
i.MX53 ARD Windows Embedded Compact 7

User's Guide

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About This Book

This document is a user's guide for the Freescale i.MX53 ARD Windows Embedded Compact 7 board support package (BSP). This document describes how to install the BSP and how to use Microsoft Platform Builder for Windows Embedded Compact 7 to build, download, and debug OS images. Information on the configuration and usage of features included within the Freescale BSP is also provided.

Audience

This guide is intended for users of Microsoft Platform Builder who want to build and execute Windows Embedded Compact 7 OS images based on the Freescale BSP. The audience also includes Windows CE application developers that want to leverage API interfaces provided by the Freescale BSP.

Organization

This document is organized into the following chapters.

Chapter 1	Describes how to install/uninstall the Freescale BSP.
Chapter 2	Describes the contents and organization of the Freescale BSP.
Chapter 3	Describes how to configure the Freescale BSP for building Windows Embedded Compact 7 OS images.
Chapter 4	Provides instructions on how to build Windows Embedded Compact 7 OS images using the Freescale BSP.
Chapter 5	Describes the preparation necessary for downloading and debugging OS images.
Chapter 6	Describes the procedures for downloading and debugging OS images.
Chapter 7	Provides details on the Freescale BSP features included in this release.

Suggested Reading

Additional information regarding Microsoft Windows Embedded Compact 7 and the i.MX53 can be found in these documents:

- i.MX53 ARD Platform System HW User Guide
- <http://msdn.microsoft.com/embedded/windowsece>
- Windows Embedded Training Resources: <http://www.windowseembedded.com/training>
- MCP Certification for Windows Embedded CE: <http://www.windowseembedded.com/certification>

Conventions

Use this section to name, describe, and define any conventions used in the book. This document uses the following notational conventions:

- `Courier monospaced type` indicate commands, command parameters, code examples, expressions, datatypes, and directives.
- *Italic type* indicates replaceable command parameters.
- All source code examples are in C.

Definitions, Acronyms, and Abbreviations

The following list defines the abbreviations used in this document.

API	application programming interface
ARD	Automotive Reference Design
BSP	board support package
CSP	chip support package
DHCP	dynamic host configuration protocol
EBOOT	Ethernet bootloader
EVB	platform evaluation board
EVK	platform evaluation kit
FAL	flash abstraction layer
GDI	graphics display interface
ICE	in-circuit emulator
IDE	integrated development environment
IST	interrupt service thread
IPU	image processing unit
KITL	kernel independent transport layer
LVDS	low-voltage differential signaling
MAC	media access control
OAL	OEM adaptation layer
OEM	original equipment manufacturer
OS	operating system
PQOAL	production quality OEM adaptation layer
RVDEBUG	RealView debugger
RVI	RealView ICE
SDC	synchronous display controller
SDRAM	synchronous dynamic random access memory

SoC system on a chip

References

The following documents were referenced to produce this document.

- *i.MX53 Applications Processor Reference Manual*
- *i.MX53 ARD Windows Embedded Compact 7 Release Notes*
- *i.MX53 ARD Windows Embedded Compact 7 Reference Manual*



Chapter 1

BSP Installation

The BSP is distributed as a single Microsoft® Installer (.msi) file that includes support for the i.MX53 ARD platform. See the *i.MX53 ARD Windows Embedded Compact 7 Release Notes* for additional instructions and information before installing and using this BSP.

1.1 Installing Windows Embedded Tools and i.MX53 ARD BSP

To create the complete i.MX53 ARD development environment, install the Microsoft Windows Embedded Compact 7 development tools and the Freescale i.MX53 ARD BSP as follows:

1. Install Visual Studio 2008, Platform Builder 7 and the Windows Embedded Compact 7 drop. See the *i.MX53 ARD BSP Release Notes* for installation instructions of the Visual Studio and Platform Builder .

NOTE

When the Windows Embedded Compact 7 installer asks for the operating system version, select the ARMV7 option. This option needs to be installed on the local hard drive. The other operating systems are not required.

See the *i.MX53 ARD BSP Release Notes* for information about any additional Microsoft-supplied QFEs or Service Packs that also need to be installed.

2. If an earlier version of the Freescale i.MX53 ARD BSP has been previously installed, remove any existing BSP files by following the instructions in [Section 1.2, “Uninstalling the Freescale i.MX53 ARD BSP.”](#)
3. Download the Freescale i.MX53 ARD BSP and install the contents in the existing WINCE700 top-level folder. The MSI installer automatically creates the necessary subfolders so all of the files are installed in the correct location.

1.2 Uninstalling the Freescale i.MX53 ARD BSP

This section describes how to remove an installation BSP from the Windows Embedded Compact 7 source code tree and Platform Builder development environment.

NOTE

Uninstalling the BSP removes all files that were installed with the MSI installer. If any changes were made to these files, they are removed. Be sure to save any valuable modified files before uninstalling the BSP.

The following steps remove the BSP:

1. Close the Platform Builder.
2. Either rerun the original MSI installer and select the **Remove** option; or open the **Add or Remove Programs** Control Panel applet, select the Freescale BSP item, and then select **Remove**.
3. Manually remove the remaining BSP files and directories (some of these files and directories remain after the previous step because they contain object files or other generated files that were not part of the original BSP installation):

```
WINCE700\osdesigns\iMX53_ARD_SmallFootprint
WINCE700\osdesigns\iMX53_ARD_Mobility
WINCE700\platform\common\src\soc\COMMON_FSL_V3
WINCE700\platform\common\src\soc\iMX53_FSL_V3
WINCE700\platform\iMX53_ARD
WINCE700\support
```

1.3 Load Sample OS Design Solution

After installing the BSP, use the sample OS solutions provided in the BSP package to build a Windows Embedded Compact 7 OS image:

1. In the Platform Builder, select **File > Open > Project/Solution...**
2. Select the i.MX53 ARD BSP sample workspace by loading the following files:

```
WINCE700\osdesigns\iMX53_ARD_Mobility\iMX53_ARD_Mobility.sln
WINCE700\osdesigns\iMX53_ARD_SmallFootprint\iMX53_ARD_SmallFootprint.sln
```

The process of loading this solution also automatically loads the associated i.MX53 ARD BSP Catalog. Simply select the **Catalog Items View** tab to see all of the available OS solution catalog items.

Chapter 2

BSP Contents and Organization

The Freescale BSP is a collection of code and support files that can be integrated into the Microsoft Platform Builder development environment to create Windows Embedded Compact 7 OS images for i.MX53 ARD-based platforms. A BSP contains the following elements:

- Boot loader for downloading OS images
- OEM adaptation layer (OAL) for providing the kernel hardware interface
- Device drivers to support on-chip and on-board peripherals
- Image configuration and build files

The BSP includes a set of directories and files that are installed into an existing Windows Embedded Compact 7 source tree. The BSP directory structure follows the production-quality OAL (PQOAL) and production-quality driver (PQD) structure recommended by Microsoft.

