

RELEASENOTES

DSP/BIOS™ LINK

LNK 111 REL

Version 1.63

JUNE 23, 2009

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TABLE OF CONTENTS

1	Introduction	6
1.1	Text Conventions.....	6
2	Out-of-Box Contents.....	6
3	Minimum System Requirements	8
3.1	Hardware	8
3.2	Software	8
4	Functionality Supported	13
4.1	Features.....	13
4.2	Feature enhancements from previous release 1.62	16
4.3	Generic Defect fixes from previous release 1.62	17
4.4	Platform-specific defect fixes.....	18
4.5	Operating System specific defect fixes	19
4.6	Upgrade and compatibility information	20
5	Validation Status	21
6	Known Issues.....	22
6.1	Generic	22
6.2	Platform Specific Issues	22
6.3	Operating System specific Issues	24
7	Guidelines and Limitations	25
7.1	SWI samples for DA8XX/OMAPL1xx	25
8	Technical Support.....	26
8.1	Support for DSP/BIOS™ LINK	26

1 Introduction

DSP/BIOS™ LINK is foundation software for the inter-processor communication across the GPP-DSP boundary. It provides a generic API that abstracts the characteristics of the physical link connecting GPP and DSP from the applications. It eliminates the need for customers to develop such link from scratch and allows them to focus more on application development¹.

As the name suggests, DSP/BIOS operating system is expected to be running on the DSP with all of these platforms.

The validated platforms in this release are:

- DRX45X
- DRA44x
- DM6437 connected to DRA44x over VLYNQ interface
- DRX416

Additionally, support for the following platforms is available in the release:

- OMAP3530 EVM
- OMAP2530 EVM
- DM6446 (Davinci)
- DM6467 (Davinci HD)
- DA8XX
- OMAPL1XX
- Linux PC + DM6437 over PCI
- Linux PC + DM648 over PCI
- DM357
- Multi-DSP configuration: Linux PC + two DM6437 over PCI
- OMAPL138
- DA850

1.1 TextConventions



This bullet indicates important information.
Please read such text carefully.



This bullet indicates additional information.

2 Out-of-BoxContents

This release of DSP/BIOS™ LINK contains the following:

1. Installer package for DSP/BIOS™ LINK containing:
 - TAR.GZ file containing the DSP/BIOS™ LINK installation package.

¹ Applications differentiate the products. The application developers would prefer to focus on the application rather than the IPC mechanism.

- Scripts, tools etc., to use on the debug and development host machines.
- 2. Release Notes (this document) providing an overview of this release.
- 3. Installation Guide, Platform Guide, User Guide, Programmer's Guide and other technical documents.

Complete list of the documents is available in the User Guide.

3 MinimumSystemRequirements

3.1 Hardware

Depending on the target platform configuration, DSP/BIOS™ Link sources can be compiled on a PC running either Microsoft Windows or Red Hat Linux.

3.1.1 Development/DebugHostMachine

Please refer to installation guide for the relevant platform.

3.2 Software

3.2.1 GenericSoftwareRequirement

- PERL Installation
- TeraTerm (or any other terminal emulation program)
- One of GNU make version 3.81, 3.81beta1, 3.90 or 3.92.

 *On hosts where the above mentioned make versions are not available, DSPLINK users can use gmake (from TI XDC tools) to build DSPLink.*

 *To build DSPLink using gmake (from TI XDC tools) run gmake as below:*

`<Absolute path of gmake from TI xdc tools>$ gmake -s [debug|release].`

For example,

1) `/opt/xdc/<xdctools install path>/gmake -s debug`

2) `/opt/ti-tools/<bios install path>/xdctools/gmake -s debug`

 *GNU make 3.81 version can be downloaded and installed from <http://ftp.gnu.org/pub/gnu/make/make-3.81.tar.gz>*

 *The software listed above is not part of the DSP/BIOS™ LINK release. For all the TI products, please contact your TI representative.*

