

# MCAL应用\_Fee模块配置及实例（一）

## 1. 版本

Config Tool Version: 2.0.2

ME0 MCAL version: 1.3.2

## 2. 前言

1. FLS一般依赖Mcu和Platform，Mcu模块里面需要配置FLS时钟，Platform里面可以配置FLS中断；
2. Mcu和Platform的默认配置参考Setup篇和Mcu篇介绍；
3. 本文需要结合和参考《Fee应用笔记\_V0.1.pdf》；

## 3. FEE要点介绍

Fee是基于FLS的上层存储算法，Fee内部使用状态机管理的方式执行FLS操作（读、写、擦），根据FLS的状态反馈做状态机管理。

### 3.1 同步/异步模式

Fee的同步模式和异步模式依赖FLS中SectorList中同步模式和异步模式的配置。

#### 3.1.1 同步模式

当FLS配置成同步模式时，Fee内部调用FLS驱动时，会先关全局中断，执行FLS驱动，再开全局中断，这会造成主程序阻塞，特别是当Cluster换页时，阻塞时间过程会包含多个FLS\_Erase和FLS\_Write等过程和，阻塞时间可能较长，影响主线程时序和流畅度，需要根据应用场景重点评估可接受性；

#### 3.1.2 异步模式

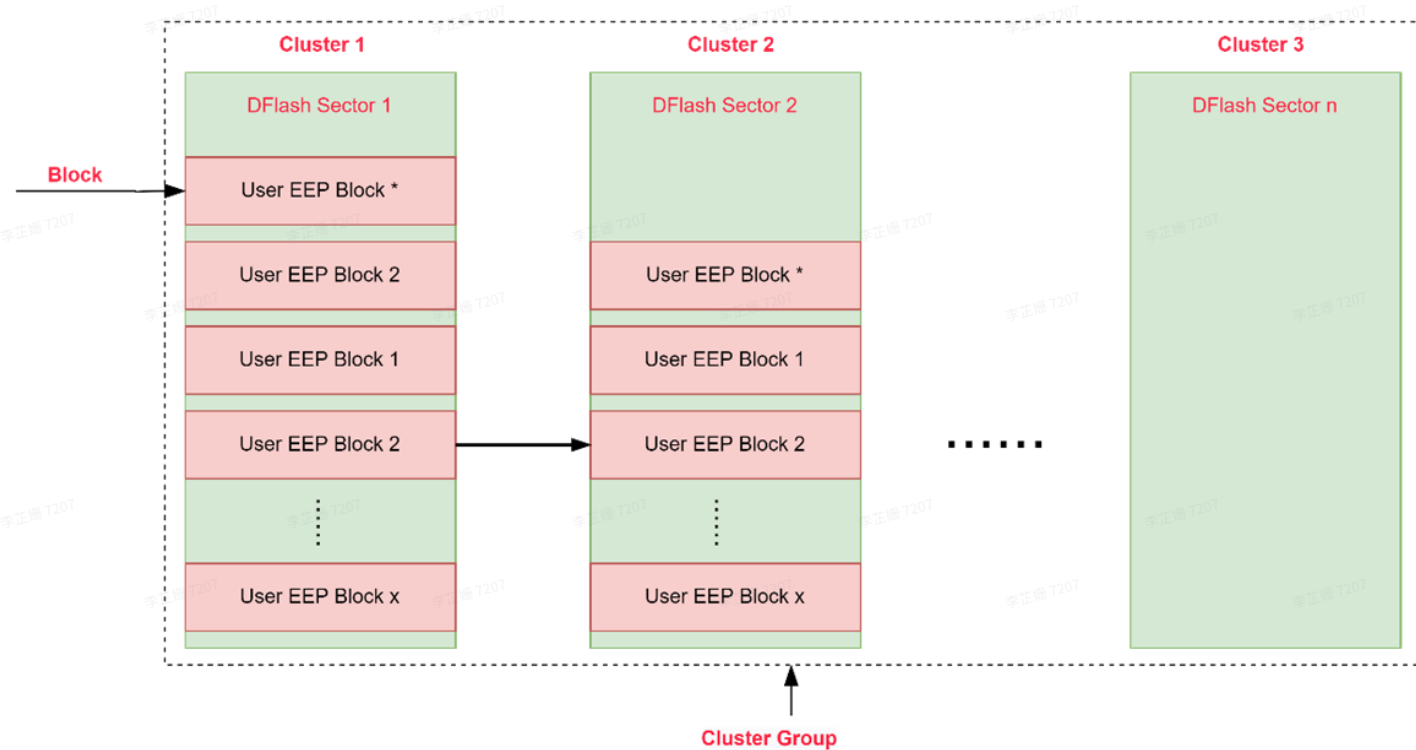
当FLS配置成异步模式时，Fee内部调用FLS驱动时，不会关全局中断，不会造成主程序阻塞，Fee状态机根据FLS的状态反馈，在消耗时间查询的代价下，完成FLS操作执行和状态机的切换，不影响系统时序和流畅度；

### 3.2 SECTOR / CLUSTER / BLOCK关系

BLOCK：用户数据单元；

CLUSTER：FEE中定义的虚拟存储器，用于存放用户定义的Block，FEE中一个CLUSTER可以对应一个或多个物理上的FLASH SECTOR；

SECTOR：用于CLUSTER映射到真实Flash的存储空间；



### 3.3 CLUSTER和FLS平衡

1. 一个ClusterGroup中可以配置多个Cluster，一个Cluster中可以配置多个FlsSector；
2. Cluster用于存储一份Block数据和预留空间持续写直到写满换页，**要求**Block写入数据不能超过Cluster的一半（详见Cluster最小容量设计讲解）；
3. ClusterGroup中多个Cluster用于循环平衡Fls磨损增加寿命，Cluster数量越多，循环存储寿命越长，**要求**至少2个Cluster；
4. 在固定大小的Fls空间上配置Fee，需要考虑配置Cluster的数量和单个Cluster的容量；
  - a. 单个Cluster容量（Flash Sector数量）变大，Cluster数量变少；Fee使用过程中换页次数减少，但每次换页时间会增加；
  - b. Cluster数量变大，单个Cluster容量（Flash Sector数量）变小；Fee使用过程中换页次数增加，但每次换页时间会减少；
  - c. 单个Cluster最小容量设计

如下图为Cluster的数据分布示意图，**要求**所有Block写入的总数据不能超过Cluster的一半；

Block写入的总数据为： $\text{Block} \times \text{Data} + \text{Block} \times \text{Hdr\&ValidFlag}$ ，即Block写入的总数据量 + 32 \* Block写入数量；