The i.MX53 ARD system-on-a-chip (SoC) leverages a common Freescale ARM[®]-based platform architecture. This platform is found in a series of ARM-based SoCs available from Freescale. In order to leverage source code that is portable across multiple Freescale ARM-based SoCs, a common directory called `COMMON_FSL_V3` is used to store shared OAL and driver components. This `COMMON_FSL_V3` common directory appears in the chip support package and PQOAL directories described below.

2.1 System-on-a-Chip Support Package (SoC)

The Freescale SoC directory contains chipset-level code that can be leveraged to develop platforms based on the i.MX53 ARD SoC and the PQOAL components customized for the i.MX53. The code and definitions in the SoC directory can be reused in a new platform design without modification. To keep the SoC sources platform agnostic, the source code in the SoC directory utilizes hardware abstraction routine that must be ported to a specific platform or board. The SoC source code is compiled into a set of static libraries that are ultimately linked with platform-specific libraries to create drivers for the system.

2.1.1 Production Quality Driver (PQD)

Windows Embedded Compact 7 supports PQD components that simplify and shorten the process of developing a driver. For more information on PQQL development concepts, see the topic **Production-Quality Drivers** in the *Windows Embedded Compact 7 Help*.

The following directories contain the SoC driver source code for the i.MX53 ARD:

```
WINCE700\platform\common\src\soc\COMMON_FSL_V3
WINCE700\platform\common\src\soc\MX53_FSL_V3
```

The SoC code in the `COMMON_FSL_V3` directory is reusable across all Freescale ARM-based SoCs. The SoC driver code in the `MX53_FSL_V3` directory is reusable across all platforms based on the i.MX53 ARD.

2.1.2 Production Quality OAL (PQOAL)

Windows Embedded Compact 7 supports PQOAL components that simplify and shorten the process of developing an OAL.

Where possible, the Freescale BSP leverages the PQOAL architecture and components provided by Microsoft to reduce the OAL code that needs to be modified and maintained by the OEM. In addition, PQOAL components customized for the i.MX53 ARD are available in the following directories:

```
WINCE700\platform\common\src\soc\COMMON_FSL_V3\OAL
WINCE700\platform\common\src\soc\iMX53_FSL_V3\OAL
```

The PQOAL code in the `COMMON_FSL_V3\OAL` directory is reusable across all Freescale ARM-based SoCs. The PQOAL code in the `iMX53_FSL_V3\OAL` directory is reusable across all platforms based on the i.MX53 ARD.

2.2 i.MX53 ARD Platform Files

The i.MX53 ARD BSP provides direct support for the interfaces and peripherals found on the i.MX53 ARD board. All of the driver and OAL content that is specific to the underlying hardware platform is located in the following directory:

```
WINCE700\platform\iMX53_ARD
```

The i.MX53 ARD platform directory implements the hardware abstraction routines invoked by driver code in the Freescale SoC directory. Additionally, this directory implements certain aspects of the PQOAL that may need to be modified by the OEM for their specific platform.

2.3 Sample OS Design Solutions

Design solutions are used by Platform Builder to encapsulate the OS components and build options necessary for the Windows Embedded Compact 7 tools to generate an OS image. Default solutions have been included in the BSP within the following directory:

```
WINCE700\osdesigns\iMX53_ARD_Mobility
```

Another solution included in the BSP provides the starting point for the smallest functional Windows Embedded Compact 7 run-time image:

```
WINCE700\osdesigns\iMX53_ARD_SmallFootprint
```

The solution was created using the Platform Builder **New > Project** feature utilizing the Custom Device Design Template.

2.4 Support Files

Support files that complement the BSP source tree are located within the following directory:

```
WINCE700\support
```

This directory is used to store applications and tests targeted for the supported platforms. Support files necessary to configure the development tools are also placed here.

Chapter 3

Configuring OS Images

Use the Platform Builder to select one of the two default build configurations provided in the BSP sample solution. These configurations control the type of OS image (debug or release) that is generated by the Platform Builder tools. In addition, the build configuration encapsulates all of the platform environment variables and custom build instructions that are used during OS image creation. This section describes the configuration options available for the i.MX53 ARD BSP.

NOTE

The sample solution provided within the i.MX53 ARD BSP is properly configured to generate a default image targeted for the i.MX53 ARD hardware. It is not necessary to adjust any of the image configuration settings prior to building the BSP.

3.1 Image Build Type

The type of OS image generated by Platform Builder can be controlled using the **Build > Configuration Manager...** menu item and choosing the appropriate **Active Solution Configuration** item from the drop-down list. The sample workspace provided with the i.MX53 ARD BSP provides the following three image build types:

- **Freescale i_MX53 ARD ARMV7 Release**—Retail build that includes KITL and kernel debugger support. This image type provides a smaller image with faster execution at the expense of limited debug capability.
- **Freescale i_MX53 ARD ARMV7 Debug**—Debug build that includes KITL and kernel debugger support. This image type provides full debug capability at the expense of a larger image size and slower execution.
- **Freescale i_MX53 ARD ARMV7 Checked**—Checked build that includes KITL and kernel debugger support. This image type provides richer check and debug capability at the expense of a larger image size and slower execution.

NOTE

The Standard toolbar can be enabled or disabled by selecting the **Tools > Customize...** menu item followed by the **Toolbars** tab and then selecting or deselecting the **Standard** toolbar item.

3.2 BSP Environment Variables

There are three types of BSP environment variables used to configure the BSP:

- BSP_NOXXX
- BSP_XXX
- IMGXXX

3.2.1 BSP_NOXXX Variables

The i.MX53 ARD BSP supports the Windows Embedded Compact 7 dependency feature, which simplifies the BSP configuration process. Support for this feature means that the selection of certain SYSGEN components in the workspace (for example SYSGEN_SMARTCARD) triggers the automatic selection of certain BSP drivers (for example SIM). The drivers that have a SYSGEN dependency have a corresponding BSP_NOXXX variable defined in the platform batch file listed below. These variables provide a means for excluding a driver from the OS image that might otherwise be included, due to a SYSGEN dependency.

```
WINCE700\platform\iMX53_ARD\iMX53_ARD.bat
```

NOTE

It is not possible to remove the selection of these drivers by clicking the items in Catalog UI. Instead, users need to set the corresponding BSP_NOXXX variables to 1 in **Environment** dialog, launched from Platform Builder menu **Project > Properties > Configuration Properties > Environment**.

Table 3-1 provides a summary of the BSP_NOXXX environment variables defined in batch file.

