



XR871 Flash Layout Guide

Revision 1.0

Jan 19, 2018

Declaration

THIS DOCUMENTATION IS THE ORIGINAL WORK AND COPYRIGHTED PROPERTY OF XRADIO TECHNOLOGY ("XRADIO"). REPRODUCTION IN WHOLE OR IN PART MUST OBTAIN THE WRITTEN APPROVAL OF XRADIO AND GIVE CLEAR ACKNOWLEDGEMENT TO THE COPYRIGHT OWNER.

THE INFORMATION FURNISHED BY XRADIO IS BELIEVED TO BE ACCURATE AND RELIABLE. XRADIO RESERVES THE RIGHT TO MAKE CHANGES IN CIRCUIT DESIGN AND/OR SPECIFICATIONS AT ANY TIME WITHOUT NOTICE. XRADIO DOES NOT ASSUME ANY RESPONSIBILITY AND LIABILITY FOR ITS USE. NOR FOR ANY INFRINGEMENTS OF PATENTS OR OTHER RIGHTS OF THE THIRD PARTIES WHICH MAY RESULT FROM ITS USE. NO LICENSE IS GRANTED BY IMPLICATION OR OTHERWISE UNDER ANY PATENT OR PATENT RIGHTS OF XRADIO. THIS DATASHEET NEITHER STATES NOR IMPLIES WARRANTY OF ANY KIND, INCLUDING FITNESS FOR ANY PARTICULAR APPLICATION.

THIRD PARTY LICENCES MAY BE REQUIRED TO IMPLEMENT THE SOLUTION/PRODUCT. CUSTOMERS SHALL BE SOLELY RESPONSIBLE TO OBTAIN ALL APPROPRIATELY REQUIRED THIRD PARTY LICENCES. XRADIO SHALL NOT BE LIABLE FOR ANY LICENCE FEE OR ROYALTY DUE IN RESPECT OF ANY REQUIRED THIRD PARTY LICENCE. XRADIO SHALL HAVE NO WARRANTY, INDEMNITY OR OTHER OBLIGATIONS WITH RESPECT TO MATTERS COVERED UNDER ANY REQUIRED THIRD PARTY LICENCE.

Revision History

| Version | Data | Summary of Changes |
|---------|------------|--------------------|
| 1.0 | 2018-01-19 | Initial Version |
| | | |

Table 1- 1 Revision History

Contents

| | |
|------------------------|----|
| Declaration..... | 2 |
| Revision History..... | 3 |
| Contents..... | 4 |
| Tables..... | 5 |
| Figures..... | 6 |
| 1 概述..... | 7 |
| 1.1 Flash 布局..... | 7 |
| 1.2 Image 1..... | 7 |
| 1.3 Image 2..... | 8 |
| 1.4 OTA area..... | 8 |
| 1.5 Sysinfo 区..... | 8 |
| 2 Cfg 文件..... | 9 |
| 2.1 Flash_offs 配置..... | 9 |
| 2.2 Bin 文件重叠的解决..... | 10 |
| 2.3 配置自定义 cfg 文件..... | 10 |

Tables

Table 1- 1 Revision History..... 3

Figures

| | | |
|-------|-------------------|----|
| 图 1-1 | Flash 布局..... | 7 |
| 图 1-2 | sysinfo 配置..... | 8 |
| 图 2-1 | 出现重叠情况..... | 10 |
| 图 2-2 | 配置自定义 cfg 文件..... | 11 |

1 概述

此文档用以从较为宏观的角度来说明 flash 所使用的布局情况，主要介绍整个 image 和 sysinfo 以及 OTA 区域之间的位置关系。如果想要了解 image 内部的结构，可以阅读文档《XR871 Memory Layout Developer Guide》了解固件打包的细节，也可以阅读《XR871 Image Developer Guide》了解 image 模块代码上的使用。

