Intel® Server Board S1200RP
UEFI Development Kit
Firmware Installation Guide

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1 About This Document

1.1 Introduction

The Intel® Server Board S1200RP UEFI Development Kit (development kit) enables engineers to design, test, and debug Unified Extensible Firmware Interface (UEFI) drivers and applications on a UEFI compliant system.

The Intel® Server Board S1200RP UEFI Development Kit is based on the Intel® Server Board S1200V3RPS, supplemented with UEFI compliant platform firmware images, a firmware update utility, and user documentation.

This guide explains how to install the developer platform UEFI firmware image on an Intel® Server Board S1200RP UEFI Development Kit.

The Intel® Server Board S1200RP UEFI Development Kit can be purchased, or it may be assembled and configured in a lab or home workshop.

1.2 Scope

This guide explains the process of installing an Intel® Server Board S1200RP UEFI Development Kit firmware image on an assembled or purchased Intel® Server Board S1200RP UEFI Development Kit (development kit).

Note: Firmware developer platforms must be assembled from supported and recommended hardware components (see Table 1).

The guide covers:
• An overview of the Intel® Server Board S1200RP UEFI Development Kit
• Upgrading to the latest UEFI firmware for the development kit
• Verifying that UEFI firmware for the development kit is programmed correctly
• Backing up, erasing and reprogramming the UEFI firmware using an SPI Flash programmer
• Troubleshooting information to help if errors occur

This guide assumes that you possess PC hardware assembly skills and familiarity with Microsoft Windows* environments. This guide does not explain PC assembly or Microsoft* operating systems.
1.3 Terminology

Commonly used terms in this guide include:

- **Host PC**: A functional PC with a Microsoft Windows 7* or Microsoft Windows 8* operating system.
- **Target PC**: An Intel® Server Board S1200RP UEFI Development Kit. This is a desktop PC built using components from the list in Section 1 of this guide. This PC is programmed with a UEFI firmware image to enable UEFI functionality.
- **UDK2015**: UEFI Development Kit 2015, which supports the UEFI and UEFI PI specifications. [http://tianocore.org/](http://tianocore.org/)

*Note: Appendix A provides a list of acronyms.*

1.4 Document Sections

This document is organized into the following sections:

- **Section 1: About This Document.** Explains how to use this guide.
- **Section 2: Overview.** Introduces the Intel® Server Board S1200RP UEFI Development Kit, explains installation requirements, and provides a detailed list of required hardware and software components and tools. This section includes an overview of the firmware upgrade and installation procedures.
- **Section 3: Software Update Method.** Provides detailed instructions for upgrading the Intel® Server Board S1200RP UEFI Development Kit firmware using a software utility.
- **Section 4: Hardware Update Method.** Provides detailed instructions for installing UEFI firmware on the development kit using an SPI Flash programmer.
- **Appendix A: Glossary**

1.5 Related documentation

For a brief overview of the firmware installation process, refer to the Intel® Server Board S1200RP UEFI Development Kit Getting Started Guide. The guide is included with the development kit.

You can find the latest documentation and firmware for this development kit at: [https://firmware.intel.com/develop/server-development-kit](https://firmware.intel.com/develop/server-development-kit)
For information about the UEFI Specification, visit the UEFI Forum website.

For information about UEFI Secure Boot features, please refer to the “Signing UEFI Applications and Drivers for UEFI Secure Boot” document available from tianocore.org.
2 Overview

2.1 Installation requirements

You need the following skills, components, and tools to install or upgrade an Intel® Server Board S1200RP UEFI Development Kit with a UEFI compliant firmware image.

Note: An Intel® Server Board S1200RP UEFI Development Kit must use components from the supported hardware list in the Getting Started Guide.

• **PC assembly skills**, including the capability to assemble the hardware to create a typical desktop PC and familiarity with firmware.

Note: This guide does not cover PC assembly.

• **Intel® Server Board S1200RP UEFI Development Kit**, including the firmware update utility and UEFI firmware images

• **USB FAT-formatted flash drive**

• **SPI flash programmer** and software utility (optional)

2.1.1 Overview of SPI flash programmer environment

The installation environment for the development kit consists of a host PC, an SPI flash programmer, and SPI programmer software. The host PC may be a Microsoft Windows 7* or Windows 8* system. The host PC must be connected to the target PC’s SPI flash device, via a third-party SPI flash programmer.

2.1.2 Intel® Server Board S1200RP UEFI Development Kit

You can download the latest documentation and firmware for this development kit at: https://firmware.intel.com/develop/server-development-kit

**UEFI Compliant Firmware Images**

The development kit includes several firmware images in different formats:

- **SDV_RP_B6_release.rom & SDV_RP_B6_release.cap**
  
  This is the release version of the firmware, with debugging features disabled. *This is the image recommended for development and testing.*

- **SDV_RP_B6_debug.rom & SDV_RP_B6_debug.cap**
  
  The debug version of the firmware, with debug output redirected to the serial port (COM1).
SDV_RP_B6_srcdbg.rom & SDV_RP_B6_srcdbg.cap

This is the source level debug version of the firmware, which supports the Intel® UEFI Development Kit Debugger Tool using the serial port (COM1). This image is only recommended for advanced debugging.

FVMAIN.fv

The USB recovery firmware image, based on the release version of the firmware. This image is only used for firmware recovery process described in Section 2.2.3.

