

ASCII 1 0x01 0x31

Hex	Value	Hex	Value	Hex	Value	Hex	Value	Hex	Value	Hex	Value	Hex	Value	Hex	Value
00	NUL	10	DLE	20	SP	30	0	40	@	50	P	60	.	70	p
01	SOH	11	DC1	21	!	31	1	41	A	51	Q	61	a	71	q
02	STX	12	DC2	22	"	32	2	42	B	52	R	62	b	72	r
03	ETX	13	DC3	23	#	33	3	43	C	53	S	63	c	73	s
04	EOT	14	DC4	24	\$	34	4	44	D	54	T	64	d	74	t
05	ENQ	15	NAK	25	%	35	5	45	E	55	U	65	e	75	u
06	ACK	16	SYN	26	&	36	6	46	F	56	V	66	f	76	v
07	BEL	17	ETB	27	'	37	7	47	G	57	W	67	g	77	w
08	BS	18	CAN	28	(	38	8	48	H	58	X	68	h	78	x
09	HT	19	EM	29	)	39	9	49	I	59	Y	69	i	79	y
0A	LF	1A	SUB	2A	*	3A	:	4A	J	5A	Z	6A	j	7A	z
0B	VT	1B	ESC	2B	+	3B	;	4B	K	5B	[	6B	k	7B	{
0C	FF	1C	FS	2C	,	3C	<	4C	L	5C	\	6C	l	7C	|
0D	CR	1D	GS	2D	-	3D	=	4D	M	5D	]	6D	m	7D	}
0E	SO	1E	RS	2E	.	3E	>	4E	N	5E	^	6E	n	7E	~
0F	SI	1F	US	2F	/	3F	?	4F	O	5F	_	6F	o	7F	DEL

