WM_W60X_SECBOOT Function Guide V1.1

Document History

Version	Completion Date	Revision Record	Author	Auditor
V1.0	2018-10-20		Cuiych	
V1.1	2018-12-15	Modify W600 to W60X	Ray	

Content

1 **Introduction**

1.1 Overview

This document describes W60X SECBOOT functions and usages for designer and developer.

1.2 Abbreviations and acronyms

Abbreviations and acronyms	Definition
CRC	Cyclic Redundancy Check
IMAGE	Binary File
MAC	Medium Access Control
QFLASH	Quad-SPI Flash
RAM	Read-Write Memory
ROM	Read-Only Memory
SECBOOT	Second Boot
UART	Universal asynchronous receiver-transmitter

1.3 References

1. <WM_W60X_Firmware Generation Guide>
2. <WM_W60X_QFLASH Management Guide>

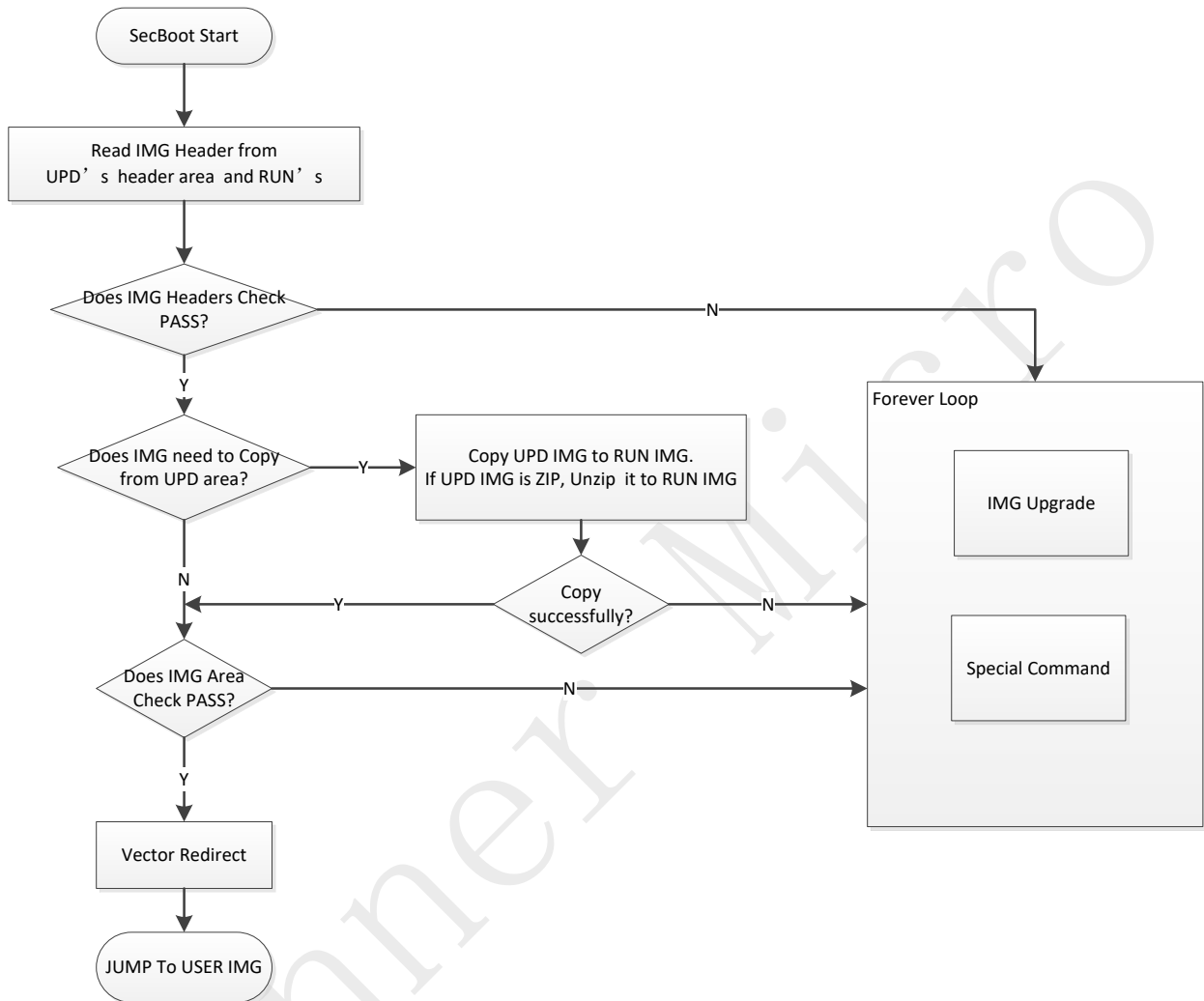## 2　SECBOOT Basic Functions

2.1　SECBOOT Flowchart

Figure 2-1

2.2　Bootloader

2.2.1　User IMG header checksum

Get IMG information from run-time area and upgrade area. Confirm if user's IMG can be used by checking the IMG header.

