of communication protocols.

- ① Synchronous communication protocols.
- ② Asynchronous communication protocols.

① Synchronous communication protocol:



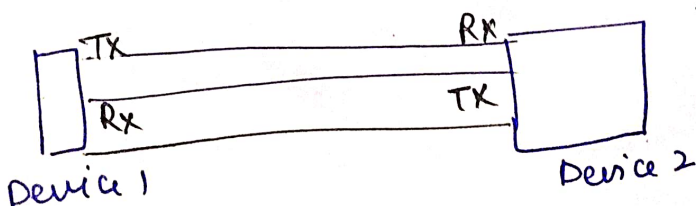
② Asynchronous commⁿ protocol.



See - 2 . Stands for.

① UART → Universal Asynchronous Receiver Transmitter

- Carrier Oriented protocol.
- data is sent byte by byte.

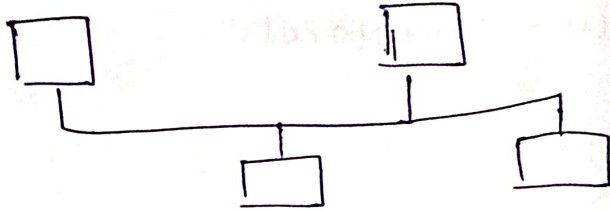


Topologies of communication

- ① Bus Topology.
- ② star Topology

- ③ Ad-hoc topology.

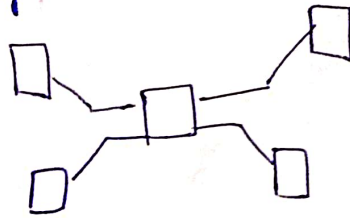
① Bus Topology



→ used in car commⁿ.

→ If one device sends data from one block it sends message on the wire.

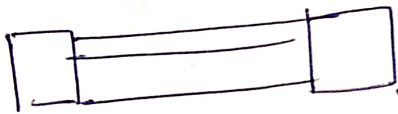
② Star topology



If the central device don't work, other devices stop working.

③ Ad-HOC (Peer to Peer) Technology.

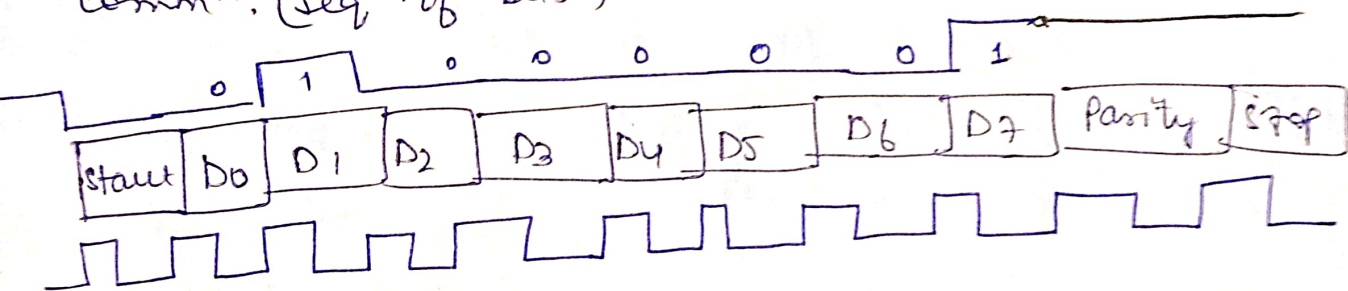
No master slave concept.



UART is Adhoc topology.

* for easy interface, default choice.

Bit frame — It tells us about starting & ending pts of data commⁿ. (seq. of bits)



→ earlier 2 stop bits at end were used for slower devices so that becomes ready to send new data frame.

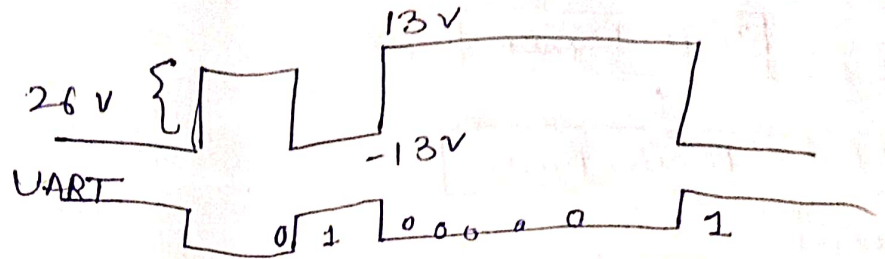
For long distance comm. RS232 UART used.

RS232 needs 9 pin connector (Multiple handshaking reqs)
→ printer is ready to receive data, ready to transmit data,
basically provide instructions to computer to perform work.
Such handshaking is important.
clear

Voltage levels

1s : -3V to -25V

0s : 3V to 25V



So

RS232 used at computer for low to high range.

