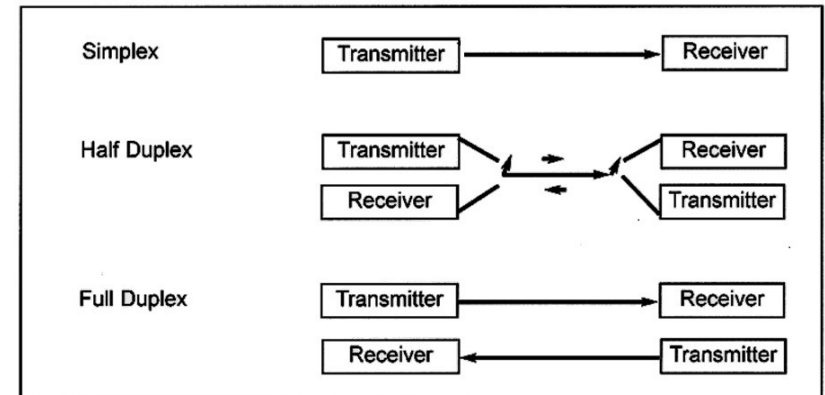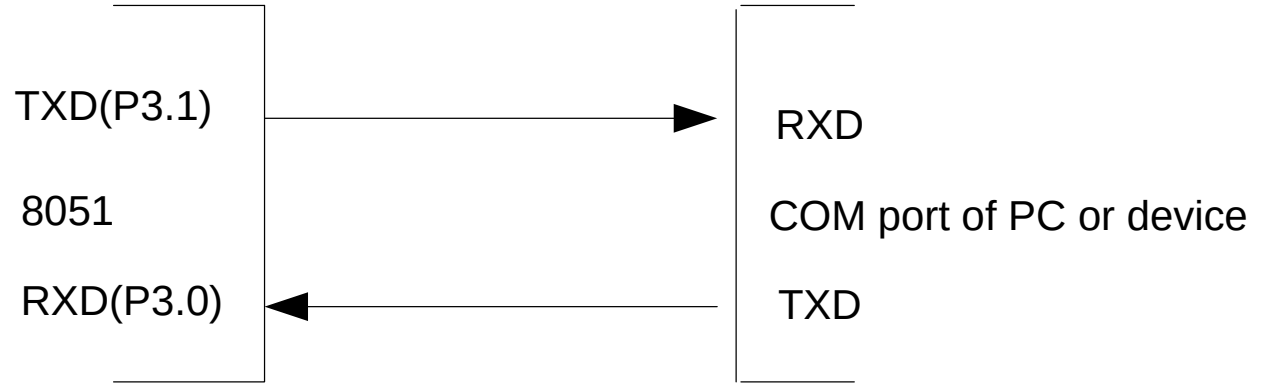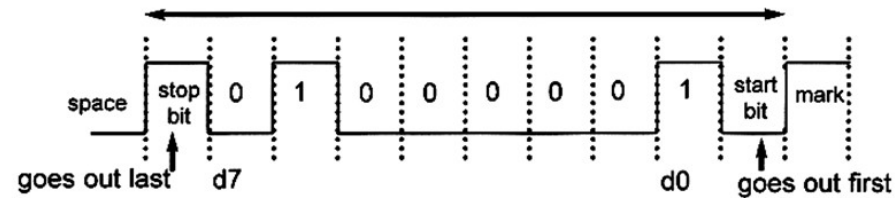# UART

- Universal Asynchronous Receiver Transmitter is the interface circuitry between the microprocessor and the serial port.

- The UART operates at TTL voltage levels (i.e. 0 to 5V).

- Baud rate generation determines the speed at which data is transmitted and received.

- One baud is one bit per second (bps).

- Types of Communication:

- ## Interconnection

TXD(P3.1)   →   RXD

8051   COM port of PC or device

RXD(P3.0)   ←   TXD

- Framing of byte of data

| space | stop bit | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | start bit | mark |

goes out last   d7   d0   goes out first

Framing ASCII "A" (41H)

SFRs

SCON (Serial Port Control)

- RI (Receive Interrupt). SCON.0

- TI (Transmit Interrupt). SCON.1

- REN (UART Receive Enable). SCON.4

- SM0 and SM1 (UART Operation Mode). SCON.6, SCON.7

IE (Interrupt Enable)

- ES (Enable Serial). IE.4. Set the bit to 1 to enable receive and transmit interrupts.

SMOD (Serial Port Baud Rate Doubler Enable)

- PCON (Power Control Register). PCON.7

- Set the bit to 1 to double the baud rate defined by serial port mode in SCON.

SBUF

- After configuring the port, we simply read from and write to the SBUF register. For example:
- in = SBUF;   // Read a character from SBUF through the UART
- SBUF = out;   // Write a character to the SBUF through the UART

- The register SBUF is used for both reading and writing bytes. Internally, there are two separate registers. They are both represented as SBUF for the convenience of the programmer.

	RS232	UART	I2C	SPI
Wires	9	2	2	4
Max Distance	15 m	15 m		
Max Baud Rate	1.5 Mbps	460 kbps	3.4 Mbps	20 Mbps
#Masters	1	1	>=1	>=1
#Slaves	1	1	unlimited	unlimited
Type	Full-duplex	Full-duplex	Half-duplex	Full-duplex