GigaDevice Semiconductor Inc.

Arm® Cortex®-M3/4/33 32-bit MCU

Application Note
AN034

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1.   Introduction

In many application scenarios, it is necessary to update the program to upgrade the functions or fix the known problems. A lot of communication protocols can be used for IAP (in application programming). USB can be used as device and host, and both can be used for IAP. The USB host IAP can be realized without the assistance of the upper computer and only with a mobile storage device (such as USB flash disk). The other communication protocols do not have this advantage.

2.   Description of USB Host IAP

2.1.   File introduction

In addition to the files contained in the library, the USB host IAP routine contains the following files:

Table 2-1 Files contained in USB Host IAP

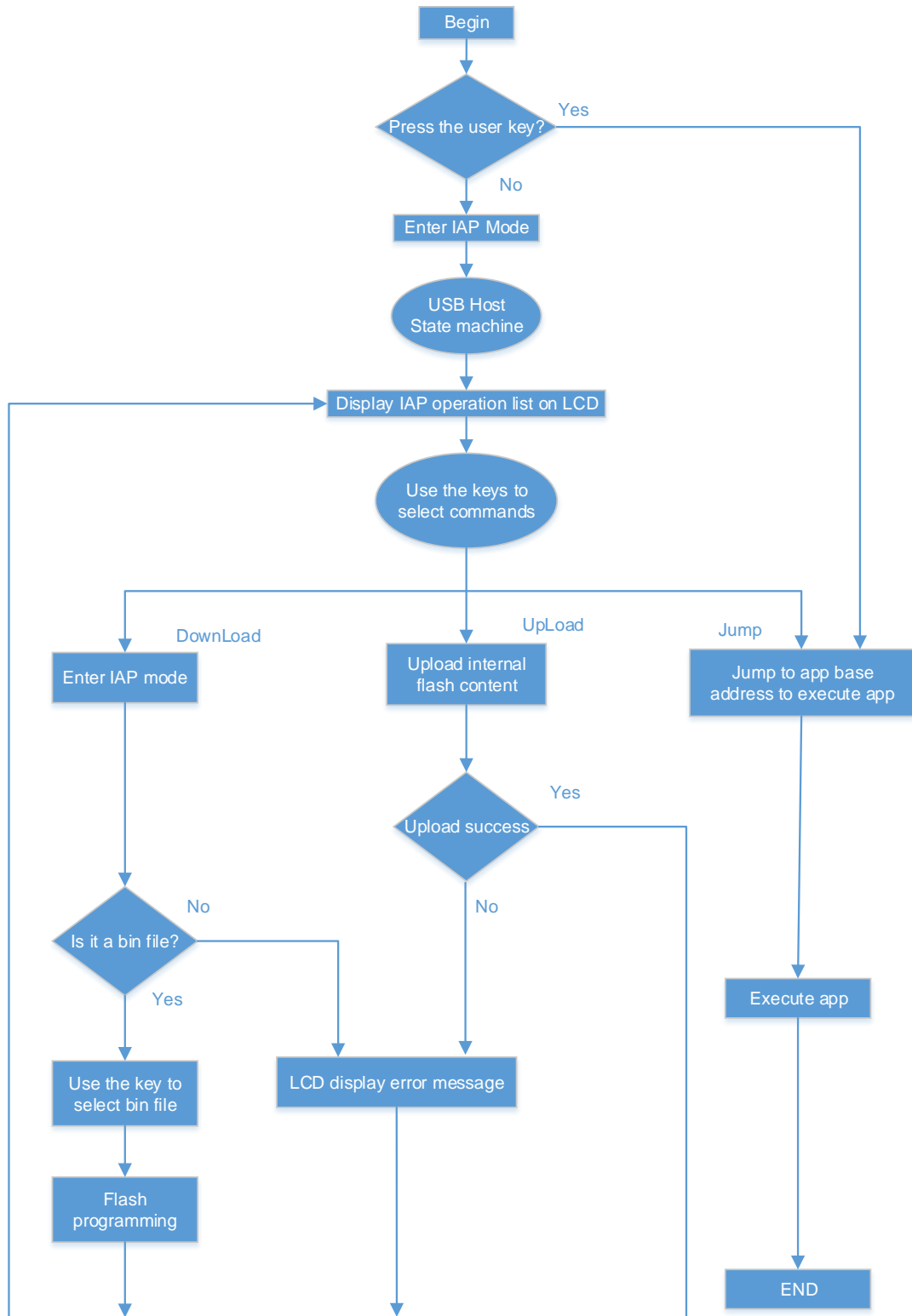| File Name	Function description
main.c	Including initialization of USB host, execution of host state machine, and judgment of whether to enter IAP mode
usbh_usr.c	Including user callback interface and LCD display data
gd32f4xx_it.c	Include interrupt service routine
command.c	Including commands implemented by IAP (download, upload, jump)
flash_layer.c	Flash operate