Note: The UEFI firmware images provided for the Intel® Server Board S1200RP UEFI Development Kit are only validated for components on the supported hardware list.

Utilities for the UEFI shell.

The firmware update utility (FvUpdate_S1200RP.efi) and capsule update utility (CapsuleApp.efi) are provided by Intel to update the firmware image on the development kit. The firmware update utility uses the .rom files & the capsule update utility uses the .cap files.

Note: Disable the UEFI Secure Boot feature prior to running FirmwareUpdate.efi or CapsuleApp.efi. The programs are unsigned and will not execute with the Secure Boot feature enabled.

User documentation.

Documentation files for the development kit include:

- Intel® Server Board S1200RP UEFI Development Kit Release Notes: UEFIDevKit_S1200_ReleaseNotes.txt
- Instructions for the Firmware Update tool: FirmwareUpdate_ReadMe.txt
- Software Tools License Agreement: EULA.pdf

2.1.2.1 USB flash drive

You need a FAT-formatted USB flash drive to copy the firmware update tool from the host system to the target PC.

2.1.2.2 SPI flash programmer and software utility (optional)

The development and testing of pre-production products may corrupt the flash image. If the flash image becomes corrupted, you may need to perform a hardware-based reprogramming of the SPI flash part on the development kit. To do this, use a third-party SPI flash programmer and corresponding software application.
**Dediprog SF100 SPI* flash programmer with 8-pin SPI socket:**

Allows the developer to read and write to an 8-pin flash device that is installed in the motherboard’s SPI flash socket.

**Dediprog SF100 USB Software Tool Chain***:

A software utility that controls the flash programmer hardware, allowing the developer to read, to erase, and to write a flash image to and from a flash device. For the procedure described in this guide, the software utility is used to load firmware onto the flash programmer and transmit the image to the flash device on the motherboard. The Dediprog software utility works only with the Dediprog SPI flash programmer listed above. See Table 1 below.

The SPI flash programmer lets you transfer the firmware image from the host PC to the flash device on the firmware developer platform (the target PC). SPI reflash instructions in this document are based on products from Dediprog Technology Co, Ltd.*, which have been verified to work with the supported hardware.

### 2.1.3 Supported and recommended hardware components

The supported and recommended PC hardware components for the Intel® Server Board S1200RP UEFI Development Kit are listed in the Intel® Server Board S1200RP UEFI Development Kit Getting Started Guide.

**Note:** [CAUTION] You must use a PC built with components from the supported hardware components list as described in the Getting Started Guide. Installing the firmware image on an unsupported motherboard may render the motherboard unusable until it is re-flashed with a backup copy of the original firmware.
Table 1 Software and hardware tools necessary for firmware installation

<table>
<thead>
<tr>
<th>Firmware or firmware tool</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Intel® Server Board S1200RP UEFI Development Kit</td>
<td>The Intel® Server Board S1200RP UEFI Development Kit is provided by Intel, and contains:</td>
</tr>
<tr>
<td></td>
<td>• Firmware images for the UEFI Development Kit</td>
</tr>
<tr>
<td></td>
<td>• Update Utilities for the UEFI Shell</td>
</tr>
<tr>
<td></td>
<td>• Related documentation: Getting Started Guide, Software Tools License Agreement (EULA), Release Notes, etc.</td>
</tr>
<tr>
<td></td>
<td>IMPORTANT: You must use the firmware update utility included in the kit, and you must use one of the supported firmware images in order to complete the procedures in this guide.</td>
</tr>
<tr>
<td></td>
<td>Multiple downloadable UEFI firmware images are provided in the kit. These images only work with specific boards:</td>
</tr>
<tr>
<td></td>
<td><a href="http://ark.intel.com/products/71384/Intel-Server-Board-S1200V3RPL">http://ark.intel.com/products/71384/Intel-Server-Board-S1200V3RPL</a></td>
</tr>
<tr>
<td></td>
<td><a href="http://ark.intel.com/products/71385/Intel-Server-Board-S1200V3RPS">http://ark.intel.com/products/71385/Intel-Server-Board-S1200V3RPS</a></td>
</tr>
<tr>
<td></td>
<td>You can download the latest documentation and firmware for this development kit at: <a href="https://firmware.intel.com/develop/server-development-kit">https://firmware.intel.com/develop/server-development-kit</a></td>
</tr>
<tr>
<td>USB flash drive</td>
<td>You need a FAT-formatted USB drive to copy the firmware update tool.</td>
</tr>
<tr>
<td>DediProg® SF100 flash programmer and software utility (optional)</td>
<td>Only if it has not been previously programmed, the third-party SPI flash programmer is required for installation of the development kit firmware image on the Intel® Server Board S1200RP.</td>
</tr>
<tr>
<td></td>
<td>The software utility is required in order to use the flash programmer. The SPI flash programmer and software utility are third-party products available from Dediprog Technology Co, Ltd.</td>
</tr>
<tr>
<td></td>
<td>• Dediprog Technology Co, Ltd., SF100 programmer</td>
</tr>
<tr>
<td></td>
<td>• Dediprog Technology Co, Ltd., SF100 USB software tool chain</td>
</tr>
<tr>
<td>Host system OS</td>
<td>Microsoft Windows 7* or appropriate Windows* operating system.</td>
</tr>
</tbody>
</table>

2.2 Overview of firmware upgrade procedures

If you have a system running properly on an older version of the Intel® Server Board S1200RP UEFI Development Kit firmware, you can use a software utility to update the firmware. If your system is not running properly, you should follow the Hardware Update Method procedure in Section 4. The full installation procedure takes about between 5 and 30 minutes, depending on your experience level. The following discussions outline procedures for upgrading or installing a firmware image on the development kit. Please review these procedures before attempting a firmware upgrade or installation.

