ADSP-CM40x Enablement Software Package v2.0.0 Release Notes

These release notes subsume the release notes for previous updates. Release notes for previous updates can be found at the end of this document.

Release Dependencies

This release was tested with the following hardware:

- Segger J-Link emulators (Ultra+ and Lite)
- Evaluation boards:

	Board Rev	BOM Rev
ADSP-CM403F EZ-KIT	1.0	0.6
ADSP-CM408F EZ-KIT	0.2	0.6

This release was tested with the following 3rd party software:

The ADSP-CM40x Enablement Software requires IAR Embedded Workbench for ARM to build, load and debug projects. The ADSP-CM40x Enablement Software package installer will add various required system files to the IAR installation. These system files allow the IAR tool chain to recognize, generate code and debug ADSP-CM40x applications.

- IAR Embedded Workbench for ARM version 7.30.1
- Segger J-Link emulator software version >= V4.97j (required)
- FreeRTOS 8.1.2
  This version of the FreeRTOS can be downloaded from SourceForge.
- lwIP 1.4.1
- The following Micrium Software components have been tested:

Micrium Software Component	Tested Version
uC/OS-III for ARM Cortex-M4	3.03.01.02
uC/TCP-IP Core	2.13.02
uC/DHCPc	2.09.01
uC/USB Core	4.01.02
uC/USB Vendor	4.01.02

New Features and Examples in this Release

- **New Features supported in 2.0 Silicon of CM40z processor family**
  - Security Protocol (see migration notes in under "Software Issues Addressed in this Release")
  - JTAG Reset fix (avoids resetting JTAG/Debug state with System Reset).
  - Revisions to Segger Emulator DLL required in support of new security protocol and JTAG Reset fix. (Users *must* obtain and apply Segger JLink release >= V4.97j, from Segger J-Link download page: https://www.segger.com/jlink-software-beta-version.html).
  - Tool Changes
    - New tool: EccGen to generate ECC values for the new security header block.
    - New Tool: UART Flash Programmer utility to erase and program flash over a serial UART port.
- **New Features and Examples for all Versions of Silicon**
  - FreeRTOS Support

    Support for the FreeRTOS has been added. This includes
    - Operating Abstraction Layer support for the FreeRTOS.
    - FreeRTOS examples

    The sources for the FreeRTOS are not distributed by Analog Devices. Please see the User's Guide for more information on the FreeRTOS and how to use.

    The following FreeRTOS examples have been added
    1. CM403F_CM408F_EZ-KIT\examples\FreeRTOS\ADCC_Circular
    2. CM403F_CM408F_EZ-KIT\examples\FreeRTOS\CrcDmaDataFill
    3. CM403F_CM408F_EZ-KIT\examples\FreeRTOS\RTOS_thread
    4. CM403F_CM408F_EZ-KIT\examples\FreeRTOS\SPI_flash_read
    5. CM403F_CM408F_EZ-KIT\examples\FreeRTOS\UartCharEcho

  - lwIP support

    Support for the lwIP light-weight TCP/IP implementation has been added. The sources for lwIP are distributed as part of this package. Examples that use lwIP are included. The lwIP examples use the FreeRTOS. For more information on lwIP and the FreeRTOS please see the User's Guide.

    The following lwIP examples have been added
    1. CM403F_CM408F_EZ-KIT\examples\lwip\inetd
    2. CM403F_CM408F_EZ-KIT\examples\lwip\multicast

  - UART Flash Programmer Utility

    A new Windows Serial Driver (WSD) utility is provided supporting the ability to bulk-erase the chip (in case of security lockup, see section below: "Security Failures and Board Recovery") and program the chip via the chip's UART0 port interface and the UART boot mode. See the readme.txt in the <ADI install dir>ADSP-CM40x\CM403F_CM408F_EZ-KIT\tool\UARTFlashProgrammer" directory.