0 ~ 255

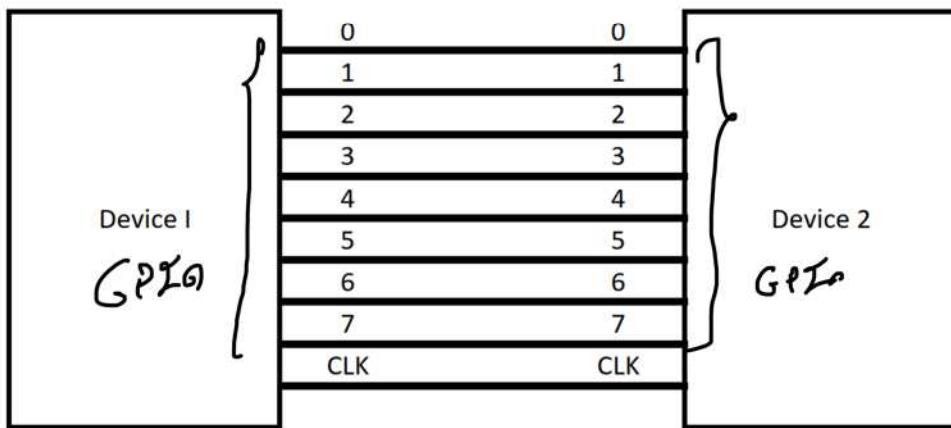
a → 0x61

0x61 = 0b01100001

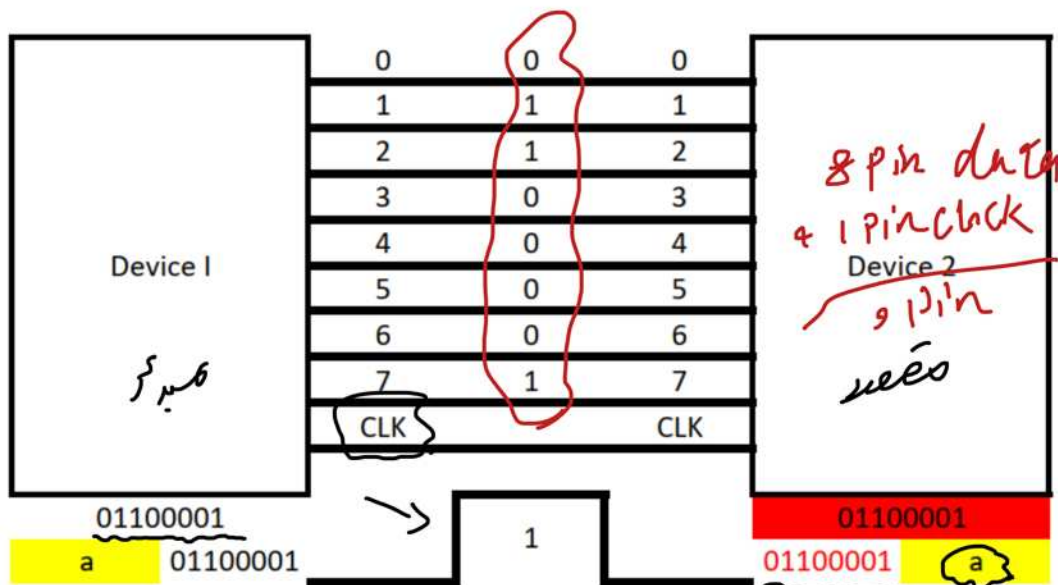
a = 10000110 = 0x86

128 ~ 255

127

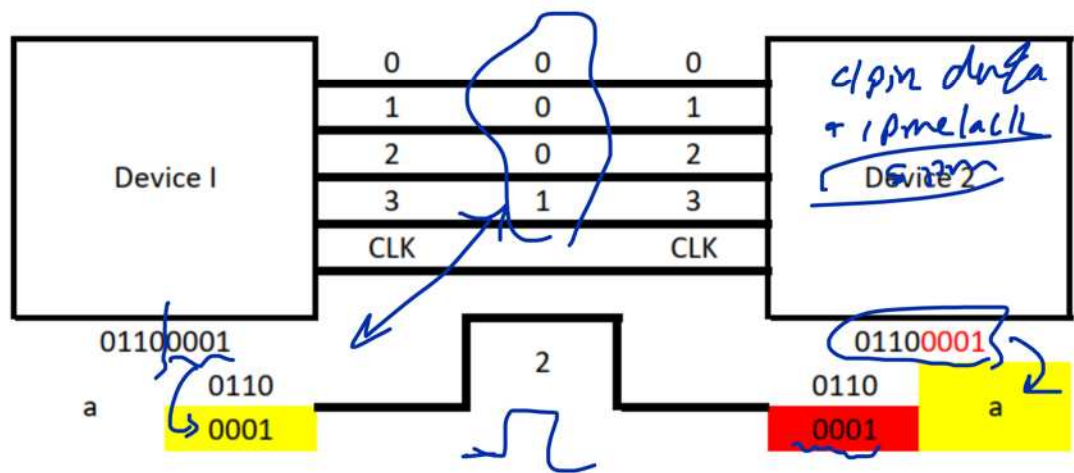
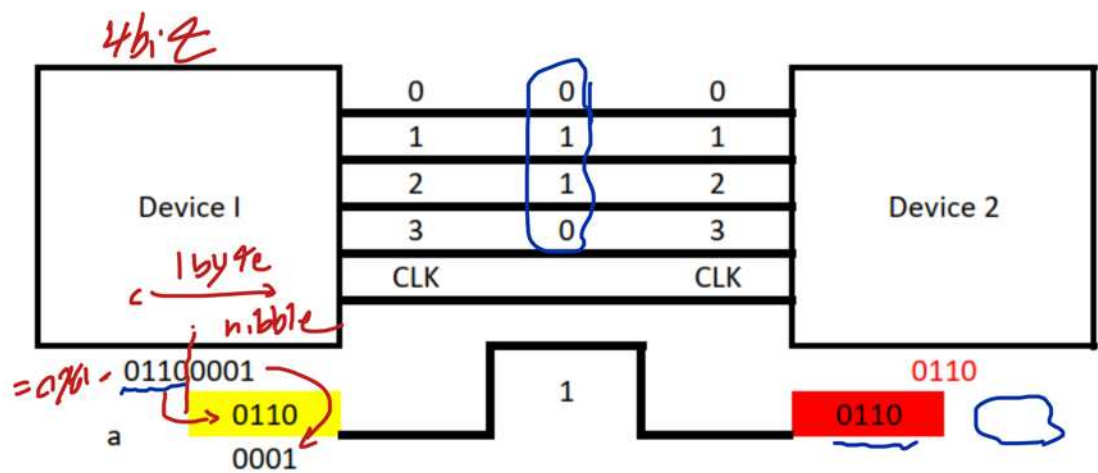


HEX	61	= a
DEC	97	
OCT	141	
BIN	0110 0001	

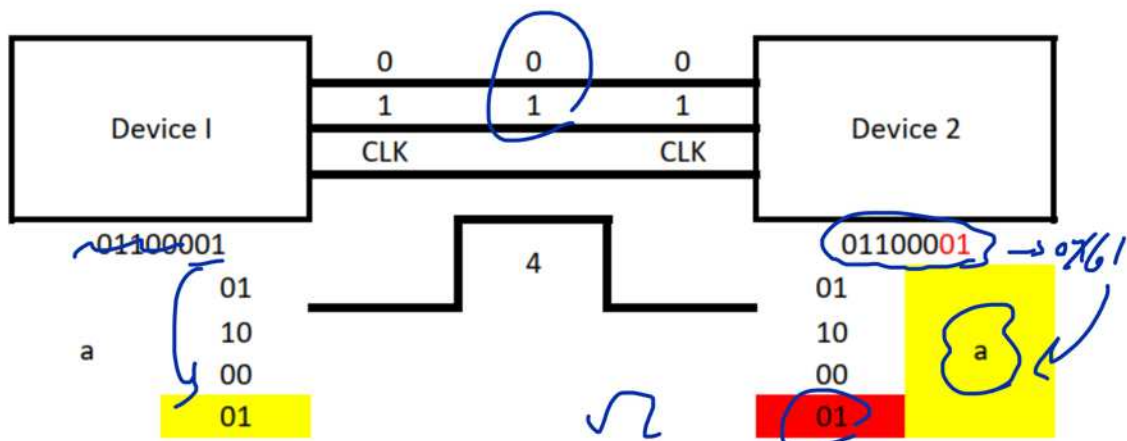
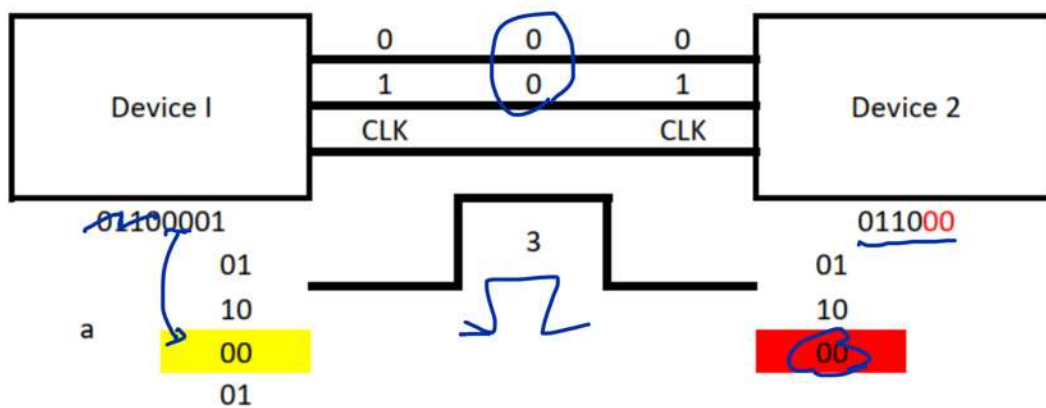
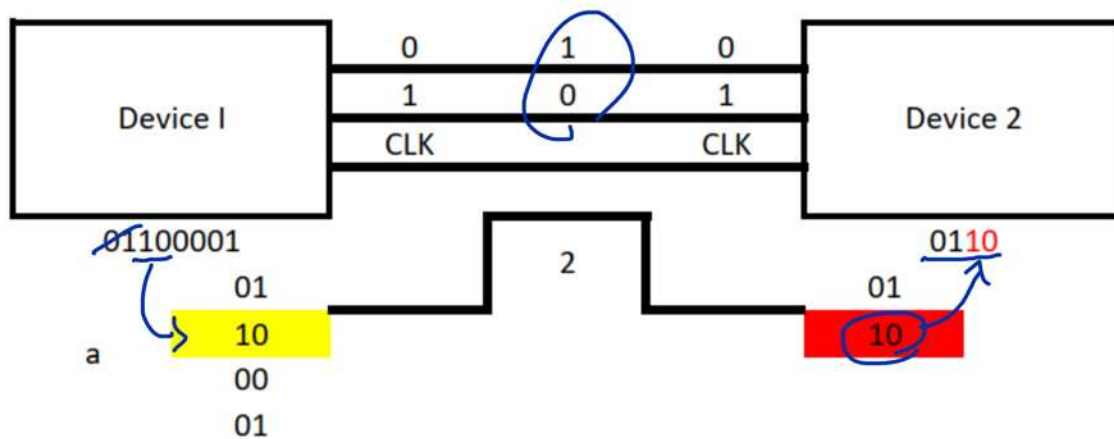
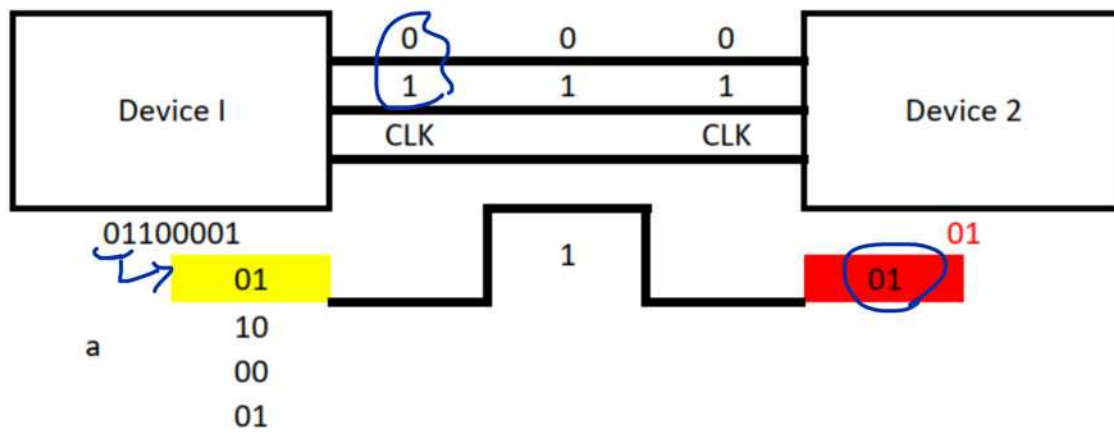