2.2.1 Firmware Upgrade

You can upgrade the firmware if your system is running properly on an older version of the Intel® Server Board S1200RP UEFI Development Kit firmware. The procedure uses the FvUpdate_S1200RP.efi utility to upgrade the firmware. No hardware-based SPI programmer is required.
Here are the general steps for upgrading the firmware:

1. Download the development kit firmware images, firmware update tool, and user documentation from https://firmware.intel.com/develop/server-development-kit.

2. Power up the target PC and boot to the UEFI shell.

3. Use the UEFI shell firmware update utility (FvUpdate_S1200RP.efi) to apply the new firmware image to the motherboard’s SPI memory device:
   FvUpdate_S1200RP SDV_RP_B6_release.rom

   **Note:** The system will shut down after the update has been applied, then performs one configuration cycle on the first boot. Wait for this cycle to complete before entering setup or booting to an operating system.

   **Note:** Upgrading the flash will restore Setup and Boot Manager settings to default values. Any previous changes to Setup or Boot Manager values will be cleared in the upgrade process. This includes boot entries created by a UEFI-compliant OS.

4. After the platform resets, verify that the firmware functions correctly by entering setup, verifying the version string matches the expected value for the new firmware version, and booting to the UEFI shell.

The development kit is ready for use after verification of the firmware update.

### 2.2.2 Capsule Update

The capsule update procedure uses software utility to update the system firmware via the UEFI UpdateCapsule() function. This method is similar to the Firmware Upgrade method in Section 2.2.1, except that UEFI NVRAM Variables are not modified. This process uses the .CAP firmware file instead of the .ROM file.

Here are the general steps for capsule update:


2. Power up the target PC and boot to the UEFI shell.

3. Use the UEFI shell firmware update utility (CapsuleApp.efi) to start the capsule update process:
   CapsuleApp.efi SDV_RP_B6_release.cap

4. The system will start the capsule update process which resets the system, displays the boot logo during the update process, then resets the system again after the update has been applied.

   **Note:** [CAUTION] Do not shut down or reset the platform during the capsule update process. Interrupting the capsule update may corrupt the system firmware.
5. After the update completes, verify that the firmware functions correctly by entering setup, verifying the version string matches the expected value for the new firmware version, and booting to the UEFI shell.

2.2.3 **USB Firmware Recovery**

The firmware recovery procedure allows recovery of partially corrupted system firmware. The firmware is loaded from a FAT32 formatted USB drive by a built-in recovery routine. We recommend this procedure for recovering systems that fail to boot after an attempted firmware upgrade or capsule update.

*Here are the general steps for capsule update:*


2. Power off the target PC and disconnect the power cord.

3. Open the case of the target PC and locate the Jumper J2K8 (see Figure 1). Move the jumper from “normal mode” (pins 1-2) to “recovery” (pins 2-3).

4. Copy the following files to the root folder of a FAT32 formatted USB drive:
   - FVMAIN.FV
   - FvUpdate_S1200RP.efi
   - FvUpdate_S1200RP SDV_RP_B6_release.rom

![Figure 1 Firmware Recovery Mode Jumper](image-url)
5. Insert the USB drive into an open USB port on the target PC.

6. Connect the power cord on the target PC and turn the system on. The system will automatically enter recovery mode, which attempts to load firmware from \texttt{FVMAIN.FV} on the USB drive. This may take several minutes to complete.

7. Once the boot screen appears, enter setup and launch the UEFI Shell.

8. Use the UEFI shell firmware update utility (\texttt{FvUpdate_S1200RP.efi}) to apply the release firmware image to the motherboard’s SPI memory device: \texttt{FvUpdate_S1200RP SDV_RP_B6_release.rom}

9. The system will shut down after the update is applied. Disconnect the power cord, remove the USB drive, and return the recovery jumper to its original position.

10. Reconnect the power cord and power on the target PC. Verify the firmware functions correctly by entering setup, verifying the version string matches the expected value for the new firmware version, and boots to the UEFI shell.

\textbf{Note:} The system will shut down after the update has been applied, then performs one configuration cycle on the first boot. Please wait for this cycle to complete before entering setup or booting to an operating system.

\textbf{Note:} Upgrading the flash will restore Setup and Boot Manager settings to default values. Any previous changes to Setup or Boot Manager values will be cleared in the upgrade process. This includes any boot entries created by a UEFI OS.

2.2.4 Firmware Installation (Socketed SPI Flash)

The firmware installation procedure uses a hardware-based SPI programmer to flash the Intel® Server Board S1200RP UEFI Development Kit firmware image. We recommend this procedure for recovering systems that fail to boot because of firmware issues.

\textbf{Note:} This procedure assumes the motherboard is fitted with a socket for the 8-pin SPI part containing the platform firmware.

