IPNC RDK Nand ECC for DM812x/DM385

App Notes

Applicable to IPNC RDK Version >= 03.00

Copyright © 2012 Texas Instruments Incorporated. All rights reserved.

Information in this document is subject to change without notice. Texas Instruments may have pending patent applications, trademarks, copyrights, or other intellectual property rights covering matter in this document. The furnishing of this documents is given for usage with Texas Instruments products only and does not give you any license to the intellectual property that might be contained within this document. Texas Instruments makes no implied or expressed warranties in this document and is not responsible for the products based from this document.

IMPORTANT NOTICE

Texas Instruments Incorporated and its subsidiaries (TI) reserve the right to make corrections, modifications, enhancements, improvements, and other changes to its products and services at any time and to discontinue any product or service without notice. Customers should obtain the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to TI's terms and conditions of sale supplied at the time of order acknowledgment.

TI warrants performance of its hardware products to the specifications applicable at the time of sale in accordance with TI's standard warranty. Testing and other quality control techniques are used to the extent TI deems necessary to support this warranty. Except where mandated by government requirements, testing of all parameters of each product is not necessarily performed.

TI assumes no liability for applications assistance or customer product design. Customers are responsible for their products and applications using TI components. To minimize the risks associated with customer products and applications, customers should provide adequate design and operating safeguards.

TI does not warrant or represent that any license, either express or implied, is granted under any TI patent right, copyright, mask work right, or other TI intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information published by TI regarding third-party products or services does not constitute a license from TI to use such products or services or a warranty or endorsement thereof. Use of such information may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

Reproduction of TI information in TI data books or data sheets is permissible only if reproduction is without alteration and is accompanied by all associated warranties, conditions, limitations, and notices. Reproduction of this information with alteration is an unfair and deceptive business practice. TI is not responsible or liable for such altered documentation. Information of third parties may be subject to additional restrictions.

Resale of TI products or services with statements different from or beyond the parameters stated by TI for that product or service voids all express and any implied warranties for the associated TI product or service and is an unfair and deceptive business practice. TI is not responsible or liable for any such statements.

TI products are not authorized for use in safety-critical applications (such as life support) where a failure of the TI product would reasonably be expected to cause severe personal injury or death, unless officers of the parties have executed an agreement specifically governing such use. Buyers represent that they have all necessary expertise in the safety and regulatory ramifications of their applications, and acknowledge and agree that they are solely responsible for all legal, regulatory and safety-related requirements concerning their products and any use of TI products in such safety-critical applications, notwithstanding any applications-related information or support that may be provided by TI. Further, Buyers must fully indemnify TI and its representatives against any damages arising out of the use of TI products in such safety-critical applications.

TI products are neither designed nor intended for use in military/aerospace applications or environments unless the TI products are specifically designated by TI as military-grade or "enhanced plastic." Only products designated by TI as military-grade meet military specifications. Buyers acknowledge and agree that any such use of TI products which TI has not designated as military-grade is solely at the Buyer's risk, and that they are solely responsible for compliance with all legal and regulatory requirements in connection with such use.

TI products are neither designed nor intended for use in automotive applications or environments unless the specific TI products are designated by TI as compliant with ISO/TS 16949 requirements. Buyers acknowledge and agree that, if they use any non-designated products in automotive applications, TI will not be responsible for any failure to meet such requirements.

Following are URLs where you can obtain information on other Texas Instruments products and application solutions:

Products		**Applications**	
Amplifiers	amplifier.ti.com	Audio	www.ti.com/audio
Data Converters	dataconverter.ti.com	Automotive	www.ti.com/automotive
DSP	dsp.ti.com	Broadband	www.ti.com/broadband
Clocks and Timers	www.ti.com/clocks	Digital Control	www.ti.com/digitalcontrol
Interface	interface.ti.com	Medical	www.ti.com/medical
Logic	logic.ti.com	Military	www.ti.com/military
Power Mgmt	power.ti.com	Optical Networking	www.ti.com/opticalnetwork
Microcontrollers	microcontroller.ti.com	Security	www.ti.com/security
RFID	www.ti-rfid.com	Telephony	www.ti.com/telephony
RF/IF and ZigBee® Solutions	www.ti.com/lprf	Video & Imaging	www.ti.com/video
		Wireless	www.ti.com/wireless

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265 Copyright 2011, Texas Instruments Incorporated