2.2.2　Confirm to transfer IMG from updating area

According to the checksum of IMG header, confirm if copy upgrade area's image to run-time area.

2.2.3 Verify the Checksum of IMG content

Verify run-time IMG content's completeness.

2.2.4 Vector Table Redirection

Because the vector table of SECBOOT is different from IMG, the vector table should be redirected.

Rules for redirection: (exception vector number + interrupt number), the address number should be round up to the nearest 2^N x 4 (vector table should be calculated by word). The result value is the base address of vector table and the integer multiple of this value is the usable redirection address.

For example: exception vector + interrupt is 56, up to nearest 2^N is 2^6=64, 64x4=256 (0x100), so the usable redirection address can be 0, 0x100, 0x200, 0x300……

2.3 Decompression Program

GZIP files can be decompressed by W60X SECBOOT.

2.4 Upgrade Image

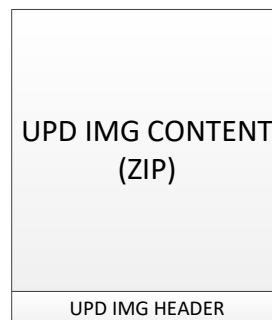Update IMAGE to QFLASH through XModem protocol.

Note: Both UART0 and UART1 can be used for updating.

Two formats of IMAGE file can be used: compressed and uncompressed

1. WM_W600_GZ.img (compressed format)

Note: The default format is GZ. The size of GZ file should be less than 384KByte, and the corresponding size of running IMAGE is 512KByte.

Following figure is the format of compressed firmware which can be updated by W60X SECBOOT or OTA. (GZ.IMAGE file is compressed by G-ZIP)

```
┌─────────────────┐
│                 │
│                 │
│  UPD IMG CONTENT│
│     (ZIP)       │
│                 │
│                 │
├─────────────────┤
│  UPD IMG HEADER │
└─────────────────┘
```

2. WM_W600_SEC.img (uncompressed format)

Note: **Not recommended**

Following is the format of uncompressed firmware which can be updated by W60X SECBOOT or OTA.

The detailed decribtion of IMAGE HEADER and IMAGE generation is in <WM_W60X_Firmware Generation Guide>.

2.5 Opereation Command

W60X SECBOOT supports some additional operations for module production such as baudrate modification, IMAGE area erasure, MAC address reading/writing, RF gain reading/writing.

Command type: hexadecimal

2.5.1 Command Table

Function	SubCmd	Data Segment	Describtion
Switch Baudrate	0x31	≤2000000	Max baurate of UART to 2Mbps
Set GAIN Parameters	0x35	≤84bytes	The reference gain values during Wi-Fi transmitting (use with caution).
Get GAIN Parameters	0x36	None	
Set MAC Address	0x37	6bytes	
Get MAC Address	0x38	None	

2.5.2 Command Sets

Changing Uart Baudrate:

2M setting command: 21 0a 00 ef 2a 31 00 00 00 80 84 1e 00

1M setting command: 21 0a 00 5e 3d 31 00 00 00 40 42 0f 00

921600 setting command: 21 0a 00 5d 50 31 00 00 00 00 10 0e 00

460800 setting command: 21 0a 00 07 00 31 00 00 00 00 08 07 00

115200 setting command: 21 0a 00 97 4b 31 00 00 00 00 c2 01 00

Getting MAC Address: 21 06 00 ea 2d 38 00 00 00

2.6 SECBOOT Error Code

During SECBOOT startup, if some exceptions happen, SECBOOT will be in endless loop. At the same time, error code will be printed on UART0 terminal to tell users current state. Following is the error code table:

Error Code	Description
C	Normal
During updating (XModem protocol)	
D	Host cancel
E	NACK
F	Time out without getting data
G	Packet number error
H	Packet number complement error
I	IMAGE is too large
J	IMAGE updating address is disagreement
K	IMAGE updating address page is not aligned
L	IMAGE header checksum error
M	IMAGE content checksum error
Function module	
R	Command check error
S	Command parameter error
U	Setting gain failed
V	Setting MAC failed