…

Software Issues Addressed in this Release

- Security Changes and Migration Notes
  - Mandatory revisions related to meeting security protocol. These revisions are contained in the 2.0.0 release and all included examples reflect this support.
  - Previous releases of the ADSP-CM40z software package and/or previous projects and any local file copies of these files **MUST be revised manually** to reflect:
    - Revisions to startup.c and linker description files to support new SecurityHeader data structure.
    - Addition of new adi_ecc.h file housing security-related macro definitions.
    - Addition of new ECC code generator utility (…/ADSP-CM40x\CM403F_CM408F_EZ-KIT\tool\EccGen\EccGen.exe) to parse and adjust ECC values of SecurityHeader block (see new adi_ecc.h file and related changes/comments in startup.c and linker description files).
    - Addition of new CM40z.JLinkScript file (to IAR ARNM/config/debugger.AnalogDevices directory) which sets secure access keys and enables secure attach, debug and flash programming with Segger JLink emulator.
    - Changes to application project options' J-Link/J-Trace emulator settings:
      - Critical: Change Reset strategy from "Connect during reset" to "Normal".
      - Optimization: Change JTAG/SWD speed from "Auto" to "Fixed 4000 kHz".
- The HAE Callback example's incorrect error check issue has been resolved.
- The power service was not allowing a combination of 240 MHz CCLK and 96 MHz SCLK to be set. This issue has been resolved.
- The CMSIS related file system.c now has a SystemCoreClockUpdate() function and a SystemCoreClock variable as defined in the Cortex Microcontroller Software Interface Standard (CMSIS).
- The source file CM403F_CM408F_EZ-KIT\src\services\int\adi_int_nvic.c is now included in the installation

Documentation

The User's Guide has been updated with instructions for the FreeRTOS, lwIP, and using the new CM40z security protocol. The user's Guide is located in the documentation directory.

 <install directory>\ADSP-CM40x\CM403F_CM408F_EZ-KIT\doc\ADSP-CM40x_Software_Users_Guide.pdf

Known Issues

- Security protocol is required and enabled by default for production silicon. See "startup.c" file for details to disable security in order to continue targeting early silicon sampling (uncommon).

- The ADI-provided Flash Loader utility used to burn target flash with application executables has an unresolved issue. This release includes a workaround that uses the flash loader included with the Segger emulator package. All the ADSP-CM40z example project files have been revised to switch to the Segger Flash Loader by default. Users will want to make this same switch to any pre-existing application project files. Do so by bringing up the application's project options dialogue and go to the "Debugger->Download" configuration page and disable the "Use flash loader(s)" checkbox. This will disable the ADI-provided flash loader and activate the default Segger flash loader. The "Verify download" checkbox may still be checked or not, as desired.

- The following examples have unresolved issues are known not to work in this release:
  - SPI_flash_read
  - USB\Vendor\VendorBulk
  - Boot_Optimization_Multi_App
  - Boot_Optimization_Single_App
  - Flash_ReadWrite
  - FreeRTOS\SPI_flash_read
  - SPI_flash_read

- The ADCC driver returns wrong frame pointer for the ADI_ADCC_EVENT_FRAME_PROCESSED event. It is supposed to pass the start of a frame within the given buffer but it returns the frame pointer beyond the given buffer.

- The user guide instructs the user to set an environment variable "*ADI_MICRIUM_PATH_CM40X*" to point to the Micrium sources. When a project is opened the environment variable is automatically substituted in the project file (.ewp file). This is a one-time substitution. It cannot be undone or redone, which is not ideal if, for example, you are moving to a new Micrium source base. This is a deficiency against the IAR IDE, which does not currently support user macros.

  For example:

  ```
  <file>
  <name>$ADI_MICRIUM_PATH_CM40X$\uCOS-III\Source\os_int.c</name>
  </file>
  ```

  Will expand to:

  ```
  <file>
   <name>$PROJ_DIR$\..\..\..\..\..\..\..\Micrium_3.03.01.02\Software\uCOS-III\Source\os_int.c</name>
  </file>
  ```

Security Failures and Board Recovery

The new security protocol is actively enforced in the boot ROM on production ADSP-CM40z parts (Silicon revision >= 2.0). Security failures result in the boot ROM faulting the board and spinning in an infinite loop awaiting a **UART Flash Programmer** bulk erase command. This is how the security protocol protects sensitive IP from unauthorized accessed. However, various unintended lockups can result during software development which renders the board inoperative. As an example, any of the following scenarios can cause lockup:

- Failure to provision for the new SecurityHeader at the start of Flash (see startup.c),

- Failure to update the SecurityHeader ECC fields when making SecurityHeader changes (see new tool: EccGen.exe),

- Bad security keys within the SecurityHeader or security key mismatch between burned image on target and JLink script file that controls emulator attach (see installed emulator script: <IAR install dir>\ARM\config\debugger\AnalogDevices\CM40z.JLinkScript),

- Incorrect "Reset Mode" in project settings: Debugger/J-Link/J-Trace/Setup: "Normal" reset mode required.