Revision History

Version	Date	Revision History
0.1	June 18, 2012	Draft

Contents

1. NAND ECC App Notes 5
1.1 Introduction 5
1.2 JFFS2 Vs BCH-8 5
1.3 Solution for using JFFS2 with LSP - 04.04.00.01 5
1.4 Patches to Apply 5
1.4.1 U-Boot Patching 5
1.4.2 Kernel Patching 6
1.5 Flashing Instructions 6
1.5.1 U-Boot 6
1.5.2 Kernel 6
1.5.3 FileSystem 6
1.5.4 Summary of Changes 7

1. NAND ECC App Notes

1.1 Introduction

In LSP Version - 04.04.00.01, the default ECC scheme used across Uboot, Kernel and File System is changed to 8-bit BCH ECC.

UBIFS file system support has been enabled by default in the kernel.

IPNC RDK release version – 3.00 uses LSP - 04.04.00.01.

1.2 JFFS2 Vs BCH-8

Supporting BCH8 with JFFS2 is not possible because of shortage of OOB area.

- Total OOB Bytes - **64 Bytes** (for every 2048 bytes (512 * 4))
- JFFS2 clean marker requires 8 bytes. Remaining OOB Bytes = **56 bytes** **(**64 – 8)
- ECC requires 14 bytes for every 512 bytes of data. Total ECC bytes = **56 Bytes** **(**14 * 4).
- Remaining OOB Bytes = 0 byte (56 – 56)
- Manufactures bad block marking requires 2 bytes which is not available.

This shortage (-2) is the main reason is the issue with using JFFS2 + 8-Bit BCH ECC.

1.3 Solution for using JFFS2 with LSP - 04.04.00.01

We need to roll back to using 1Bit 1-bit HW HAMMING to use JFFS2.

U-Boot min still uses BCH-8.

U-Boot min should be still flashed using BCH-8 <***nandecc hw 2***>.

U-Boot, uImage, jffs2 image etc should be written after switching to 1-bit HW HAMMING CODE <***nandecc hw 0***>.

Kernel & Uboot should be patched to roll back to 1Bit Hamming code.

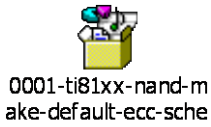
1.4 Patches to Apply

1.4.1 U-Boot Patching

- cd u-boot-04.04.00.01

- patch -R -p1 < 0001-ti81xx-nand-make-default-ecc-scheme-as-BCH8.patch
- Rebuild U-Boot images

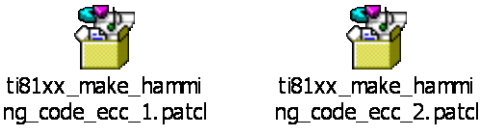
U-Boot Patch



1.4.2 Kernel Patching

- cd linux-04.04.00.01
- patch -p1 < ti81xx_make_hamming_code_ecc_1.patch
- patch -p1 < ti81xx_make_hamming_code_ecc_2.patch
- Rebuild kernel image

Kernel Patch



1.5 Flashing Instructions

1.5.1 U-Boot

mw.b 0x81000000 0xFF 0x30000;nand erase 0x0 0x20000;tftp 0x81000000 u-boot.min.nand;nandecc hw 2;nand write.i 0x81000000 0x0 0x20000;nandecc hw 0

mw.b 0x81000000 0xFF 0x60000;nand erase 0x20000 0x60000;tftp 0x81000000 u-boot.bin;nandecc hw 0;nand write.i 0x81000000 0x20000 0x60000

1.5.2 Kernel

tftp 81000000 uImage;nand erase 0x00280000 0x00300000;nandecc hw 0;nand write 0x81000000 0x00280000 0x00300000

1.5.3 FileSystem

mw.b 0x81000000 0xFF 0x0C820000;tftp 0x81000000 jffs2_ipnc.bin;nand erase 0x006C0000 0x0C820000;nandecc hw 0;nand write 0x81000000 0x006C0000 0x4000000

Note

Boot arguments remain the same. Refer the Install Guide.

1.5.4 Summary of Changes

- Revert the patch that makes BCH8 as default ECC in the Uboot (so now the Uboot has 1bit ECC as default). Set the default ECC in kernel as 1-bit HW HAMMING (so that Uboot and Kernel ECCs are aligned).
- When in the Uboot, change the ECC scheme to BCH8 (using 'nandecc hw 2' command). Flash the uboot image on partition 0 (so that ROM code can read it correctly using BCH8 ECC).
- Use 1-bit HW ECC for other purposes ('nandecc hw 0').