
INSTALLATION GUIDE

DSP/BIOS™ LINK

OMAP5912 Starter Kit (OSK)

Montavista Linux Professional Edition 3.1

LNK 057 USR

Version 1.10.01

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

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A. INTRODUCTION

1 Purpose

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 development.

This document provides the users necessary information to install DSP/BIOS™ LINK on your development host.

This document corresponds to the product release Version 1.10.01 dated APR 23, 2004.

2 Text Conventions

○	This bullet indicates important information. Please read such text carefully.
q	This bullet indicates additional information.
[arg1 arg2]	In context of the commands, contents enclosed in square brackets are the optional arguments to the command. Different values of these arguments are separated by " ".

3 Terms & Abbreviations

CCS	Code Composer Studio
IPC	Inter Processor Communication
GPP	General Purpose e.g. ARM
DSP	Digital Signal Processor e.g. TMS320C5510

4 References

1.	MontaVista™ Linux® Professional Edition 3.1 Users Guide dated FEB 03, 2004.
2.	OMAP Starter Kit for the OMAP5912 (OSK5912) Users Guide Version 1.0

B. INSTALLATION

5 Basic Installation

The DSP/BIOS™ LINK is made available as a self-extracting executable on the Microsoft Windows platform. To install the product follow the steps below:

1. Double click on the file 'dsplink-5912osk-montavista-v110.01.exe'.
2. Follow the instructions on screen to install the DSP/BIOS™LINK.
During installation, the sources are extracted in the directory chosen by the user.

- This document assumes the install path to be **L:\dsplink**. This path will be used in remainder of this document.
- If the installation was done at different location, make appropriate changes to the commands listed in the document.

It is advisable to archive the released sources in a configuration management system. This will help in merging:

- § The updates delivered in the newer releases of DSP/BIOS™ LINK.
- § The changes to the product, if any, done by the users.

5.1 Installing DSP/BIOS™ MSGQ Module

The MSGQ module is available as update to the Code Composer Studio v2.20.

It can be downloaded from the URL: <http://www.ti.com/bioslink>

From the windows explorer, double click on the executable and follow the instructions on screen to install this component.

5.2 Moving sources to a Linux host

The sources are available in a single ZIP file (sources.zip) located in the directory L:\zip. Transfer this file to the Linux host.

6 Configuring CCS

The description below assumes that CCS v2.21 was installed at location C:\ti.

Copy specific files provided in the installation package of DSP/BIOS™ LINK into CCS area:

1. Copy the textual configuration files (.tci):

```
copy L:\dsplink\dsp\src\tcf\*.tci  
C:\ti\bin\utilities\tconf\include
```

- Enter the command shown above in a single line.

6.1 Configure CCS for OMAP

Before using CCS with the OMAP5912 Starter Kit, it must be configured appropriately. The configuration varies for different operations e.g. loading u-boot, debugging applications, etc.

This configuration also depends upon the JTAG being used.

The steps to configure CCS are described in the OMAP5912 Starter Kit (OSK) User's Guide [2]. Refer to this document for details.

7 Setting up Linux Workstation

The description in this section is based on the following assumptions:

1. The workstation is running on Redhat Linux version 9.0
 2. Services telnetd, nfsd, ftpd are configured on this workstation.
 3. The workstation is assigned a fixed IP address.
- The release package has been tested on RedHat Linux version 9.0. You may be able to build on a different version depending on the compatibility of the build tools in your version with version 9.0.
- A fixed IP address is preferred, as the IP address needs to be specified while booting the target board. This allows the boot loader configuration to be saved in flash.

7.1 Creating development workspace

This document and the scripts included in the release assume the following directory structure in your home directory on the Linux workstation:

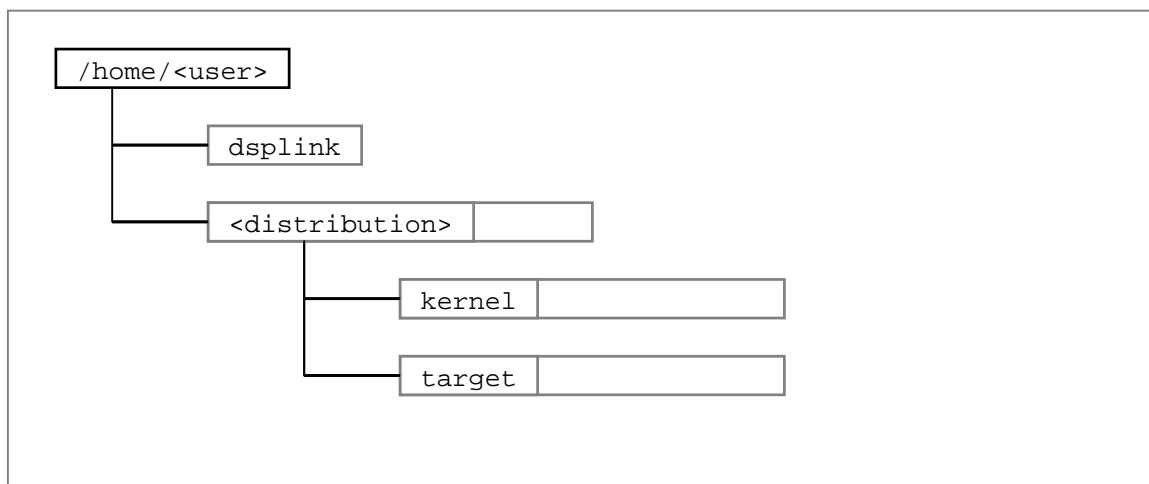


Figure 1. Expected directory structure on the Linux workstation

In this diagram:

\$ <user> represents the actual user name

\$ <distribution> represents the actual distribution of Linux being used.