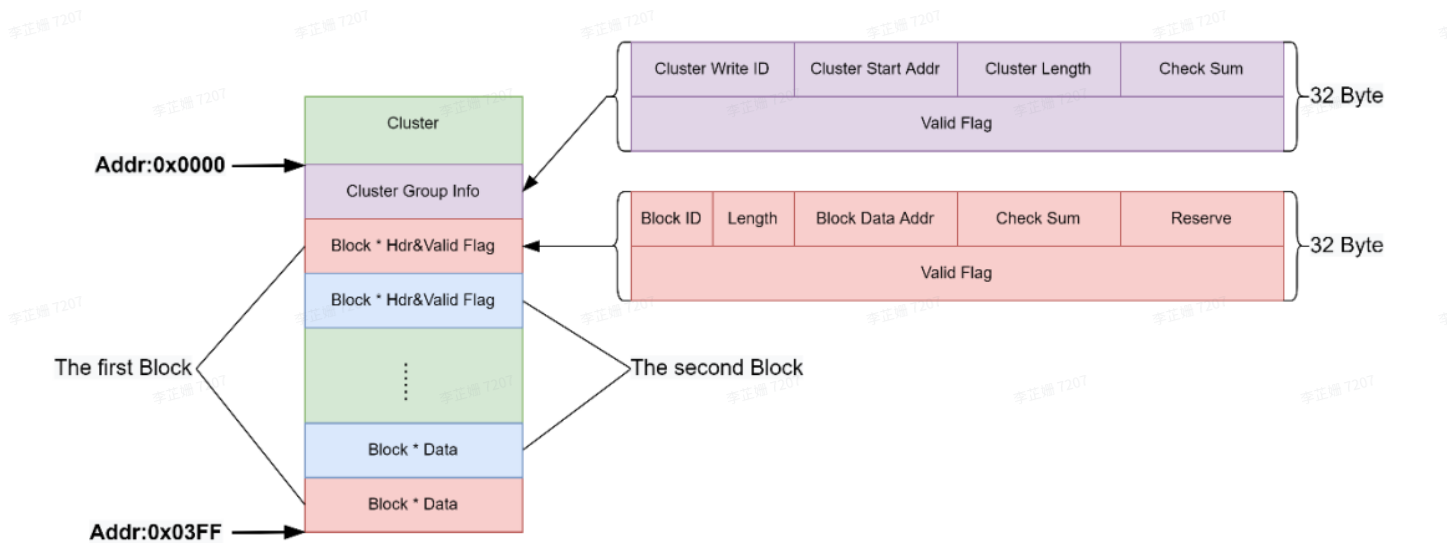


图 2 Fee数据分布示意图



### Tips

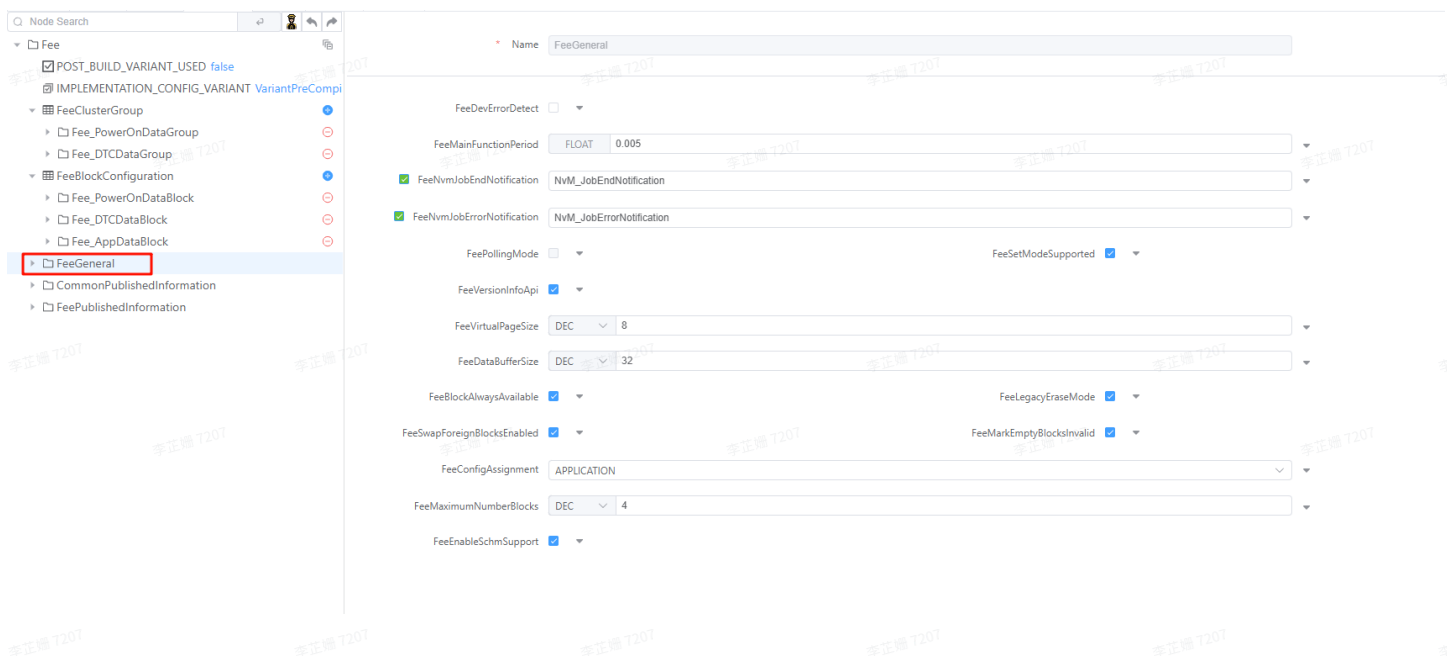
如果应用中要求数据百万级别存储寿命要求，则需要按需增加Cluster数量，根据总空间设计Cluster容量。

FEE本质上是时间、空间、寿命的平衡。

## 4. FEE配置介绍

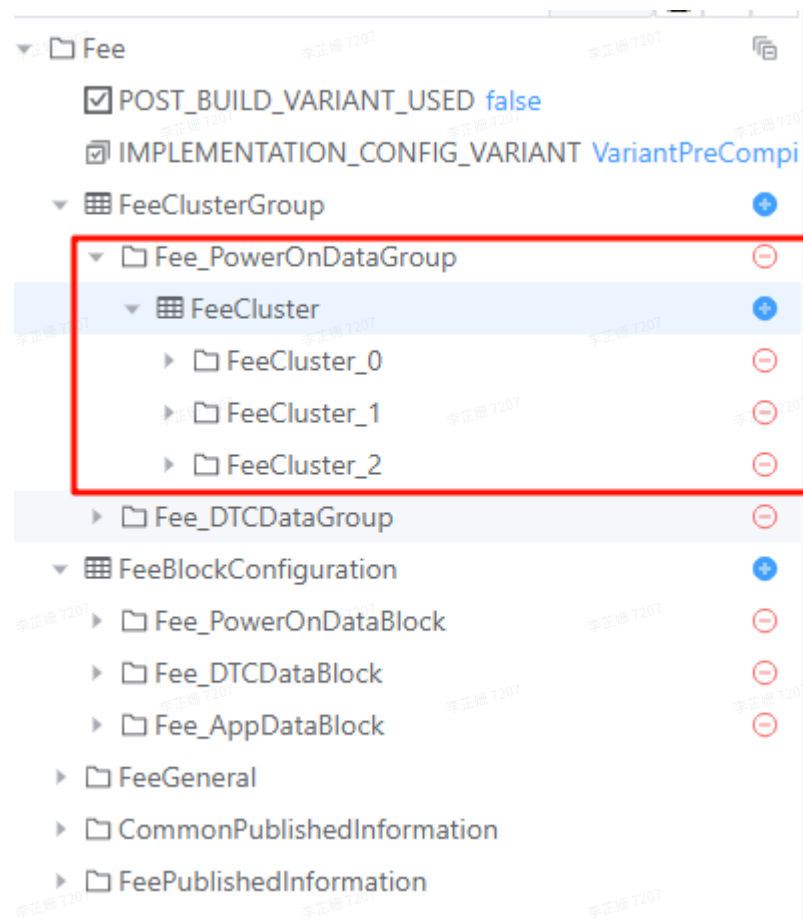
### 4.1 FeeGeneral

默认配置参考如下

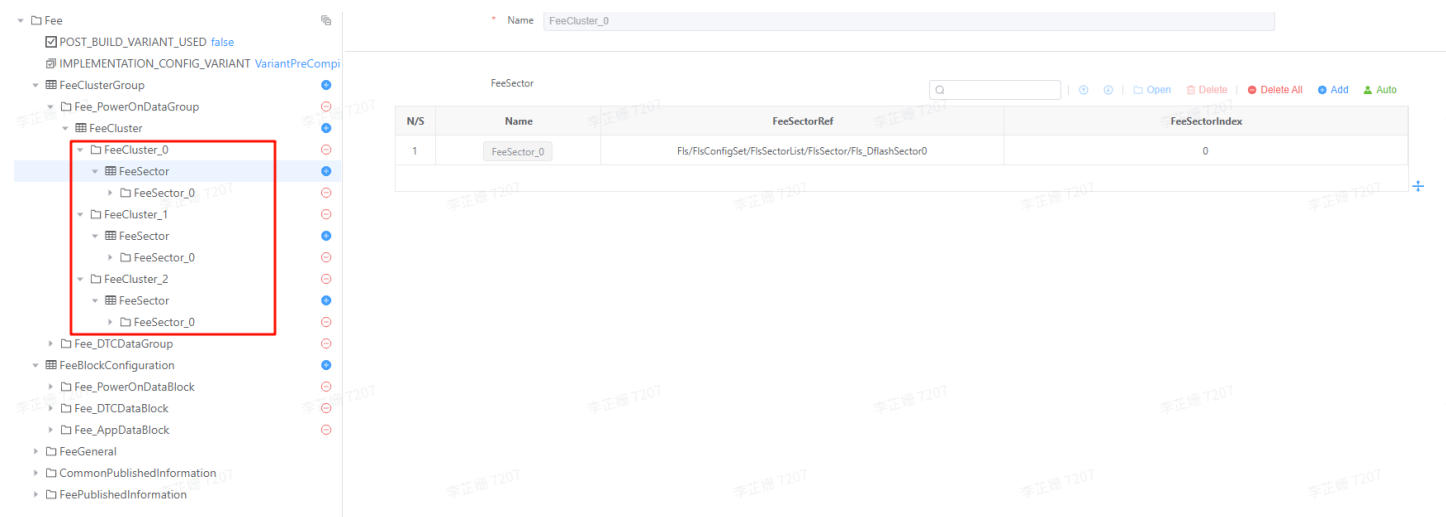


## 4.2 FeeClusterGroup

新建配置FeeClusterGroup->Fee\_PowerOnDataGroup，在此ClusterGroup中配置三个Cluster，如下图所示：



三个Cluster中每个Cluster配置一个Fls的Sector，配置Fls的Sector的数量，跟FeeBlock中DataSize有关，在FeeBlock配置中做对应说明。



新建配置FeeClusterGroup->Fee\_DTCDDataGroup，在此ClusterGroup中配置九个Cluster，如下图所示：

Fee

POST\_BUILD\_VARIANT\_USED false

IMPLEMENTATION\_CONFIG\_VARIANT VariantPreCompi

FeeClusterGroup

Fee\_PowerOnDataGroup

FeeCluster

Fee\_DTCDDataGroup

FeeBlockConfiguration

Fee\_PowerOnDataBlock

Fee\_DTCDDataBlock

Fee\_AppDataBlock

FeeGeneral

CommonPublishedInformation

Name Fee\_DTCDDataGroup

FeeCluster

| N/S | Name         | FeeSector |
|-----|--------------|-----------|
| 1   | FeeCluster_0 |           |
| 2   | FeeCluster_1 |           |
| 3   | FeeCluster_2 |           |
| 4   | FeeCluster_3 |           |
| 5   | FeeCluster_4 |           |
| 6   | FeeCluster_5 |           |
| 7   | FeeCluster_6 |           |
| 8   | FeeCluster_7 |           |
| 9   | FeeCluster_8 |           |

九个Cluster中每个Cluster配置三个Fls的Sector，配置Fls的Sector的数量，跟FeeBlock中DataSize有关，在FeeBlock配置中做对应说明。

