

# TI81XX PSP NAND Driver User Guide

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## Linux PSP NAND Driver Guide

Linux PSP

### IMPORTANT

TI81XX refers to TI816X, TI814X and TI813X.

## Introduction

The general-purpose memory controller (GPMC) is an unified memory controller dedicated to interfacing external memory devices:

- Asynchronous SRAM-like memories and application-specific integrated circuit (ASIC) devices
- Asynchronous, synchronous, and page mode (only available in non-multiplexed mode) burst NOR flash devices
- NAND Flash
- Pseudo-SRAM devices

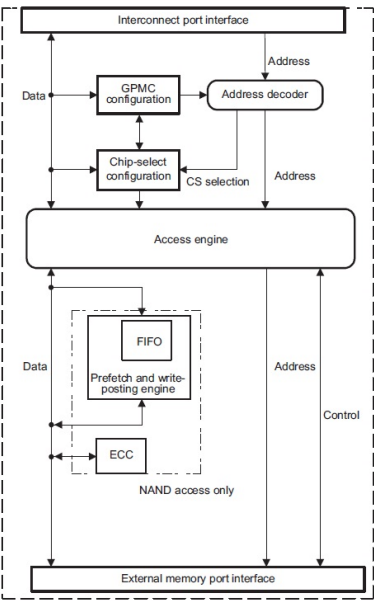
## Features

### Hardware Features

The GPMC can access various external devices through the L3 Slow Interconnect. The flexible programming model allows a wide range of attached device types and access schemes.

The GPMC consists of six blocks:

- Interconnect port interface
- Address decoder, GPMC configuration, and chip-select configuration register file
- Access engine
- Prefetch and write-posting engine
- Error correction code engine (ECC)
- External device/memory port interface



Software Features

- Access 8-bit NAND
- Access 16-bit NAND
- 8-bit BCH ECC scheme with 8-bit error correction enabled by default (consistent across ROM, Uboot, Kernel and File System)
- Prefetch Polled transfer Mode enabled by default

ECC schemes usage table

ECC scheme used by different components:

ECC schemes usage table

Component	Default ECC scheme used by the component	ECC scheme to be used to flash the component	ECC schemes supported by the component
ROM	BCH8	NA	BCH8
U-boot	BCH8	BCH8	BCH8 (default) / 1-bit HW
Linux	BCH8	BCH8	BCH8 (default) / 1-bit HW
File System	NA	BCH8	NA
Environment variables	NA	BCH8	NA

## Driver Configuration

To enable/disable NAND support, start the *Linux Kernel Configuration* tool:

```
host$ make menuconfig
```

Select *Device Drivers* from the main menu.

```
...
...
[ ] Networking support --->
Device Drivers --->
File systems --->
...
...
```

- Enable below Configs to enable MTD Support along with MTD nand driver support

```
Device Drivers --->
<*> Memory Technology Device (MTD) support --->
    [*] Command line partition table parsing
    <*> Direct char device access to MTD devices
    <*> Caching block device access to MTD devices
    <*> NAND Device Support --->
        <*> NAND Flash device on OMAP2 and OMAP3
    <*> Enable UBI - Unsorted block images --->
```

## Module Build

Module build for the NAND driver is supported. To do this, make the changes as below

```
Device Drivers --->
<*> Memory Technology Device (MTD) support --->
    [*] Command line partition table parsing
    <*> Direct char device access to MTD devices
    <*> Caching block device access to MTD devices
    <M> NAND Device Support --->
        <M> NAND Flash device on OMAP2 and OMAP3
    <*> Enable UBI - Unsorted block images --->
```

For loading modules follow the steps below

```
target$ insmod drivers/mtd/nand/nand_ecc.ko
target$ insmod drivers/mtd/nand/nand_ids.ko
target$ insmod drivers/mtd/nand/nand.ko
target$ insmod drivers/mtd/devices/omap2_elm.ko
target$ insmod drivers/mtd/nand/omap2.ko
```

## Device Interface

You always need a pair `mtdx/mtdblockx` of device nodes to access your flash file system. The `mtdx` is used to access the raw flash device, the `mtdblockx` is used to access the disk/block established in the raw flash.

Use MTD-Utils user space tools to access NAND partition from Linux console

Below are some of the examples for accessing NAND partitions

- Erase the nand partition (assume partition 3)

```
target$ flash_eraseall /dev/mtd3
```

- write a file to nand partition (assume partition 4)

```
target$ nandwrite -p /dev/mtd4 u-boot.img
```

- Mount nand partition from U-Boot as Root file system partition for Linux

```
u-boot> setenv bootargs 'console=tty00,115200n8 root=ubi0:rootfs rw ubi.mtd=<partition_id>,2048 noinitrd rootfstype=ubifs mem=256M rootwait=1'
```

The value of PARTITION\_ID depends on MTD device which holds the root filesystem. The below example assumes UBIFS file system is flashed on MTD partition 7 and respective device is enabled on the board.

```
u-boot> setenv bootargs 'console=tty00,115200n8 root=ubi0:rootfs rw ubi.mtd=7,2048 noinitrd rootfstype=ubifs mem=256M rootwait=1'
```

## Proc Interface

The `/proc/mtd` kernel interface is a status interface. A lot of useful information about the nand system can be found in the `/proc/mtd` file.

- Use `/proc/mtd` to get information on how many partitions are currently configured by the kernels flash driver.

```
target$ cat /proc/mtd
```

You should see output similar to:

```
target$ cat /proc/mtd
dev:    size  erasesize  name
mtd0: 00020000 00020000 "SPL"
mtd1: 00020000 00020000 "SPL.backup1"
mtd2: 00020000 00020000 "SPL.backup2"
mtd3: 00020000 00020000 "SPL.backup3"
mtd4: 001e0000 00020000 "U-Boot"
mtd5: 00020000 00020000 "U-Boot Env"
mtd6: 00500000 00020000 "Kernel"
mtd7: 0f880000 00020000 "File System"
```

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