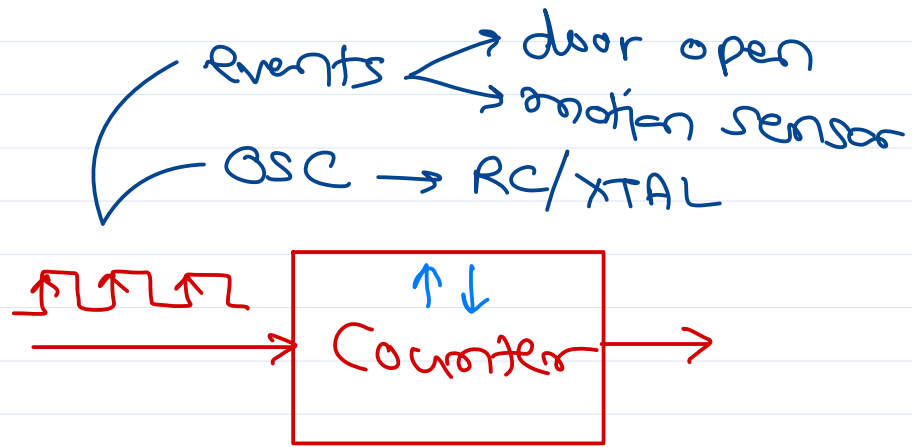


The ARM logo consists of the letters "ARM" in a bold, white, sans-serif font, followed by a registered trademark symbol (®). The logo is centered within a solid blue rectangular box.