 *ActivePerl - a distribution of PERL from Active State - can be obtained from the URL <http://www.activestate.com/Products/ActivePerl/>*

3.2.2 PlatformSpecificSoftwareRequirement

3.2.2.1 ForWorkingwithDRX45X

- For Standalone DSP/BIOS™ 5_33_05
 - CCS 3.3.77 IDE
 - DSP CG Tools version v6.0.14 or greater
 - ***This release will not work with versions of DSP/BIOS earlier than v5.33.05.***
- PROS Kernel release (PSP DRx45x Version 03.00.00.03)
 - Toolchain (MS470 C/C++ CODE GENERATION TOOLS Release 4.1.4)

3.2.2.2 *ForWorkingwithDM6446*

- DSP/BIOS™ version can be 5.32.04 or 6.20.00.37 (one of the below)
 - For Standalone DSP/BIOS™ 5.32.04.
 - DSP CG Tools version v6.0.18 or greater
 - CCS 3.3.77 IDE for debugging purposes.
 - For Standalone DSP/BIOS™ bios 6.20.00.37
 - XDC release version xdctools 3.15.00.50
 - IPC 1.00.00.40
 - CCS 3.3.77 for debugging purposes.
 - DSP CG tools version v6.1.5.
- U-boot release 1.1.4 showing date Mar 21 2007
- Montavista Linux release
 - With Davinci Engineering Release LSP 2.00 version 1.4.0. Either glibc or uclibc toolchain can be installed.

3.2.2.3 *ForWorkingwithDM6467*

- Standalone DSP/BIOS™ 5.32.04
- DSP CG Tools version v6.0.18 or greater
- CCS 3.3.77 IDE
- U-boot release 1.2.0 showing date Dec 20 2007
- Montavista Linux release
 - With Davinci Engineering Release LSP 2.00 version 1.4.0. Either glibc or uclibc toolchain can be installed.

3.2.2.4 *ForworkingwithOMAP3530*

- Standalone DSP/BIOS™ 5.32.04.
- DSP CG Tools version v6.0.18 or greater
- CCS 3.3.77 IDE
- Release OMAP35x EVM Linux PSP 02.01.01.08 with tool chain version arm-2008q1.

3.2.2.5 *ForworkingwithOMAP2530*

- Standalone DSP/BIOS™ 5.32.04
- DSP CG Tools version v6.0.18 or greater
- CCS 3.3.77 IDE
- Mistral release 1.1 and Mistral Additional Software Release 3.1.
- Codesourcery tool-chain arm-2007q1

3.2.2.6 *ForWorkingwithDM6437*

- Standalone DSP/BIOS™ 5.32.04.

- DSP CG Tools version v6.0.18 or greater
- CCS 3.3.77 IDE
- Linux kernel version 2.6.21 with big physical area patch.

3.2.2.7 *ForWorkingwithDM648*

- Standalone DSP/BIOS™ 5.32.04.
- DSP CG Tools version v6.0.18 or greater
- CCS 3.3.77 IDE
- Linux kernel version 2.6.21 with big physical area patch.

 For additional details on installation and software/hardware requirements for a specific platform, please refer to the install guide for that platform provided with the DSPLink release.

3.2.2.8 *ForWorkingwithDM357*

- Standalone DSP/BIOS™ 5.33.03.
- DSP CG Tools version v6.1.2 or greater
- CCS 3.3.77 IDE
- U-boot release 1.2.0 showing date Dec 20 2007
- Montavista Linux release
 - With Davinci Engineering Release LSP 2.00 version 1.4.0. Either glibc or uclibc toolchain can be installed.