Table 3-1. BSP_NOXXX Variables in Batch File

Variable Name	Description	Setting
BSP_NOAUDIO	Excludes support for SSI Audio driver	BSP_NOAUDIO=1 Excludes Audio driver support from the OS image despite the SYSGEN_AUDIO dependency.
BSP_NOBATTERY	Excludes support for SSI Battery driver	BSP_NOBATTERY=1 Excludes Battery driver support from the OS image despite the SYSGEN_BATTERY dependency.
BSP_NOBLUETOOTH	Excludes support for Bluetooth [®] driver	BSP_NOBLUETOOTH=1 Excludes Bluetooth driver support from the OS image despite the SYSGEN_BTH dependency.
BSP_NOCSPDDK	Excludes CSP driver development kit (CSPDDK) support. The CSPDDK is required for most BSP device drivers.	BSP_NOCSPDDK=1 Excludes CSPDDK from the OS image despite the SYSGEN_CEDDK dependency. Only use this configuration when building an OS design that does not include BSP device drivers.
BSP_NOCSPI	Excludes support for eCSPI driver	BSP_NOCSPI=1 Excludes eCSPI driver support from the OS image despite the SYSGEN_DEVICE dependency.
BSP_NODISPLAY	Excludes support for Display driver	BSP_NODISPLAY=1 Excludes Display driver support from the OS image despite the SYSGEN_DISPLAY dependency.
BSP_NOETHER	Excludes support for ethernet driver	BSP_NOETHER=1 Excludes Ethernet driver support from the OS image despite the SYSGEN_NDIS dependency.

Table 3-1. BSP_NOXXX Variables in Batch File (continued)

Variable Name	Description	Setting
BSP_NOKEYPAD	Excludes support for Keypad driver	BSP_NOKEYPAD=1 Excludes Keypad driver support from the OS image despite the SYSGEN_MININPUT dependency.
BSP_NONLED	Excludes support for NLED driver	BSP_NONLED=1 Excludes NLED driver support from the OS image despite the SYSGEN_NLED dependency.
BSP_NOPMIC	Excludes support for PMIC driver	BSP_NOPMIC=1 Excludes PMIC driver support from the OS image despite the SYSGEN_DEVICE dependency.
BSP_NOPWRBTN	Excludes support for Power Button driver	BSP_NOPWRBTN=1 Excludes Power Button driver support from the OS image despite the SYSGEN_DEVICE dependency.
BSP_NOSDHC	Excludes support for eSDHC driver	BSP_NOSDHC=1 Excludes eSDHC driver support from the OS image despite the SYSGEN_SDBUS dependency.
BSP_NOSIM	Excludes support for SIM driver	BSP_NOSIM=1 Excludes SIM driver support from the OS image despite the SYSGEN_SMARTCARD dependency.
BSP_NOTOUCH	Excludes support for Touch driver	BSP_NOTOUCH=1 Excludes Touch driver support from the OS image despite the SYSGEN_TOUCH dependency.
BSP_NOUSB	Excludes support for all USB drivers	BSP_NOUSB=1 Excludes all USB drivers support from the OS image despite the SYSGEN_USB and SYSGEN_USBFN dependency.

NOTE

The opposite setting of `BSP_NOXXX = 1` is either `BSP_NOXXX =`, which is set in the batch file by default, or no definition of the `BSP_NOXXX` variable at all. Thus, the driver is included by SYSGEN selection.

Although the drivers listed above have direct SYSGEN dependency, some of them may not be automatically selected by SYSGEN dependency because of the following possibilities:

1. The driver may have multiple subordinate selections; for example, when there are two selections (eSDHC1 and eSDHC3) for SD Host Controllers.
2. The driver may depend on another driver; for example, when Audio depends on the I2C2 driver.
3. The driver may conflict with other drivers.

3.2.2 BSP_XXX Variables

The i.MX53 ARD BSP uses the `BSP_XXX` variables defined in the catalog to configure the drivers that can not be automatically be selected by SYSGEN dependency. In these cases, users can use the Platform Builder Catalog UI to select or deselect drivers by clicking the catalog items.

NOTE

Users might not always be able to successfully select the desired drivers in the catalog graphical user interface. They may see a small red **x** for some cases, which means there is some dependency or conflict involved in the selection. In this case, users should right-click the catalog item and see the details in **Reasons for Exclusion of Item**. To successfully make the selection, use the information shown to select the required SYSGEN components or drivers and to deselect conflicting components.

When creating a custom workspace using the Platform Builder wizard, manually select the desired drivers that may not be automatically selected by SYSGEN dependency using the BSP catalog items under **Third party > BSP > Freescale i.MX53 ARD: ARMV7**.

To improve the GDI performance, make sure `BSP_DISPLAY_Z160` variable is set in the Environment dialog, launched from the Platform Builder menu **Project > Properties > Configuration Properties > Environment**.

To enable AR6102 SDIO WiFi, make sure `BSP_AR6102_SDIO` variable is set in the Environment dialog, launched from the Platform Builder menu **Project > Properties > Configuration Properties > Environment**.

3.2.3 IMG_XXX Variables

The `IMG_XXX` variables are used to control the Make Run-Time Image procedure. The variables can be viewed and configured within the **Environment** dialog as follows:

1. Open the sample solution for the i.MX53 ARD BSP.
2. From the **Project** menu, choose **Properties**.
3. Expand **Configuration Properties** if necessary and select the **Environment** item.

[Table 3-2](#) provides a summary of the `IMG_XXX` environment variables available on i.MX53 ARD BSP.

Table 3-2. IMG_XXX Variables

Variable Name	Description	Setting
IMGSDMMC	Used by EBOOT and OS build files to determine if images are targeted for SD/MMC card	IMGSDMMC = 1 Link EBOOT and OS images for SD/MMC card
IMGNAND	Used by EBOOT and OS build files to determine if images are targeted for NAND Flash	IMGNAND = 1 Link EBOOT and OS images for NAND Flash

Table 3-2. IMG_XXX Variables (continued)

Variable Name	Description	Setting
IMGATA	Used by EBOOT and OS build files to determine if images are targeted for SATA Disk	IMGATA = 1 Link EBOOT and OS images for SATA Disk
IMGRAM512	Configures the run-time image for 512 Mbytes of RAM	IMGRAM512 = 1 Configures the run-time image for 512 Mbytes of RAM Remove to configure the run-time image for 1 Gbytes of RAM

3.3 Catalog Environment Variables

The i.MX53 ARD BSP utilizes the Platform Builder Windows CE Catalog to configure BSP components in the OS design.

Chapter 4

Building OS Images

This chapter provides instructions for building Windows Embedded Compact 7 OS images using the BSP.

4.1 Building the Freescale SoC Libraries

The Freescale SoC libraries that support the i.MX53 ARD are generated during the **Build > Advanced Build Commands > Sysgen** or **Build > Advanced Build Commands > Build Current BSP and Subprojects** build procedure. Windows CE ships with pre-built SoC libraries for various ARM processors, but the libraries for the i.MX53 ARD must be built from the sources since they are not included with the standard Microsoft distribution.

The sample OS design solution provided is already preconfigured to build the required Freescale SoC. That is, the sample i.MX53 ARD OS design solution automatically build the i.MX53 SoC sources.

Follow these steps to build the Freescale SoC libraries:

1. Open the sample solution.
2. Select the desired build type discussed in [Section 3.1, “Image Build Type.”](#)
3. Select a **Sysgen** build if a Sysgen operation has never been performed. If a Sysgen has already been performed, it is only necessary to **Build Current BSP and Subprojects**, which rebuilds the Freescale SoC libraries.