ARM®

Advanced Micro-controllers - ARM

DESD @ Sunbeam Infotech



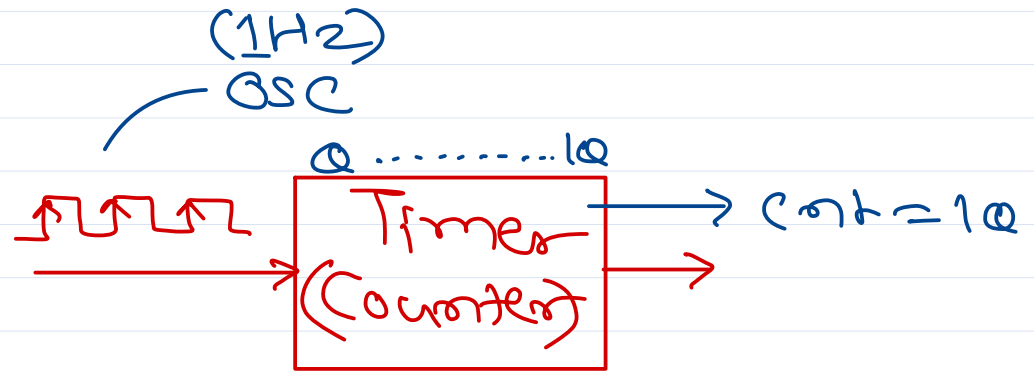
$$\text{Freq} = F \text{ Hz}$$

$$\text{Period } (T) = \frac{1}{F} \text{ sec.}$$

$$\text{Counter value} = N$$

$$\text{Time } (t) = N \times T = \frac{N}{F} \text{ sec}$$

$$t = \frac{N}{F} \times 1000 \text{ ms}$$



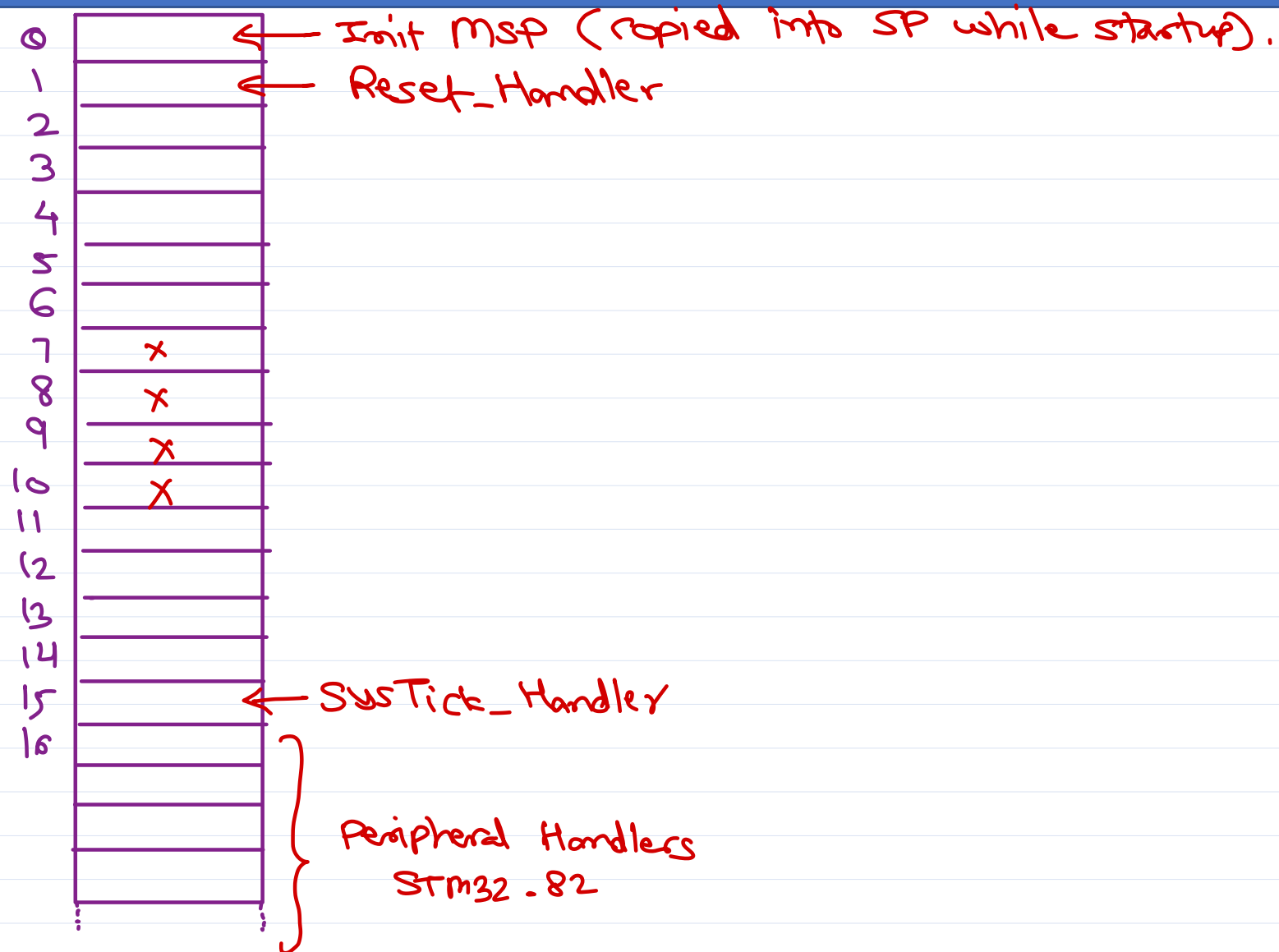
$$t = \frac{N \times PR \times 1000}{TCLK}$$

$$N = \frac{TCLK}{1000} \times \frac{t}{PR}$$

e.g. $TCLK = 1 \text{ MHz}$
 $PR = 100$
 $N = 50$
 $t = 5 \text{ ms}$



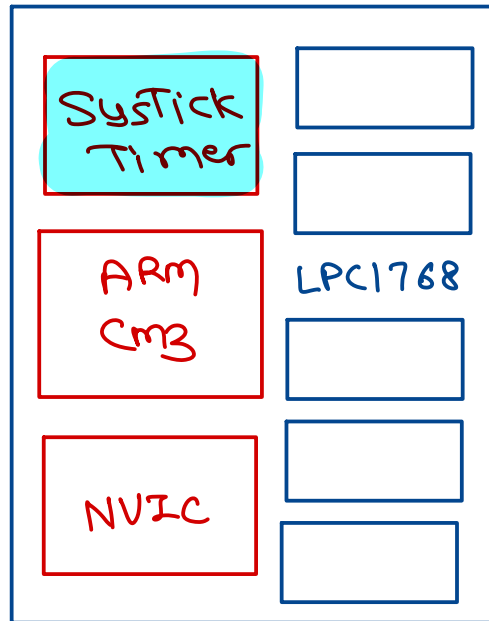
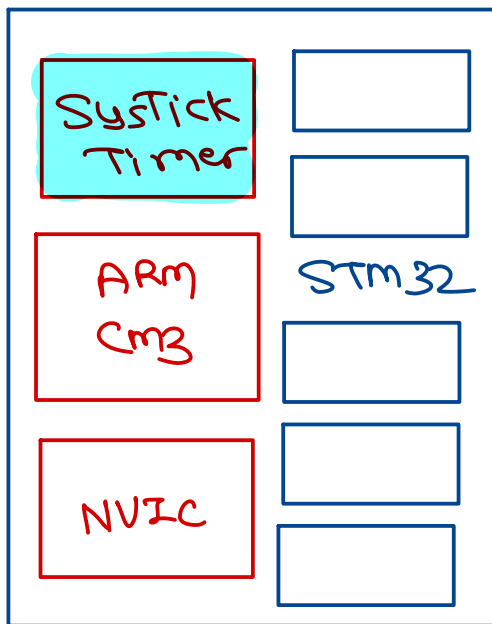
Cortex-M exception/interrupt table



SysTick Timer

- SysTick timer is tightly coupled with Cortex-M core.
- Provides portable time-base (periodic timer interrupts) for applications/embedded OS
- Exception vector (15) with programmable priority.
- 24-bit down counter that generates exception when timer counter clears.

usually 1ms or 10ms



Example: $CCLK = 25\text{ MHz}$
Period/Delay = 1ms.