1. Download development kit firmware images, update tools, and documentation from \url{https://firmware.intel.com/develop/server-development-kit}.

2. Download and install the DediProg software on the host PC.

3. Remove the SPI memory device from the motherboard SPI socket. The SPI device is located near the SAS\_MOD slot at the front of the motherboard.

4. Insert the SPI device into the SPI programmer’s 8-pin socket adapter.

5. Use the DediProg Engineering utility to create a backup copy of the SPI device.

6. Erase the existing firmware from the SPI device.

7. Write one of the development kit firmware images to the SPI device (\texttt{SDV_RP_B6_release.rom}, \texttt{SDV_RP_B6_debug.rom} or \texttt{SDV_RP_B6_srcdbg.rom}).
8. Remove the SPI flash device from the DediProg SPI socket and reinstall it in the SPI socket.
9. Reassemble the target PC.

**Note:** *The system performs one configuration cycle on the first boot. Wait for this cycle to complete before entering the UEFI Shell.*

10. After the platform resets, verify that the firmware functions correctly by entering setup and booting to the UEFI shell.

### 2.2.5 Firmware Installation (Soldered SPI Flash)

The firmware installation procedure requires a hardware-based SPI flash programmer clip adapter for the 8-pin SPI device and does not work with a socketed SPI part. Use the instructions in Section 2.2.4 for motherboards with socketed SPI flash devices.

General steps for a complete firmware installation are:

2. Download and install the DediProg software on the host PC.
3. Attach the DediProg S08 test clip to the SPI device.
4. Power on the target PC and boot to the UEFI Shell.
5. Power off the target PC using the power button (hold for four seconds until the processor fan stops). The PC power supply should still be on (motherboard’s blue and green LEDs are on) but the system is not on.
6. Start the DediProg Engineering utility, which will detect the SPI device.
7. Use the DediProg software utility to create a backup copy of the SPI device.
8. Program one of the development kit firmware images to the SPI device (*SDV_RP_B6_release.rom*, *SDV_RP_B6_debug.rom* or *SDV_RP_B6_srcdbg.rom*) using the ‘Batch’ feature in the DediProg Engineering utility.
9. Remove the DediProg S08 test clip from the motherboard.
10. Turn off the power supply and wait ten seconds.
11. Power up the target PC and boot to the UEFI shell.

**Note:** *The system performs one configuration cycle on the first boot. Wait for this cycle to complete before entering the UEFI Shell.*

12. After the platform resets, verify that the firmware functions correctly by entering setup and booting to the UEFI shell.

### 2.2.6 Important installation information

The firmware update and installation instructions apply only to the *Intel® Server Board S1200RP UEFI Development Kit*.

For information about ordering third party Dediprog hardware and software tools, visit the Dediprog website: [http://www.dediprog.com/](http://www.dediprog.com/)
3

Software Update Methods

3.1 Introduction

The firmware upgrade procedure uses a UEFI shell utility to upgrade the firmware. We recommend this procedure for firmware upgrades on properly booting systems that are running older versions of the Intel® Server Board S1200RP UEFI Development Kit firmware.

The development kit supports multiple update methods. The “Firmware Upgrade” procedure described below is recommended for routine UEFI firmware updates.

Refer to the Hardware Update Method procedure in Section 4 if you are upgrading the firmware on an improperly booting system, or if you are flashing the firmware for the development kit onto a retail motherboard for the first time.

3.2 Firmware Upgrade Procedure (UEFI Shell)

For troubleshooting information, refer to Section 4 of this guide.

Note: [CAUTION] If you try to install the supported firmware image on an unsupported motherboard or processor, the motherboard may be unusable unless reflashed with the motherboard’s original firmware. Use only supported components with the Intel® Server Board S1200RP UEFI Development Kit.

3.2.1 Download files

2. Unzip the files and verify that these individual files are present:

   SDV_RP_B6_release.rom
   This is the release version of the firmware, with debugging features disabled. This is the image recommended for development and testing.

   SDV_RP_B6_debug.rom
   This is the debug version of the firmware, with debug output redirected to the serial port (COM1).

   SDV_RP_B6_srcdbg.rom
This is the source level debug version of the firmware, which supports the Intel® UEFI Development Kit Debugger Tool using the serial port (COM1). This image is recommended only for advanced debugging.

FvUpdate_S1200RP.efi

This is the firmware update tool.

3. Copy the firmware update tool and firmware image (ROM) files to a FAT-formatted USB flash drive.

**Note:** Always use the latest version of FvUpdate_S1200RP.efi included with the Intel® Server Board S1200RP UEFI Development Kit. Using older versions of the firmware update tool with the latest firmware may cause problems with the upgrade process.

### 3.2.2 Boot the target PC to the UEFI shell

1. Check all connections between components on the target PC.
2. Connect the target PC to an appropriate power source.
3. Insert the USB key containing the firmware update tool & firmware image into an open USB port on the target PC.
4. Power up the target PC.
5. During boot, in the initialization screen, press the appropriate key(s) to enter the setup menu.
6. Navigate to the Boot Manager and load the built-in UEFI shell.
7. Verify that the system boots to the built-in UEFI shell.