2.2.   Instruction for use

Using GD USB host IAP routine, after compilation, you can download it to the corresponding development board through JLINK or GDlink, or generate a bin file and download it through ISP.

After downloading to the development board, you can see the corresponding information on the LCD screen and operate according to the prompts on the LCD. In addition, a USB flash disk is needed to copy the bin file.

After the chip is powered on, the IAP code is executed by default. If the APP code has been successfully downloaded, you can enter the APP by pressing the User key when powered on. After entering the IAP code, you can also jump to the APP through the jump command.

The execution process of IAP program is shown in the following figure:

Figure 2-1 IAP execution process

Begin

Press the user key?

Yes

No

Enter IAP Mode

USB Host State machine

Display IAP operation list on LCD

Use the keys to select commands

DownLoad

UpLoad

Jump

Enter IAP mode

Upload internal flash content

Jump to app base address to execute app

Upload success

Yes

No

Is it a bin file?

No

Yes

Execute app

Use the key to select bin file

LCD display error message

Flash programming

END

3. User define

User can define the starting address of the APP. The specific configuration options are as follows:

1. In the IAP program, set the page size, flash size, IAP space size and the starting address of APP program.

```
#define PAGE_SIZE            ((uint16_t)0x800)     /* 2K Bytes */
#define FLASH_SIZE           ((uint32_t)0x300000)  /* 3M Bytes */
#define IAP_SIZE             ((uint32_t)0x20000)   /* 128K Bytes
as IAP size */
#define APPLICATIONADDRESS   ((uint32_t)0x08020000)  /* User
start code space */
```
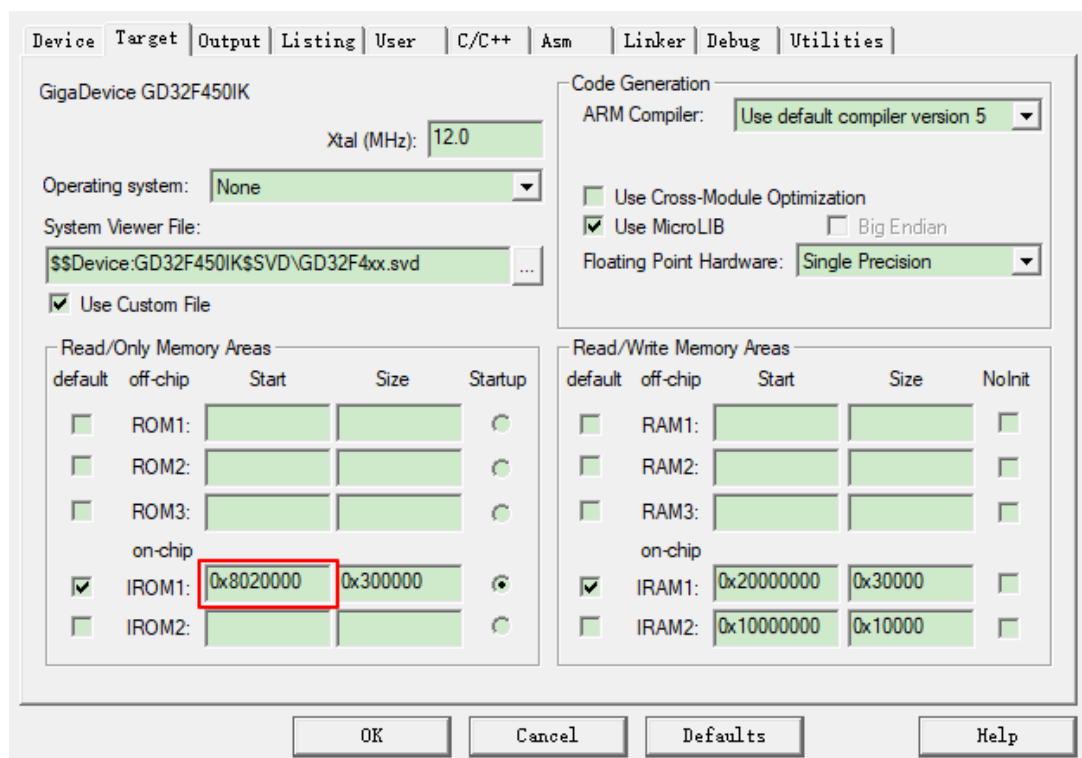
2. Set flash start address and interrupt vector offset address in APP program:

Add the interrupt vector offset at the beginning of the main function as follows:

```
nvic_vector_table_set(NVIC_VECTTAB_FLASH,0x20000);
```
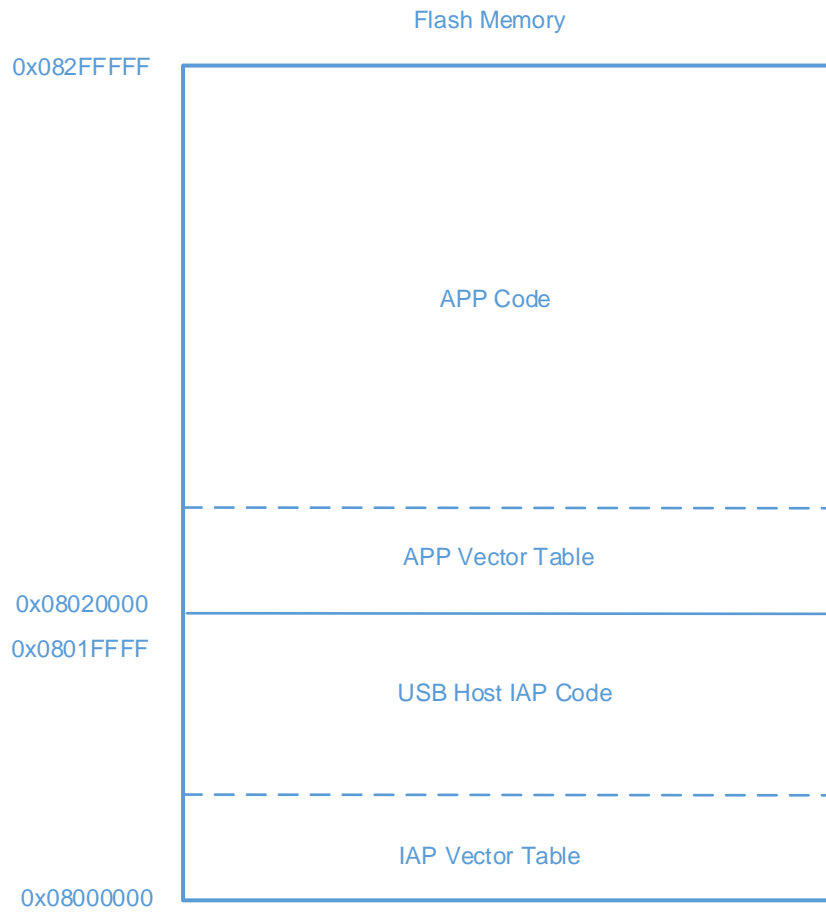
In keil's configuration options, set the flash start address of APP to 0x0802000:

Figure 3-1 Start address of APP

3. The allocation of the whole chip is shown in the figure below:

Figure 3-2 The allocation of the whole chip

Flash Memory

0x082FFFFF

APP Code

APP Vector Table

0x08020000
0x0801FFFF

USB Host IAP Code

IAP Vector Table

0x08000000

4.　　　USB IAP operation options

After the chip is powered on, if the user key is not pressed, the IAP program will be run by default. At this time, connect the USB flash disk containing bin file to the USB port to perform IAP related operations. IAP recognizes the USB flash disk see figure *Figure 4-1 IAP recognizes the USB flash disk*, the specific operation options of IAP are shown in the figure *Figure 4-2 IAP options*.

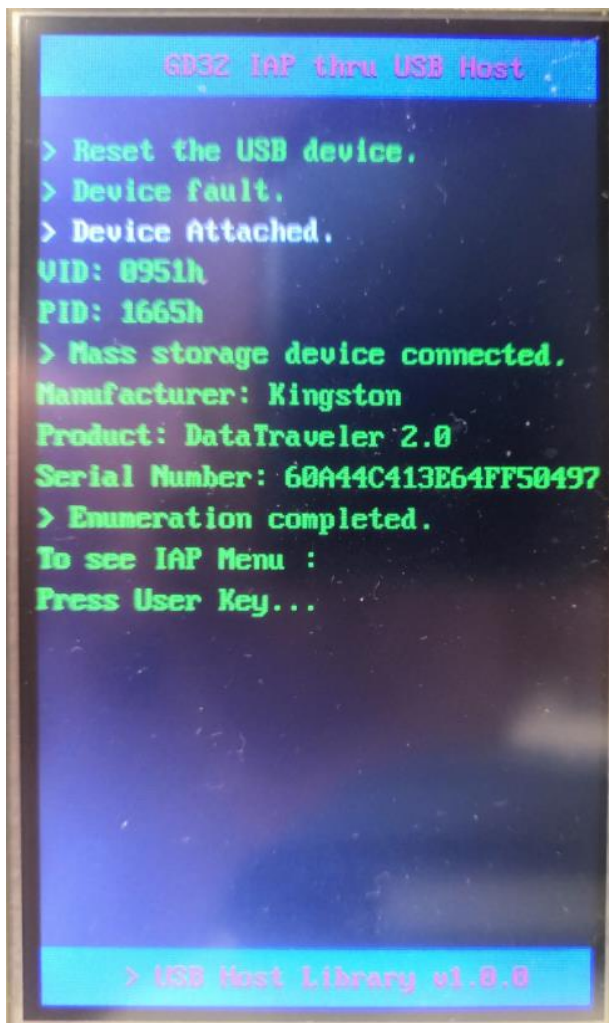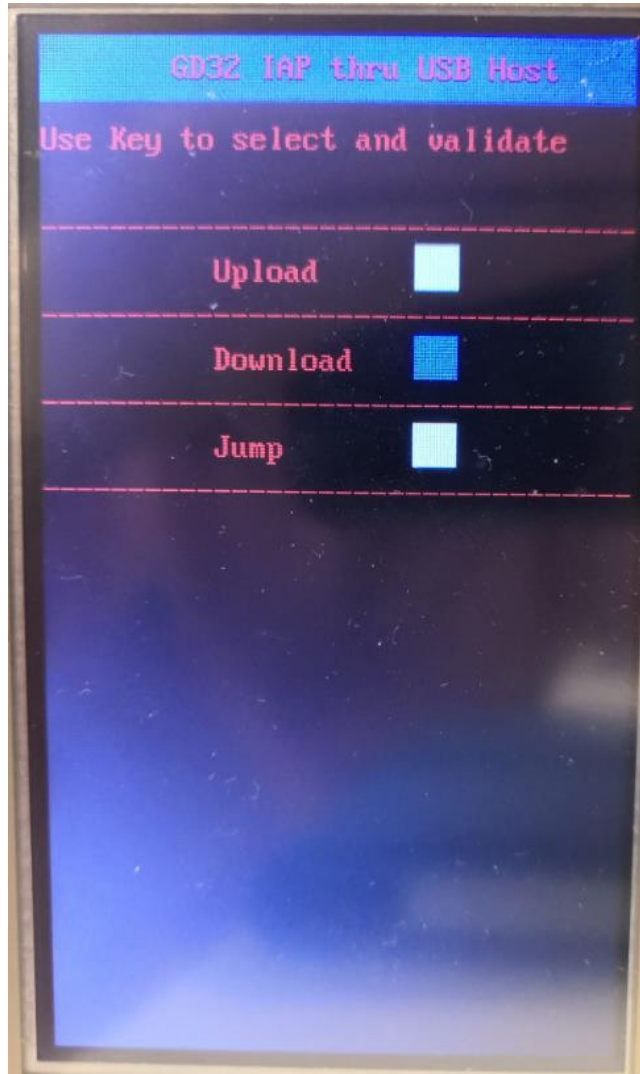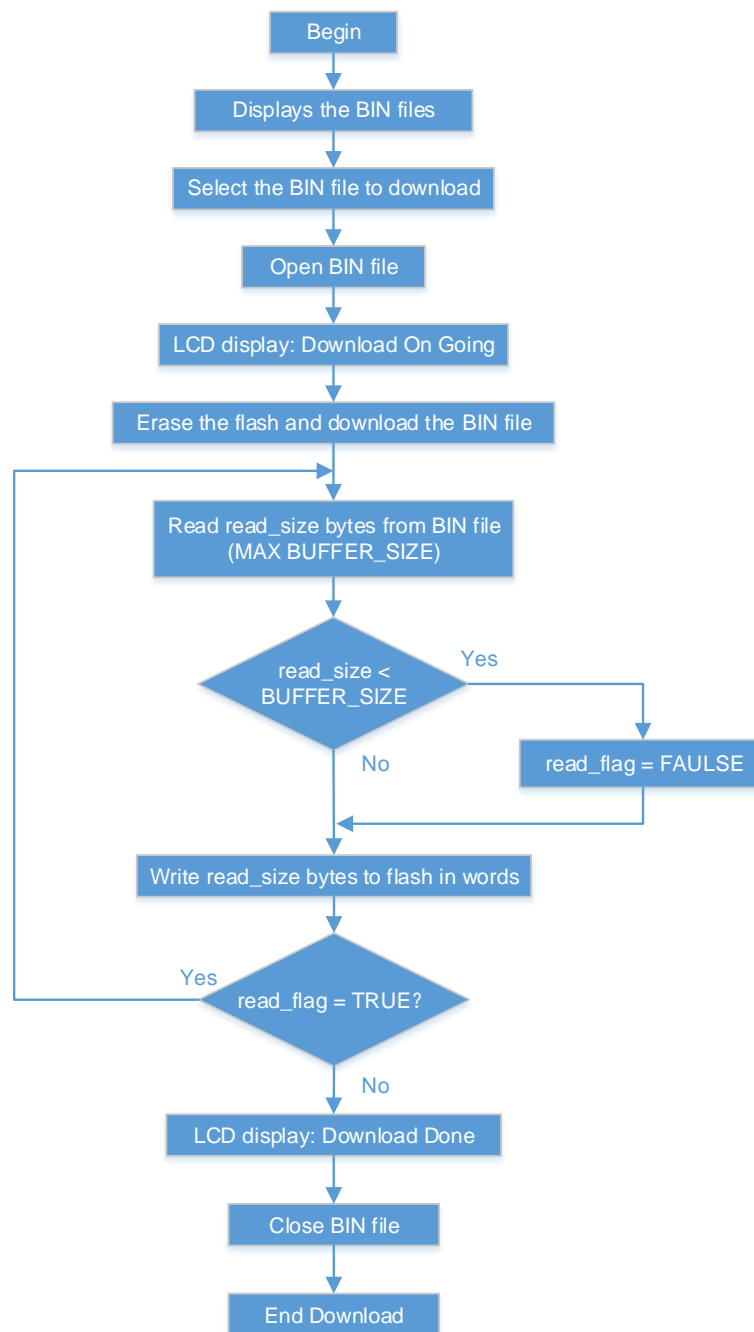**Figure 4-1 IAP recognizes the USB flash disk**