Fee

POST\_BUILD\_VARIANT\_USED false

IMPLEMENTATION\_CONFIG\_VARIANT VariantPreCompi

FeeClusterGroup

Fee\_PowerOnDataGroup

FeeCluster

Fee\_DTCDDataGroup

FeeBlockConfiguration

Fee\_PowerOnDataBlock

Fee\_DTCDDataBlock

Fee\_AppDataBlock

FeeGeneral

CommonPublishedInformation

Name FeeCluster\_0

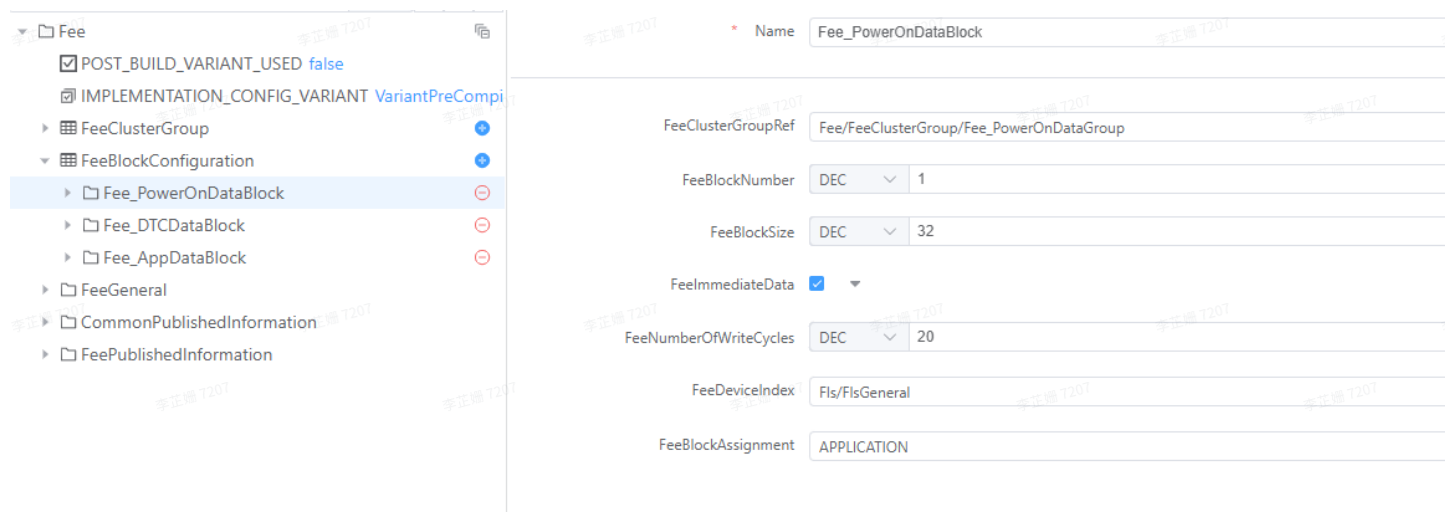
FeeSector

| N/S | Name        | FeeSectorRef                                               | FeeSectorIndex |
|-----|-------------|------------------------------------------------------------|----------------|
| 1   | FeeSector_0 | Fls/FlsConfigSet/FlsSectorList/FlsSector/Fls_DflashSector3 | 0              |
| 2   | FeeSector_1 | Fls/FlsConfigSet/FlsSectorList/FlsSector/Fls_DflashSector4 | 1              |
| 3   | FeeSector_2 | Fls/FlsConfigSet/FlsSectorList/FlsSector/Fls_DflashSector5 | 2              |

### 4.3 FeeBlockConfiguration

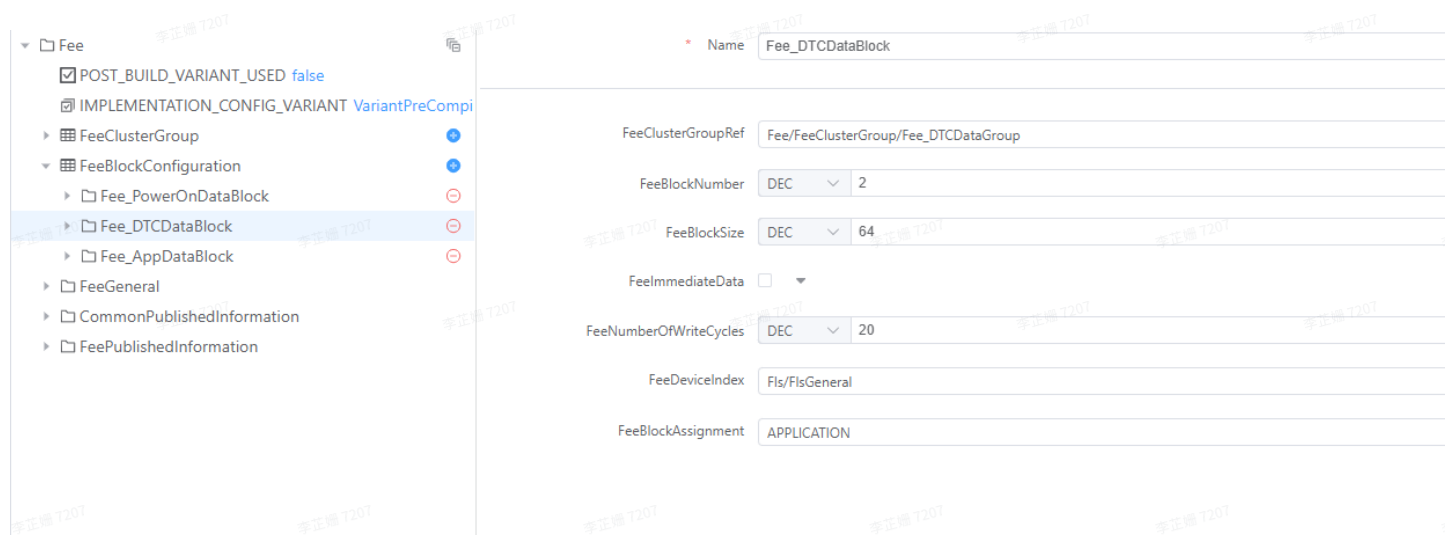
在FeeBlock配置中新建三个FeeBlock：

Fee\_PowerOnDataBlock、Fee\_DTCDDataBlock、Fee\_AppDataBlock，如下三幅图所示

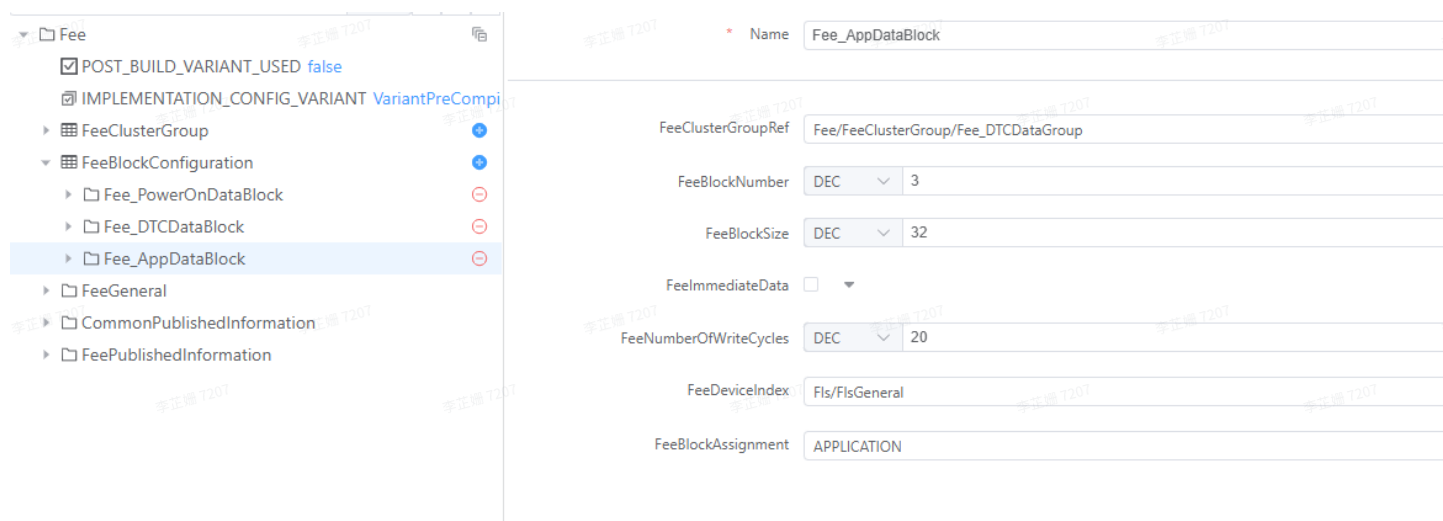


如上图，配置的`Fee_PowerOnDataBlock`指向`Fee_PowerOnDataGroup`。

- `FeeClusterGroupRef`：指Block映射存储到对应的ClusterGroup中；
- `FeeBlockNumber`：自然序列号，用于Fee读写访问Block的序号索引；
- `FeeBlockSize`：一次写入数据数量，单位Bytes；
- `FeeImmediateData`：立即存储特性配置，用于支持单个Block写入时不换页；
- `FeeNumberOfWriteCycles`：暂无功能；



如上图，配置的`Fee_DTCDDataBlock`指向`Fee_DTCDDataGroup`；配置Block映射存储到`Fee_DTCDDataGroup`，一次写入64个Bytes。