For a release build type, the SoC libraries are placed in

```
WINCE700\osdesigns\iMX53_ARD_Mobility\Wince700\iMX53_ARD_ARMV7_Retail\cesysgen\platcomm\iMX53_ARD\lib\ARMV7\retail
```

For a debug build type, the SoC libraries are placed in

```
WINCE700\osdesigns\iMX53_ARD_Mobility\Wince700\iMX53_ARD_ARMV7_Debug\cesysgen\platcomm\iMX53_ARD\lib\ARMV7\debug
```

For a checked build type, the SoC libraries are placed in

```
WINCE700\osdesigns\iMX53_ARD_Mobility\Wince700\iMX53_ARD_ARMV7_Checked\cesysgen\platcomm\iMX53_ARD\lib\ARMV7\checked
```

4.2 Building Run-Time Images

The remaining steps to build an OS image follow the standard procedures described in the Platform Builder documentation.

4.2.1 Building the BSP for the First Time

1. Open the sample solution.
2. Select the desired build type discussed in [Section 3.1, “Image Build Type.”](#)
3. Using the **Build > Global Build Settings** menu, configure the build options as follows:
 - Select **Make Run-Time Image After Build**

4. Select **Build > Advanced Build Commands > Sysgen** to start the build process.

For a release build type, the OS image files are placed in the following directory depending on the OS design being used:

```
WINCE700\osdesigns\iMX53_ARD_Mobility\RelDir\Freescale_i_MX53_ARD_ARMV7_Release
```

For a debug build type, the OS image files are placed in the following directory:

```
WINCE700\osdesigns\iMX53_ARD_Mobility\RelDir\Freescale_i_MX53_ARD_ARMV7_Debug
```

For a checked build type, the OS image files are placed in the following directory:

```
WINCE700\osdesigns\iMX53_ARD_Mobility\RelDir\Freescale_i_MX53_ARD_ARMV7_Checked
```

4.2.2 Clean Build for the BSP

By default, the Platform Builder performs incremental builds of the BSP components, even during the **Sysgen** build procedure. It may be desirable under certain circumstances to force a clean build for the BSP.

A clean build of all the Freescale BSP components can be accomplished as follows:

1. Deselect **Make Run-Time Image After Build**.
2. Select **Build > Advanced Build Commands > Rebuild Current BSP and Subprojects** to perform a clean build of the BSP platform directory (including the SoC libraries), and complete the creation of a new OS image.

4.2.3 Incremental BSP Build

The **Sysgen** build phase results in pre-built OS component binaries being copied to the release directory for the current build configuration. It is not necessary to perform a **Sysgen** again unless components are being added or removed from the **OS design**. Instead, an incremental build of the Freescale BSP components can be performed to quickly build an updated OS image as follows:

1. Open a solution.
2. Select the desired build type discussed in [Section 3.1, “Image Build Type.”](#)
3. Using the **Build > Global Build Settings** menu, configure the build options as follows:
 - Select **Make Run-Time Image After Build**
4. Select **Build > Advanced Build Commands > Build Current BSP and Subprojects** to perform an incremental build of the BSP platform directory (including the SoC libraries), and complete the creation of an OS image.

Chapter 5

Preparing for Downloading and Debugging

The target and development workstation must be properly configured and initialized before OS images can be downloaded and executed. This section discusses the steps required to prepare the target and development workstation so that the Platform Builder can be used to download and debug images on the target.

5.1 Serial Debug Messages

Serial debug messages are used by the boot loader and OS images to report status and error information. Additionally, the boot loader uses serial input to allow for user interaction. This section describes the configuration of the desktop workstation and Freescale BSP to support serial debug messages.

5.1.1 Desktop Workstation Serial Debug Port

Any terminal emulation application can be used to display messages sent from the serial port of the target. Configure the terminal application with the following communications parameters:

- Bits per second—115200
- Data bits—8
- Parity—None
- Stop bits—1
- Flow control—None

5.1.2 Target Serial Debug Port

The i.MX53 ARD BSP has been configured to use internal UART1 routed to the UARTC connector for serial debug messages. UARTC on the ARD board is the DB-9 connector next to the power port. Connect a standard serial cable between UARTC of the i.MX53 ARD board and the development workstation.

5.2 Board Configuration

5.2.1 i.MX53 ARD Board Configuration

This section describes the switch and jumper configuration required for proper operation of the BSP on the i.MX53 ARD board. For specific BSP features, the ARD board may need to be reconfigured to support the necessary interface.

5.2.2 i.MX53 ARD Boot Mode Settings

Table 5-1 shows the configuration for the i.MX53 ARD Boot Mode.

Table 5-1. CPU Boot Mode Settings

Boot Mode	Boot Switch Setting for Rev A board	Boot Switch Setting for Rev B board
SATA Boot	On: 1,6,8 Off: others	On: 6,8 Off: others
NAND Flash Boot	On: 1,2,4,5,6,9,10 Off: others	On: 2,4,5,6,9,10 Off: others
SD Boot from SDHC1	On: 1,3,9 Off: others	On: 3,9 Off: others
MMC Boot from SDHC1	On: 1,3,8,9 Off: others	On: 3,8,9 Off: others
Bootstrap	On: n/a Off: all	On: n/a Off: all

5.3 EBOOT Installation and Configuration

The Ethernet boot loader (EBOOT) is used to download and execute OS images. EBOOT is typically programmed into storage memory on the target hardware and executes immediately out of reset. Initially, the target hardware does not have EBOOT resident in the storage memory. Furthermore, the target hardware has non-volatile storage for the EBOOT network configuration (DHCP/static, MAC address, and so on) that must be initialized before using the boot loader with the Platform Builder. This section describes the procedure for building, installing, and configuring EBOOT.

5.3.1 Building an EBOOT Image for SD/MMC Card

Build EBOOT for SD/MMC Flash by following these steps:

1. Follow the steps in [Section 4.2, “Building Run-Time Images,”](#) to build a retail OS image. During the process of building the OS image, the libraries needed by EBOOT are created.
2. Specify the targeted memory for the EBOOT image as a SD/MMC card. This is achieved by ensuring that the IMGSDMMC environment variable is set within **Project > Properties > Configuration Properties > Environment**. This causes the EBOOT image to be linked for a SD/MMC card.
3. Select the **Solution Explorer** tab of the Platform Builder window.
4. Expand **iMX53_ARD_Mobility > <%WINCEROOT%> > platform > iMX53_ARD > src > BOOTLOADER**.
5. Right-click on the **EBOOT** folder again and select **Rebuild**.
6. The EBOOT binary image is created in the workspace release directory.