High to low for UART.

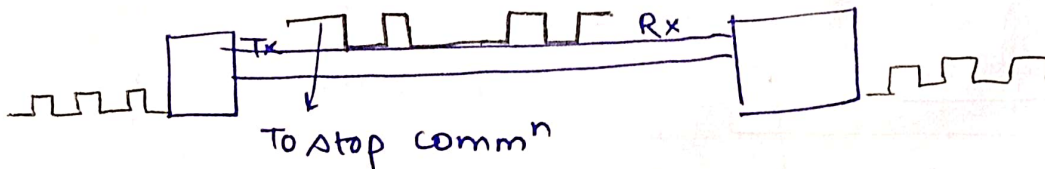
Ques-3

- ① Baud Rate
- ② Prog. Methods
- ③ Peripherals
- ④ Ons, Com

① Baud Rate. for good handshaking (9600, 115200 Bits/sec)

Prog. Approach

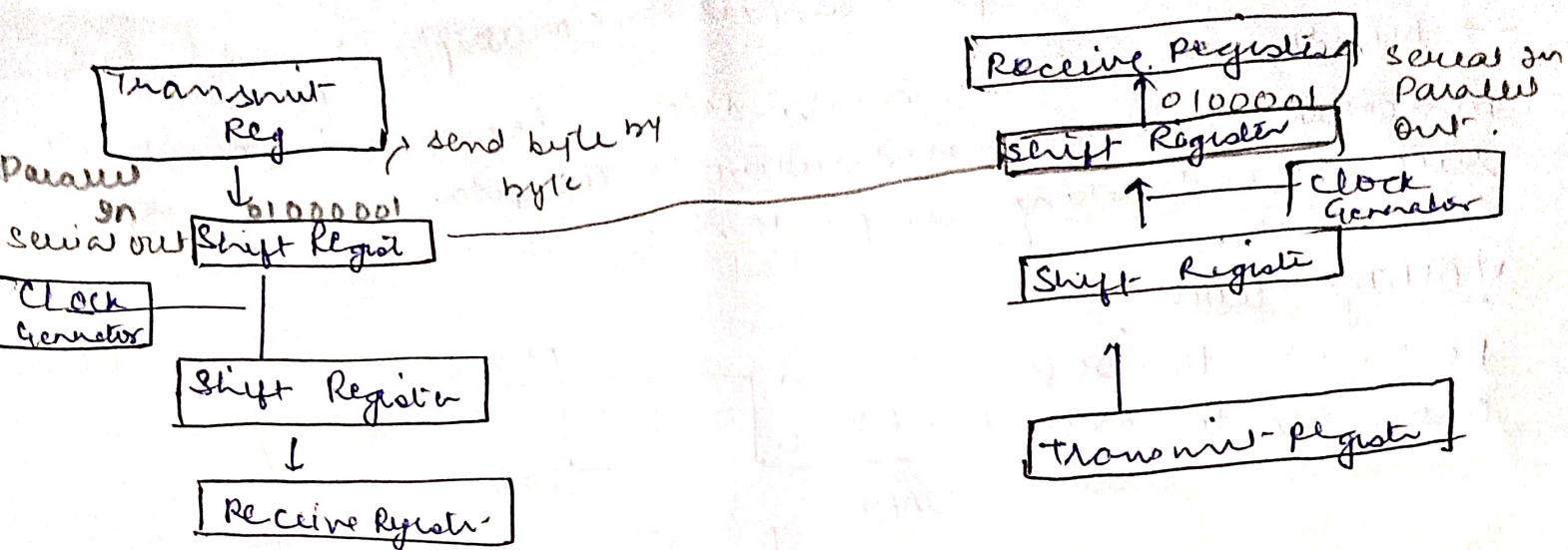
① Bit Banging A = 01000001 ✓



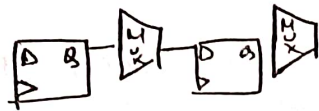
2. UART peripherals.

Two devices who want to talk (communicate).





Shift Register



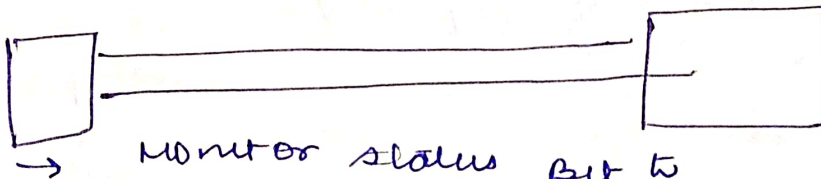
pushes whole data after receiving the shift Register of Receive Register. byte by byte to

* clock imp. for Band Rate of peripheral.