如上图，配置的Fee\_AppDataBlock指向Fee\_DTCDDataGroup；配置Block映射存储到Fee\_DTCDDataGroup，一次写入32个Bytes。



### Tips:

#### 1. 关于ClusterGroup的空间分配

- Fee\_PowerOnDataBlock配置32Bytes，一个Cluster配置一个Fls Sector，足够写入一次备份N次，所以最少可以分配一个Fls Sector；ClusterGroup配置有3个Cluster；
- Fee\_DTCDDataBlock配置64Bytes，Fee\_AppDataBlock配置32Bytes，分配到一个ClusterGroup中了，按照Block最大SIZE和数量粗略估算Block写入需要 $64+32+64+32=192$ Bytes，则最少需要1个Fls Sector，如上图是配置了三个（可以多）；ClusterGroup配置有9个Cluster；

#### 2. 不同写入频率的block为了方便数据的存储管理，推荐一个block映射一个ClusterGroup中；

如上例程中，有两个block映射到一个ClusterGroup是支持的，但由于block的size和写入频率不一致，两个block的数据在ClusterGroup映射的Fls Sector上分布是不均匀的（如上Cluster Group视图），都是靠数据标签查询获取；不同性质的block建议按需合并或者分开映射到不同的ClusterGroup中；

#### 3. ClusterGroup中Cluster的数量是为了循环滚动平衡Fls磨损的，一般至少配置两个。

如上图，Fee\_PowerOnDataGroup配置了三个Cluster，Fee\_DTCDDataGroup配置了九个Cluster；

#### 4. Block中Immediate配置用于针对多个Block存储到一个ClusterGroup中且需要保障一个Block写入时快速写入不换页，其他场景此特性不强；

## 5. FEE配置实例拓展

### 5.1 需求

256Bytes空间存储，整存整取

## 5.2 概要分析

1. 256Bytes空间**整存整取**，如果数据量大，写入和换页的时间较长，存储管理上做好状态管理；
2. Block
  - a. 需要256 Bytes空间；
3. ClusterGroup
  - a. Block写入数量：Block数据256Bytes，加上每次写数据的Header标记（32Bytes），288Bytes；
  - b. Block写入数据要求小于Cluster的一半，所以一个Cluster最少576Bytes，Flash Sector取整1K；
  - c. ClusterGroup要求至少两个Cluster，所以一个ClusterGroup粗略估算至少取2K；

## 5.3 详细设计

### 5.3.1 Fls

分配2K空间

### 5.3.2 Fee

1. Block：一个block
2. ClusterGroup：两个Cluster，每个Cluster映射分配1K空间（1个YTM32B1ME0 DFlash Sector）

### 5.3.3 平衡考虑

1. 以上是最小空间分配设计方案，可以根据Fls空间大小余量增加分配空间；
2. 寿命、空间根据实际情况灵活配置

## 5.4 软件设计

### 5.4.1 Fee配置

1. ClusterGroup配置

配置2个Cluster，每个Cluster配置1个Flash Sector，对应YTM32B1ME00的DFlash Sector0和Sector1；



## 2.2 System Memory Map

Table 2.1: System Memory Map

| Module  | Start Address | End Address | Size   |
|---------|---------------|-------------|--------|
| PFlash0 | 0x0000_0000   | 0x0007_FFFF | 512 KB |
| PFlash1 | 0x0008_0000   | 0x000F_FFFF | 512 KB |
| DFlash  | 0x0010_0000   | 0x0013_FFFF | 256 KB |
| HCU_NVR | 0x1000_0000   | 0x1000_03FF | 1 KB   |
| OTP_NVR | 0x1001_0000   | 0x1001_03FF | 1 KB   |
| CUS_NVR | 0x1003_0000   | 0x1003_03FF | 1 KB   |
| SRAM_L  | 0x1FFF_0000   | 0x1FFF_FFFF | 64 KB  |
| SRAM_U  | 0x2000_0000   | 0x2000_FFFF | 64 KB  |
| APB0    | 0x4000_0000   | 0x4007_FFFF | 512 KB |
| PPB     | 0xE000_0000   | 0xE00F_FFFF | 1 MB   |

MCAL 1.3.2 Fee\_Demo : YTM32B1ME0

Platform Resource

Fee

FeeClusterGroup

FeeCluster

FeeCluster\_0

FeeSector

FeeSector\_0

FeeCluster\_1

FeeSector

FeeSector\_0

FeeBlockConfiguration

FeeDemoDataBlock

FeeClusterGroupRef Fee/FeeClusterGroup/

FeeBlockNumber 1

FeeBlockSize 256

FeeImmediateData false

FeeNumberOfWriteCycles 20

FeeDeviceIndex FIs/FIsGeneral

FeeBlockAssignment APPLICATION

FeeGeneral

CommonPublishedInformation

FeePublishedInformation

Tools

Ctrl+S

Generate

+ Module

Setting

Desc

Info

Error

Problems E:0 W:0 I:0

Errors

Warns

Infos

Name FeeCluster\_0

FeeSector

N/S

Name

FeeSectorRef

FeeSectorIndex

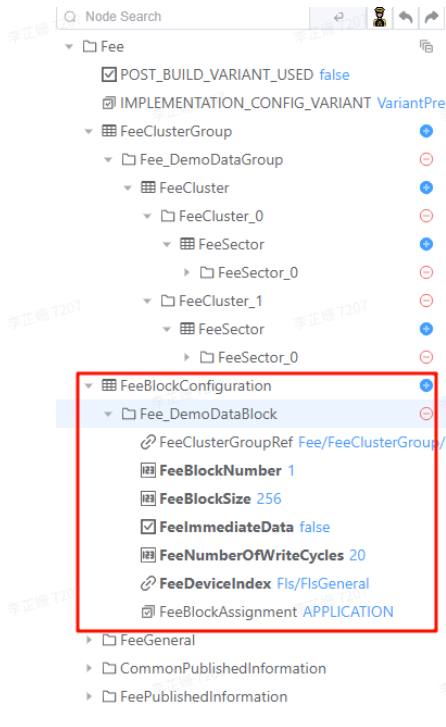
1

FeeSector\_0

FIs/FIsConfigSet/FIsSectorList/FIsSector/FIs\_DFlashSector0

0

## 2. Block配置



|                        |                                       |
|------------------------|---------------------------------------|
| Name                   | Fee_DemoDataBlock                     |
| FeeClusterGroupRef     | Fee/FeeClusterGroup/Fee_DemoDataGroup |
| FeeBlockNumber         | DEC 1                                 |
| FeeBlockSize           | DEC 256                               |
| FeeImmediateData       | <input type="checkbox"/>              |
| FeeNumberOfWriteCycles | DEC 20                                |
| FeeDeviceIndex         | Fls/FlsGeneral                        |
| FeeBlockAssignment     | APPLICATION                           |

## 5.4.2 主程序测试代码

### 1. 数据定义

#### 代码块

```
1  uint8
   Fee_Block0DataBuffer_Write[FeeConf_FeeBlockConfiguration_Fee_DemoDataBlock_BlockSize] = {0};

2  uint8
   Fee_Block0DataBuffer_Read[FeeConf_FeeBlockConfiguration_Fee_DemoDataBlock_BlockSize];
```

### 2. 测试代码

#### 代码块

```
1  /*Fee Init*/
2  Fls_Init(&Fls_Config);
3  Fee_Init(NULL_PTR);
4  do
5  {
6      Fls_MainFunction();
7      Fee_MainFunction();
8  }while(MEMIF_IDLE!=Fee_GetStatus());
9
10  for(int
    i=0;i<FeeConf_FeeBlockConfiguration_Fee_DemoDataBlock_BlockSize;i++)
```

```

11     {
12         /*Fill data to block 0*/
13         Fee_Block0DataBuffer_Write[i] = i;
14
15         /*Write data to block 0*/
16         Fee_Write(FeeConf_FeeBlockConfiguration_Fee_DemoDataBlock,
17         Fee_Block0DataBuffer_Write);
18         /*Perform write data to Block 0*/
19         do
20         {
21             Fls_MainFunction();
22             Fee_MainFunction();
23         } while (Fee_GetStatus() != MEMIF_IDLE);
24         /*Read data block 0, from offset 0 and length is 6*/
25         Fee_Read(FeeConf_FeeBlockConfiguration_Fee_DemoDataBlock, 0,
26         Fee_Block0DataBuffer_Read,
27         FeeConf_FeeBlockConfiguration_Fee_DemoDataBlock_BlockSize);
28
29         /*Perform read pwoeron times and block0 write tiems form Block 0*/
30         do
31         {
32             Fls_MainFunction();
33             Fee_MainFunction();
34         } while (Fee_GetStatus() != MEMIF_IDLE);
35     }
36 while(1)
37 {}