$$N = \frac{CCLK}{1000} \times \frac{t}{1}$$
$$= \frac{25000000}{1000} \times \frac{1}{1} = \underline{25000}$$

vector table	
0	MSP init
1	Reset
2	
3	
4	
5	
6	
7	Reserved
8	
9	
10	
11	
12	
13	
14	
15	SysTick
16	Perf ...
:	:



SysTick Timer

- Registers (0xE000 E010)

- STCTRL

- Bit 0: Enable (1) or Disable (0)
- Bit 1: Interrupt (1) or No Intr (0)
- Bit 2: CCLK (1) or External (0)
- Bit 16: Counter flag (Count→0)

- RELOAD

- 24-bit reload value

- CURR

- Timer counter (VAL)

volatile uint32_t jiffies;

- void SysTick_Handler(void) {

jiffies++;

}

*void SysTick_Delay(uint32_t ms) {
uint32_t waituntil = jiffies + ms;
while(jiffies < waituntil);
}*

$$CCLK = 25\text{ MHz}$$

$$t = 1\text{ ms}$$

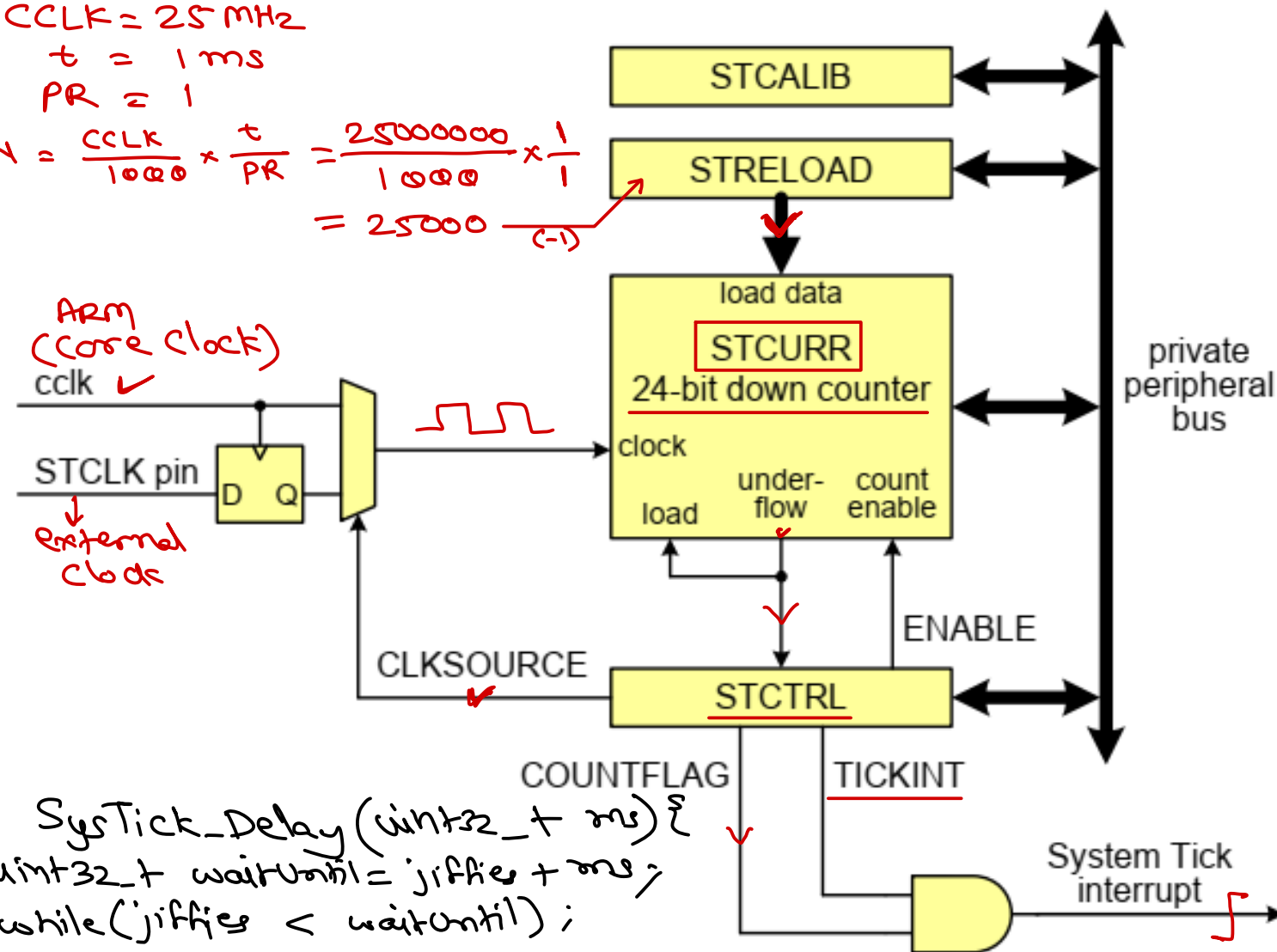
$$PR = 1$$

$$N = \frac{CCLK}{1000} \times \frac{t}{PR} = \frac{25000000}{1000} \times \frac{1}{1} = 25000$$