5.3.2 Building an EBOOT Image for NAND Flash

Build EBOOT for NAND Flash by following these steps:

1. Follow the steps in [Section 4.2, “Building Run-Time Images,”](#) to build a retail OS image. During the process of building the OS image, the libraries needed by EBOOT are created.
2. Specify the targeted memory for the EBOOT image as a NAND Flash. This is achieved by ensuring that the IMG_NAND environment variable is set within **Project > Properties > Configuration Properties > Environment**. This causes the EBOOT image to be linked for a NAND Flash.
3. Select the **Solution Explorer** tab of the Platform Builder window.
4. Expand **iMX53_ARD_Mobility > <%WINCEROOT%> > platform > iMX53_ARD > src > BOOTLOADER**.
5. Right-click on the **EBOOT** folder again and select **Rebuild**.
6. The EBOOT binary image is created in the workspace release directory.

5.3.3 Building an EBOOT Image for SATA

Build EBOOT for SATA Disk by following these steps:

1. Follow the steps in [Section 4.2, “Building Run-Time Images,”](#) to build a retail OS image. During the process of building the OS image, the libraries needed by EBOOT are created.
2. Specify the targeted memory for the EBOOT image as a SATA storage. This is achieved by ensuring that the IMG_GATA environment variable is set within **Project > Properties > Configuration Properties > Environment**. This causes the EBOOT image to be linked for a SATA storage.
3. Select the **Solution Explorer** tab of the Platform Builder window.
4. Expand **iMX53_ARD_Mobility > <%WINCEROOT%> > platform > iMX53_ARD > src > BOOTLOADER**.
5. Right-click on the **EBOOT** folder again and select **Rebuild**.
6. The EBOOT binary image is created in the workspace release directory.

5.3.4 Program EBOOT in SD/MMC Using Manufacture Tool

See the *i.MX53 ARD BSP Release Notes* for the suggested Manufacture Tool version. Refer to Manufacture Tool document to program EBOOT in a SD/MMC card using Manufacture Tool

5.3.5 Program/Update EBOOT in SD/MMC Card Using Platform Builder

EBOOT running from SDRAM can be used to program or update the EBOOT image resident in a SD/MMC card. Follow these steps to program/update the EBOOT image:

1. Build EBOOT for SD/MMC card following the steps in [Section 5.3.1, “Building an EBOOT Image for SD/MMC Card.”](#)

2. If EBOOT is not resident in Flash or the resident EBOOT is not compatible with the current BSP, follow the steps in [Section A.3, “Loading EBOOT to SDRAM Using RVDEBUG,”](#) to get a valid copy of EBOOT running from RAM.
3. From the **File** menu of the Platform Builder choose **Open Workspace**.
4. Select EBOOT.bin found in the appropriate workspace release directory:


```
WINCE700\osdesigns\iMX53_ARD_Mobility\RelDir\Freescale_i_MX53_ARD_ARMV7_Release\EBOOT.bin
```
5. Follow the steps in [Section 5.4, “Configuring Ethernet Connection for Downloading and Debugging,”](#) to establish an Ethernet connection between the target and the Platform Builder.
6. From the **Target** menu, select **Attach Device**.
7. After the download is complete, from the **Target** menu, select **Detach Device**.
8. Switch over to the terminal emulation application. At this point, EBOOT has downloaded the image temporarily into SDRAM and is ready to begin the Flash programming procedure.
9. In the terminal emulation application, press the y key to begin programming the Flash.
10. EBOOT programs the image into SD/MMC card and provides status using serial debug messages. After the programming is complete, the following messages appears:


```
INFO: Update to EBOOT/SBOOT completed successfully.
Reboot the device manually...
SpinForever...
```
11. Close the Platform Builder workspace for EBOOT.bin. It is not necessary to save any workspace changes.
12. If EBOOT was downloaded to SDRAM using RVDEBUG, disconnect from the RVDEBUG by selecting **File > Connection > Disconnect**.
13. Use the instructions provided in [Section 5.2.2, “i.MX53 ARD Boot Mode Settings,”](#) to configure the ARD board for boot from the SD/MMC card.
14. Reset the target hardware. If new EBOOT messages appear on the terminal, EBOOT has been properly programmed into SD/MMC card.

5.3.6 Program/Update EBOOT in NAND Flash Using Platform Builder

EBOOT running from SDRAM can be used to program or update the EBOOT image resident in a NAND Flash. Follow these steps to program/update the EBOOT image:

1. Build EBOOT for NAND Flash following the steps in [Section 5.3.2, “Building an EBOOT Image for NAND Flash.”](#)
2. If EBOOT is not resident in Flash or the resident EBOOT is not compatible with the current BSP, follow the steps in [Section A.3, “Loading EBOOT to SDRAM Using RVDEBUG,”](#) to get a valid copy of EBOOT running from RAM.
3. From the **File** menu of the Platform Builder choose **Open Workspace**.
4. Select EBOOT.bin found in the appropriate workspace release directory:

```
WINCE700\osdesigns\iMX53_ARD_Mobility\RelDir\Freescale_i_MX53_ARD_ARMV7_Release\EBOOT.bin
```

5. Follow the steps in [Section 5.4, “Configuring Ethernet Connection for Downloading and Debugging,”](#) to establish an Ethernet connection between the target and the Platform Builder.
6. From the **Target** menu, select **Attach Device**.
7. After the download is complete, from the **Target** menu, select **Detach Device**.
8. Switch over to the terminal emulation application. At this point, EBOOT has downloaded the image temporarily into SDRAM and is ready to begin the Flash programming procedure.
9. In the terminal emulation application, press the **y** key to begin programming the Flash.
10. EBOOT programs the image into NAND Flash and provides status using serial debug messages. After the programming is complete, the following messages appears:

```
INFO: Update to EBOOT/SBOOT completed successfully.
Reboot the device manually...
SpinForever...
```

11. Close the Platform Builder workspace for EBOOT.bin. It is not necessary to save any workspace changes.
12. If EBOOT was downloaded to SDRAM using RVDEBUG, disconnect from the RVDEBUG by selecting **File > Connection > Disconnect**.
13. Use the instructions provided in [Section 5.2.2, “i.MX53 ARD Boot Mode Settings,”](#) to configure the ARD board for boot from the NAND Flash.
14. Reset the target hardware. If new EBOOT messages appear on the terminal, EBOOT has been properly programmed into NAND Flash.

5.3.7 Program/Update EBOOT in SATA Using Platform Builder

EBOOT running from SDRAM can be used to program or update the EBOOT image resident in a SATA storage. Follow these steps to program/update the EBOOT image:

1. Build EBOOT for SATA storage following the steps in [Section 5.3.3, “Building an EBOOT Image for SATA.”](#)
2. If EBOOT is not resident in Flash or the resident EBOOT is not compatible with the current BSP, follow the steps in [Section A.3, “Loading EBOOT to SDRAM Using RVDEBUG,”](#) to get a valid copy of EBOOT running from RAM.
3. From the **File** menu of the Platform Builder choose **Open Workspace**.
4. Select EBOOT.bin found in the appropriate workspace release directory:

```
wince700\osdesigns\iMX53_ARD_Mobility\RelDir\Freescale_i_MX53_ARD_ARMV7_Release\EBOOT.b
in
```

5. Follow the steps in [Section 5.4, “Configuring Ethernet Connection for Downloading and Debugging,”](#) to establish an Ethernet connection between the target and the Platform Builder.
6. From the **Target** menu, select **Attach Device**.
7. After the download is complete, from the **Target** menu, select **Detach Device**.
8. Switch over to the terminal emulation application. At this point, EBOOT has downloaded the image temporarily into SDRAM and is ready to begin the Flash programming procedure.
9. In the terminal emulation application, press the **y** key to begin programming the storage.