```

## 5.5 调试测试

### 5.5.1 初始化

```

271 /*Fee Init*/
272 Fls_Init(&Fls_Config);
273 Fee_Init(NULL_PTR);
274 do
275 {
276     Fls_MainFunction();
277     Fee_MainFunction();
278 }while(MEMIF_IDLE!=Fee_GetStatus());
279
280 for(int i=0;i<FeeConf_FeeBlockConfiguration_Fee_DemoDataBlock_BlockSize;i++)
281 {
282     /*Fill data to block 0*/
283     Fee_BlockDataBuffer_Write[i] = 1;
284     do
285     {
286         /*Write data to block 0*/
287         Fee_Write(FeeConf_FeeBlockConfiguration_Fee_DemoDataBlock, Fee_BlockDataBuffer_Write);
288         /*Perform write data to Block 0*/
289         do
290         {
291             Fls_MainFunction();
292             Fee_MainFunction();
293             while (Fee_GetStatus() != MEMIF_IDLE);
294         }
295         /*Read data block 0, from offset 0 and length is 6*/
296         Fee_Read(FeeConf_FeeBlockConfiguration_Fee_DemoDataBlock, 0, Fee_BlockDataBuffer_Read, FeeConf_FeeBlockConfiguration_Fee_Dem
297         /*Perform read pwoer on times and block0 write tiems form Block 0*/
298         do
299         {
300             Fls_MainFunction();
301             Fee_MainFunction();
302             while (Fee_GetStatus() != MEMIF_IDLE);
303         }
304     }
305     while(i)
306     {}
307 }
308 // Fee_TestPowerOnInit();
309
310 /* USER CODE END 2 */
311
312 /* Infinite loop */
313 /* USER CODE BEGIN WHILE */
314
315 /* USER CODE END WHILE */
316
317 /* USER CODE BEGIN 3 */
318
319 /* USER CODE END 3 */
320
321 static void Board_Init(void)
322 {
323     Platform_Init(NULL_PTR);
324     Port_Init(&Port_Config);
325     Gpt_Init(&Gpt_Config);
326 }
327
328 /* USER CODE BEGIN 4 */

```

| Address  | Disassembly     | Find Results |
|----------|-----------------|--------------|
| 000000B4 | 7447 7380 MOV W | R3, #0x0100  |
| 000000B8 | 463A MOV        | R2, R7       |
| 000000BA | 2100 MOV        | R1, #0       |
| 000000BC | 4628 MOV        | R0, R5       |
| 000000BE | 7003 F019 PL    | Fee Read     |
|          |                 | ; 0x000035F4 |

| Address  | Disassembly                         | Find Results                       |
|----------|-------------------------------------|------------------------------------|
| 00100000 | 00000001 00000000 00000400 00000401 | FFFFF01 FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100004 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100008 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 0010000C | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100010 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100014 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100018 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 0010001C | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100020 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100024 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100028 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 0010002C | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100030 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100034 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100038 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 0010003C | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100040 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100044 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100048 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 0010004C | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100050 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100054 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100058 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 0010005C | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100060 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100064 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100068 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 0010006C | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100070 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100074 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100078 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 0010007C | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100080 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100084 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100088 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 0010008C | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100090 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100094 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100098 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 0010009C | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000A0 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000A4 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000A8 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000AC | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000B0 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000B4 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000B8 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000BC | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000C0 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000C4 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000C8 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000CC | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000D0 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000D4 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000D8 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000DC | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000E0 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000E4 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000E8 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000EC | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000F0 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000F4 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000F8 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000FC | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |

## FLASH空间上对应数据的理解为

| Address  | Disassembly                         | Find Results                       |
|----------|-------------------------------------|------------------------------------|
| 00000000 | 00000001 00000000 00000400 00000401 | FFFFF01 FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100004 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100008 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 0010000C | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100010 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100014 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100018 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 0010001C | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100020 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100024 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100028 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 0010002C | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100030 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100034 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100038 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 0010003C | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100040 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100044 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100048 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 0010004C | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100050 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100054 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100058 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 0010005C | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100060 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100064 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100068 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 0010006C | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100070 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100074 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100078 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 0010007C | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100080 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100084 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100088 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 0010008C | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100090 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100094 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 00100098 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 0010009C | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000A0 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000A4 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000A8 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000AC | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000B0 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000B4 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000B8 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000BC | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000C0 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000C4 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000C8 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000CC | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000D0 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000D4 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000D8 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000DC | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000E0 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000E4 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000E8 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000EC | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000F0 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000F4 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000F8 | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |
| 001000FC | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF  | FFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF |

- Cluster信息:** 该信息描述当前该Cluster Group当前所在Cluster(Sector)的信息, 共计32Byte, 固定写入在每个Cluster的前32Byte, Cluster擦除后第一次使用该Cluster时被写入。Cluster信息包括 Fee Cluster写入ID(4Byte)、Cluster起始地址 (相对地址、4Byte)、Cluster长度(4Byte)、Group Hdr校验和 (4Byte) 以及Cluster有效标志(16Byte)。其中Cluster写入ID每次写入前递增1, 因此当前Cluster Group中, ID最大且标志有效的Cluster为当前活跃的Cluster(可执行Fee读、写等操作)。
- Block信息及数据:** 该部分数据为用户定义的Block数据及相关信息, Block数据及信息由3部分组成, 包括: ①用户EEP Block数据信息(Block Hdr), 共计32Byte, 其中Block编号(2Byte)、Block数据长度(2Byte)、Block Data(4Byte)存储地址、Hdr校验和 (4Byte) 、Block数据Valid Flag(16Byte)以及预留4byte。②用户Fee Block数据。

Fee数据分布如图2所示。

Fee用户Block写入过程如下, Block数据在Cluster(Flash Sector)中的分布如图2所示Cluster信息被写入在Cluster开始32Byte中, Block信息与数据分别写入到不同地址中, 其中Block信息从低地址端开始写入, 写入后Fee空闲Block信息地址递增; Block数据从地址端开始写入, 写入后Fee空闲Data地址递减。

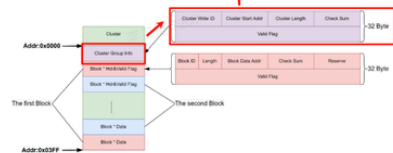


图2 Fee数据分布示意图

## 5.5.2 i=0写读



```
269 //Initialize the Fee/
270
271 //Fee Init/
272 #if 1
273 Fee_Init(Fee_Config);
274 do
275 {
276     Fee_Init(NULL_PTR);
277     Fee_MainFunction();
278     while (Fee_GetStatus() != MHIF_IDLE);
279 }
280 for (int i=0; i<FeeConf_FeeBlockConfiguration_Fee_DemoDataBlock_BlockSize; i++)
281 {
282     //Fill data to block 0/
283     Fee_BlockDataBuffer_Write[1] = i;
284     //Write data to block 0/
285     Fee_Write(FeeConf_FeeBlockConfiguration_Fee_DemoDataBlock_Fee_BlockDataBuffer_Write);
286     //Perform write data to block 0/
287     do
288     {
289         Fee_MainFunction();
290         Fee_MainFunction();
291     } while (Fee_GetStatus() != MHIF_IDLE);
292 }
293 //Read data block 0, from offset 0 and length is 4/
294 Fee_Read(FeeConf_FeeBlockConfiguration_Fee_DemoDataBlock_0_Fee_BlockDataBuffer_Read, FeeConf_FeeBlockConfiguration_Fee_DemoDataBlock_0_Fee_BlockDataBuffer_Read);
295 //Perform read puercon times and block write times from block 0/
296 do
297 {
298     Fee_MainFunction();
299     Fee_MainFunction();
300 } while (Fee_GetStatus() != MHIF_IDLE);
301 while (1)
302 {
303     // USER CODE BEGIN 1 /
304     // Infinite loop /
305     // USER CODE BEGIN WHILE /
306     // USER CODE END WHILE /
307     // USER CODE BEGIN 3 /
308     // USER CODE END 3 /
309 }
310 static void Board_Init(void)
311 {
312     Platform_Init(NULL_PTR);
313     Fee_Init(Fee_Config);
314     Fee_Init(NULL_PTR);
315 }
316 // USER CODE BEGIN 4 /
317 void MvM_JobNotification(void)
318 {
319     // USER CODE BEGIN 4 /
320     // USER CODE END 4 /
321 }
```