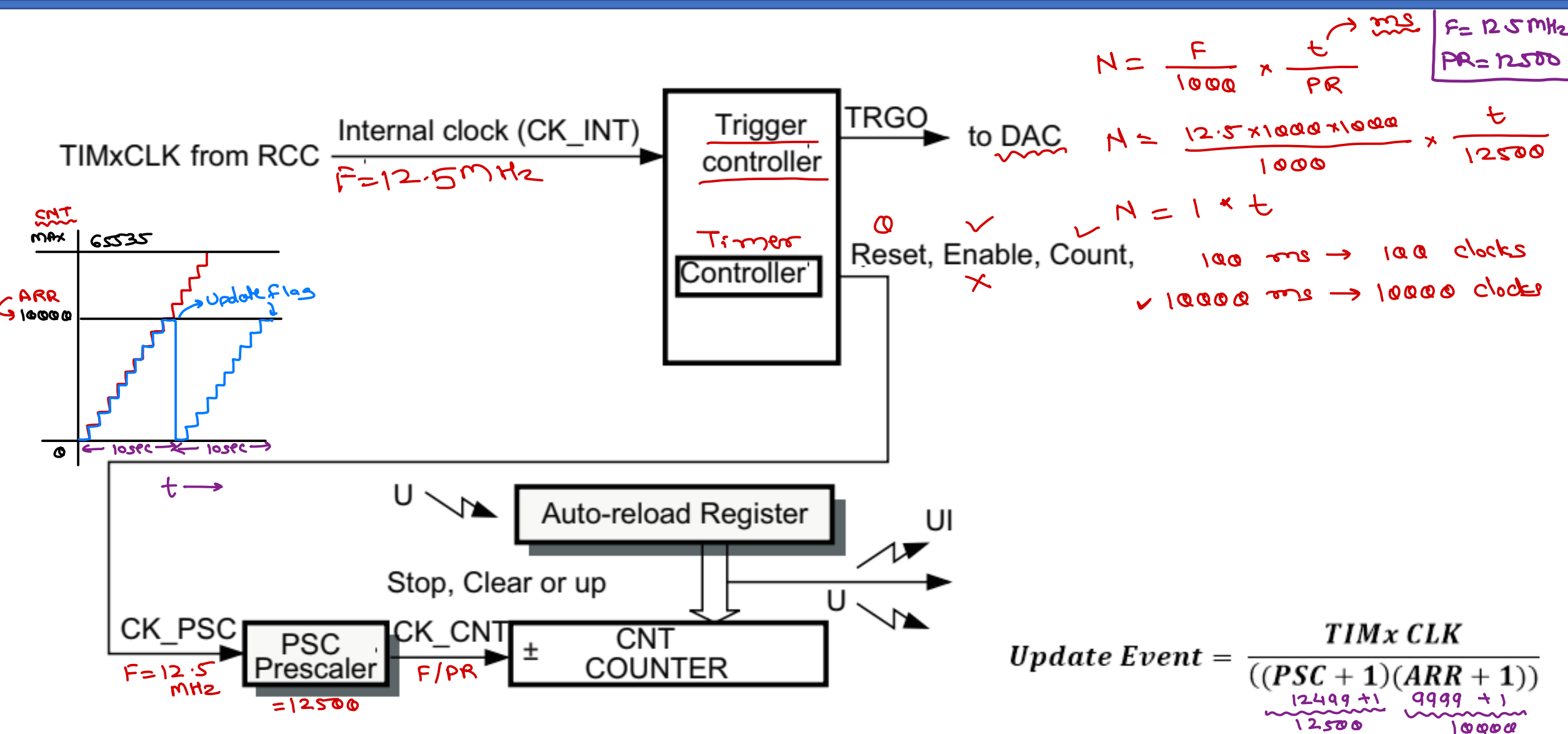
ARM (core clock)