10. EBOOT programs the image into SATA storage and provides status using serial debug messages. After the programming is complete, the following messages appears:

```
INFO: Update to EBOOT/SBOOT completed successfully.
Reboot the device manually...
SpinForever...
```

11. Close the Platform Builder workspace for EBOOT.bin. It is not necessary to save any workspace changes.
12. If EBOOT was downloaded to SDRAM using RVDEBUG, disconnect from the RVDEBUG by selecting **File > Connection > Disconnect**.
13. Use the instructions provided in [Section 5.2.2, “i.MX53 ARD Boot Mode Settings,”](#) to configure the ARD board for boot from the SATA storage.

Reset the target hardware. If new EBOOT messages appear on the terminal, EBOOT has been properly programmed into SATA storage.

5.3.8 Using cfimager Utility to Flash SD/MMC Card

cfimager.exe is a host PC tool used to flash boot images (eboot.nb0, nk.nb0) and create a FAT partition on SD/MMC cards for i.MX53. Users can avoid programming the card on the device. The tool for i.MX53 can only flash *.nb0 files. A card reader on the PC is required. The utility, accompanied by a readme file, is provided under `<%WINCEROOT%>\support\TOOL\COMMON\CFIMAGER`. Any data on the card may be lost by flashing it with cfimager. Follow these steps to flash the card:

1. Build the EBOOT for SD. See [Section 5.3.1, “Building an EBOOT Image for SD/MMC Card,”](#) section for instructions.

2. To flash the bootloader, use the following command:

```
cfimager -f eboot.nb0 -d <card reader drive letter without colon> -iMX53
```

3. To flash the OS image, use the following command:

```
cfimager -f nk.nb0 -d <card reader drive letter without colon> -iMX53
```

Flashing a debug nk.nb0 image may not work because it may be too big.

4. To add the FAT partition, add `-a` option to any of the above command lines.

When creating a FAT partition, any previous data in any existing FAT partition is erased.

NOTE

Using SATA to USB bridge, SATA storage can be considered as a USB device for PC. Then cfimager.exe can also be used to program EBOOT for SATA follow the above steps. But the EBOOT image here should be for SATA. See [Section 5.3.3, “Building an EBOOT Image for SATA,”](#) section for instructions.

5.3.9 Initialize EBOOT Network Configuration

To initialize EBOOT network configuration, follow these steps:

1. Follow the steps in Section 5.3.4 ~ Section 5.3.10 to execute EBOOT on the target.
2. Quickly switch over to the terminal emulation application and wait for the debug message, **Press [ENTER] to download now or [SPACE] to cancel** to appear.
3. Press the space bar to bring up the EBOOT configuration menu.

NOTE

If the Flash memory has not been previously programmed or has been erased due to reprogramming, EBOOT automatically displays the configuration menu without prompting the user, and steps 2 and 3 above are skipped.

4. Specify an Ethernet MAC address by selecting the **MAC Address** menu option and then entering the 12-digit hexadecimal MAC address delimited by periods.
5. Press enter to return to the EBOOT configuration menu. The specified MAC address should now be displayed in the EBOOT menu.
6. By default, DHCP is enabled and there is no need to specify a static IP or static subnet mask. If static networking parameters are needed, use the **IP Address** and **Subnet Mask** menu options.
7. After the desired network configuration appears in the EBOOT menu, select the **Save configuration** menu option to save the configuration to nonvolatile memory.

5.3.10 Using SD/MMC Boot Card for File System Support

To use a SD/MMC card that is already flashed with boot images as described in [Section 5.3.5, “Program/Update EBOOT in SD/MMC Card Using Platform Builder,”](#) and which is older than specification versions 2.1 (for SD) and 4.3 (for MMC), follow these steps for storing file system data:

1. Reset the ARD board to launch EBOOT on the target.
2. Quickly switch over to the terminal emulation application and wait for the debug message, **Press [ENTER] to download now or [SPACE] to cancel** to appear.
3. Press the space bar or enter key to bring up the EBOOT configuration menu.
4. Select **M** to enter the submenu for MMC and SD utilities.
5. Select **C** to create boot and file system partitions on the card. Select **y** when prompted by the warning message. This step does not harm the boot images already flashed on the card. This step completes successfully only on a card larger than 96 Mbytes, because first 96 Mbytes on the card is saved for the boot image partition.
6. Remove the card from the device and plug it into an SD card reader on a Windows XP PC.
7. Format the card using Windows XP. This step does not harm the boot images already flashed on the card.

This card can now be used on the Windows CE system as a file system storage device as well as continue to be used as a boot device.

NOTE

Do not format the card on the Windows CE system, as this erases the boot images as well as the file system partition. Running any kind of CETK Storage Device tests erases the boot and file system on the card, because they format the card as needed by the tests. The only way to format the card safely (that is, without erasing the boot images) on the CE device is to do the following: From the Storage Manager, select the **PART01** partition on the card, and select **Properties**. Dismount this partition. Select **Format**. On the next dialog box, be sure to select **FAT32** as the file system from the drop-down menu, and complete the format.

5.4 Configuring Ethernet Connection for Downloading and Debugging

To configure an Ethernet connection that can be used for downloading and debugging images, follow these steps:

1. From the Platform Builder **Target** menu, choose **Connectivity Options**.
2. Choose **Kernel Service Map**.
3. In the **Target Device** box, choose a target device.

NOTE

If a connection to a target device is already configured, the settings associated with the connection to the target device appear in the **Download** box and the **Transport** box.

4. In the **Kernel Download** box, choose **Ethernet** as the download service.
5. Launch EBOOT on the target. After EBOOT initialization completes, BOOTME messages begin to appear on the serial debug output. Observe the device name created by EBOOT on the serial debug output.

NOTE

If EBOOT has already been programmed into the target, a hardware reset starts EBOOT execution. If EBOOT is being programmed into the target, see [Section A.3, “Loading EBOOT to SDRAM Using RVDEBUG,”](#) for steps to launch EBOOT.

6. To the right of the **Download** box, choose **Settings**. The device name of the target should appear in the **Active Target Devices** box.
7. Select the target from the **Active Devices** box, and then choose **OK**.
8. In the **Kernel Transport** box, choose **Ethernet** as a kernel transport.
9. To the right of the **Transport** box, choose **Settings**.
10. Check the box next to **Use device name from bootloader** and then choose **OK**.