| Hex      | Value    | Location |
|----------|----------|----------|
| 00000000 | 00000000 | 00000000 |
| 00000001 | 00000000 | 00000001 |
| 00000002 | 00000000 | 00000002 |
| 00000003 | 00000000 | 00000003 |
| 00000004 | 00000000 | 00000004 |
| 00000005 | 00000000 | 00000005 |
| 00000006 | 00000000 | 00000006 |
| 00000007 | 00000000 | 00000007 |
| 00000008 | 00000000 | 00000008 |
| 00000009 | 00000000 | 00000009 |
| 0000000A | 00000000 | 0000000A |
| 0000000B | 00000000 | 0000000B |
| 0000000C | 00000000 | 0000000C |
| 0000000D | 00000000 | 0000000D |
| 0000000E | 00000000 | 0000000E |
| 0000000F | 00000000 | 0000000F |
| 00000010 | 00000000 | 00000010 |
| 00000011 | 00000000 | 00000011 |
| 00000012 | 00000000 | 00000012 |
| 00000013 | 00000000 | 00000013 |
| 00000014 | 00000000 | 00000014 |
| 00000015 | 00000000 | 00000015 |
| 00000016 | 00000000 | 00000016 |
| 00000017 | 00000000 | 00000017 |
| 00000018 | 00000000 | 00000018 |
| 00000019 | 00000000 | 00000019 |
| 0000001A | 00000000 | 0000001A |
| 0000001B | 00000000 | 0000001B |
| 0000001C | 00000000 | 0000001C |
| 0000001D | 00000000 | 0000001D |
| 0000001E | 00000000 | 0000001E |
| 0000001F | 00000000 | 0000001F |
| 00000020 | 00000000 | 00000020 |
| 00000021 | 00000000 | 00000021 |
| 00000022 | 00000000 | 00000022 |
| 00000023 | 00000000 | 00000023 |
| 00000024 | 00000000 | 00000024 |
| 00000025 | 00000000 | 00000025 |
| 00000026 | 00000000 | 00000026 |
| 00000027 | 00000000 | 00000027 |
| 00000028 | 00000000 | 00000028 |
| 00000029 | 00000000 | 00000029 |
| 0000002A | 00000000 | 0000002A |
| 0000002B | 00000000 | 0000002B |
| 0000002C | 00000000 | 0000002C |
| 0000002D | 00000000 | 0000002D |
| 0000002E | 00000000 | 0000002E |
| 0000002F | 00000000 | 0000002F |
| 00000030 | 00000000 | 00000030 |
| 00000031 | 00000000 | 00000031 |
| 00000032 | 00000000 | 00000032 |
| 00000033 | 00000000 | 00000033 |
| 00000034 | 00000000 | 00000034 |
| 00000035 | 00000000 | 00000035 |
| 00000036 | 00000000 | 00000036 |
| 00000037 | 00000000 | 00000037 |
| 00000038 | 00000000 | 00000038 |
| 00000039 | 00000000 | 00000039 |
| 0000003A | 00000000 | 0000003A |
| 0000003B | 00000000 | 0000003B |
| 0000003C | 00000000 | 0000003C |
| 0000003D | 00000000 | 0000003D |
| 0000003E | 00000000 | 0000003E |
| 0000003F | 00000000 | 0000003F |
| 00000040 | 00000000 | 00000040 |
| 00000041 | 00000000 | 00000041 |
| 00000042 | 00000000 | 00000042 |
| 00000043 | 00000000 | 00000043 |
| 00000044 | 00000000 | 00000044 |
| 00000045 | 00000000 | 00000045 |
| 00000046 | 00000000 | 00000046 |
| 00000047 | 00000000 | 00000047 |
| 00000048 | 00000000 | 00000048 |
| 00000049 | 00000000 | 00000049 |
| 0000004A | 00000000 | 0000004A |
| 0000004B | 00000000 | 0000004B |
| 0000004C | 00000000 | 0000004C |
| 0000004D | 00000000 | 0000004D |
| 0000004E | 00000000 | 0000004E |
| 0000004F | 00000000 | 0000004F |
| 00000050 | 00000000 | 00000050 |
| 00000051 | 00000000 | 00000051 |
| 00000052 | 00000000 | 00000052 |
| 00000053 | 00000000 | 00000053 |
| 00000054 | 00000000 | 00000054 |
| 00000055 | 00000000 | 00000055 |
| 00000056 | 00000000 | 00000056 |
| 00000057 | 00000000 | 00000057 |
| 00000058 | 00000000 | 00000058 |
| 00000059 | 00000000 | 00000059 |
| 0000005A | 00000000 | 0000005A |
| 0000005B | 00000000 | 0000005B |
| 0000005C | 00000000 | 0000005C |
| 0000005D | 00000000 | 0000005D |
| 0000005E | 00000000 | 0000005E |
| 0000005F | 00000000 | 0000005F |
| 00000060 | 00000000 | 00000060 |
| 00000061 | 00000000 | 00000061 |
| 00000062 | 00000000 | 00000062 |
| 00000063 | 00000000 | 00000063 |
| 00000064 | 00000000 | 00000064 |
| 00000065 | 00000000 | 00000065 |
| 00000066 | 00000000 | 00000066 |
| 00000067 | 00000000 | 00000067 |
| 00000068 | 00000000 | 00000068 |
| 00000069 | 00000000 | 00000069 |
| 0000006A | 00000000 | 0000006A |
| 0000006B | 00000000 | 0000006B |
| 0000006C | 00000000 | 0000006C |
| 0000006D | 00000000 | 0000006D |
| 0000006E | 00000000 | 0000006E |
| 0000006F | 00000000 | 0000006F |
| 00000070 | 00000000 | 00000070 |
| 00000071 | 00000000 | 00000071 |
| 00000072 | 00000000 | 00000072 |
| 00000073 | 00000000 | 00000073 |
| 00000074 | 00000000 | 00000074 |
| 00000075 | 00000000 | 00000075 |
| 00000076 | 00000000 | 00000076 |
| 00000077 | 00000000 | 00000077 |
| 00000078 | 00000000 | 00000078 |
| 00000079 | 00000000 | 00000079 |
| 0000007A | 00000000 | 0000007A |
| 0000007B | 00000000 | 0000007B |
| 0000007C | 00000000 | 0000007C |
| 0000007D | 00000000 | 0000007D |
| 0000007E | 00000000 | 0000007E |
| 0000007F | 00000000 | 0000007F |
| 00000080 | 00000000 | 00000080 |
| 00000081 | 00000000 | 00000081 |
| 00000082 | 00000000 | 00000082 |
| 00000083 | 00000000 | 00000083 |
| 00000084 | 00000000 | 00000084 |
| 00000085 | 00000000 | 00000085 |
| 00000086 | 00000000 | 00000086 |
| 00000087 | 00000000 | 00000087 |
| 00000088 | 00000000 | 00000088 |
| 00000089 | 00000000 | 00000089 |
| 0000008A | 00000000 | 0000008A |
| 0000008B | 00000000 | 0000008B |
| 0000008C | 00000000 | 0000008C |
| 0000008D | 00000000 | 0000008D |
| 0000008E | 00000000 | 0000008E |
| 0000008F | 00000000 | 0000008F |
| 00000090 | 00000000 | 00000090 |
| 00000091 | 00000000 | 00000091 |
| 00000092 | 00000000 | 00000092 |
| 00000093 | 00000000 | 00000093 |
| 00000094 | 00000000 | 00000094 |
| 00000095 | 00000000 | 00000095 |
| 00000096 | 00000000 | 00000096 |
| 00000097 | 00000000 | 00000097 |
| 00000098 | 00000000 | 00000098 |
| 00000099 | 00000000 | 00000099 |
| 0000009A | 00000000 | 0000009A |
| 0000009B | 00000000 | 0000009B |
| 0000009C | 00000000 | 0000009C |
| 0000009D | 00000000 | 0000009D |
| 0000009E | 00000000 | 0000009E |
| 0000009F | 00000000 | 0000009F |
| 000000A0 | 00000000 | 000000A0 |
| 000000A1 | 00000000 | 000000A1 |
| 000000A2 | 00000000 | 000000A2 |
| 000000A3 | 00000000 | 000000A3 |
| 000000A4 | 00000000 | 000000A4 |
| 000000A5 | 00000000 | 000000A5 |
| 000000A6 | 00000000 | 000000A6 |
| 000000A7 | 00000000 | 000000A7 |
| 000000A8 | 00000000 | 000000A8 |
| 000000A9 | 00000000 | 000000A9 |
| 000000AA | 00000000 | 000000AA |
| 000000AB | 00000000 | 000000AB |
| 000000AC | 00000000 | 000000AC |
| 000000AD | 00000000 | 000000AD |
| 000000AE | 00000000 | 000000AE |
| 000000AF | 00000000 | 000000AF |
| 000000B0 | 00000000 | 000000B0 |
| 000000B1 | 00000000 | 000000B1 |
| 000000B2 | 00000000 | 000000B2 |
| 000000B3 | 00000000 | 000000B3 |
| 000000B4 | 00000000 | 000000B4 |
| 000000B5 | 00000000 | 000000B5 |
| 000000B6 | 00000000 | 000000B6 |
| 000000B7 | 00000000 | 000000B7 |
| 000000B8 | 00000000 | 000000B8 |
| 000000B9 | 00000000 | 000000B9 |
| 000000BA | 00000000 | 000000BA |
| 000000BB | 00000000 | 000000BB |
| 000000BC | 00000000 | 000000BC |
| 000000BD | 00000000 | 000000BD |
| 000000BE | 00000000 | 000000BE |
| 000000BF | 00000000 | 000000BF |
| 000000C0 | 00000000 | 000000C0 |
| 000000C1 | 00000000 | 000000C1 |
| 000000C2 | 00000000 | 000000C2 |
| 000000C3 | 00000000 | 000000C3 |
| 000000C4 | 00000000 | 000000C4 |
| 000000C5 | 00000000 | 000000C5 |
| 000000C6 | 00000000 | 000000C6 |
| 000000C7 | 00000000 | 000000C7 |
| 000000C8 | 00000000 | 000000C8 |
| 000000C9 | 00000000 | 000000C9 |
| 000000CA | 00000000 | 000000CA |
| 000000CB | 00000000 | 000000CB |
| 000000CC | 00000000 | 000000CC |
| 000000CD | 00000000 | 000000CD |
| 000000CE | 00000000 | 000000CE |
| 000000CF | 00000000 | 000000CF |
| 000000D0 | 00000000 | 000000D0 |
| 000000D1 | 00000000 | 000000D1 |
| 000000D2 | 00000000 | 000000D2 |
| 000000D3 | 00000000 | 000000D3 |
| 000000D4 | 00000000 | 000000D4 |
| 000000D5 | 00000000 | 000000D5 |
| 000000D6 | 00000000 | 000000D6 |
| 000000D7 | 00000000 | 000000D7 |
| 000000D8 | 00000000 | 000000D8 |
| 000000D9 | 00000000 | 000000D9 |
| 000000DA | 00000000 | 000000DA |
| 000000DB | 00000000 | 000000DB |
| 000000DC | 00000000 | 000000DC |
| 000000DD | 00000000 | 000000DD |
| 000000DE | 00000000 | 000000DE |
| 000000DF | 00000000 | 000000DF |
| 000000E0 | 00000000 | 000000E0 |
| 000000E1 | 00000000 | 000000E1 |
| 000000E2 | 00000000 | 000000E2 |
| 000000E3 | 00000000 | 000000E3 |
| 000000E4 | 00000000 | 000000E4 |
| 000000E5 | 00000000 | 000000E5 |
| 000000E6 | 00000000 | 000000E6 |
| 000000E7 | 00000000 | 000000E7 |
| 000000E8 | 00000000 | 000000E8 |
| 000000E9 | 00000000 | 000000E9 |
| 000000EA | 00000000 | 000000EA |
| 000000EB | 00000000 | 000000EB |
| 000000EC | 00000000 | 000000EC |
| 000000ED | 00000000 | 000000ED |
| 000000EE | 00000000 | 000000EE |
| 000000EF | 00000000 | 000000EF |
| 000000F0 | 00000000 | 000000F0 |
| 000000F1 | 00000000 | 000000F1 |
| 000000F2 | 00000000 | 000000F2 |
| 000000F3 | 00000000 | 000000F3 |
| 000000F4 | 00000000 | 000000F4 |
| 000000F5 | 00000000 | 000000F5 |
| 000000F6 | 00000000 | 000000F6 |
| 000000F7 | 00000000 | 000000F7 |
| 000000F8 | 00000000 | 000000F8 |
| 000000F9 | 00000000 | 000000F9 |
| 000000FA | 00000000 | 000000FA |
| 000000FB | 00000000 | 000000FB |
| 000000FC | 00000000 | 000000FC |
| 000000FD | 00000000 | 000000FD |
| 000000FE | 00000000 | 000000FE |
| 000000FF | 00000000 | 000000FF |