---

**Figure 2 UEFI Shell 2.0**

---

### 3.2.3 Update the firmware

1. Make sure you have the firmware update tool copied onto a FAT-formatted USB flash drive.
Note: The firmware update tool included with the development kit does not need to be installed on the target PC. This tool works from the USB drive. We assume the presence of only one USB drive on the target PC (software-development platform).

2. Connect the FAT-formatted USB flash drive to USB port on target PC.
3. Boot the system to the UEFI shell. If the system is already at the UEFI shell, reboot the system to make sure the USB flash drive is correctly mapped. Use the UEFI map command to identify the file system associated with the attached USB flash drive. This example uses fs1 as the file system.
4. Select the file system associated with the USB flash drive by typing the following command:

   Shell> fs1:

5. Press Enter.
6. Run the firmware update utility (FvUpdate_S1200RP.efi) to upgrade the firmware. Replace the filename in the examples with the proper firmware image name (if different file is used).

   FvUpdate_S1200RP SDV_RP_B6_release.rom

Note: The system will shut down after the update has been applied, then performs one configuration cycle on the first boot. Please wait for this cycle to complete before entering setup or booting to an operating system.

Note: Upgrading the flash will restore Setup and Boot Manager settings to default values. Any previous changes to Setup or Boot Manager values are cleared in the upgrade process. This includes any boot entries created by a UEFI OS.

3.2.4 Verify the firmware upgrade

1. After the system resets (previous procedure), use the [F2] key to enter setup. Check the firmware version string (third line from the top). Make sure the version string matches the upgrade version.
2. Select the Boot Manager option.
3. Use the Boot Option Menu to load the UEFI shell. If the shell loads properly then the update process was successful.

For issues with this procedure, see the troubleshooting tips in Section 4 of this guide.

3.3 Capsule Update (UEFI Shell)

The capsule update procedure uses software utility to update the system firmware via the UEFI UpdateCapsule() function. This method is similar to the Firmware Upgrade method in Section 2.2.1, except UEFI NVRAM Variables are not modified. This process uses the .cap firmware file instead of the .rom file.

Here are the general steps for capsule update:

2. Power up the target PC and boot to the UEFI shell.
3. Use the UEFI shell capsule utility (CapsuleApp.efi) to start the capsule update:

```
CapsuleApp.efi SDV_RP_B6_release.cap
```
4. The system will start the capsule update process, which resets the system, displays the boot logo during the update process, then resets the system again after the update has been applied.

**Note:** [CAUTION] Do not shut down or reset the platform during the capsule update process. Interrupting the capsule update may corrupt the system firmware.
5. After the update completes, verify that the firmware functions correctly by entering setup, verifying the version string matches the expected value for the new firmware version, and booting to the UEFI shell.

### 3.4 USB Firmware Recovery

The firmware recovery procedure allows the user to recover partially corrupted system firmware. The firmware is loaded from a FAT32 formatted USB drive by a built-in recovery routine. We recommend this procedure for recovering systems that fail to boot after an attempted firmware upgrade or capsule update.

Here are the general steps for capsule update:

2. Power off the target PC and disconnect the power cord.
3. Open the case of the target PC and locate the Jumper J2K8 (see Figure 3). Move the jumper from “normal mode” (pins 1-2) to “recovery” (pins 2-3).
4. Copy the following files to the root folder of a FAT32 formatted USB drive:
   - FVMAIN.FV
   - FvUpdate_S1200RP.efi
   - FvUpdate_S1200RP SDV_RP_B6_release.rom

5. Insert the USB drive into an open USB port on the target PC.

6. Connect the power cord on the target PC and turn the system on. The system will automatically enter recovery mode, which attempts to load firmware from FVMAIN.FV on the USB drive. This may take several minutes to complete.

7. Once the boot screen appears, enter setup and launch the UEFI Shell.

8. Use the UEFI shell firmware update utility (FvUpdate_S1200RP.efi) to apply the release firmware image to the motherboard's SPI memory device:
   - FvUpdate_S1200RP SDV_RP_B6_release.rom

9. When the screen shows a message that the system will reboot, power off the target PC and disconnect the power cord. Remove the USB drive and return the recovery jumper to its original position.

10. Power on the target PC. Verify that the firmware functions correctly by entering setup, verifying the version string matches the expected value for the new firmware version, and booting to the UEFI shell.
**Note:** Recovery will restore Setup and Boot Manager settings to default values. Any previous changes to Setup or Boot Manager values will be cleared in the recovery process. This includes any boot entries created by a UEFI OS.
4

Hardware Update Methods

4.1 Introduction

This section explains in detail how to install an Intel® Server Board S1200RP UEFI Development Kit firmware image on an Intel® Server Board S1200RP UEFI Development Kit (target PC) using an SPI programmer. This section includes screen shots and troubleshooting information.

For a basic software-based firmware upgrade, use the procedure found in Section 3.2.

4.2 Requirements

Table 2 summarizes the required tools and estimated completion times for the firmware installation procedure.