1.1 Flash 布局

整个 flash 的布局如下图所示。

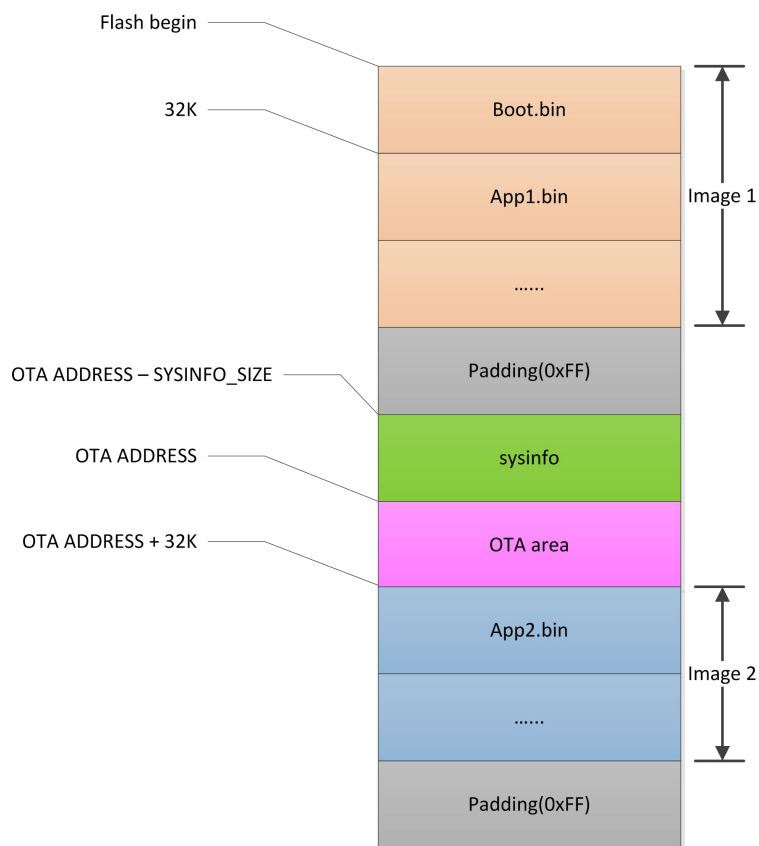


图 1-1 Flash 布局

1.2 Image 1

Image 1 是一个完整的镜像，从 flash 的 0 地址开始；

1.3 Image 2

Image 2 是不包含 boot.bin 的，其起始位置决定于 OTA 的起始位置，所以 image 2 的 app.bin 是放在相对于 OTA ADDRESS 32K 的位置；

1.4 OTA area

OTA area 用于存储 OTA 使用的参数，该区域的地址 OTA ADDRESS 的配置是在 cfg 文件中指定的，默认是指定为 0x00100000，即 1M 的偏移地址。如下标红位置即配置 OTA ADDRESS；

```
{
  "magic"    : "AWIH",
  "version"  : "0.2",
  "OTA"      : {"addr": "0x00100000"},
  "count"    : 7,
  "section" : [
    {"id": "0xa5ff5a00", "bin": "boot.bin", "cert": "null", "flash_offs": "0K", "sram_offs": "0x00067000",
    "ep": "0x00067101", "attr": "0x1"},
    .....
  ]
}
```

1.5 Sysinfo 区

Sysinfo 是一段用于存储用户自定义数据的区域，其大小默认被设置为 4K，位置被设置为 (1M - 4K) 的地址，所以默认是放在 OTA 区域之前的位置。Sysinfo 的位置和大小是被定义在工程目录下的 prj_config.h 文件中，用户可根据需求进行修改，但是需要注意不能与 image 区域和 OTA 区域重叠。

```
00051:
00052: /* image */
00053: #define PRJCONF_IMG_FLASH           (0)
00054: #define PRJCONF_IMG_ADDR           (0x00000000)
00055: #define PRJCONF_IMG_SIZE           ((1 << 20) - (4 << 10))
00056:
00057: /* sysinfo */
00058: #define PRJCONF_SYSINFO_FLASH       (0)
00059: #define PRJCONF_SYSINFO_ADDR       ((1 << 20) - (4 << 10))
00060: #define PRJCONF_SYSINFO_SIZE       (4 << 10)
00061:
00062: /* MAC address source */
00063: #define PRJCONF_MAC_ADDR_SOURCE     SYSINFO_MAC_ADDR_CODE
00064:
00065: /* watchdog hardware and service */
00066: #define PRJCONF_WDG_EN               1
```

图 1-2 sysinfo 配置

2 Cfg 文件

Cfg 文件包含整个 image 的组织结构，其中每个参数的具体含义在文档《XR871 Memory Layout Developer Guide》中已经有详细的说明，不再赘述，这里主要说明 flash 地址的配置方式。

如下是一个完整的 cfg 文件，标为红色的部分配置了每一个 bin 文件的起始 flash 偏移地址。

```
{
  "magic"    : "AWIH",
  "version"  : "0.2",
  "OTA"      : {"addr": "0x00100000"},
  "count"    : 7,
  "section"  : [
    {"id": "0xa5ff5a00", "bin": "boot.bin", "cert": "null", "flash_offs": "0K", "sram_offs": "0x00067000",
    "ep": "0x00067101", "attr": "0x1"},
    {"id": "0xa5fe5a01", "bin": "app.bin", "cert": "null", "flash_offs": "32K", "sram_offs": "0x00010000",
    "ep": "0x00010101", "attr": "0x1"},
    {"id": "0xa5fc5a03", "bin": "net.bin", "cert": "null", "flash_offs": "310K", "sram_offs":
    "0x60000000", "ep": "0xffffffff", "attr": "0x1"},
    {"id": "0xa5fb5a04", "bin": "net_ap.bin", "cert": "null", "flash_offs": "591K", "sram_offs":
    "0x60000000", "ep": "0xffffffff", "attr": "0x1"},
    {"id": "0xa5fa5a05", "bin": "wlan_bl.bin", "cert": "null", "flash_offs": "840K", "sram_offs":
    "0xffffffff", "ep": "0xffffffff", "attr": "0x1"},
    {"id": "0xa5f95a06", "bin": "wlan_fw.bin", "cert": "null", "flash_offs": "843K", "sram_offs":
    "0xffffffff", "ep": "0xffffffff", "attr": "0x1"},
    {"id": "0xa5f85a07", "bin": "wlan_sdd.bin", "cert": "null", "flash_offs": "973K", "sram_offs":
    "0xffffffff", "ep": "0xffffffff", "attr": "0x1"}
  ]
}
```