3.2.2.9 *ForWorkingwithDA8XX*

- DSP/BIOS™ version 6.20.00.37 (one of the below)
 - For Standalone DSP/BIOS™ bios 6.20.00.37.
 - XDC release version xdctools 3.15.00.50
 - IPC 1.00.00.40
 - CCS 3.3.77 for debugging purposes.
 - DSP CG tools version v6.1.5
- For DSPLINK_NOBOOT_MODE (where ARM does not load and start DSP)
 - U-boot version 1.3.3 ported for DA8xx EVM(Available with the TI's Linux Platform Support Product (PSP) 02.20 package for DA8xx Evaluation Module (EVM)).
 - Montavista Linux release
 - With Linux Support Package (LSP) LSP 02.20 version 02.20.00.01.It is available as part of the TI's Linux Platform Support Product (PSP) 02.20 package for DA8xx Evaluation Module (EVM).

For additional details on installation and software/hardware requirements for a specific platform, please refer to the install guide for that platform provided with the DSPLink release.

3.2.2.10 *ForWorkingwithOMAPL1XX*

- DSP/BIOS™ version 5.33.03
 - For Standalone DSP/BIOS™ 5.33.03.
 - DSP CG Tools version v6.1.2 or greater
 - CCS 3.3.77 IDE for debugging purposes.
- For DSPLINK_BOOT_MODE where ARM loads and start DSP
 - U-boot version 1.3.3 ported for OMAPL1xx EVM(Available with the TI's Linux Platform Support Product (PSP) 02.20 package for DA8xx EvaluationModule (EVM)).
 - Montavista Linux release
 - With Linux Support Package (LSP) LSP 02.20 version 02.20.00.07. It is available as part of the TI's Linux Platform Support Product (PSP) 02.20 packages for OMAPL1xx Evaluation Module (EVM).

For additional details on installation and software/hardware requirements for a specific platform, please refer to the install guide for that platform provided with the DSPLink release.

 ***For all above platforms which use BIOS 5.32.xx, this release will not work with versions of DSP/BIOS earlier than 5.32.01.***

3.2.2.11 *ForWorkingwithOMAPL138*

- DSP/BIOS™ version 5.33.05
 - For Standalone DSP/BIOS™ 5.33.05.
 - DSP CG Tools version v6.1.5 or greater
 - CCS 3.3.77 IDE for debugging purposes.
- For DSP boot mode where ARM loads and start DSP
 - U-Boot 2009.01-00054-g80eca53 (May 03 2009 - 14:54:44)
 - PSP Linux release package
 - OMAPL138 EVM based on linux 2.6.18 kernel with tool chain version arm-2008q3.

The OMAPL138 (DaVinci-PSP-SDK-03.20.00.01) Engineering Release is available as part of the TI's Linux Platform Support Product (PSP) package for OMAPL138 Evaluation Module (EVM).

 ***This release will not work with versions of DSP/BIOS earlier than 5.33.05.***

3.2.2.12 *ForWorkingwithDA850*

- DSP/BIOS™ version can be 6.20.00.37
 - For Standalone DSP/BIOS™ bios 6.20.00.37

- XDC release version xdctools 3.15.00.50
- IPC 1.00.00.40
- CCS 3.3.77 for debugging purposes.
- DSP CG tools version v6.1.5.
- U-Boot 2009.01-00054-g80eca53 (May 03 2009 - 14:54:44)
- PSP Linux release package
 - DA850 EVM based on linux 2.6.18 kernel.

The DA850 (DaVinci-PSP-SDK-03.20.00.01) Engineering Release is available as part of the TI's Linux Platform Support Product (PSP) package for DA850 Evaluation Module (EVM).

4 FunctionalitySupported

4.1 Features

4.1.1 GenericFeatures

4.1.1.1 *Supportformultipleplatforms*

DSPLink supports multiple platforms in specific configurations as mentioned in this document. The standard features of DSP/BIOS™ LINK are supported with this release. For additional information, please refer to the User Guide and Programmer's Guide documents.