# FLASH空间上对应数据的理解

| Hex      | Value    | Location |
|----------|----------|----------|
| 00000000 | 00000000 | 00000000 |
| 00000001 | 00000000 | 00000001 |
| 00000002 | 00000000 | 00000002 |
| 00000003 | 00000000 | 00000003 |
| 00000004 | 00000000 | 00000004 |
| 00000005 | 00000000 | 00000005 |
| 00000006 | 00000000 | 00000006 |
| 00000007 | 00000000 | 00000007 |
| 00000008 | 00000000 | 00000008 |
| 00000009 | 00000000 | 00000009 |
| 0000000A | 00000000 | 0000000A |
| 0000000B | 00000000 | 0000000B |
| 0000000C | 00000000 | 0000000C |
| 0000000D | 00000000 | 0000000D |
| 0000000E | 00000000 | 0000000E |
| 0000000F | 00000000 | 0000000F |



```

271 //Fee Init*/
272 Fee_Init(Fee_Conf);
273 Fee_Init(MEMIF_FTR);
274 do
275 {
276     Fee_MainFunction();
277     Fee_MainFunction();
278 }while(MEMIF_IDLE!=Fee_GetStatus());
279
280 for(int i=0;i<FeeConf_FeeBlockConfiguration_Fee_DemoDataBlock_BlockSize;i++)
281 {
282     //Fill data to block 0*/
283     Fee_BlockDataBuffer_Write[i] = i;
284
285     //Write data to block 0*/
286     Fee_Write(FeeConf_FeeBlockConfiguration_Fee_DemoDataBlock, Fee_BlockDataBuffer_Write);
287     //Perform write data to block 0*/
288     do
289     {
290         Fee_MainFunction();
291         Fee_MainFunction();
292     } while (Fee_GetStatus() != MEMIF_IDLE);
293
294     //Read data block 0, from offset 0 and length is 6*/
295     Fee_Read(FeeConf_FeeBlockConfiguration_Fee_DemoDataBlock, 0, Fee_BlockDataBuffer_Read, FeeConf_FeeBlockConfiguration_Fee_DemoDataBlock_BlockSize);
296     //Perform read process times and block0 write times from block 0*/
297     do
298     {
299         Fee_MainFunction();
300         Fee_MainFunction();
301     } while (Fee_GetStatus() != MEMIF_IDLE);
302
303     while(i)
304     {
305         //Fee_TestPowerOnInit();
306         // USER CODE END 2 */
307         // Infinite loop */
308         // USER CODE BEGIN WHILE */
309         // USER CODE END WHILE */
310         // USER CODE BEGIN 3 */
311         // USER CODE END 3 */
312     }
313 }

