uClinux MTD Application Note V1.0

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Support Chips:

NUC710A

NUC745A

Support Platforms:

uClinux 2.4.x

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1. Introduction

Memory Technology Devices are flash, RAM and similar chips, often used for solid state file systems on embedded devices. This option will provide the generic support for MTD drivers to register themselves with the kernel and for potential users of MTD devices to enumerate the devices which are present and obtain a handle on them. It will also allow user to select individual drivers for particular hardware and users of MTD devices. – *[Quote from Linux kernel configuration help page]*

Nuvoton uClinux BSP supports MTD on both NOR flash and NAND flash. Configuration and manipulation of MTD are described in following sections

2. NOR Flash and JFFS2

2.1. Kernel Configuration for NOR Flash

NOR flash usually works with JFFS2 file system, below is the kernel configuration for supporting AMD command set NOR flashes MTD and JFFS2

```
Memory Technology Devices (MTD)  --->
[*] Memory Technology Device (MTD) support
[*]   MTD partitioning support
--- User Modules And Translation Layers
[*]   Direct char device access to MTD devices
[*]   Caching block device access to MTD devices
RAM/ROM/Flash chip drivers  --->
[*]   Detect flash chips by Common Flash Interface (CFI) probe
[*]   Flash chip driver advanced configuration options
(NO) Flash cmd/query data swapping
[*]   Specific CFI Flash geometry selection
[*]     Support  16-bit buswidth
[*]     Support 1-chip flash interleave
[*]   Support for AMD/Fujitsu flash chips
Mapping drivers for chip access  --->
[*]   Support for non-linear mappings of flash chips
[*]   <CHIP NAME> board mappings
File systems  --->
[*] Journalling Flash File System v2 (JFFS2) support
(0) JFFS2 debugging verbosity (0 = quiet, 2 = noisy)
```

MTD partition must be mounted before it can be accessed. Use following command to mount the correct partition:

```
> mount –t jffs2 /dev/mtdblock<x> /<dir>
```

2.2. Supporting Different CFI Command Set

User could make MTD support different command sets by enable kernel configuration options list below. Default kernel configuration in BSP enables AMD/Fujitsu command set only

```
RAM/ROM/Flash chip drivers  --->
[ ]   Support for Intel/Sharp flash chips
[*]   Support for AMD/Fujitsu flash chips
[ ]   Support for ST (Advanced Architecture) flash chips
```

2.3. Supporting MTD on Two NOR Flashes

Duplicate a map file from <chip name>_map.c. Change the base address (the EXTxCON register need to be configured), and partition configuration, modify the Makefile and Config.in to include the new map file. Also create new device file for the new partitions. The minor number of block device mtdblockA should be A, the minor number of char device mtdA should be 2xA instead of A or it'll become a read only device.

2.4. Modifying Partition Setting

It's defined in <CHIP NAME>_partitions[] in <chip name>_map.c. It can be rearranged according to the system requirement as long as the partitions aren't overlapped with kernel or romfs images in flash.

2.5. Mounting the Correct Partition(s)

There are two MTD partitions in the system by the original driver's design. The first should never be mounted since its space is reserved for bootloader and images. There might be more if user changes the mapping table or add other MTD device into the system. The correct method of knowing the partition number is to read the kernel boot up message. The first appeared partition will be mtdblock0, and the second will be mtdblock1... This sequence will not change unless user modified the driver's file name or add other partition.

2.6. JFFS2 Partition not Full but cannot Write Anything in

File system need space to save directory and file information, and JFFS2 need free sectors in order to do garbage collection. So it is possible that the partition is not full, but no more data is allowed to be written into it.

3. NAND Flash and YAFFS2

3.1. Kernel Configuration for NAND Flash

NAND flash usually works with YAFFS2 file system for better performance comparing to JFFS2. Below is the kernel configuration for supporting NAND flash MTD and YAFFS2. BSP support two types of NAND flash, 32MB with 512 bytes page size and 128MB with 2k bytes page size.

```
Memory Technology Devices (MTD)  --->
[*] Memory Technology Device (MTD) support
[*]   MTD partitioning support
[*]   NFTL (NAND Flash Translation Layer) support
[*]     Write support for NFTL (BETA)
NAND Flash Device Drivers  --->
[*]   NAND Device Support
[*]   NAND Flash device on NUVOTON board
(128MB_2k_page_size) NAND is to be used in the system
File systems  --->
[*] YAFFS2 file system support
```

The NAND flash driver assumes NAND flash connects on EBI bank 2 and GPIO5-4 and GPIO5-5 connect to NAND's WP# and R/B# respectively. This code might need to be modified according to the hardware design.

To mount the NAND partition, use following command:

```
> mount –t yaffs /dev/mtdblock<x> /<dir>
```

4. Revision History

Version	Date	Description
V1.0	Aug. 2008	● Created

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