2.1 Flash_offs 配置

boot.bin 固定需要设置为 0 地址，app.bin 固定需要设置为 32k 的偏移地址，其他的 bin 文件的地址并没有强制性的要求，只要没有互相重叠并且不覆盖到 sysinfo 和 OTA 区域，都是可以正常运行的；

2.2 Bin 文件重叠的解决

如果 bin 文件出现了互相重叠的情况，打包工具会进行自动计算，然后生成一个“image_auto_cal.cfg”文件（默认位置在工程目录/image/xr871/下），用户可以直接使用该 cfg 文件重新进行打包。需要注意的是，如果全部的 bin 文件在经过自动计算后，其大小依然超过 sysinfo 的默认位置（OTA ADDRESS - 4K），则不会生成“image_auto_cal.cfg”文件。此时，用户需要自己手动进行 cfg 文件的修改。

```
xieqihai@Exdroid6:~/IOT/17XX_tools/pack_code/mkimage/Release$ ./mkimage
cfg string:
{
  "magic" : "AWIH",
  "version" : "0.2",
  "OTA" : {"addr": "0x00100000"},
  "count" : 7,
  "section" : [
    {"id": "0xa5ff5a00", "bin": "boot.bin", "cert": "null", "flash_offs": "0K", "sram_offs": "0x00067000", "e
p": "0x00067101", "attr": "0x1"},
    {"id": "0xa5fe5a01", "bin": "app.bin", "cert": "null", "flash_offs": "32K", "sram_offs": "0x00010000", "e
p": "0x00010101", "attr": "0x1"},
    {"id": "0xa5fc5a03", "bin": "net.bin", "cert": "null", "flash_offs": "332K", "sram_offs": "0x60000000", "e
p": "0xffffffff", "attr": "0x1"},
    {"id": "0xa5fb5a04", "bin": "net_ap.bin", "cert": "null", "flash_offs": "624K", "sram_offs": "0x60000000", "e
p": "0xffffffff", "attr": "0x1"},
    {"id": "0xa5fa5a05", "bin": "wlan_bl.bin", "cert": "null", "flash_offs": "876K", "sram_offs": "0xffffffff", "e
p": "0xffffffff", "attr": "0x1"},
    {"id": "0xa5f95a06", "bin": "wlan_fw.bin", "cert": "null", "flash_offs": "880K", "sram_offs": "0xffffffff", "e
p": "0xffffffff", "attr": "0x1"},
    {"id": "0xa5f85a07", "bin": "wlan_sdd.bin", "cert": "null", "flash_offs": "1000K", "sram_offs": "0xffffffff", "
ep": "0xffffffff", "attr": "0x1"}
  ]
}

err: bin 5 and bin 6 were overlaped!
Overlapped size: 9520 Byte(10kB)
bin 5 name:wlan_fw.bin begin: 0x000C0000 end: 0x000FC530
bin 6 name:wlan_sdd.bin begin: 0x000FA000

We've rearranged bin files and generated new cfg file 'image_auto_cal.cfg', the new one is recommended.
Generate image file failed
xieqihai@Exdroid6:~/IOT/17XX_tools/pack_code/mkimage/Release$
```

图 2-1 出现重叠情况

2.3 配置自定义 cfg 文件

项目工程在默认时使用的 cfg 文件是/appos/project/image_cfg/xr871/路径下的某个 cfg 文件，如果用户想要使用自己修改的 cfg 文件，可以在对应的项目工程目下的/gcc/Makefile 中添加自定义 cfg 路径。修改方式如下图：

```
36 # -----
37 # override project variables
38 # -----
39 # linker script path/file
40 # - relative to "./"
41 # - define your own "LINKER_SCRIPT_PATH" and/or "LINKER_SCRIPT" to override
42 #   the default one
43 # LINKER_SCRIPT_PATH := .
44 # LINKER_SCRIPT :=
45
46 # image config path/file
47 # - relative to "../image/xxxxx/", eg. "../image/xr871/"
48 # - define your own "IMAGE_CFG_PATH" and/or "IMAGE_CFG" to override the
49 #   default one
50 # IMAGE_CFG_PATH := ../image/xr871/
51 # IMAGE_CFG := my_image.cfg
52
53 # image name, default to xr_system
54 # IMAGE_NAME :=
55
```

图 2-2 配置自定义 cfg 文件