4.1.1.2 *Multi-processandmulti-applicationsupport*

Multiple applications or processes can directly call DSP/BIOS LINK PROC APIs to setup, control the DSP and destroy the DSPLink driver. They do not need to coordinate between themselves at run-time to access the DSPLink driver. The only thing they need to ensure is:

1. The same DSP executable is used by all applications simultaneously using DSPLink
2. The same dynamic configuration is used by all applications simultaneously using DSPLink

4.1.1.3 *SupportformultipleDSPsconnectedtoGPP instar-topology*

DSPLink supports multiple DSPs connected to the master GPP processor in a star-topology. With this feature, it is possible to connect multiple DSPs to the GPP in the system, over heterogeneous physical links. Example reference ports have also be included for multi-DSP configurations:

- Linux PC connected to two DM6437 devices over PCI
- DRA44x connected to external DM6437 over VLYNQ

The DSPLink static build configuration supports choosing the desired device and build configuration. The static build configuration supports command-line based usage to enable scripting.

4.1.2 PROCmodule

4.1.2.1 *DSPboot-load*

This release supports boot-loading the DSP from the ARM. This includes:

- Initializing the DSP & making it available for access from the GPP.
- On OMAP platforms: Configuring the DSP MMU to allow straight-through access for specified memory regions.
- Loading code on the DSP. Multiple types of loaders can be used for this. DSPLink provides a few standard loaders as part of the release package. Additional loaders can be added and plugged into DSPLink.
- Starting execution from the run address specified in the executable.
- Reading from or writing to DSP memory.

- Stopping DSP execution.
- DSP/BIOS LINK for the OMAP platforms does not perform any power management of the DSP. This is expected to be done by u-boot or other power-management utilities.

If PROC-only scalability configuration build is used, DSPLink does not perform driver handshake and interrupts initialization. Due to this, DSPLink can be used in PROC-only configuration to load and start a non-DSPLink DSP executable, i.e. a DSP executable that has no DSPLink content or shared memory usage within it.

Support for multiple boot modes

DSPLink supports three different types of DSP boot modes:

- DSPLINK_BOOT_MODE: Default
 - GPP boots first
 - Uses DSPLink to load the DSP
 - Uses DSPLink to start the DSP running
- DSPLINK_NOLOAD_MODE: External DSP load
 - GPP boots first
 - Application/GPP boot-loader pre-loads the DSP
 - Uses DSPLink to optionally power up the DSP
 - Uses DSPLink to start the DSP running
- DSPLINK_NOBOOT_MODE: External DSP start. This supports two scenarios
 - GPP-based load
 - GPP boots first
 - Application/GPP boot-loader pre-loads the DSP
 - Application/GPP boot-loader starts the DSP running
 - Uses DSPLink only for IPC with the DSP
 - OR
 - DSP-based load
 - DSP boots first, starts running an application
 - GPP comes up later and sets up DSPLink, which initializes shared memory
 - DSPLink is not used to load or start the DSP
 - Uses DSPLink only for IPC with the DSP

For complete details on the boot modes along with information on configuration and application usage, please refer to the Programmer's Guide document.

4.1.2.2 Dynamic configuration

DSP/BIOS™ LINK can be dynamically configured with parameters specific to the system configuration. This can be decided by the system integrator. Usage of a new dynamic configuration does not require re-build of DSPLink libraries.

4.1.3 Inter-processor communication modules

4.1.3.1 POOL

The POOL component supports configuring and using shared memory buffers across processors. This includes

- Configuring the shared memory region through open & close calls.
- Allocating and freeing buffers from the shared memory region.
- Translating address of a buffer allocated to different address spaces (e.g. GPP to DSP)
- Synchronizing contents of memory as seen by the different CPU cores (Not applicable for the OMAP3530 platform)

4.1.3.2 NOTIFY

The NOTIFY component allows applications to register for notification of events occurring on the remote processor and send event notification to the remote processor.

It uses the physical interrupt present between the processors and provides the facility of multiple prioritized events over the same physical interrupt.

4.1.3.3 MPCS

The MPCS component allows applications to achieve mutually exclusive access to shared data structures through a multi-processor critical section (MPCS) between GPP and DSP.

4.1.3.4 MPLIST

The MPLIST component provides a doubly-linked circular linked list based transport mechanism between GPP and DSP.

