# *1. Description*

## 1.1. Project

| | |
|---|---|
| Project Name | 446_FreeOS |
| Board Name | NUCLEO-F446RE |
| Generated with: | STM32CubeMX 4.18.0 |
| Date | 12/01/2016 |

## 1.2. MCU

| | |
|---|---|
| MCU Series | STM32F4 |
| MCU Line | STM32F446 |
| MCU name | STM32F446RETx |
| MCU Package | LQFP64 |
| MCU Pin number | 64 |

# 2. Pinout Configuration

# 3. Pins Configuration

| Pin Number LQFP64 | Pin Name (function after reset) | Pin Type | Alternate Function(s) | Label |
|---|---|---|---|---|
| 1 | VBAT | Power | | |
| 2 | PC13 | I/O | GPIO_EXTI13 | B1 [Blue PushButton] |
| 3 | PC14-OSC32_IN * | I/O | RCC_OSC32_IN | |
| 4 | PC15-OSC32_OUT * | I/O | RCC_OSC32_OUT | |
| 5 | PH0-OSC_IN | I/O | RCC_OSC_IN | |
| 6 | PH1-OSC_OUT | I/O | RCC_OSC_OUT | |
| 7 | NRST | Reset | | |
| 12 | VSSA | Power | | |
| 13 | VDDA | Power | | |
| 16 | PA2 * | I/O | USART2_TX | USART_TX |
| 17 | PA3 * | I/O | USART2_RX | USART_RX |
| 18 | VSS | Power | | |
| 19 | VDD | Power | | |
| 21 | PA5 ** | I/O | GPIO_Output | LD2 [Green Led] |
| 30 | VCAP_1 | Power | | |
| 31 | VSS | Power | | |
| 32 | VDD | Power | | |
| 46 | PA13 * | I/O | SYS_JTMS-SWDIO | TMS |
| 47 | VSS | Power | | |
| 48 | VDD | Power | | |
| 49 | PA14 * | I/O | SYS_JTCK-SWCLK | TCK |
| 55 | PB3 * | I/O | SYS_JTDO-SWO | SWO |
| 60 | BOOT0 | Boot | | |
| 63 | VSS | Power | | |
| 64 | VDD | Power | | |

** The pin is affected with an I/O function

 * The pin is affected with a peripheral function but no peripheral mode is activated