cclk

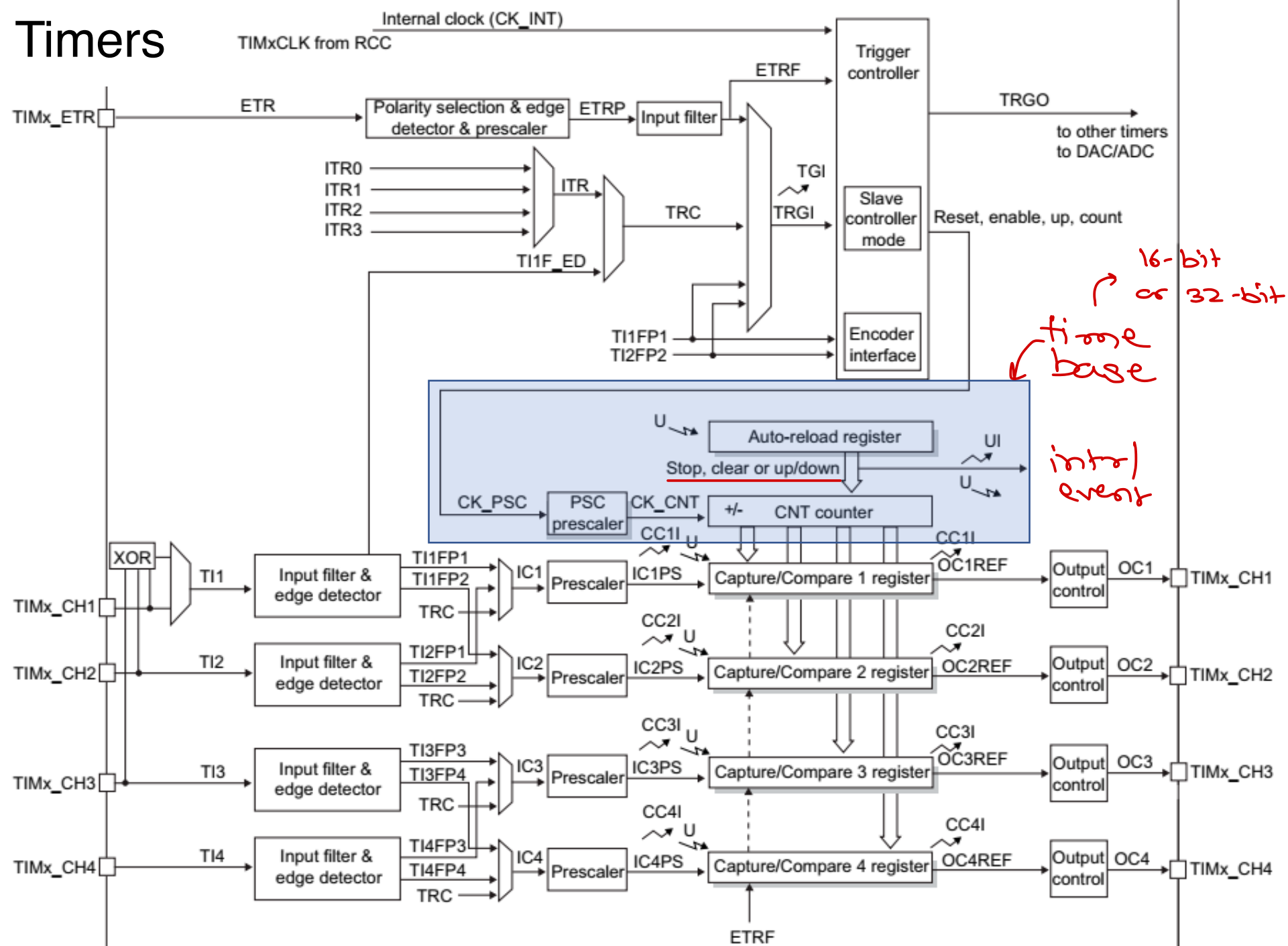
STCLK pin
external clock



Basic Timer (Tim6)