11. If the run-time image includes support for the kernel debugger stub, KdStub, from the **Kernel Debugger** box, choose **KdStub**. If the run-time image does not include support for a debugger, from the **Debugger** box, choose **None**.
12. Choose **Core Service Settings**.
13. To instruct the Platform Builder to download a run-time image each time the Platform Builder connects with the target device, under **Download Image**, choose **Always**.
14. Select **Enable KITL on device boot**.
15. Select **Clear memory on soft reset**.
16. Select **Enable access to desktop files**.
17. Choose **Apply**.
18. Choose **Close**.

Chapter 6

Downloading and Debugging Images

This section describes the procedures for downloading and debugging OS images on the i.MX53 ARD board. It is assumed that the steps to build an OS image have been followed and that development hardware has been configured prior to attempting a download and debug session.

6.1 Downloading OS Image to SDRAM Using EBOOT

To download an image into the SDRAM of the target, follow these steps:

1. If EBOOT is not resident on the target, follow the procedure in [Section 5.3, “EBOOT Installation and Configuration,”](#) to program EBOOT into the target.
2. Prepare the target hardware by following the instructions in [Section 5.2.1, “i.MX53 ARD Board Configuration.”](#) Configure the ARD board for boot from NAND Flash or SD/MMC card.
3. Open the desired workspace within the Platform Builder.
4. Deselect **Project > Properties > Configuration Properties > Build Options > Write Run-time Image to Flash Memory.**
5. Within **Build > Properties > Configuration Properties > Environment**, remove the IMGSDMMC or IMG NAND environment variable if it exists.
6. Build the image following the steps provided in [Chapter 4, “Building OS Images.”](#)
7. Reset the ARD board to launch EBOOT on the target.
8. If a target device connection has not been created within the Platform Builder, follow the steps in [Section 5.4, “Configuring Ethernet Connection for Downloading and Debugging,”](#) to establish a connection.
9. From the Platform Builder **Target** menu, select **Attach Device** to begin the download.

6.2 Downloading OS Image to SD/MMC Card Using EBOOT

To download an image into the SD/MMC card of the target, follow these steps:

1. If EBOOT is not resident on the target, follow the procedure in [Section 5.3, “EBOOT Installation and Configuration,”](#) to program EBOOT into the target.
2. Prepare the target hardware by following the instructions in [Section 5.2.1, “i.MX53 ARD Board Configuration.”](#) Configure the ARD board for boot from SD/MMC card.
3. Open the desired workspace within the Platform Builder.
4. Within **Build > Properties > Configuration Properties > Environment**, set the IMGSDMMC environment variable if it does not exist.
5. Build the image following the steps provided in [Chapter 4, “Building OS Images.”](#)
6. Reset the ARD board to launch EBOOT on the target.
7. If a target device connection has not been created within the Platform Builder, follow the steps in [Section 5.4, “Configuring Ethernet Connection for Downloading and Debugging,”](#) to establish a connection.

8. From the Platform Builder **Target** menu, select **Attach Device** to begin the download.
9. After the download is complete, switch over to the terminal emulation application.
10. At this point EBOOT has downloaded the image temporarily into SDRAM and is ready to begin the Flash programming procedure.
11. EBOOT programs the image to a SD/MMC card and provides status using serial debug messages. After the programming is complete, the following messages appear:

```
INFO: Update of NK completed successfully.
Reboot the device manually...
SpinForever...
```

6.3 Downloading OS Image to NAND Flash Using EBOOT

To download an image into the NAND Flash of the target, follow these steps:

1. If EBOOT is not resident on the target, follow the procedure in [Section 5.3, “EBOOT Installation and Configuration,”](#) to program EBOOT into the target.
2. Prepare the target hardware by following the instructions in [Section 5.2.1, “i.MX53 ARD Board Configuration.”](#) Configure the ARD board for boot from NAND Flash.
3. Open the desired workspace within the Platform Builder.
4. Within **Build > Properties > Configuration Properties > Environment**, set the IMG NAND environment variable if it does not exist.
5. Build the image following the steps provided in [Chapter 4, “Building OS Images.”](#)
6. Reset the ARD board to launch EBOOT on the target.
7. If a target device connection has not been created within the Platform Builder, follow the steps in [Section 5.4, “Configuring Ethernet Connection for Downloading and Debugging,”](#) to establish a connection.
8. From the Platform Builder **Target** menu, select **Attach Device** to begin the download.
9. After the download is complete, switch over to the terminal emulation application.
10. At this point EBOOT has downloaded the image temporarily into SDRAM and is ready to begin the Flash programming procedure.
11. EBOOT programs the image to the NAND Flash and provides status using serial debug messages. After the programming is complete, the following messages appear:

```
INFO: Update of NK completed successfully.
Reboot the device manually...
SpinForever...
```

6.4 Downloading OS Image to SATA Using EBOOT

To download an image into the SATA storage of the target, follow these steps:

1. If EBOOT is not resident on the target, follow the procedure in [Section 5.3, “EBOOT Installation and Configuration,”](#) to program EBOOT into the target.
2. Prepare the target hardware by following the instructions in [Section 5.2.1, “i.MX53 ARD Board Configuration.”](#) Configure the ARD board for boot from SATA.

3. Open the desired workspace within the Platform Builder.
4. Within **Build > Properties > Configuration Properties > Environment**, set the IMGATA environment variable if it does not exist.
5. Build the image following the steps provided in [Chapter 4, “Building OS Images.”](#)
6. Reset the ARD board to launch EBOOT on the target.
7. If a target device connection has not been created within the Platform Builder, follow the steps in [Section 5.4, “Configuring Ethernet Connection for Downloading and Debugging,”](#) to establish a connection.
8. From the Platform Builder **Target** menu, select **Attach Device** to begin the download.
9. After the download is complete, switch over to the terminal emulation application.
10. At this point EBOOT has downloaded the image temporarily into SDRAM and is ready to begin the Flash programming procedure.
11. EBOOT programs the image to the SATA and provides status using serial debug messages. After the programming is complete, the following messages appear:

```
INFO: Update of NK completed successfully.
Reboot the device manually...
SpinForever...
```

6.5 Running OS Image from SD/MMC Card Using EBOOT

To execute an OS image from a SD/MMC card that has been previously programmed using the procedure described in [Section 6.2, “Downloading OS Image to SD/MMC Card Using EBOOT,”](#) follow these steps:

1. Reset the ARD board to launch EBOOT on the target.
2. Quickly switch over to the terminal emulation application and wait for the debug message, **Press [ENTER] to download now or [SPACE] to cancel** to appear.
3. Press the space bar to bring up the EBOOT configuration menu.
4. Continue selecting the **Select Boot Device** option of the EBOOT menu until SD/MMC is selected.
5. Specify the desired boot delay using the **Boot Delay** menu option.
6. Save the configuration using the EBOOT menu.
7. Reset the ARD board to launch EBOOT again. EBOOT automatically loads the OS image from SD/MMC to RAM and executes it after the specified boot delay.

NOTE

If the ARD board is configured for active KITL, the image waits for a Platform Builder connection before booting the OS image. Because the OS image is already resident in Flash memory, it is necessary to reconfigure the Platform Builder to jump directly to the image by selecting **Target > Connectivity Options > Core Service Settings > Download Image: Never (jump to image)**.