# 4. Clock Tree Configuration
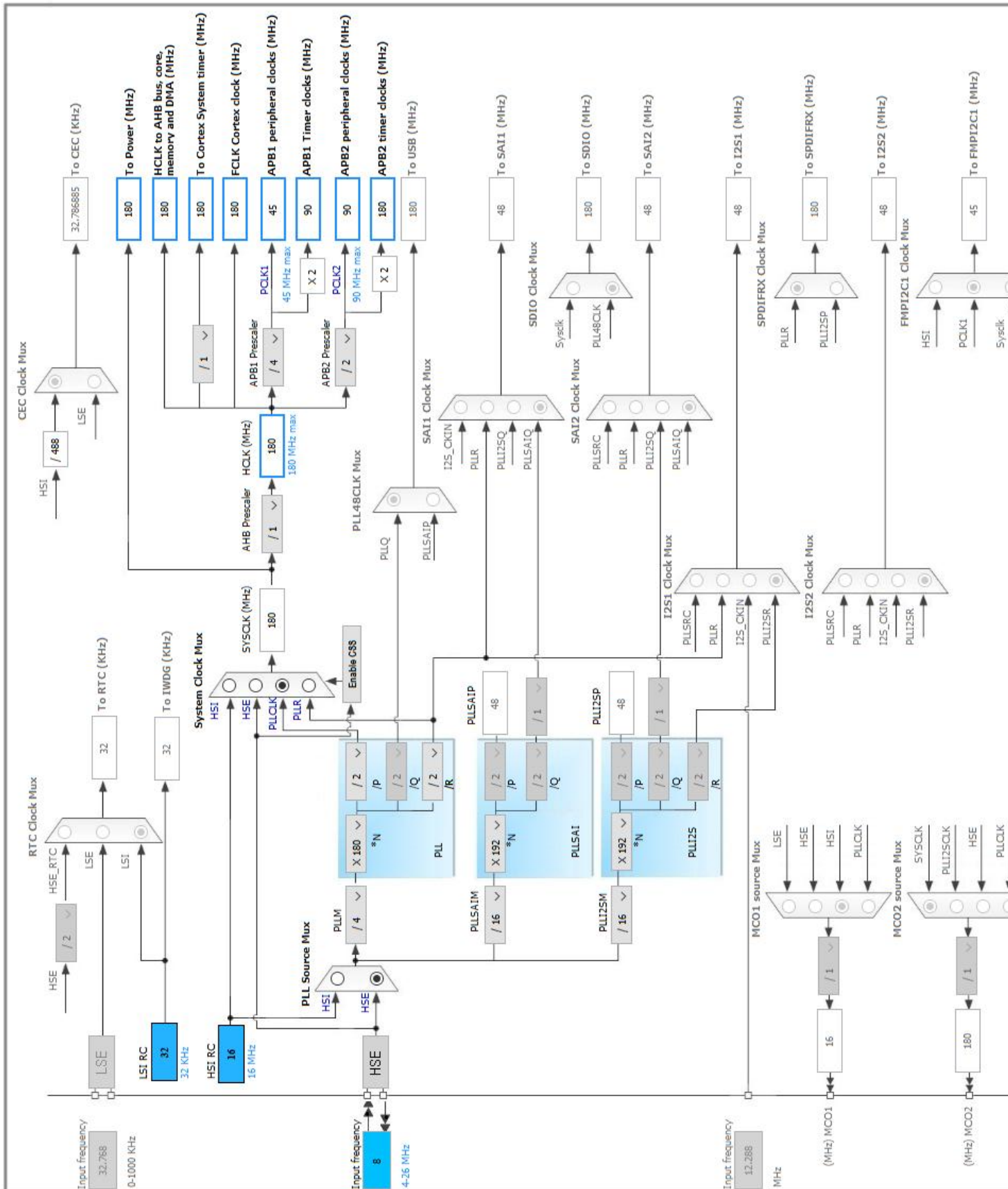
# 5. IPs and Middleware Configuration

## 5.1. RCC
**High Speed Clock (HSE): Crystal/Ceramic Resonator**

### 5.1.1. Parameter Settings:

**System Parameters:**

| | |
|---|---|
| VDD voltage (V) | 3.3 |
| Instruction Cache | Enabled |
| Prefetch Buffer | Enabled |
| Data Cache | Enabled |
| Flash Latency(WS) | 5 WS (6 CPU cycle) |

**RCC Parameters:**

| | |
|---|---|
| HSI Calibration Value | 16 |
| TIM Prescaler Selection | Disabled |
| HSE Startup Timout Value (ms) | 100 |
| LSE Startup Timout Value (ms) | 5000 |

**Power Parameters:**

| | |
|---|---|
| Power Regulatror Voltage Scale | Power Regulator Voltage Scale 1 |
| Power Over Drive | Enabled |

## 5.2. SYS
**Timebase Source: SysTick**

## 5.3. FREERTOS
**mode: Enabled**

### 5.3.1. Config parameters:

**Versions:**

| | |
|---|---|
| CMSIS-RTOS version | 1.02 |
| FreeRTOS version | 8.2.3 |

**Kernel settings:**

| | |
|---|---|
| USE_PREEMPTION | Enabled |
| CPU_CLOCK_HZ | SystemCoreClock |

| | |
|---|---|
| TICK_RATE_HZ | 1000 |
| MAX_PRIORITIES | 7 |
| MINIMAL_STACK_SIZE | 128 |
| MAX_TASK_NAME_LEN | 16 |
| USE_16_BIT_TICKS | Disabled |
| IDLE_SHOULD_YIELD | Enabled |
| USE_MUTEXES | Enabled |
| USE_RECURSIVE_MUTEXES | Disabled |
| USE_COUNTING_SEMAPHORES | Disabled |
| QUEUE_REGISTRY_SIZE | 8 |
| USE_APPLICATION_TASK_TAG | Disabled |
| TOTAL_HEAP_SIZE | 15360 |
| Memory Management scheme | heap_4 |
| USE_ALTERNATIVE_API | Disabled |
| ENABLE_BACKWARD_COMPATIBILITY | Enabled |
| USE_PORT_OPTIMISED_TASK_SELECTION | Disabled |
| USE_TICKLESS_IDLE | Disabled |
| USE_TASK_NOTIFICATIONS | Enabled |

**Hook function related definitions:**

| | |
|---|---|
| USE_IDLE_HOOK | Disabled |
| USE_TICK_HOOK | Disabled |
| USE_MALLOC_FAILED_HOOK | Disabled |
| CHECK_FOR_STACK_OVERFLOW | Disabled |

**Run time and task stats gathering related definitions:**

| | |
|---|---|
| USE_TRACE_FACILITY | Enabled |
| GENERATE_RUN_TIME_STATS | Disabled |

**Co-routine related definitions:**

| | |
|---|---|
| USE_CO_ROUTINES | Disabled |
| MAX_CO_ROUTINE_PRIORITIES | 2 |

**Software timer definitions:**

| | |
|---|---|
| USE_TIMERS | Disabled |
| TIMER_TASK_PRIORITY | 2 |
| TIMER_QUEUE_LENGTH | 10 |
| TIMER_TASK_STACK_DEPTH | 256 |