- Incorrect use of ADI-provided Flash Loader (see below).

- Etc.

When building applications, it is a good idea to generate and check the linker map file for correct placement of a correctly filled SecurityHeader at address 0x18000000 (start of flash memory) and the Interrupt Vector Table at address (0x18001000) by default and which should be reflected in the SecurityHeader itself.

Recovery:

> In all cases of evaluation board lockup, please employ the **UART Flash Programmer** to bulk erase the target and recover the target. When running the bulk erase command, please wait for a minute or so to insure the flash erase operation completes on the target before exiting the application. Refer to the UART Flash Programmer **readme.txt** file for operational details.

NOTE: This recovery method results in a non-recoverable erasure of the entire device flash.

ADSP-CM40x Enablement Software package v1.2.0 Release Notes

These release notes subsume the release notes for previous updates. Release notes for previous updates can be found at the end of this document.

Release Dependencies

This release was tested with the following hardware:

- Segger J-Link emulators (Ultra+ and Lite)
- Evaluation boards:

	Board Rev	BOM Rev
ADSP-CM403F EZ-KIT	1.0	0.5
ADSP-CM408F EZ-KIT	0.2	0.5

This release was tested with the following 3rd party software:

The ADSP-CM40x Enablement Software requires IAR Embedded Workbench for ARM to build, load and debug projects. The ADSP-CM40x Enablement Software package installer will add various required system files to the IAR installation. These system files allow the IAR tool chain to recognize, generate code and debug ADSP-CM40x applications.

- IAR Embedded Workbench for ARM version 7.30
- Segger J-Link emulator software version 4.92
- The following Micrium Software components have been tested:

Micrium Software Component	Tested Version
uC/OS-III for ARM Cortex-M4	3.03.01.02
uC/TCP-IP Core	2.13.02
uC/DHCPc	2.09.01
uC/USB Core	4.01.02
uC/USB Vendor	4.01.02

New features and examples in this release

- UART Flash Programmer tool
- Read_AFEID example added which demonstrates how to read the AFE ID register.
- The Device Driver User's Guide (ADSP-CM40x_Device_Drivers_User_guide.pdf.pdf) has been added to the doc directory

UART Flash Programmer Tool

A UART Flash Programmer tool has been provided with this release. This tool allows the user to write their applications to, and then boot, from the flash memory of ADSP-CM40x devices. More details can be found in the Software User's Guide and in the README.TXT in the tool's directory:

<install directory>\ADSP-CM40x\CM403F_CM408F_EZ-KIT\tool\UARTFlashProgrammer\

Software issues addressed in this release

- Rename the timer handler function
- The HAE Callback example has an incorrect error check

Documentation

Device Drivers User Guide added to this release.

Known issues

- The ADCC driver returns wrong frame pointer for the ADI_ADCC_EVENT_FRAME_PROCESSED event. It is supposed to pass the start of a frame within the given buffer but it return the frame pointer beyond the given buffer.

- The user guide instructs the user to set an environment variable "*ADI_MICRIUM_PATH_CM40X*" to point to the Micrium sources. When a project is opened the environment variable is automatically substituted in the project file (.ewp file). This is a one time substitution. It cannot be undone or redone, which is not ideal if, for example, you are moving to a new Micrium source base. This is a deficiency against the IAR IDE.

  For example

  <file>

  <name>$*ADI_MICRIUM_PATH_CM40X*$\uCOS-III\Source\os_int.c</name>

  </file>

  Will expand to

  <file>

   <name>$PROJ_DIR$\..\..\..\..\..\..\..\Micrium_3.03.01.02\Software\uCOS-III\Source\os_int.c</name>

  </file>

ADSP-CM40x Enablement Software package v1.1.0 Release Notes

Release Dependencies

This release was tested with the following hardware:

- Segger J-Link emulators (Ultra+ and Lite)
- Evaluation boards:

	Board Rev	BOM Rev
ADSP-CM403F EZ-KIT	1.0	0.5
ADSP-CM408F EZ-KIT	0.2	0.5

This release was tested with the following 3rd party software:

The ADSP-CM40x Enablement Software requires IAR Embedded Workbench for ARM to build, load and debug projects. The ADSP-CM40x Enablement Software package installer will add various required system files to the IAR installation. These system files allow the IAR tool chain to recognize, generate code and debug ADSP-CM40x applications.