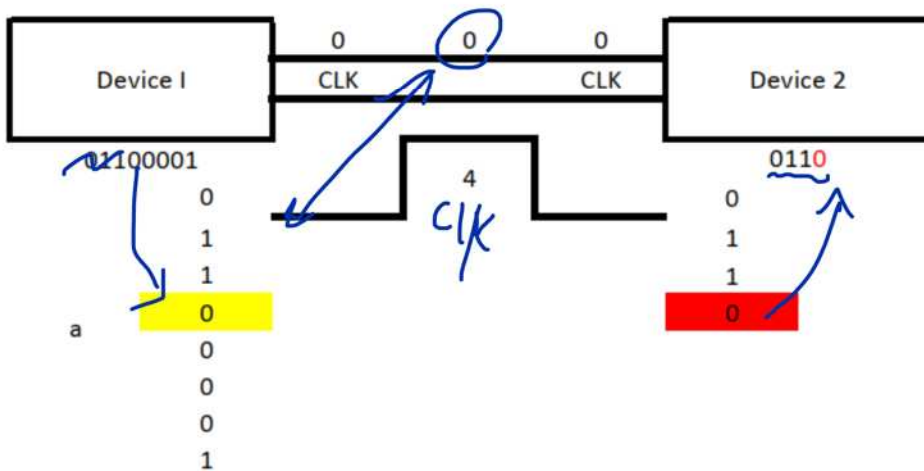
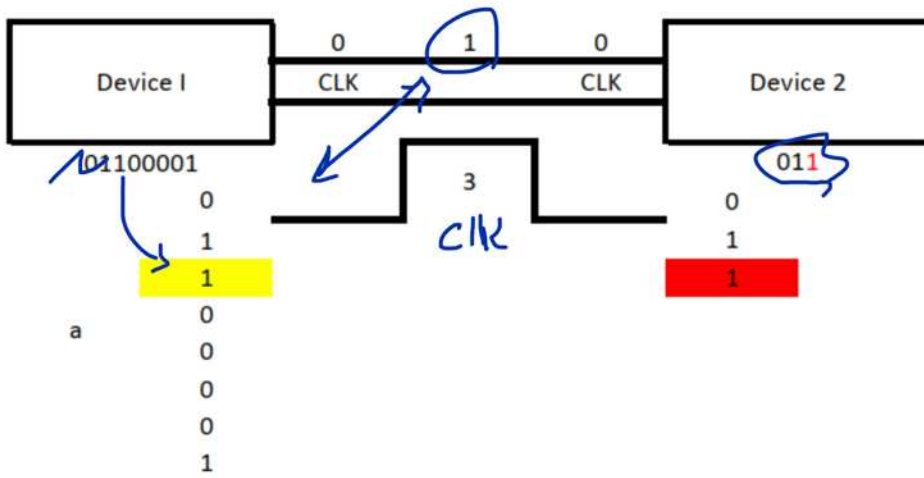
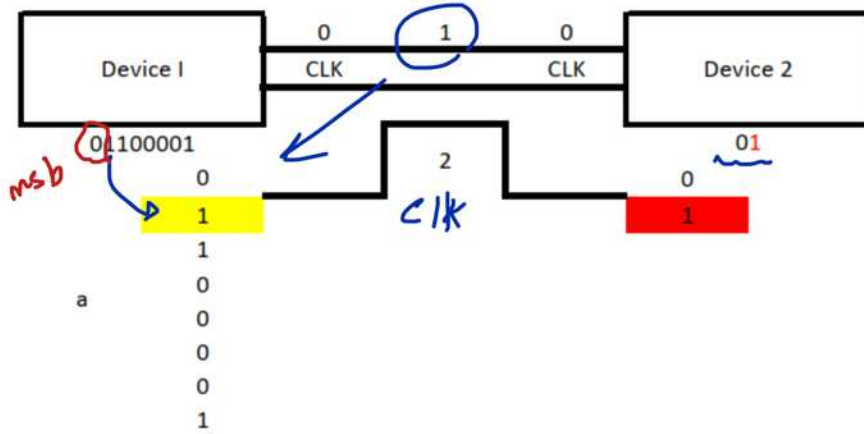
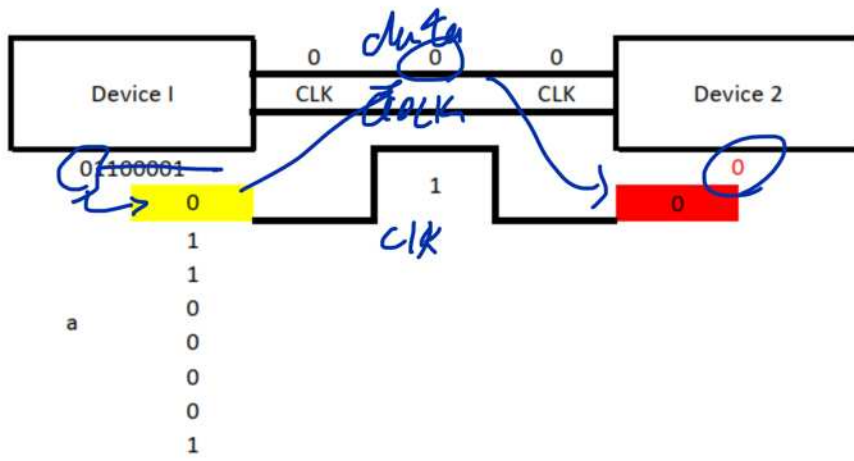
نیز