UART Configuration, (Configuring for UART)

- ① clock configuration
2. Data loading
3. Data transmission
4. Monitor data.

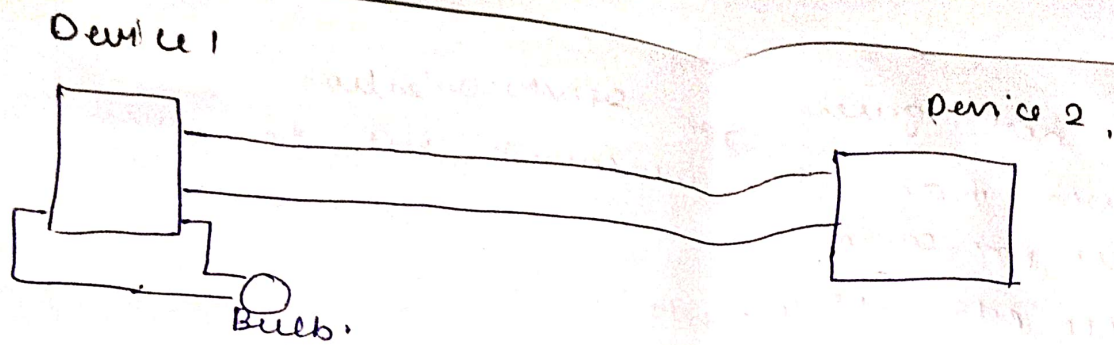
1. Looping method



check whether 8 bits are sent or not.

Similarly, in Receiver it checks whether complete data is RX or not.

2. Interrupt method



When the data is transferred from Device 1 to Device 2 the led's will blink.

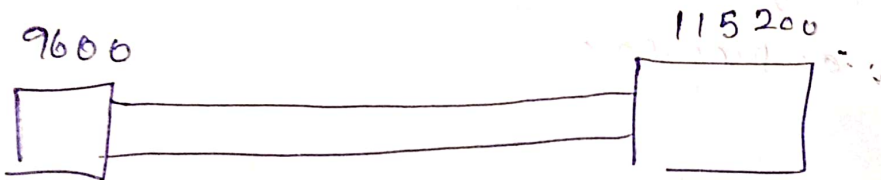
If we use interrupt method the bulb can glow simultaneously it will generate interrupt when the data is transferred.

Advantages of UART

- ① Very easy to interface
- ② less Hardware. (only two wires makes it easy)
- ③ less software complications

Disadvantages

- ① Synchronizing Baud Rate



It should be same for we'll go for lower BR.


2. only 2 devices can be connected (Adhoc)
3. no Acknowledgement.

Applications

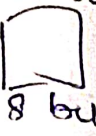
- ① Simple task like printers, command line interf Bluetooth & GSM Modules.

- clock not given for synchronization
- slower than parallel comm but then bus interface for comm.

→ Fixed data bits (5 to 9 bits).



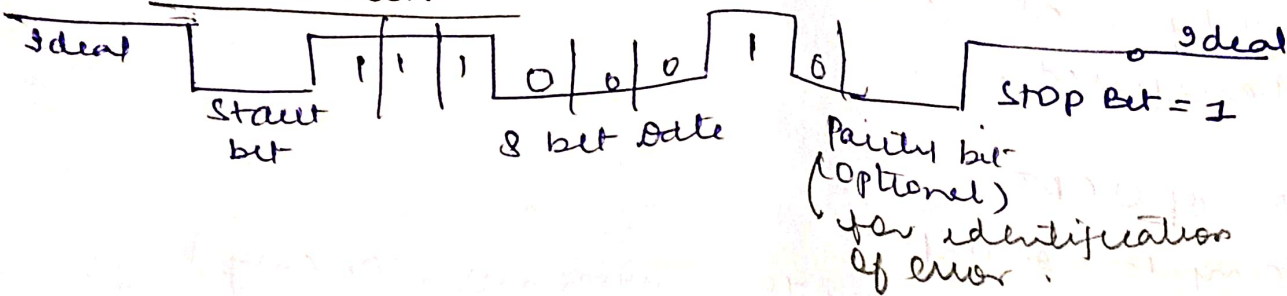
8 bits



8 bits

- Requires start + stop bits.
- NRZ encoding for data coding

→ Data Format



Questions

① What -

Protocol for exchanging serial data b/w 2 devices.

- Can be simple, half duplex, full duplex.
- Data transmitted as frames.

② When used?

ancient serial protocols — serial (COM) ports, RS232, modems.

- Popularity decreasing — SPI & I2C replacing Ethernet & USB b/w comp & peripherals.
- important for lower speed, low throughput applications.

About Timing

- ↳ Asynchronous — TX & RX don't share same clk.
- Rx & Tx should have same speed.
- use same frame st / parameters.