Figure 4-2 IAP options

4.1. Download

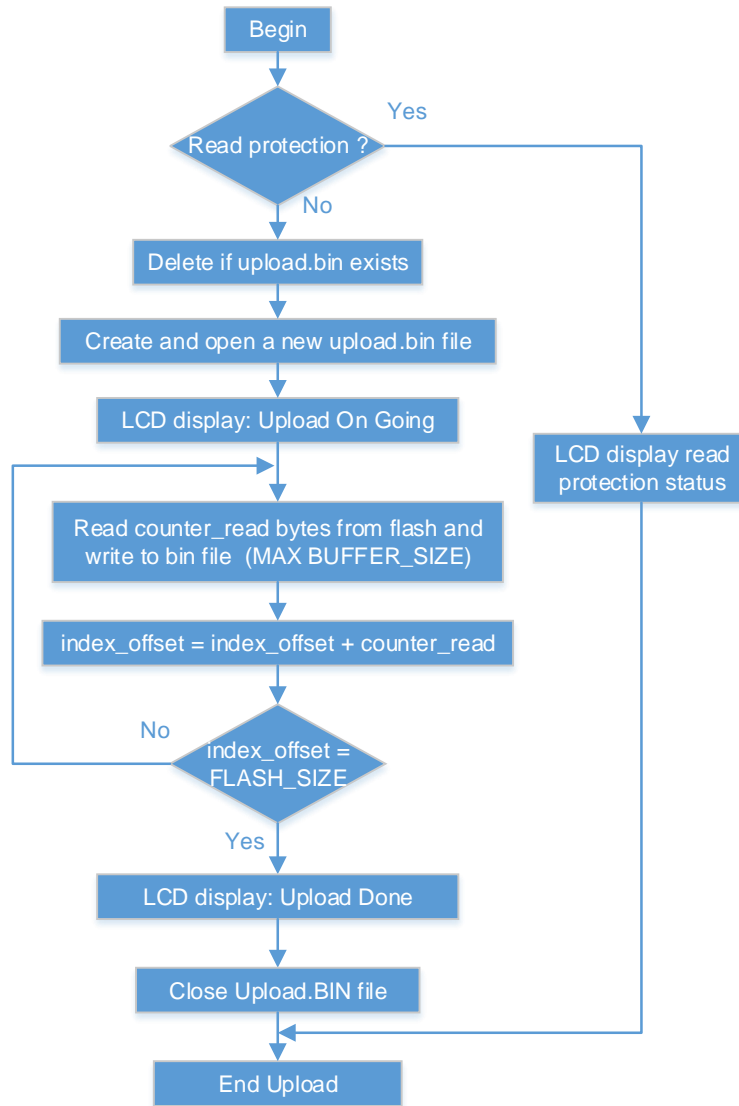Download a BIN file to the specified flash address. the process is as follows:

Figure 4-3 IAP download process

4.2. Upload

Upload the contents of the specified flash to the bin file on the USB flash disk. The specific process is as follows:
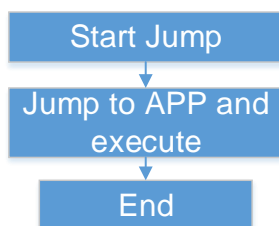
Figure 4-4 IAP down

4.3. Jump

When the APP is updated, the user can execute the jump command to jump to the APP code area for execution. The jump process is as follows:

Figure 4-5 IAP jump process

5. Revision history

Table 5-1 Revision history

Revision No.	Description	Date
1.0	Initial Release	Sep.06, 2021

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