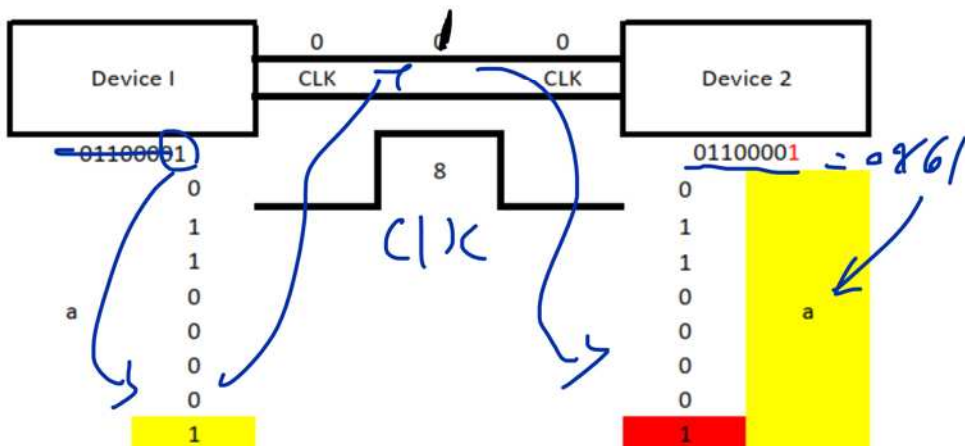
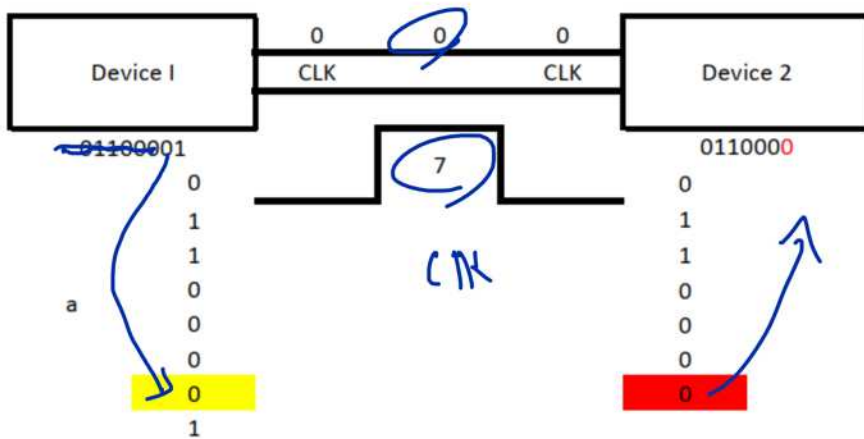
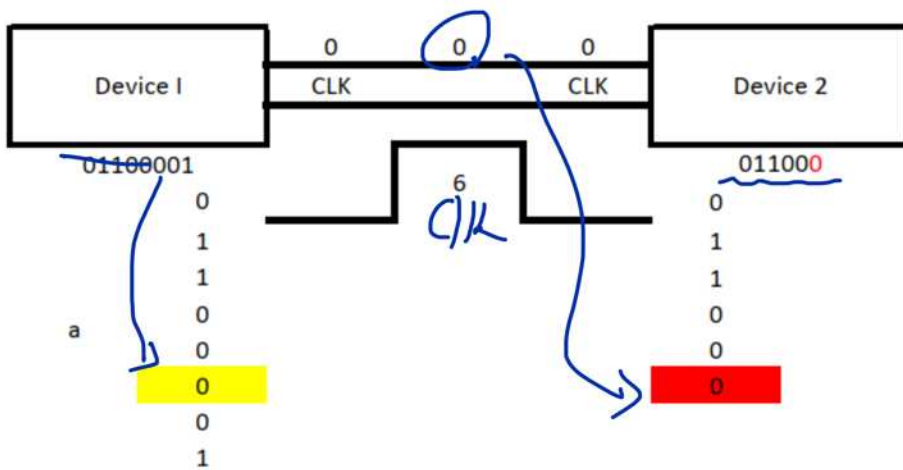
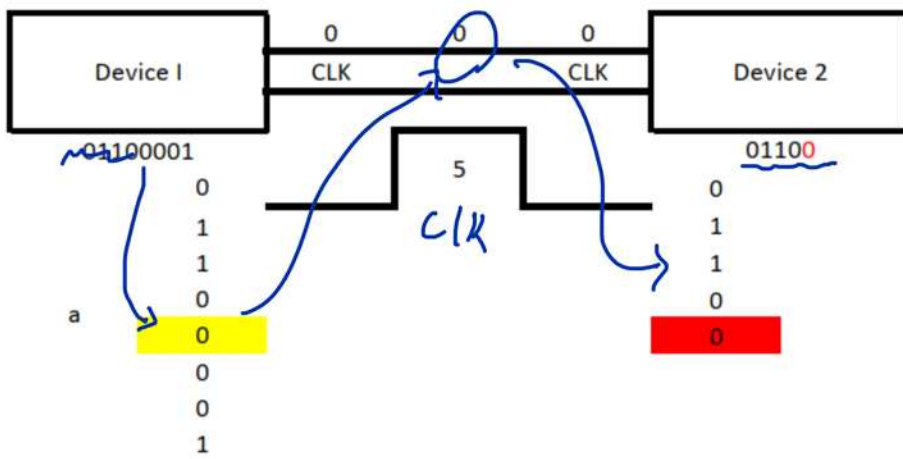
ahead