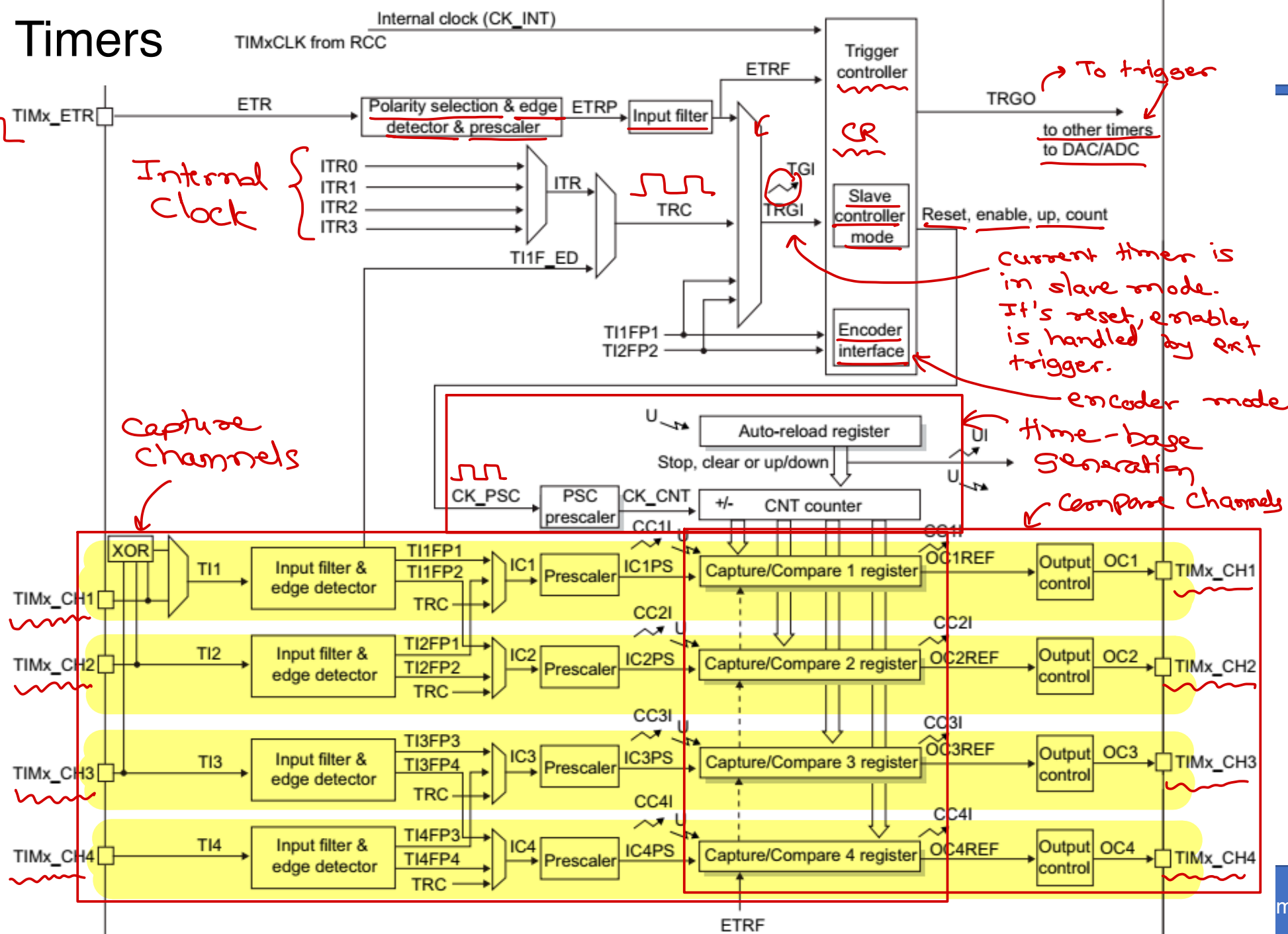


General Purpose Timers



General Purpose Timers

External clock
↓
Counter



General Purpose Timers

TCNT

MAX 65535