It provides APIs for pushing and popping buffers from the list, traversing the list, inserting and removing elements and other services. The list is shared between the two processors.

4.1.3.5 CHNL

The CHNL component provides issue-reclaim based data streaming. It is based on the SIO module in DSP/BIOS™.

4.1.3.6 MSGQ

The MSGQ component provides queue based messaging. It is an acronym for 'message queue'.

This component is responsible for exchanging short messages of variable length between the GPP and DSP clients. It is based on the MSGQ module in DSP/BIOS™.

The messages are sent and received through message queues.

This component is based on the MSGQ module in DSP/BIOS™.

4.1.3.7 RINGIO

The RingIO component provides circular ring buffer based data streaming. Each ring buffer can be operated on by a single reader and single writer.

4.2 Feature enhancements from previous release 1.62

4.2.1 Support for OMAPL138/DA850

This release adds support for OMAPL138/DA850.

4.3 GenericDefectfixesfrompreviousrelease1.62

Identifier	Headline
SDOC00057677	While Create and initialize the MSGQ object GEN_Strcpyn is corrupting the msgqQueue,Only if the name of MSGQ is 32 chars.

Description :

Scenario:

If the name of msgq is equal to 32 chars,GEN_Strcpyn therefore overwrites the msgqHandle->msgqQueue.

Release Notes:

The length of MSGQ or RingIO name should not be equal or greater than 32 chars.

4.4 Platform-specific defect fixes

4.4.1 DM6446 specific

None.

4.4.2 DA8xx/OMAPL1XX specific

None.

4.4.3 OMAP2530 specific

None.

4.4.4 OMAP3530 specific

None.

4.4.5 DM6437 specific

None.

4.4.6 DM648 specific

None.

4.4.7 DM357

None.

4.5 OperatingSystemspecificdefectfixes

4.5.1 PrOS-specific

None.

4.6 Upgradeandcompatibilityinformation

DSPLink 1.63 is API and binary compatible with DSPLink 1.62. Other changes that are relevant to applications are listed below.

4.6.1 OMAPL138/DA850Support

This release has support for OMAPL138/DA850 device.

5 ValidationStatus

This Product release has been validated using the following configurations:

Sr. No	Platform	GPP-side			DSP-side	
		OS distribution	Tool-chain	Base port	Tool-chain	DSP/BIOS
1	DRX45X	REL_DRX45X_03.00.00.03.01.zip	TMS470 C/C++ CODE GENERATION TOOLS Release 4.1.4	N/A	CGTOOLS v6.0.14 with CCS3.3.77	5.33.05
2	DRA4xx	eSOL PrKernel v4 ver3.1 rev5	RVCT toolchain 2.2	pre-drx40xpsp-0.4.0	CGTOOLS v6.0.8 with CCS3.3.77	5.32.04
3	DRX41x	eSOL PrKernel v4 ver3.1 rev5	RVCT toolchain 2.2	REL_DRX40X_P SP_0.6.0	CGTOOLS v6.0.8 with CCS3.3.77	5.32.04 with DRX41x patch
4	DRA4xx + DM6437 over VLYNQ	eSOL PrKernel v4 ver3.1 rev5	RVCT toolchain 2.2	pre-drx40xpsp-0.4.0	CGTOOLS v6.0.8 with CCS3.3.77	5.32.04

Distribution files for Uclibc tool-chains are provided for OMAP2530, OMAP3530 and OMAPL138.

6 Known Issues

6.1 Generic

Identifier	Headline
SDOCM00035970	DSPLINK does not build correctly in CYGWIN environment

Description :

DSPLink make system does not build DSP-side sample applications correctly in CYGWIN environment. However, DSPLink libraries on DSP-side and GPP-side build can be completed successfully in CYGWIN environment.

Workaround:

Remove CYGWIN from the path on MSDOS prompt and build DSP-side sample applications using gmake.