**Interrupt nesting behaviour configuration:**

| | |
|---|---|
| LIBRARY_LOWEST_INTERRUPT_PRIORITY | 15 |
| LIBRARY_MAX_SYSCALL_INTERRUPT_PRIORITY | 5 |

## 5.3.2. Include parameters:

**Include definitions:**

| | |
|---|---|
| vTaskPrioritySet | Enabled |
| uxTaskPriorityGet | Enabled |
| vTaskDelete | Enabled |
| vTaskCleanUpResources | Disabled |
| vTaskSuspend | Enabled |
| vTaskDelayUntil | Disabled |
| vTaskDelay | Enabled |
| xTaskGetSchedulerState | Enabled |
| xTaskResumeFromISR | Enabled |
| xQueueGetMutexHolder | Disabled |
| xSemaphoreGetMutexHolder | Disabled |
| pcTaskGetTaskName | Disabled |
| uxTaskGetStackHighWaterMark | Disabled |
| xTaskGetCurrentTaskHandle | Disabled |
| eTaskGetState | Disabled |
| xEventGroupSetBitFromISR | Disabled |
| xTimerPendFunctionCall | Disabled |

**\* User modified value**

# 6. System Configuration

## 6.1. GPIO configuration

| IP | Pin | Signal | GPIO mode | GPIO pull/up pull down | Max Speed | User Label |
|---|---|---|---|---|---|---|
| RCC | PH0-OSC_IN | RCC_OSC_IN | n/a | n/a | n/a | |
| | PH1-OSC_OUT | RCC_OSC_OUT | n/a | n/a | n/a | |
| Single Mapped Signals | PC14-OSC32_IN | RCC_OSC32_IN | n/a | n/a | n/a | |
| | PC15-OSC32_OUT | RCC_OSC32_OUT | n/a | n/a | n/a | |
| | PA2 | USART2_TX | Alternate Function Push Pull | No pull-up and no pull-down | **Very High** * | USART_TX |
| | PA3 | USART2_RX | Alternate Function Push Pull | No pull-up and no pull-down | **Very High** * | USART_RX |
| | PA13 | SYS_JTMS-SWDIO | n/a | n/a | **n/a** | TMS |
| | PA14 | SYS_JTCK-SWCLK | n/a | n/a | **n/a** | TCK |
| | PB3 | SYS_JTDO-SWO | n/a | n/a | **n/a** | SWO |
| GPIO | PC13 | GPIO_EXTI13 | **External Event Mode with Rising edge trigger detection *** | No pull-up and no pull-down | n/a | B1 [Blue PushButton] |
| | PA5 | GPIO_Output | Output Push Pull | No pull-up and no pull-down | Low | LD2 [Green Led] |

## 6.2. DMA configuration

nothing configured in DMA service

## *6.3. NVIC configuration*

| Interrupt Table | Enable | Preenmption Priority | SubPriority |
|---|---|---|---|
| Non maskable interrupt | true | 0 | 0 |
| Hard fault interrupt | true | 0 | 0 |
| Memory management fault | true | 0 | 0 |
| Pre-fetch fault, memory access fault | true | 0 | 0 |
| Undefined instruction or illegal state | true | 0 | 0 |
| System service call via SWI instruction | true | 0 | 0 |
| Debug monitor | true | 0 | 0 |
| Pendable request for system service | true | 15 | 0 |
| System tick timer | true | 15 | 0 |
| PVD interrupt through EXTI line 16 | unused | | |
| Flash global interrupt | unused | | |
| RCC global interrupt | unused | | |
| FPU global interrupt | unused | | |

**\* User modified value**

# *7. Power Consumption Calculator report*

7.1. Microcontroller Selection

| | |
|---|---|
| Series | STM32F4 |
| Line | STM32F446 |
| MCU | STM32F446RETx |
| Datasheet | 027107_Rev5 |

7.2. Parameter Selection

| | |
|---|---|
| Temperature | 25 |
| Vdd | null |

# *8. Software Project*

## 8.1. Project Settings

| Name | Value |
|---|---|
| Project Name | 446_FreeOS |
| Project Folder | C:\Users\sohae\Desktop\STM32F446RET6_HAL\446_FreeOS |
| Toolchain / IDE | TrueSTUDIO |
| Firmware Package Name and Version | STM32Cube FW_F4 V1.14.0 |

## 8.2. Code Generation Settings

| Name | Value |
|---|---|
| STM32Cube Firmware Library Package | Copy only the necessary library files |
| Generate peripheral initialization as a pair of '.c/.h' files | No |
| Backup previously generated files when re-generating | No |
| Delete previously generated files when not re-generated | Yes |
| Set all free pins as analog (to optimize the power consumption) | No |