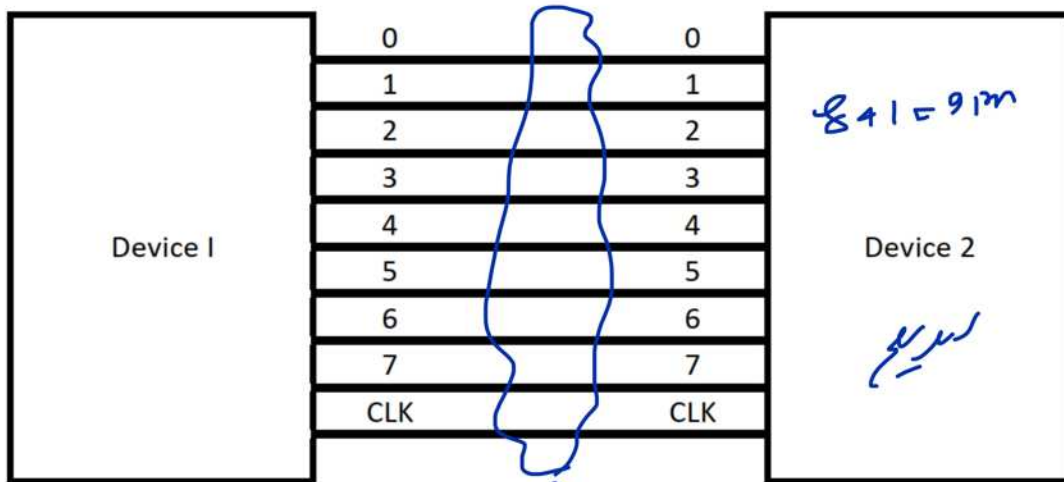


En ahead









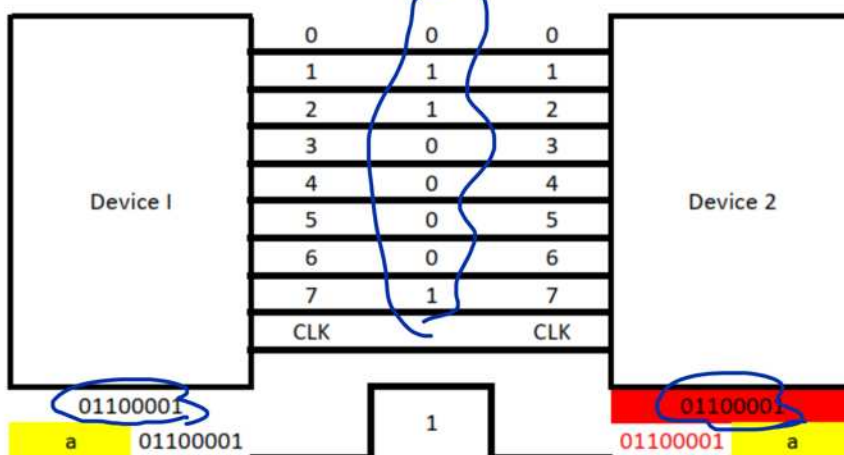
841 = 91m

سریس

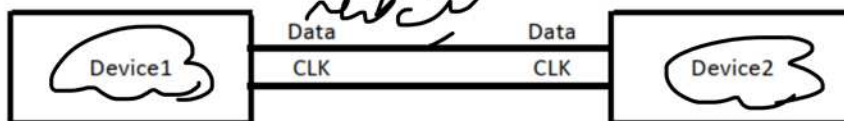


12814 = 271m

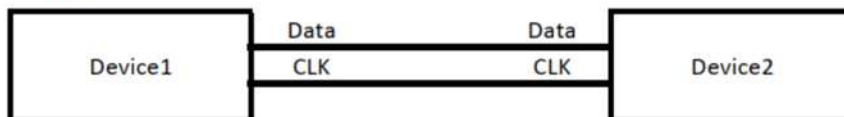
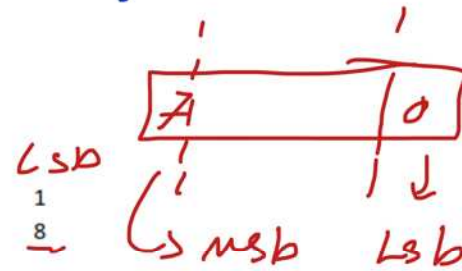
سریس