Identifier	Headline
SDOCM00056316	Intermittent crashes are seen when running DSPLink sample applications on Montavista Linux based devices

Description :

On devices running Montavista Linux on the ARM (DM6446, DM6467, DM357, DA8xx, OMAP-L1xx), intermittent crashes are seen when running the sample applications. Crash is not seen on devices where GIT kernel is used (OMAP3530, OMAP2530, DM6437, DM648).

Observation:

The crash appears to happen when interrupts are sent very frequently to the ARM from the DSP.

Workaround:

None.

6.2 Platform Specific Issues

6.2.1 DM6446

Identifier	Headline
SDOCM00056114	CE appln fails if user calls the sequence: 1) eng = Engine_open("myEng",.); 2) Engine_close(eng); 3) eng = Engine_open("myEng

Description :

An application will fail if it tries to do the following:

```
eng = Engine_open("myEngine", ...);
Engine_close(eng);
eng = Engine_open("myEngine", ...);
```

As far as DSPLink is concerned, this boils down to:

```

Engine_open:
    LAD_startupDsp() =====switch-to-LAD-process=====>
PROC_setup(); PROC_attach(); etc.
    PROC_attach()
Engine_close:
    LAD_releaseDsp() =====switch-to-LAD-process=====>
PROC_destroy();
    
```

Workaround:

None.

6.2.2 DM6467

Identifier	Headline
DSPLN00000734	<PROC> DSP-side configuration mismatch/failure is thrown if a test is run infinite number of times

Description :

<PROC> DSP-side configuration mismatch/failure is thrown if a test is run infinite number of times

Workaround:

Power cycle the EVM and re-try.

6.2.3 DM648

None.

6.2.4 DM6437

Identifier	Headline
SDOCM00044596	<sample> scale sample hangs in SWI mode on both debug and release modes.

Description :

Observation :

scale sample hangs only in SWI mode on both debug and release modes.

Same sample works fine on TSK mode.

Workaround:

None.

6.2.5 OMAP2530

Identifier	Headline
SDOCM00035953	OMAP2530: First run of any application times out in PROC_start.

Description :

The first run of any DSPLink application times out in PROC_start. The subsequent application runs without re-booting the board in between work correctly.

Workaround:

The GPP sources have been updated to reset and release the DSP twice as a workaround to ensure that DSP starts correctly in the first run. This workaround is present in the DSPLink release.

6.2.6 DM357

None.

6.2.7 OMAPL1XX

Identifier	Headline
DOCM00051547	<Samples> Loop sample stops execution in-between on swi release mode.

Description :
Observation :

Loop sample stops execution in-between on swi release mode on both DA8xx and OMAPL1xx platforms.

The sample works fine on swi debug mode.

The sample won't hang, after ctrl+c able to run other samples without rebooting EVM.

Workaround:

None.

6.3 OperatingSystemspecificIssues
6.3.1 PrOS

None.

6.3.2 DSP/BIOS

Identifier	Headline
CQ17490	BIOS/XDC conf tool breaks DSP build, if the DSPLink installation directory contains `.' Character.

Description :

DSP Side build system generates all files in the build folder instead of sample directories. This would cause error if the DSPLink installation directory has `.' Character. For example, if the installation path is

```
/home/user/dsplink.160/
```

then DSP Side build will break.

Workaround:

Install DSPLink without a `.' In the path.

7 Guidelines and Limitations

7.1 SWI samples for DA8XX/OMAPL1xx

Currently on DA8XX and OMAPL1XX platforms, Samples with SWI mode are not supported in DSP self boot mode.

8 TechnicalSupport

8.1 SupportforDSP/BIOS™LINK

8.1.1 TIExternalwiki

A significant amount of information about DSPLink including FAQs and troubleshooting guides are present and the TI external wiki. These can be used as a first-level source of information for DSPLink:

<http://www.tiexpressdsp.com>

8.1.2 SupportforTIproducts

Procedure to report problems/issues for TI products is available at the TI support page:

External forums at: <http://community.ti.com>

Or: <http://support.ti.com>