# STM32 UART BOOTLOADER IAP

1. **Test Board STM32F4-Discover**

**Board: STM32F4-DISCOVER**

**Chip: STM32F407VGT6**

**Environment: Keil uVersion5**

|  |  |  |
| --- | --- | --- |
| **Function** | **Description** | **Progressing** |
| **UART Send** | **Using UART send ACK command.** | **Finish** |
| **UART Receive** | **Using UART receive \*.bin file.** | **Finish** |
| **Flash Program** | **Write \*.bin file to assign address.** | **Finish** |
| **Jump and Execution** | **Jump to given address and execute application program.** | **Finish** |
| **Simple IAP** | **Receive \*.bin file and write to flash. Then jump to execution.** | **Finish** |

**Note**

1. Keil uVersion5 write \*.hex file :

**MDK-Arm st-link tool default loading \*.axf to flash, if you need write \*.hex file, you should download stm32 st-link usb dirver and st-link utility tool and bind bin\\*.exe.**

* 1. **MDK-ARM: Option->Utilies 選擇"USE Extrtnal tool for flash Programming"**
  2. **Command: C:\Program Files (x86)\STMicroelectronics\STM32 ST-LINK Utility\ST-LINK Utility\ST-LINK\_CLI.exe**
  3. **Arguments: -c SWD -p "$H@H.hex" -Rst -Run**

1. \*.hex to \*.bin:

arm-none-eabi-objcopy -I ihex -O binary \*.hex \*.bin

1. **HMI CanIO Board**

**Board: CanIO-V4**

**Chip: STM32F107VCT6**

**Environment: Keil uVersion5**

|  |  |  |
| --- | --- | --- |
| **Function** | **Description** | **Progressing** |
| **UART Send** | **Using UART send ACK command.** | **Debugging** |
| **UART Receive** | **Using UART receive \*.bin file.** | **-** |
| **Flash Program** | **Write \*.bin file to assign address.** | **-** |
| **Jump and Execution** | **Jump to given address and execute application program.** | **-** |
| **Simple IAP** | **Receive \*.bin file and write to flash. Then jump to execution.** | **-** |

**Note**

1. **UART IAP Protocol**

* Boot loader
* App execute

Figure 1. Boo loader Code Sequence with USART

No

Yes

Receive command?

Yes

App execute

No

Yes

Jump to App Address

Run App

Set update flag

Update command

Go command routine

Is update flag set?

Yes

No

Command

Is GO command?

Table 1.Memory mapping of boot loader

|  |  |  |
| --- | --- | --- |
|  | Start Address | End Address |
| Bootloader | 0x0800 0000 | 0x0800 FFFF |
| App | 0x0801 0000 | 0x0803 F7FF |
| State | 0x0803 F800 |  |
| Update |  | 0x0803 FFFF |

State and update flag

Commands

* Get Version: *get boot loader version.*
* Get ID: *get chip ID*
* Read Memory:
* Go: *jump to app.*
* Write Memory:
* Erase:
* Set Command : *reset*.
* Update: *need update firmware after restart.*

Command code:

|  |  |  |
| --- | --- | --- |
| Command | Command code | Command description |
| Get Version | 0x01 | Gets the version of boot loader. |
| Get ID | 0x02 | Gets the chip ID |
| Read Memory | 0x11 | Reads up to 256 bytes of memory starting from an address specified by the application |
| Go | 0x21 | Jumps to user application and executes it. |
| Write Memory | 0x31 | Writes up to 256 bytes of memory to the RAM of flash starting from an address specified by the application. |
| Erase | 0x43 | Erases from one to all the flash memory pages. |
| Set Command | 0x63 | Reset command |
| Update | 0x83 | Sets update flag. |

*\*Each packet is either accepted (ACK answer) or discarded (NACK answer):*

*•* ***ACK = 0x79*** *•* ***NACK = 0x1F***

**Command Type:**

Command-type (2+13+5 bytes = 20bytes)

Data-type (2+6+1024+5bytes = 1037bytes)

Host <-> Device : H->D 0x2\_ ; D->H 0x8\_

**Ex: H->D C-type: 0x2C ; D->H D-type: 0x8D**