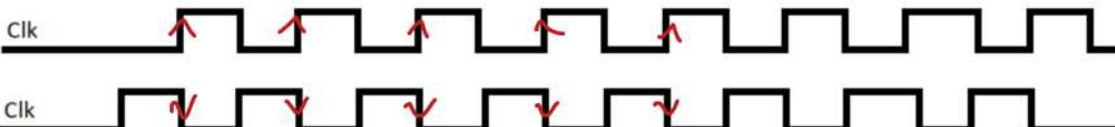
سریس



msb



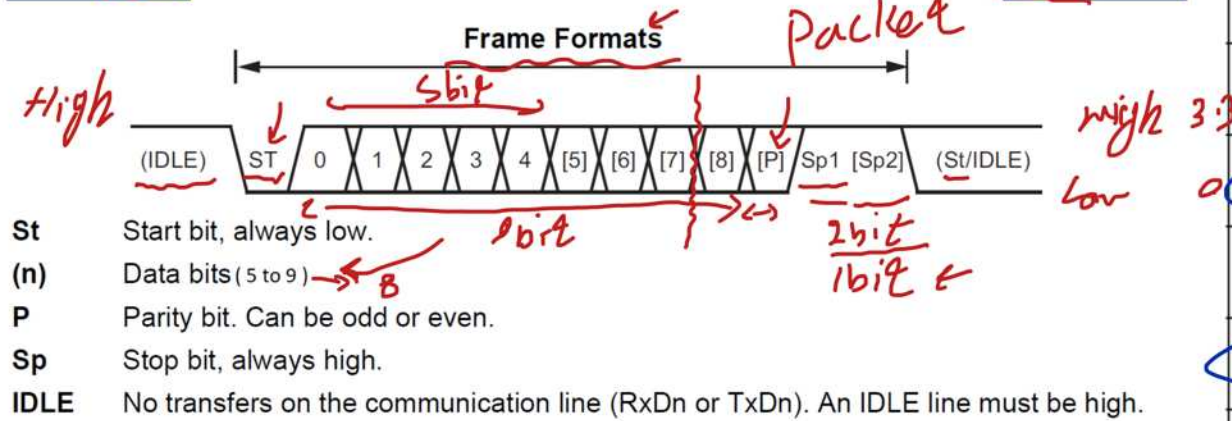
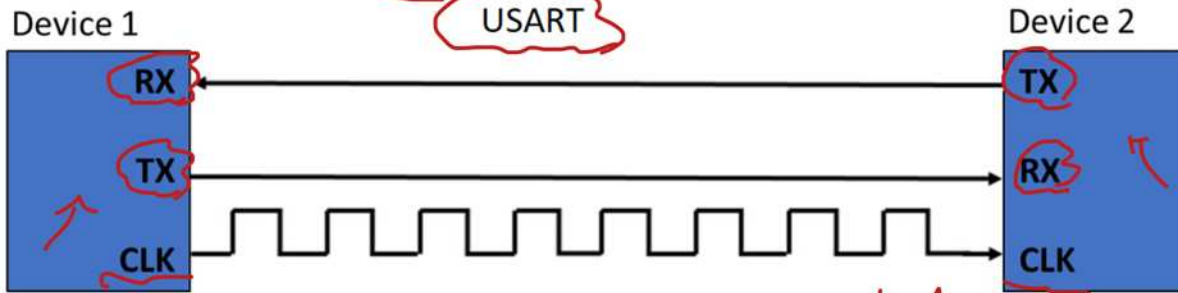
msb



msb

msb

Universal Synchronous Asynchronous Receiver Transmitter



Data $\rightarrow 8\text{bit}$
 stop bit $\rightarrow 1\text{bit}$

parity \times none
 Baud rate = 115200

Baud rate = bit rate = 9600



1 Byte = 10 bits

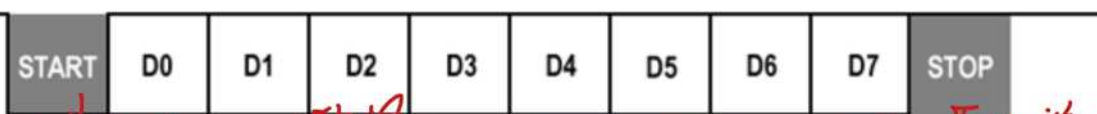
$$\frac{1}{9600} \text{ bit} \times 10 = \frac{1}{960}$$

$$\frac{1}{960} \approx 1.041 \text{ ms} \approx 1 \text{ ms}$$

Start bit
logic 0

Word data

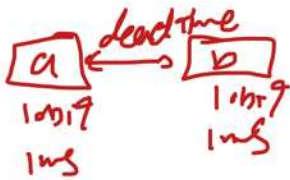
Stop bit
logic 1



1 bit \leftarrow 8 bit \rightarrow 1 bit stop 115200



Baud rate
300
600
1200
2400
4800
9600
14400
19200
28800
38400
57600
115200
230400
460800
921600
1843200
3000000
3686400