6.6 Running OS Image from NAND Flash Using EBOOT

To execute an OS image from a SD/MMC card that has been previously programmed using the procedure described in [Section 6.3, “Downloading OS Image to NAND Flash Using EBOOT,”](#) follow these steps:

1. Reset the ARD board to launch EBOOT on the target.
2. Quickly switch over to the terminal emulation application and wait for the debug message, **Press [ENTER] to download now or [SPACE] to cancel** to appear.
3. Press the space bar to bring up the EBOOT configuration menu.
4. Continue selecting the **Select Boot Device** option of the EBOOT menu until NAND is selected.
5. Specify the desired boot delay using the **Boot Delay** menu option.
6. Save the configuration using the EBOOT menu.
7. Reset the ARD board to launch EBOOT again. EBOOT automatically loads the OS image from NAND Flash to RAM and executes it after the specified boot delay.

NOTE

If the ARD board is configured for active KITL, the image waits for a Platform Builder connection before booting the OS image. Because the OS image is already resident in Flash memory, it is necessary to reconfigure the Platform Builder to jump directly to the image by selecting **Target > Connectivity Options > Core Service Settings > Download Image: Never (jump to image)**.

6.7 Running OS Image from SATA Using EBOOT

To execute an OS image from a SATA storage that has been previously programmed using the procedure described in [Section 6.4, “Downloading OS Image to SATA Using EBOOT,”](#) follow these steps:

1. Reset the ARD board to launch EBOOT on the target.
2. Quickly switch over to the terminal emulation application and wait for the debug message, **Press [ENTER] to download now or [SPACE] to cancel** to appear.
3. Press the space bar to bring up the EBOOT configuration menu.
4. Continue selecting the **Select Boot Device** option of the EBOOT menu until ATA is selected.
5. Specify the desired boot delay using the **Boot Delay** menu option.
6. Save the configuration using the EBOOT menu.
7. Reset the ARD board to launch EBOOT again. EBOOT automatically loads the OS image from SATA storage to RAM and executes it after the specified boot delay.

NOTE

If the ARD board is configured for active KITL, the image waits for a Platform Builder connection before booting the OS image. Because the OS image is already resident in the storage, it is necessary to reconfigure the Platform Builder to jump directly to the image by selecting **Target > Connectivity Options > Core Service Settings > Download Image: Never (jump to image)**.

Chapter 7

BSP Features

7.1 Supported Features and Device Drivers

Details of the drivers and the kernel support provided in the i.MX53 ARD BSP are described in the *Windows Embedded Compact 7 BSP for i.MX53 ARD Reference Manual*. This document contains detailed information regarding the requirements, implementation, and testing for each of the i.MX53 ARD BSP features.

Appendix A

RealView Toolchain Configuration

The RealView ICE (RVI) interface is used in conjunction with the RealView Debugger (RVDEBUG) to enable programming of EBOOT into Flash memory, as well as offer hardware debug capability that would otherwise not be possible in the Platform Builder. This section describes the configuration required to prepare the RealView tools for connection with the target.

A.1 RVI Configuration

The following steps configure the RVI:

1. Install the utility software provided with the RVI unit.
2. Use **RVI Config IP** to configure the RVI unit on the network. See the RVI user documentation installed with the RVI software for more information on how to use **RVI Config IP**.
3. Use **RVI Update** to install the firmware update required for proper communication with the target device. See the *i.MX53 ARD BSP Release Notes* for the suggested firmware version. See the RVI user documentation installed with the RVI software for more information on how to use **RVI Update**.
4. Use the LVDS probe connector and the supplied cable to connect the RVI unit to the i.MX53 ARD board.

A.2 RVDEBUG Configuration

The following steps configure the RVDEBUG:

1. Follow the steps in [Section A.1, “RVI Configuration,”](#) to configure the RVI unit.
2. Install the RealView Developer Suite.
3. Launch RVDEBUG.
4. Select **File > Connection > Connect to Target**.
5. Expand **RealView Ice**.
6. Right-Click on **RealView Ice** and select **Configure Device Info**.
7. Click on **RealView ICE: (TCP/IP...)** on left window pane.
8. Click **Browse...** button on right window pane.
9. Choose the desired RVI unit and click OK.
10. Click **Connect**.
11. Under **JTAG Clock Speed** select **10.000 MHz**.

NOTE

Currently, the Auto Configure Scan Chain feature does not work correctly with the i.MX53 ARD. Use the **Add Device** and **Device Properties** buttons to manually create the necessary scan chain entries:

- **Add Device > Custom Device > UNKNOWN > IR Length = 5**

- **Add Device > Custom Device > UNKNOWN > IR Length = 4**
 - **Add Device > Registered Device > CoreSight > ARMCS-DP**
 - **Add Device > Registered Device > Cortex > Cortex-A8**
12. Update the CoreSight base address as follows:
 - Right-click on **Cortex-A8 Device**
 - Select **Configuration**
 - Set **CoreSight base address = 0xC0008000**
 13. Select **File > Save**.
 14. Select **File > Exit**.
 15. In the **Connection Control** window, expand **RealView ICE**
 16. For the i.MX53 ARD, click the **Cortex-A8** device to establish a connection.

NOTE

If using RVI and RVDEBUG to download and debug OS images, disable vector catching and semihosting by setting **File > Connection > Connection Properties > Connection=RealView ICE > Advanced_Information > Default > ARM Config > Vector Catch** to FALSE and setting **File > Connection > Connection Properties > Connection=RealView ICE > Advanced_Information > Default > ARM Config > Semihosting > Enabled** to FALSE

A.3 Loading EBOOT to SDRAM Using RVDEBUG

Load EBOOT to SDRAM using RVDEBUG following these steps:

1. Configure the target and desktop workstation for serial debug messages. See [Section 5.1, “Serial Debug Messages,”](#) for more information.
2. Prepare the target hardware by following the instructions in [Section 5.2.1, “i.MX53 ARD Board Configuration.”](#) See [Section 5.2.2, “i.MX53 ARD Boot Mode Settings,”](#) to set the board to Bootstrap boot mode.
3. Configure the RealView toolchain by following the instructions in [Section A.1, “RVI Configuration.”](#) and [Section A.2, “RVDEBUG Configuration.”](#)
4. Locate the RVDEBUG initialization script in the following BSP directory:
`WINCE700\Support\TOOL\iMX53_ARD\RVD\`
5. Edit the RVD script (`RVD_MX53_DDR2.inc` for the i.MX53 ARD) and update the path for EBOOT.nb0 to point to the workspace release directory. Save the script.
6. Within RVDEBUG, select **Debug > Include Commands from File** and choose the previously edited and saved EBOOT initialization script.
7. The script initializes the CPU, loads EBOOT into SDRAM, and sets the program counter to the starting address. Select the **Go** button within RVDEBUG or press **F5** to start the EBOOT execution.
8. EBOOT serial debug messages should appear on the desktop terminal emulation application.