<table>
<thead>
<tr>
<th>Required tools for installation</th>
<th>Estimated time (maximum)</th>
<th>Estimated time (minimum)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dediprog® SPI software tool chain (software application)</td>
<td>30 minutes</td>
<td>5 minutes</td>
</tr>
<tr>
<td>SPI flash programmer tool</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intel®-provided firmware update utility</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FAT-formatted USB flash drive</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The instructions in this section assume use of the following hardware and software:

- A host PC with Microsoft Windows XP® or another appropriate Windows* operating system. This system is needed to support the Dediprog software tool.
- The Intel® Server Board S1200RP UEFI Development Kit (target PC) assembled with components from the supported hardware component list. See Table 1.
- The Intel® Server Board S1200RP UEFI Development Kit firmware images and user documentation.
- A third party Dediprog tool, consisting of the Dediprog SF100 flash programmer and the Dediprog software utility.
- A FAT-formatted USB flash device.
4.3 SPI Firmware Update

This guide assumes you have assembled or purchased a target PC (the Intel® Server Board S1200RP UEFI Development Kit) comprised of hardware components compliant with the supported hardware list (see Table 1). PC assembly is not covered in this document.

Note: Installing the firmware image on an unsupported motherboard may render the motherboard unusable until it is reflashed with a backup copy of the motherboard’s original firmware. Use only supported components with the Intel® Server Board S1200RP UEFI Development Kit.

Note: Handle the motherboard properly during installation to prevent damage to the board and its flash memory.

4.3.1 Download files

Before beginning the firmware update, you must download the development kit from the Intel® Web site. The kit consists of multiple UEFI compliant firmware images, the Intel®-provided firmware update utility, and user documentation.

Follow these steps to download the necessary files:

2. Unzip the download and verify that these individual files are present:

   SDV_RP_B6_release.rom
   This is the release version of the firmware, with debugging features disabled. This is the image recommended for development and testing.

   SDV_RP_B6_debug.rom
   This is the debug version of the firmware, with debug output redirected to the serial port (COM1).

   SDV_RP_B6_srcdbg.rom
   This is the source level debug version of the firmware, which supports the Intel® UEFI Development Kit Debugger Tool using the serial port (COM1). This image is recommended only for advanced debugging.

4.3.2 Install the Dediprog* software utility and device drivers

Make sure you install the Dediprog software utility and all necessary device drivers for the flash programmer before trying to run the application.

4.3.3 Verify functionality of target PC

If possible, verify functionality of the target desktop PC before reprogramming the firmware:
1. Check all connections between components on the target PC.
2. Connect the target PC to an appropriate power source.
3. Power up the target PC.
4. During boot, in the initialization screen, press the appropriate key(s) to enter firmware.
5. Navigate to at least two firmware menus to verify that the system is working properly.
7. Power down the system.

### 4.3.4 Prepare the target PC

Throughout this procedure, refer to Figure 1 for the location of the SPI flash device.

**Note:** [CAUTION] To avoid damaging the motherboard and/or other components, AUX power to the machine must be OFF, and the AC power should be unplugged.

**Note:** [CAUTION] To avoid damaging the motherboard and/or other components, follow standard anti-static precautions, including the use of ground straps.

Follow these steps:

1. On the target PC, make sure that the power is off.
2. Disconnect the power cable from AC power.
3. Wait for all motherboard LEDs to turn off after power is disconnected.
4. On the host PC, plug the USB end of the Dediprog cable into a USB port.

**Note:** Verify installation of the Dediprog* flash programmer software utility and all necessary device drivers before trying to program the firmware. Refer to the Dediprog product documentation for information about installing the software utility and device drivers.

### 4.3.5 Firmware installation (Socketed SPI)

**Note:** This board will not function if the SPI devices are improperly reinstalled after programming.

Following are the general steps for installing the firmware:

2. Download and install the DediProg software on the host PC.
3. Remove the SPI memory device from the motherboard SPI socket. The SPI device is located near the SAS_MOD slot at the front of the motherboard.
4. Insert the SPI device into the SPI programmer’s 8-pin socket adapter.
5. Use the DediProg Engineering utility to create a backup copy of the SPI device.
6. Erase the existing firmware from the SPI device.
7. Write one of the development kit firmware images to the SPI device (SDV_RPCB6_release.rom, SDV_RPCB6_debug.rom or SDV_RPCB6_srcdbg.rom).
8. Remove the SPI flash device from the DediProg SPI socket and reinstall it in the SPI socket.
9. Reassemble the target PC.

**Note:** The system performs one configuration cycle on the first boot. Wait for this cycle to complete before entering the UEFI Shell.

10. After the platform resets, verify that the firmware functions correctly by entering setup and booting to the UEFI shell.

Once a firmware update is verified, the Intel® Server Board S1200RP UEFI Development Kit is ready for use in UEFI development.

**Note:** The system performs one configuration cycle on the first boot. Please wait for this cycle to complete before entering setup or booting to an operating system.

**Note:** Upgrading the flash will restore Setup and Boot Manager settings to default values. Any previous changes to values in Setup or Boot Manager will be cleared in the upgrade process. This includes any boot entries created by a UEFI OS.

### 4.3.6 Firmware Installation (Soldered SPI Flash)

The firmware installation procedure requires a hardware-based SPI flash programmer clip adapter for the 8-pin SPI device and does not work with a socketed SPI part. Use the instructions in Section 4.3.5 for motherboards with socketed SPI flash devices.

General steps for a complete firmware installation are:

2. Download and install the DediProg software on the host PC.
3. Attach the DediProg S08 test clip to the SPI device.
4. Power on the target PC and boot to the UEFI Shell.
5. Power off the target PC using the power button (hold for four seconds until the processor fan stops). The PC power supply should still be on (motherboard’s blue and green LEDs are on) but the system is not on.
6. Start the DediProg Engineering utility, which will detect the SPI device.