This section assumes that Montavista Linux Professional Edition 3.1 is installed on the development workstation at **/opt/montavista/pro**.

7.2 Building the kernel

The original distribution may not have been configured for the target hardware. To configure the distribution, copy the distribution to your home directory.

1. Copy the kernel sources to your workspace.

```
$ cp -a /opt/montavista/pro/devkit/lsp/ti-omap5912_osk-
arm_v4t_le/linux-2.4.20_mvl31 ~/montavista/kernel/linux
```

- Enter the command shown above in a single line.
- The sources can be copied to a different location. In such a case ~/montavista/kernel/linux can be a soft link to the actual location.
- 2. Modify your search path to include kernel build tools.


```
$ set path = (/opt/montavista/pro/host/lib $path)
$ set path = (/opt/montavista/pro/host/info $path)
$ set path = (/opt/montavista/pro/devkit/arm/v4t_le/bin $path)
$ set path = (/opt/montavista/pro/host/bin $path)
```
- q You can modify the shell startup file to include the paths in the standard search path.
- 3. Configure the kernel for OMAP 5912 OSK.


```
$ cd ~/montavista/kernel/linux
$ make menuconfig
```

Ensure that the kernel is configured for OMAP5912 OSK. Further, DHCP should be enabled.
- 4. Build the kernel.


```
$ make dep
$ make clean
$ make zImage
```

The image for uncompressed kernel – vmlinux – is generated after successful completion of the build process in the current directory.

This kernel needs to be converted in a format understood by the boot-loader before it can be used for booting the 5912 OSK.
- For detailed instructions to build the kernel, refer to instructions in MontaVista™ Linux® Professional Edition Users Guide [Ref. 1].

7.2.1 Build the U-Boot boot-loader

Refer to u-boot documentation on the web for instructions to build the boot-loader. The OMAP5912 OSK ships with a pre-built u-boot binary that can be used on the board for working with DSP/BIOS™ LINK.

7.2.2 Convert the Linux kernel for use with U-Boot

This step uses the 'mkimage' utility obtained through building u-boot.

1. Execute the following command to convert the image of kernel built in previous section for use with u-boot:

```
$ cd ~/montavista/kernel/linux
$ /opt/montavista/pro/devkit/arm/v4t_le/bin/arm_v4t_le-objcopy -O binary -R .note -R .comment -S vmlinux linux.bin
$ gzip -9 linux.bin
$ ~/u-boot-1.0.0/tools/mkimage -A arm -O linux -T kernel -C gzip -a 0x10c08000 -e 0x10c08000 -n "Linux Kernel Image" -d linux.bin.gz mvlpro3_1.cc
```

- Q The file mvlpro3_1.cc will be used to boot the ARM on 5912 OSK.
- Q The above command assumes that you have installed U-boot in your home directory. If it is installed at another location, please change the command accordingly.

7.2.3 Enable TFTP for downloading the kernel image to target

U-boot can be configured to download the kernel onto the target by various mechanisms:

- a. TFTP
- b. Serial Port

This section configures the Linux development host as a TFTP server.

Modify the 'xinet.d/tftp' file to enable TFTP:

1. Make the following changes:

```
disable      = no
server_args  = -s /tftpboot
```

2. Restart the network service

```
$ /etc/init.d/xinetd restart
```

- O The above configuration assumes that a directory 'tftpboot' has been created at the root '/' directory. The files in this directory are exposed through the TFTP protocol.

7.2.4 Create target file system

The target device needs a file system to boot from. A directory on the development host can be setup and exported for this purpose.

1. Copy the target file system to your workspace.

```
$ cp -a /opt/montavista/pro/devkit/arm/v4t_le/target
~/montavista/target
```

- O Enter the command shown above in a single line.
- O You need to be 'root' to successfully execute this command.
- O The file system can be copied to a different location. In such a case ~/montavista/target can be a soft link to the actual location.
- 3. The directory ~/montavista/target will be mounted as root directory on the target through NFS.

To do so, add the following line to the file /etc/exports.

```
/home/<user>/montavista/target *(rw,no_root_squash)
```

- O Replace "/home/<user>" in the path above with the actual path of your home directory on the development workstation.

C. WORKING ON TARGET PLATFORM

8 Loading the boot loader

Use CCS to load the boot loader. Refer to the OSK5912 User guide for setting up CCS to work with OSK 5912.

9 Loading Montavista Linux

Refer to the OSK5912 User guide for loading Montavista Linux Professional Edition 3.1 on OSK 5912.

10 Configuring Kernel Parameters

DSP/BIOS™ LINK requires a few specific arguments to be passed to the Linux kernel during boot up.

1. Set the kernel parameters

```
OMAP5912 OSK # setenv bootargs console=ttyS0,115200n8 noinitrd  
root=/dev/nfs rw ip=dhcp  
nfsroot=64.64.64.64:/home/<user>/montavista/target,nolock  
mem=30M
```

- ☐ Enter the command shown above in a single line.
- ☐ Replace 64.64.64.64 with the IP address assigned to the Development Host Machine.
- ☐ Replace 'user' with your username.
- ☐ The path `/home/<user>/montavista/target` should be NFS exported from the Linux workstation to allow mounting on the target.
- ☐ Notice that the command specifies 30Mb memory (out of 32Mb) to be used by Linux. The remaining 2MBs are used by DSP/BIOS™ LINK for communication between GPP and DSP, and for DSP external memory

2. Save the settings

```
OMAP5912 OSK # saveenv
```

11 Booting Montavista Linux

1. Execute the following command to boot Linux.

```
OMAP5912 OSK # bootm <addr>
```

2. After successful boot up, you will be prompted to login. You can login as 'root'. No password is required.

```
192.168.1.20 login:
```

- ☐ Replace 'addr' with the address where kernel is stored in flash.