ARR = 5000

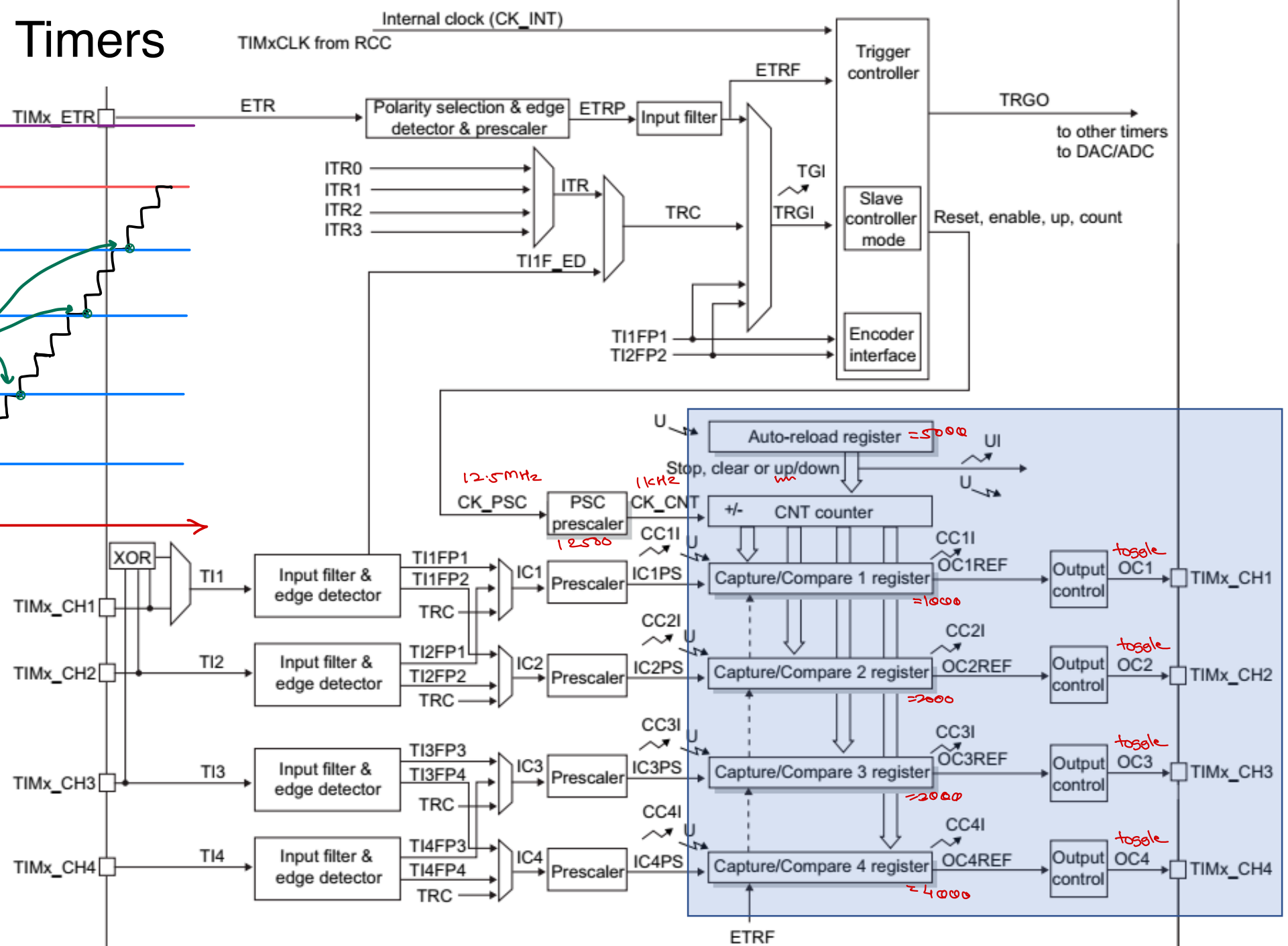
4000 CCR4

3000 CCR3

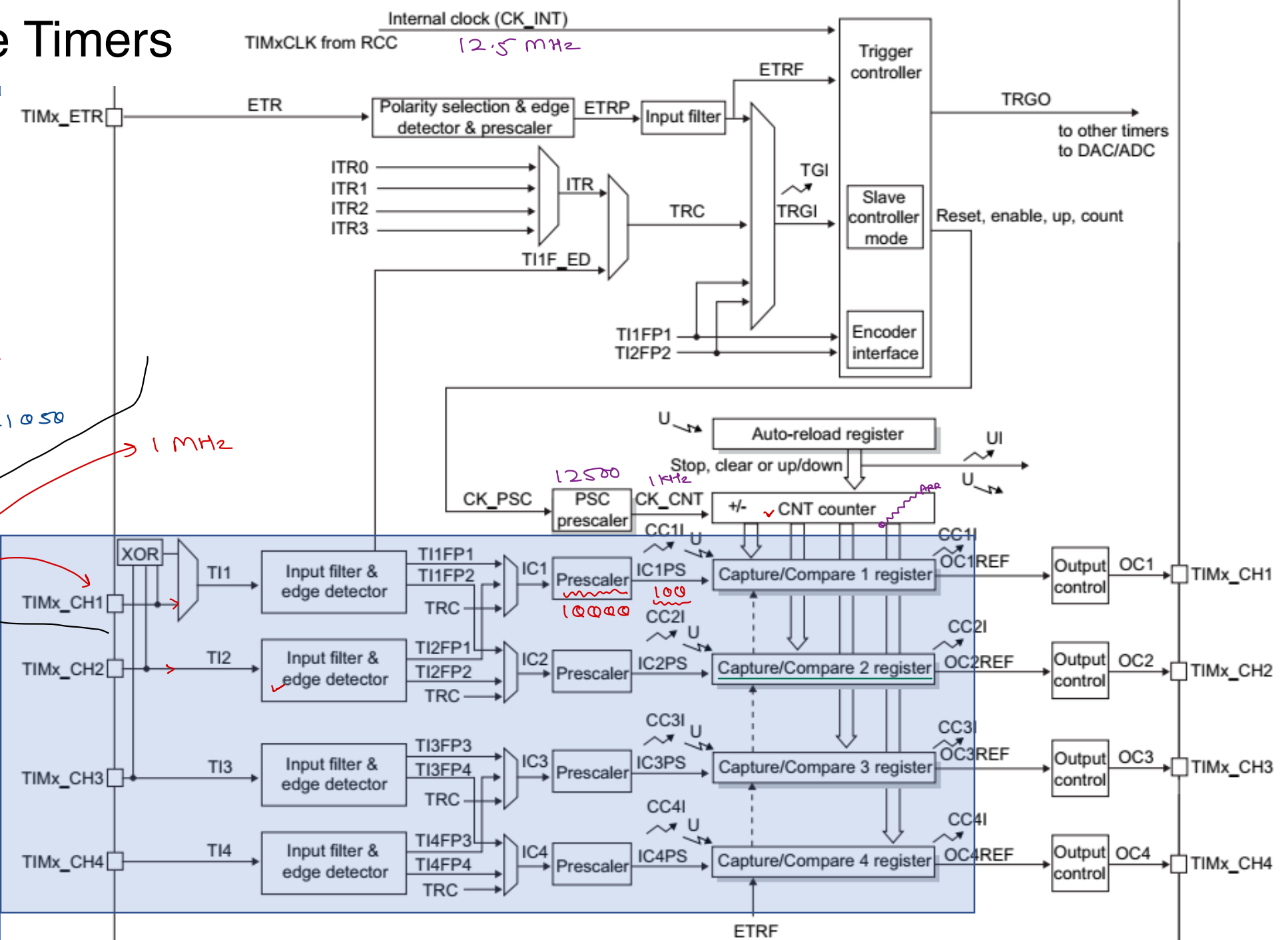
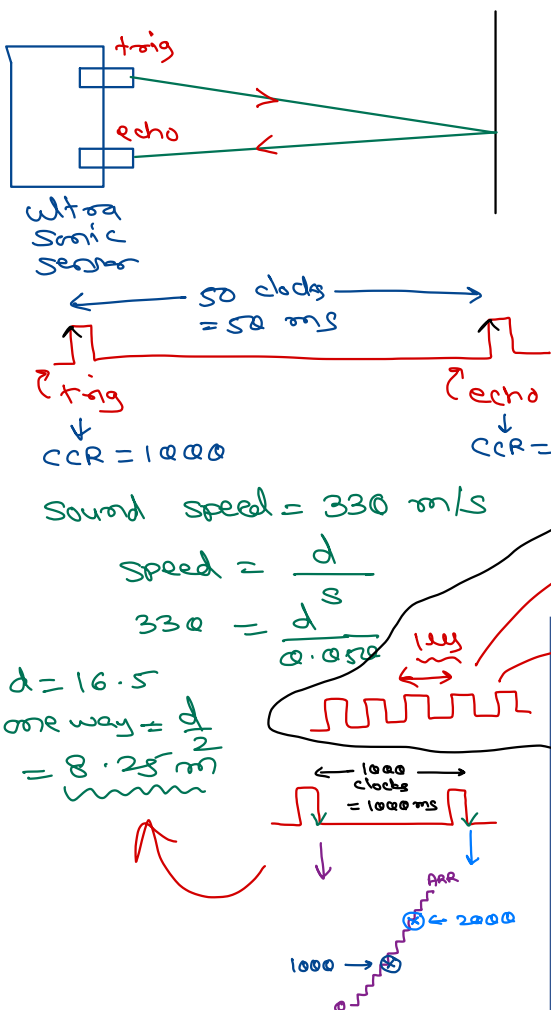
2000 CCR2