**Note:** The DediProg S08 test clip must be seated and make proper contact with the SPI device for reliable detection and programming. If the SPI device is not detected, check the position of the test clip and retry.

7. Use the DediProg software utility to create a backup copy of the SPI device.
8. Program one of the development kit firmware images to the SPI device (SDV_RP_B6_release.rom, SDV_RP_B6_debug.rom or SDV_RP_B6_srcdbg.rom) using the ‘Batch’ feature in the DediProg Engineering utility.
9. Remove the DediProg S08 test clip from the motherboard.
10. Turn off the power supply and wait ten seconds.
11. Power up the target PC and boot to the UEFI shell.
**Note:** The system performs one configuration cycle on the first boot. Wait for this cycle to complete before entering the UEFI Shell.

12. After the platform resets, verify that the firmware functions correctly by entering setup and booting to the UEFI shell.

The *Intel® Server Board S1200RP UEFI Development Kit* is ready for use in UEFI development after verification of a firmware update.

### 4.4 Tips for using the DediProg

#### 4.4.1 Back up the original firmware

To help you recover from any errors, you should always create a backup copy of the original motherboard firmware. Table 3 is a preparation checklist.

<table>
<thead>
<tr>
<th>Checklist</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Backup copy</td>
<td>Do not perform any further steps until you have made a backup copy of the original motherboard firmware. You may need to restore the original firmware in the event of a catastrophic error.</td>
</tr>
<tr>
<td>Power down and disconnect power cable</td>
<td>To avoid damaging the motherboard or other components, make sure the PC is powered down at the start of this procedure, and that the power cable is disconnected from AC power.</td>
</tr>
</tbody>
</table>

**Note:** The file types `.bin`, `.rom`, and `.fd (firmware device)` are all binary ROM images and are synonymous.

The following steps show how to create a backup copy of the original motherboard firmware.

1. Verify that the 8-pin SPI device from the motherboard is installed in the DediProg programmer socket. Note the position of pin 1 on the SPI device.
2. On the host system, to open the Dediprog application, double-click the Dediprog icon on the desktop (see Figure 4). When the application opens, it should display either a screen of events or a Memory Type Ambiguity window. If you see the ambiguity window, there may be several SPI chips available from the manufacturer. Note that only one chip from each manufacturer is supported by the system board.

   - If a list of events is displayed, the list should include detection of the connection between the host and target PCs (see Figure 5).
The Dediprog application opens and starts communication with the SPI flash chip on the target system. The event log will normally show both a green highlighted line and an orange highlighted line. The upper green line shows that the USB connection successfully initiated between the host and target system. The orange line specifies the voltage applied to the flash area, to perform the read and write functions.

When the Dediprog application opens, it will normally display a list of available chips from the manufacturer (see Figure 5).
3. Select the chip supported by your motherboard. The model number is found on the top of the SPI memory device.

4. Click the **Edit** icon in the top menu bar (see Figure 7). The application then displays the View Contents window (see Figure 8).

![Figure 7 Icons list](image)

![Figure 8 View content in the Memory Chip display](image)

5. Click **Read**. When you click the **Read** button, Dediprog reads the contents of the flash image into a temporary location.

   A green progress bar indicates the status of the download (see Figure 9). The filename shown in the upper left area is simply the name of the previous file opened for programming, and does not reflect the current download.

![Figure 9 Progress bar](image)

When the read operation is complete, Dediprog displays the contents of the file buffer, as shown in Figure 10.
6. Select **Chip Buffer to File** (see Figure 11). This initiates a ‘save as’ operation.

7. Enter a destination directory and filename into which to save the file.
8. To save the file, click **Save**. The file is then saved, and the event log displays a line showing that the save is complete.
9. Close the window by clicking the **red X** in the upper right corner.

Once you have a backup copy of the original firmware, you are ready to erase the existing firmware from the motherboard.
4.4.1.1 Troubleshooting

Typical problems using the Dediprog application are listed in the table below (Table 4).

Table 4 Common errors encountered

<table>
<thead>
<tr>
<th>Error</th>
<th>Typically seen when:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cannot identify the target SPI Memory Device</td>
<td>You have not properly connected the SPI device or adapter.</td>
</tr>
<tr>
<td></td>
<td>• Verify pin 1 alignment with the SPI socket and SPI device.</td>
</tr>
<tr>
<td>Unable to detect the Dediprog device</td>
<td>You have not properly connected the cable to a USB port.</td>
</tr>
<tr>
<td></td>
<td>• Check your connections, make sure the cable is plugged into an appropriate USB port, and reseat the USB</td>
</tr>
<tr>
<td></td>
<td>cable firmly.</td>
</tr>
<tr>
<td></td>
<td>You have not installed device drivers for Dediprog device.</td>
</tr>
<tr>
<td></td>
<td>• Make sure that you have installed the required device drivers before trying to run the Dediprog utility.</td>
</tr>
</tbody>
</table>

4.4.2 Erase the existing firmware

In this procedure, you will erase the existing firmware from the SPI Memory Device.

**Note:** [CAUTION] This procedure assumes you are experienced in erasing and restoring a firmware. The Dediprog tool does not request confirmation before erasing a firmware.