```

| Hex      | Value    | Location |
|----------|----------|----------|
| 00000000 | 00000000 | 00000000 |
| 00000001 | 00000001 | 00000001 |
| 00000002 | 00000002 | 00000002 |
| 00000003 | 00000003 | 00000003 |
| 00000004 | 00000004 | 00000004 |
| 00000005 | 00000005 | 00000005 |
| 00000006 | 00000006 | 00000006 |
| 00000007 | 00000007 | 00000007 |
| 00000008 | 00000008 | 00000008 |
| 00000009 | 00000009 | 00000009 |
| 0000000A | 0000000A | 0000000A |
| 0000000B | 0000000B | 0000000B |
| 0000000C | 0000000C | 0000000C |
| 0000000D | 0000000D | 0000000D |
| 0000000E | 0000000E | 0000000E |
| 0000000F | 0000000F | 0000000F |
| 00000010 | 00000010 | 00000010 |
| 00000011 | 00000011 | 00000011 |
| 00000012 | 00000012 | 00000012 |
| 00000013 | 00000013 | 00000013 |
| 00000014 | 00000014 | 00000014 |
| 00000015 | 00000015 | 00000015 |
| 00000016 | 00000016 | 00000016 |
| 00000017 | 00000017 | 00000017 |
| 00000018 | 00000018 | 00000018 |
| 00000019 | 00000019 | 00000019 |
| 0000001A | 0000001A | 0000001A |
| 0000001B | 0000001B | 0000001B |
| 0000001C | 0000001C | 0000001C |
| 0000001D | 0000001D | 0000001D |
| 0000001E | 0000001E | 0000001E |
| 0000001F | 0000001F | 0000001F |
| 00000020 | 00000020 | 00000020 |
| 00000021 | 00000021 | 00000021 |
| 00000022 | 00000022 | 00000022 |
| 00000023 | 00000023 | 00000023 |
| 00000024 | 00000024 | 00000024 |
| 00000025 | 00000025 | 00000025 |
| 00000026 | 00000026 | 00000026 |
| 00000027 | 00000027 | 00000027 |
| 00000028 | 00000028 | 00000028 |
| 00000029 | 00000029 | 00000029 |
| 0000002A | 0000002A | 0000002A |
| 0000002B | 0000002B | 0000002B |
| 0000002C | 0000002C | 0000002C |
| 0000002D | 0000002D | 0000002D |
| 0000002E | 0000002E | 0000002E |
| 0000002F | 0000002F | 0000002F |
| 00000030 | 00000030 | 00000030 |
| 00000031 | 00000031 | 00000031 |
| 00000032 | 00000032 | 00000032 |
| 00000033 | 00000033 | 00000033 |
| 00000034 | 00000034 | 00000034 |
| 00000035 | 00000035 | 00000035 |
| 00000036 | 00000036 | 00000036 |
| 00000037 | 00000037 | 00000037 |
| 00000038 | 00000038 | 00000038 |
| 00000039 | 00000039 | 00000039 |
| 0000003A | 0000003A | 0000003A |
| 0000003B | 0000003B | 0000003B |
| 0000003C | 0000003C | 0000003C |
| 0000003D | 0000003D | 0000003D |
| 0000003E | 0000003E | 0000003E |
| 0000003F | 0000003F | 0000003F |
| 00000040 | 00000040 | 00000040 |
| 00000041 | 00000041 | 00000041 |
| 00000042 | 00000042 | 00000042 |
| 00000043 | 00000043 | 00000043 |
| 00000044 | 00000044 | 00000044 |
| 00000045 | 00000045 | 00000045 |
| 00000046 | 00000046 | 00000046 |
| 00000047 | 00000047 | 00000047 |
| 00000048 | 00000048 | 00000048 |
| 00000049 | 00000049 | 00000049 |
| 0000004A | 0000004A | 0000004A |
| 0000004B | 0000004B | 0000004B |
| 0000004C | 0000004C | 0000004C |
| 0000004D | 0000004D | 0000004D |
| 0000004E | 0000004E | 0000004E |
| 0000004F | 0000004F | 0000004F |
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| 00000051 | 00000051 | 00000051 |
| 00000052 | 00000052 | 00000052 |
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| 00000056 | 00000056 | 00000056 |
| 00000057 | 00000057 | 00000057 |
| 00000058 | 00000058 | 00000058 |
| 00000059 | 00000059 | 00000059 |
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| 0000005B | 0000005B | 0000005B |
| 0000005C | 0000005C | 0000005C |
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| 0000005E | 0000005E | 0000005E |
| 0000005F | 0000005F | 0000005F |
| 00000060 | 00000060 | 00000060 |
| 00000061 | 00000061 | 00000061 |
| 00000062 | 00000062 | 00000062 |
| 00000063 | 00000063 | 00000063 |
| 00000064 | 00000064 | 00000064 |
| 00000065 | 00000065 | 00000065 |
| 00000066 | 00000066 | 00000066 |
| 00000067 | 00000067 | 00000067 |
| 00000068 | 00000068 | 00000068 |
| 00000069 | 00000069 | 00000069 |
| 0000006A | 0000006A | 0000006A |
| 0000006B | 0000006B | 0000006B |
| 0000006C | 0000006C | 0000006C |
| 0000006D | 0000006D | 0000006D |
| 0000006E | 0000006E | 0000006E |
| 0000006F | 0000006F | 0000006F |
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| 00000072 | 00000072 | 00000072 |
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| 00000075 | 00000075 | 00000075 |
| 00000076 | 00000076 | 00000076 |
| 00000077 | 00000077 | 00000077 |
| 00000078 | 00000078 | 00000078 |
| 00000079 | 00000079 | 00000079 |
| 0000007A | 0000007A | 0000007A |
| 0000007B | 0000007B | 0000007B |
| 0000007C | 0000007C | 0000007C |
| 0000007D | 0000007D | 0000007D |
| 0000007E | 0000007E | 0000007E |
| 0000007F | 0000007F | 0000007F |
| 00000080 | 00000080 | 00000080 |
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| 00000082 | 00000082 | 00000082 |
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| 00000085 | 00000085 | 00000085 |
| 00000086 | 00000086 | 00000086 |
| 00000087 | 00000087 | 00000087 |
| 00000088 | 00000088 | 00000088 |
| 00000089 | 00000089 | 00000089 |
| 0000008A | 0000008A | 0000008A |
| 0000008B | 0000008B | 0000008B |
| 0000008C | 0000008C | 0000008C |
| 0000008D | 0000008D | 0000008D |
| 0000008E | 0000008E | 0000008E |
| 0000008F | 0000008F | 0000008F |
| 00000090 | 00000090 | 00000090 |
| 00000091 | 00000091 | 00000091 |
| 00000092 | 00000092 | 00000092 |
| 00000093 | 00000093 | 00000093 |
| 00000094 | 00000094 | 00000094 |
| 00000095 | 00000095 | 00000095 |
| 00000096 | 00000096 | 00000096 |
| 00000097 | 00000097 | 00000097 |
| 00000098 | 00000098 | 00000098 |
| 00000099 | 00000099 | 00000099 |
| 0000009A | 0000009A | 0000009A |
| 0000009B | 0000009B | 0000009B |
| 0000009C | 0000009C | 0000009C |
| 0000009D | 0000009D | 0000009D |
| 0000009E | 0000009E | 0000009E |
| 0000009F | 0000009F | 0000009F |
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| 000000A1 | 000000A1 | 000000A1 |
| 000000A2 | 000000A2 | 000000A2 |
| 000000A3 | 000000A3 | 000000A3 |
| 000000A4 | 000000A4 | 000000A4 |
| 000000A5 | 000000A5 | 000000A5 |
| 000000A6 | 000000A6 | 000000A6 |
| 000000A7 | 000000A7 | 000000A7 |
| 000000A8 | 000000A8 | 000000A8 |
| 000000A9 | 000000A9 | 000000A9 |
| 000000AA | 000000AA | 000000AA |
| 000000AB | 000000AB | 000000AB |
| 000000AC | 000000AC | 000000AC |
| 000000AD | 000000AD | 000000AD |
| 000000AE | 000000AE | 000000AE |
| 000000AF | 000000AF | 000000AF |
| 000000B0 | 000000B0 | 000000B0 |
| 000000B1 | 000000B1 | 000000B1 |
| 000000B2 | 000000B2 | 000000B2 |
| 000000B3 | 000000B3 | 000000B3 |
| 000000B4 | 000000B4 | 000000B4 |
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| 000000B6 | 000000B6 | 000000B6 |
| 000000B7 | 000000B7 | 000000B7 |
| 000000B8 | 000000B8 | 000000B8 |
| 000000B9 | 000000B9 | 000000B9 |
| 000000BA | 000000BA | 000000BA |
| 000000BB | 000000BB | 000000BB |
| 000000BC | 000000BC | 000000BC |
| 000000BD | 000000BD | 000000BD |
| 000000BE | 000000BE | 000000BE |
| 000000BF | 000000BF | 000000BF |
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| 000000C1 | 000000C1 | 000000C1 |
| 000000C2 | 000000C2 | 000000C2 |
| 000000C3 | 000000C3 | 000000C3 |
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| 000000C8 | 000000C8 | 000000C8 |
| 000000C9 | 000000C9 | 000000C9 |
| 000000CA | 000000CA | 000000CA |
| 000000CB | 000000CB | 000000CB |
| 000000CC | 000000CC | 000000CC |
| 000000CD | 000000CD | 000000CD |
| 000000CE | 000000CE | 000000CE |
| 000000CF | 000000CF | 000000CF |
| 000000D0 | 000000D0 | 000000D0 |
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| 000000D2 | 000000D2 | 000000D2 |
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| 000000D6 | 000000D6 | 000000D6 |
| 000000D7 | 000000D7 | 000000D7 |
| 000000D8 | 000000D8 | 000000D8 |
| 000000D9 | 000000D9 | 000000D9 |
| 000000DA | 000000DA | 000000DA |
| 000000DB | 000000DB | 000000DB |
| 000000DC | 000000DC | 000000DC |
| 000000DD | 000000DD | 000000DD |
| 000000DE | 000000DE | 000000DE |
| 000000DF | 000000DF | 000000DF |
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| 000000E1 | 000000E1 | 000000E1 |
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| 000000E6 | 000000E6 | 000000E6 |
| 000000E7 | 000000E7 | 000000E7 |
| 000000E8 | 000000E8 | 000000E8 |
| 000000E9 | 000000E9 | 000000E9 |
| 000000EA | 000000EA | 000000EA |
| 000000EB | 000000EB | 000000EB |
| 000000EC | 000000EC | 000000EC |
| 000000ED | 000000ED | 000000ED |
| 000000EE | 000000EE | 000000EE |
| 000000EF | 000000EF | 000000EF |
| 000000F0 | 000000F0 | 000000F0 |
| 000000F1 | 000000F1 | 000000F1 |
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| 000000F7 | 000000F7 | 000000F7 |
| 000000F8 | 000000F8 | 000000F8 |
| 000000F9 | 000000F9 | 000000F9 |
| 000000FA | 000000FA | 000000FA |
| 000000FB | 000000FB | 000000FB |
| 000000FC | 000000FC | 000000FC |
| 000000FD | 000000FD | 000000FD |
| 000000FE | 000000FE | 000000FE |
| 000000FF | 000000FF | 000000FF |

|                        |          |          |              |                    |          |            |                       |          |
|------------------------|----------|----------|--------------|--------------------|----------|------------|-----------------------|----------|
| 00000000               | FeeDead  | FeeConf  | FeeBlockConf | FeeBlockDataHeader | Dead     | FeeConf    | FeeBlockConfiguration |          |
| 00000001               | 7347     | 7350     | MOV          | 5                  | 00000000 |            |                       |          |
| 00000008               | 463A     |          | MOV          | 32                 | 27       |            |                       |          |
| 00000009               | 00000000 | 00000000 | MOV          | 32                 | 27       |            |                       |          |
| 0000000C               | 4628     |          | MOV          | 20                 | 25       |            |                       |          |
| 0000000E               | 0000     | F033     | RL           |                    |          | 00000003FE |                       |          |
| Disassembly - Line End |          |          |              |                    |          |            |                       |          |
| Memory: 1 00010000     |          |          |              |                    |          |            |                       |          |
| Go to: 100000          |          |          |              |                    |          |            |                       |          |
| 00100000               | 00000001 | 00000000 | 00000401     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100001               | 01000001 | 00000000 | 00000401     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100002               | 00000000 | 00000000 | 00000000     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100003               | 00000000 | 00000000 | 00000000     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100004               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100005               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100006               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100007               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100008               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100009               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 0010000A               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 0010000B               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 0010000C               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 0010000D               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 0010000E               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 0010000F               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100010               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100011               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100012               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100013               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100014               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100015               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100016               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100017               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100018               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100019               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 0010001A               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 0010001B               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 0010001C               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 0010001D               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 0010001E               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 0010001F               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100020               | 00000100 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 00100021               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 00100022               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 00100023               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 00100024               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 00100025               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 00100026               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 00100027               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 00100028               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 00100029               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 0010002A               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 0010002B               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 0010002C               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 0010002D               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 0010002E               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 0010002F               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 00100030               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 00100031               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 00100032               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 00100033               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 00100034               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 00100035               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 00100036               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 00100037               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 00100038               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 00100039               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 0010003A               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 0010003B               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 0010003C               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 0010003D               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 0010003E               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 0010003F               | 00000000 | 00000000 | 00000000     | 00000000           | 00000000 | 00000000   | 00000000              | 00000000 |
| 00100040               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100041               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100042               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100043               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100044               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100045               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100046               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100047               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100048               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100049               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 0010004A               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 0010004B               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 0010004C               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 0010004D               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 0010004E               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 0010004F               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100050               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100051               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |
| 00100052               | FFFFFFFE | FFFFFFFE | FFFFFFFE     | FFFFFFF0           | FFFFFFF0 | FFFFFFF0   | FFFFFFF0              | FFFFFFFF |



[illegible][illegible][illegible]

- Fee用户Block写入过程如下，Block数据在Cluster(Flash Sector)中的分布如图2所示Cluster信息被写入在Cluster开始的32Byte中，Block信息与数据分别写入到不同地址中，其中Block信息从低地址端开始写入，写入后Fee空闲Block信息地址递增；Block数据从高地址端开始写入，写入后Fee空闲Data地址递减。



空间发生了换页，转存历史数据，写入新数据。