- IAR Embedded Workbench for ARM versions 6.50.3 and 6.60.1
- Segger J-Link emulator software version 4.76a
- The following Micrium Software components have been tested:
-

Micrium Software Component	Tested Version
uC/OS-III for ARM Cortex-M4	3.03.01.02
uC/TCP-IP Core	2.13.02
uC/DHCPc	2.09.01
uC/USB Core	4.01.02
uC/USB Vendor	4.01.02

Software Users Guide

A Software Users Guide document is located in the <install directory>\ADSP-CM40x\CM403F_CM408F_EZ-KIT\doc folder. This document describes the ADSP-CM40x Enablement Software package and its use on the ADSP-CM403F and ADSP-CM408F EZ-KIT's. The Software Users Guide contains important installation, usage and product configuration instructions.

New features and examples in this release

- Harmonic Analysis Engine (HAE) Driver
- Flash Programmer Driver
- Boot_Optimization_Multi_App Example
- Boot_Optimization_Single_App Example
- Flash_ReadWrite Example
- HAE_Callback Example
- HAE_Dma Example

Power On Self Test (POST)

The ADSP-CM40x EZ-KIT's are pre-programmed with the Power_On_Self_Test (POST) example in flash memory. Most examples are configured to overwrite flash. After executing an example that overwrites flash, POST can be restored by executing the the Power_On_Self_Test example project.

Software issues addressed in this release

- ADCC event time registers are programmed incorrectly
- ADSP-CM408F : All Examples generate warnings when building
- ADSP-CM408F : Generate "Data verification failed" errors when run DMA examples
- CAN module changes for Group 2 registers mailbox numbering, also access changes
- CM408F - SPI Loopback Test Failure
- Cortex Chip ID identification registers need to be public
- M4P CACHE_MEMY register requires exposure of bit fields
- Modify the ADCC examples to use the TRU service
- RCU_MSG bits missing from CODA in CM40x
- SCB module changes (System Cross Bar) impacts Visibility and Names
- Some M4P Register and Bit Fields changing from Public to Private Visibility, macros will be removed
- Subset of Cortex M4 registers (NVIC and others) are required in the IAR deliverables for CM40z
- The ADSP-CM40x CRC examples fail
- The Timer Service should clear all configuration data when the timer is opened
- The memory offset (nMemOffset) is wrongly documented
- USB changes not in generated output in installation

Documentation

- The ADSP-CM40x Enablement Software package User's Guide is updated.
- The Driver API Reference documentation is updated.
- Engineer-to-Engineer Note (EE-359) ADSP-CM40x Boot Time Optimization and Device Initialization is added.

Known issues

- Emulator
  - Only the "Connect During Reset" IAR reset strategy is supported at this time.
- The Flash driver adi_flash_SetMode() API is unable to set ADI_FLASH_MODE_MMAP_XIP correctly. Only ADI_FLASH_MODE_MMAP and ADI_FLASH_MODE_PERIPHERAL should be used.

Source Lookup

The device driver code is provided in 'C' source code and libraries. Each provided example links with these driver libraries. When debugging application code the debugger is unable to locate the driver source files and will display a "Get Alternative File" dialog. The source code is located in the <install directory>\ADSP-CM40x\CM403F_CM408F_EZ-KIT\src" folder. In the "Get Alternative File" dialog use the "Suggested alternative" browse (...) button to locate the source file in the src subfolders

Support and Assistance

- Submit your questions online at:
    - o http://www.analog.com/support

- E-mail your Processor and DSP software and development tools questions from within CrossCore Embedded Studio:
    - o processor.tools.support@analog.com
- E-mail your Processors and DSP applications and processor questions to:
    - o processor.support@analog.com OR
    - o processor.china@analog.com (Greater China support)
- Post your questions in the Processors and DSP online technical support community in Engineer Zone at:
    - o http://ez.analog.com/community/dsp