15

960 BYT (15ec)

9600

Start bit
logic 0

Word data

Stop bit
logic 1

Idle START D0 D1 D2 D3 D4 D5 D6 D7 STOP Idle

LSB first
Rising edge

LSB

baud rate = 115200

8 bit - parity

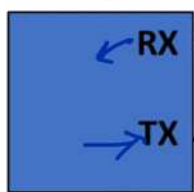
stop = 1 bit

Universal Asynchronous Receiver Transmitter

Device 1

UART

Device 2



2 pin

serial

duplex

$\frac{1}{9600} = 104\mu s$

Start bit
logic 0

Word data

Stop bit
logic 1

idle START D0 D1 D2 D3 D4 D5 D6 D7 STOP idle

High

Low

104uS 104uS 104uS 104uS 104uS 104uS 104uS 104uS 104uS 104uS

104uS 104uS 104uS 104uS 104uS 104uS 104uS 104uS 104uS 104uS

104uS 104uS 104uS 104uS 104uS 104uS 104uS 104uS 104uS 104uS

Start bit
logic 0

Word data

Stop bit
logic 1

idle Start 1 0 0 0 0 1 1 0 Stop idle

104uS 104uS 104uS 104uS 104uS 104uS 104uS 104uS 104uS 104uS

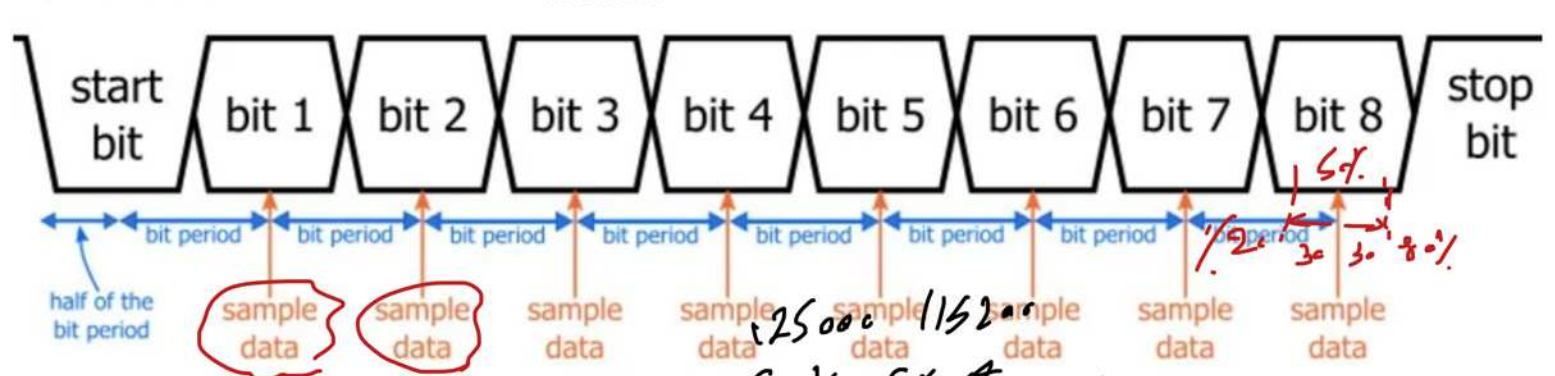
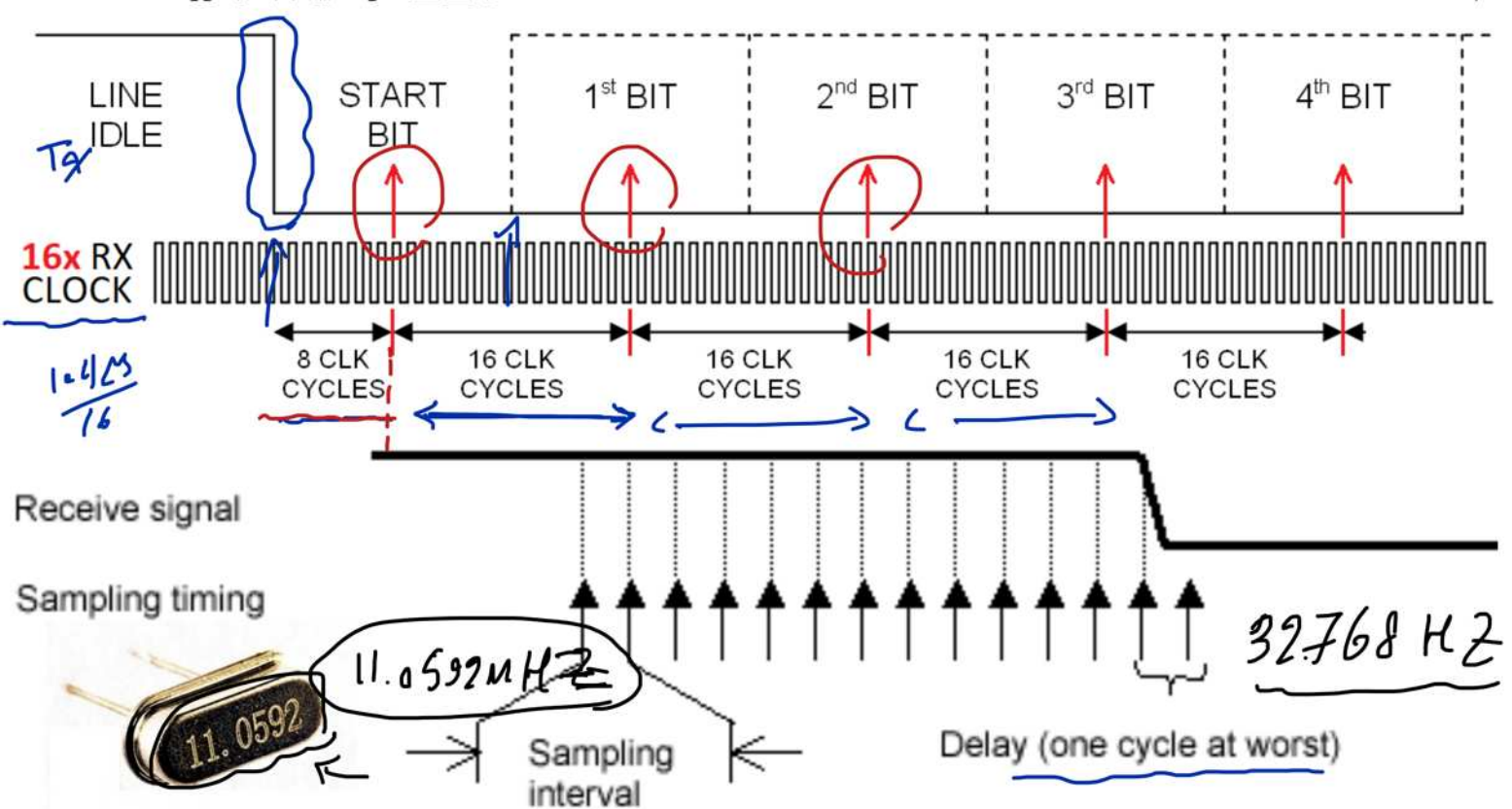
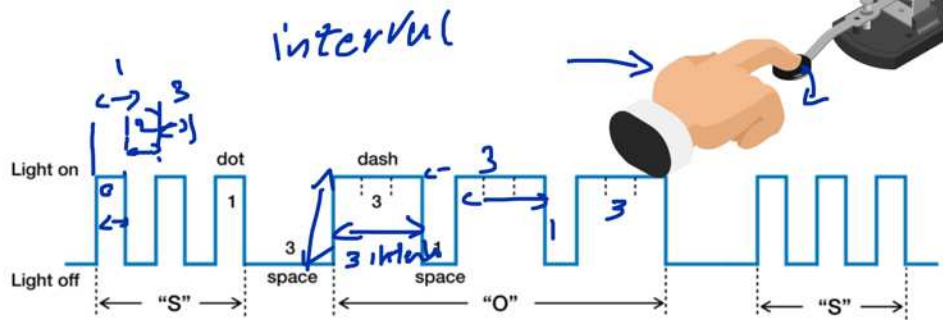
104uS 104uS 104uS 104uS 104uS 104uS 104uS 104uS 104uS 104uS

104uS 104uS 104uS 104uS 104uS 104uS 104uS 104uS 104uS 104uS

0x61 = 9

0b01100001;