1000 CCR1

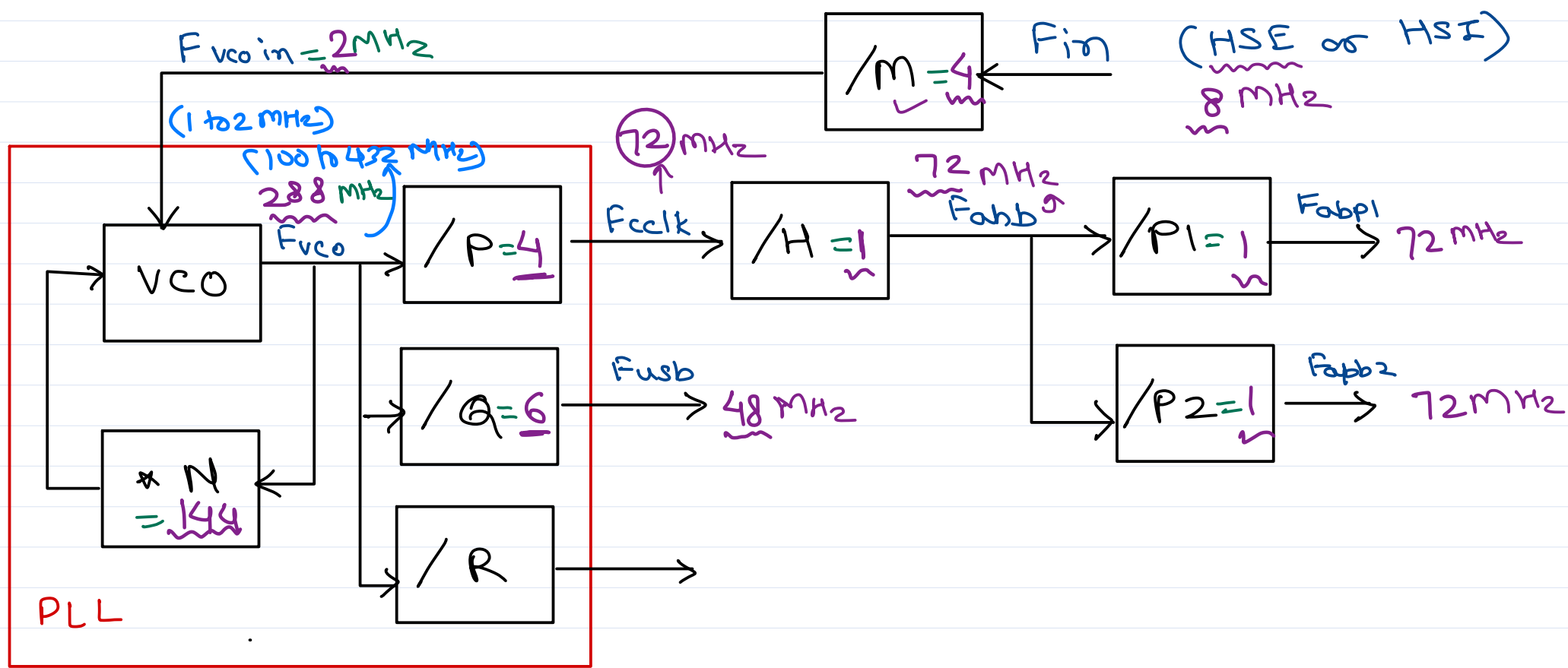
Toggle on match



General Purpose Timers



STM32 PLL 72 MHz Config





Thank you!

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