1. On the host system, click the Erase icon in the top menu bar (see Figure 12). You will not be prompted to confirm the delete.

![Figure 12 Click on the Erase icon to begin erasing the existing flash image](Image)

Dediprog immediately begins erasing the flash area. The green progress bar at the bottom of the screen shows the status of the erase. When the erase is complete, the event log shows an "operation completed" message (See Figure 13).
2. Click the **Blank** icon in the top menu bar (see Figure 14). The Blank feature checks to make sure the flash area is erased (blank).

![Blank icon and menu bar](image)

**Figure 14 Verify that the erase was successful**

3. Click the **Blank** icon to make sure the flash area is erased.
4. Look at the Dediprog event log for an entry reading “A whole chip erased” (see Figure 15, following page).

![Event log](image)

**Figure 15 Event log verifies that the flash device is blank**

After verifying that the flash device is erased, you are ready to write the new firmware image, as described in the next procedure.
4.4.3 **Write the new firmware image**

This procedure describes writing a firmware image to the SPI Memory Device, using the Dediprog SPI flash programmer. Follow these steps:

1. On the host system, in the Dediprog application, click the **File** icon in the top menu bar (see Figure 16). A dialog box will open (see Figure 17).

![Figure 16 Click the File icon](image)

2. In the dialog box, click **Find**.
3. Browse to the location where you saved the extracted firmware images. Then select the appropriate firmware image file to program, that is, the firmware image you downloaded from the Intel Web site.

Figure 18 shows the event log after the file is loaded into the memory buffer. When you click **Open**, the Load File dialog box is displayed again.

![Figure 17 Load File dialog box](image)
The event log shows that the firmware image was loaded into the memory buffer and is ready for the program operation.

4. Uncheck the box for Truncate file to fit in the target area.
5. Now click the Prog (program) icon in the top menu bar to write the specified file to the SPI memory device (see Figure 19). Dediprog immediately begins writing to the flash area the file that is currently loaded into memory. Dediprog does not request confirmation for this write function.

The green progress bar at the bottom of the screen indicates the status of the write operation (see Figure 20).
The Dediprog event log indicates that the firmware image was written to the SPI device (see Figure 21).

6. Click the **Verify** icon in the top menu bar (see Figure 22). Dediprog then compares the previously saved file to the file written into flash memory.

7. Verify the write via a comparison of the file written to flash memory versus the file you loaded into the buffer.

8. Check the event log. If the firmware image was correctly programmed, the event log will state **Checksum identical** (see Figure 23, following page). Verify that the Dediprog event log indicates that the firmware image was written to the SPI device.
4.5 For more information

For information about ordering third-party Dediprog hardware and software tools, visit the Dediprog website.

For information related to UEFI software development, visit the Develop section of the Intel UEFI Community Resource Center at http://intel.com/udk

For information about the UEFI Specification, visit the UEFI home page at www.uefi.org/home
Appendix A: Acronyms and Glossary

The following terms are used within this document:

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOS</td>
<td>Basic input-output system</td>
</tr>
<tr>
<td>CAP</td>
<td>The .cap file extension is used for UEFI Capsule Files. UEFI Capsule Update uses a runtime function to pass information to the firmware. Update Capsule is commonly used to update the firmware FLASH or for an operating system to have information persist across a system reset.</td>
</tr>
<tr>
<td>EDK II</td>
<td>EFI developer’s kit, 2nd Generation: the second series of the UEFI Developer’s kit based on new design techniques and tools. More information is available at tianocore.org.</td>
</tr>
<tr>
<td>EFI</td>
<td>Generic term that refers to one of the versions of the Extensible Firmware Interface (EFI) or Unified Extensible Firmware Interface (UEFI) specifications: EFI 1.02, EFI 1.10, UEFI 2.0, UEFI 2.1, UEFI 2.2, UEFI 2.3, UEFI 2.3.1, UEFI 2.4, etc.</td>
</tr>
<tr>
<td>FAT</td>
<td>File Allocation Table: a file system commonly used by UEFI, MS-DOS and Microsoft Windows. This is a common file system format for USB flash drives and UEFI system partitions.</td>
</tr>
<tr>
<td>FD</td>
<td>Firmware device: A persistent physical repository that contains firmware code and/or data and that may provide NVS.</td>
</tr>
<tr>
<td>GUID</td>
<td>Globally unique identifier. A 128-bit value used to name entities uniquely. An individual without the help of a centralized authority can generate a unique GUID. This allows the generation of names that will never conflict, even among multiple, unrelated parties.</td>
</tr>
<tr>
<td>OS</td>
<td>Operating system</td>
</tr>
<tr>
<td>PC</td>
<td>Personal computer</td>
</tr>
<tr>
<td>SPI</td>
<td>Serial peripheral interface</td>
</tr>
</tbody>
</table>
UDK  UEFI development kit

UEFI  Unified Extensible Firmware Interface (see: http://www.uefi.org/). UEFI is a firmware technology replacement for legacy firmware. UEFI is an evolution of EFI, developed as a replacement of legacy firmware to streamline the booting process and act as the interface between a PC operating system and its platform firmware. UEFI replaces only firmware functions, but also offers a rich extensible pre-OS environment with advanced boot runtime services.