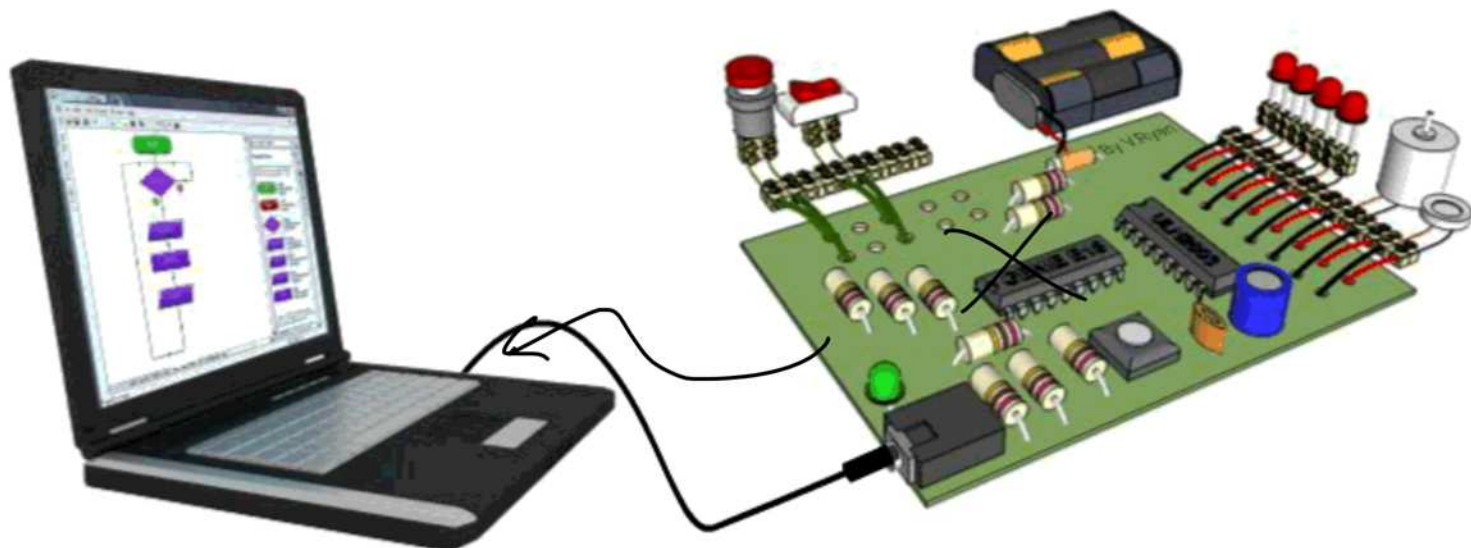
A	●—	M	—●—	Y	—●—●—
B	—●—●—	N	—●—	Z	—●—●—●—
C	—●—●—	O	—●—●—	1	—●—●—●—
D	—●—●—	P	—●—●—	2	—●—●—●—
E	—●—●—	Q	—●—●—	3	—●—●—●—
F	—●—●—	R	—●—●—	4	—●—●—●—
G	—●—●—	S	—●—●—	5	—●—●—●—
H	—●—●—	T	—●—●—	6	—●—●—●—
I	—●—●—	U	—●—●—	7	—●—●—●—
J	—●—●—	V	—●—●—	8	—●—●—●—
K	—●—●—	W	—●—●—	9	—●—●—●—
L	—●—●—	X	—●—●—	0	—●—●—●—



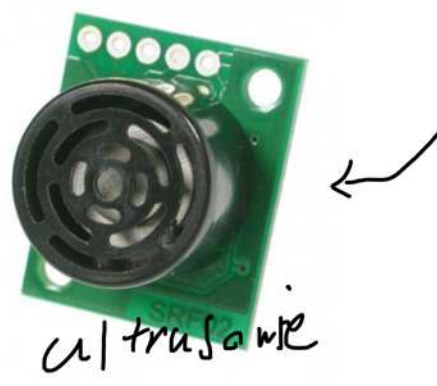
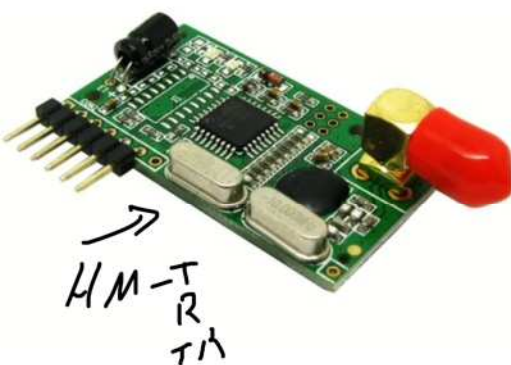
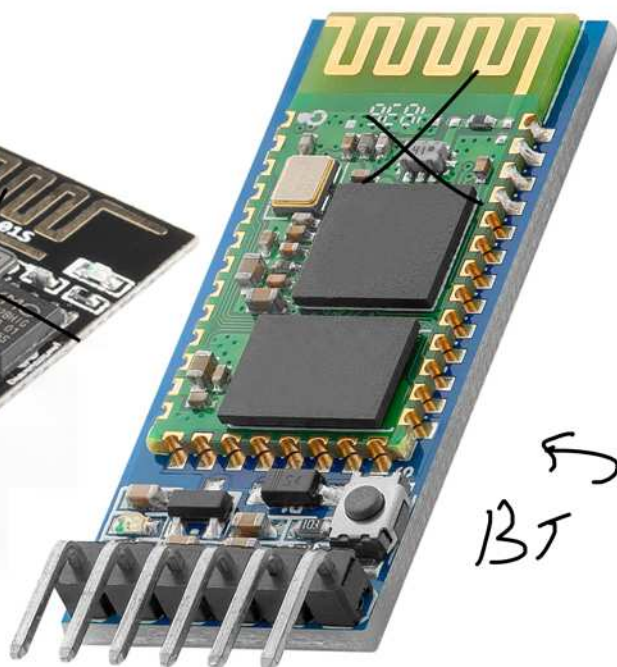
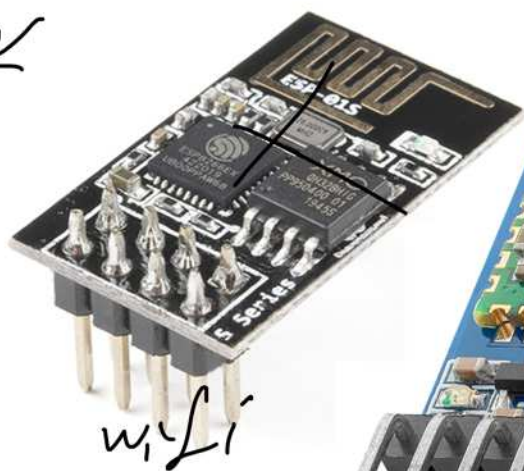
$$\text{band rate} = \frac{f_{\text{clk}}}{16(1 + \text{overhead})} \Rightarrow \frac{175200}{16(1 + 0.0768)} = 115200 \text{ baud}$$

$$\Delta t = \text{time} \left(\frac{\text{Err}}{100} \right) \Rightarrow \Delta t \leq 0.3 \text{ time}$$

$$\text{Err} \leq \frac{0.3 \times 100}{8} = 3.75\% \Rightarrow \text{Err} \leq 3.5\%$$



AT



AT Commands

AT

