



Intel® System Firmware Update Utility

User Guide

Reference for using the Intel® System Firmware Update Utility (Sysfwupdt). For Intel® Server System M50CYP and D50TNP Families.

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1. Introduction

1.1 Purpose of the document

This document describes the functionality of the Intel® System Firmware Update utility, also referred to “sysfwupdt”. Based on this document, users can get to know how this utility works.

1.2 Platforms and Operating System Support

Intel® System Firmware Update Utility (Sysfwupdt) is only supported on the following Intel® Server products:

- Intel® Server System M50CYP
- Intel® Server System D50TNP

Note: Using this revision of the utility on any other Intel® server product is not supported.

The Intel® System Firmware Update Utility is available in versions for different platforms, such as UEFI, Windows*, and Linux*. The following table summarizes the operating systems and platforms that each utility revision supports.

Table 1: Operating Systems Supported

Platforms	Operating Systems/Preboot Environment Supported
<ul style="list-style-type: none"> • Intel® Server System M50CYP • Intel® Server System D50TNP 	<ul style="list-style-type: none"> • UEFI Shell • WinPE* 4.0 (x64) • Windows* Server 2019 • Windows* Server 2016 • Windows* Server 2012 R2 • Windows* 10 • RHEL* 6.8 (x64) • RHEL* 7.3(x64) • RHEL* 7.5(x64) • RHEL* 7.6(x64) • RHEL* 8.0(x64) • SLES* 11.4 (x64) • SLES* 12.2(x64) • SLES* 15 & Sp1(x64) • CentOS* 7.3 (x64) • Debian* 8.10(x64)

1.3 Intended Audience

This document is intended for:

- Developers of BIOS and Baseboard Management Controller (BMC) FW and their respective validation team engineers
- System Level Validators
- Users of the utility who desire a more detailed understanding of its operation.

1.4 Document Overview

This document contains information pertaining to the System Firmware Update utility. This document is organized as follows:

Chapter 1: Introduction

Describes the purpose of the document.

Chapter 2: Product Overview

Provides an overview of the architectural components that make this utility.

Chapter 3: Functional Specification

Describes the operation, how to use this utility, and a description of the input files used by this utility.

Chapter 4: Installation and Un-installation

Appendix A: Exit Error Codes

Describes the error code of the application. It also describes what each exit code means.

2. Product Overview

2.1 Overview

The System Firmware Update utility provides the ability to update the system BIOS and Firmware while the server is running its host operating system. This utility is a command-line tool and it requires users to have admin (Windows*) or root (Linux*) privileges.

This version of the System Firmware Update Utility is designed for use only with the Intel Server System M50CYP and D50TNP product family. When using the System Firmware Update Utility for other Intel® server product families, check the product family documentation for the applicable System Firmware Update Utility version.

2.2 Features

The Intel® System Firmware Update Utility supports following features:

- BIOS Update – Update PFR BIOS in the system, the update will be performed on next reboot
- BMC Update - Update Server Management (SM) firmware (FW) of the Baseboard Management Controller (BMC), and on next BMC reset the new BMC FW will be loaded.
- CPLD Update
- ITK Update
- NVRAM Update
- Recovery Update
- FRUSDR Update – update the Field Replaceable Units (FRU) in Non-Volatile RAM and Sensor Data Records of the system in BMC staging area.
- Modify specific FRU field
- Display BIOS/ME/BMC/Base Board/System/FRU / SDR / SMBIOS information
- Restore BIOS Default setting
- Clear BIOS customized settings

2.3 Update Process Overview

This section contains an overview of the update process. A full description of the internal mechanism in the BIOS, Firmware, and Hardware is outside the scope of this document. Refer to the Firmware / BIOS EPS for a complete description.

The front panel of the server is locked during the update of any of the components to prevent the user from accidentally triggering a reset or power down. The Ctrl-C and Ctrl-Break keys are also disabled while running this utility.

Note: The front panel locking feature is not supported on BMC-less platforms.

2.3.1 Flash/Firmware Update Operation

This section describes the update process of the BIOS and Firmware.

Utility would transfer the entire bin files by means of series of IPMI commands.

BMC Update

The Utility passes the firmware image to the BMC. The BMC receives the image and stores the entire image into a RAM buffer. The firmware image will be committed to the flash by the BMC after the entire image has been completely received, decrypted, validated, and uncompressed. Upon successful validation of the final image, the image will be programmed into the flash device.

BIOS Update

By default, the real update would not be started after utility transfers PFR BIOS image to BMC. Update would start on next system reboot by PFR FW. User could switch to immediate update by adding ImmReset option in command.

Refer to the BIOS and BMC EPS for more details on this topic.

2.3.2 Support Information

For more information, visit Intel's support site at <http://support.intel.com/support/>.

For an updated support contact list, see <http://www.intel.com/support/9089.htm/>.

3. Functional Specification

The executable for the System Firmware Update utility is named **sysfwupdt.exe** for Windows*, **sysfwupdt** for Linux* and **sysfwupdt.efi** for UEFI shell.

3.1 Command-line Interface

This utility parses the command line arguments and sets internal flags to control operation. Any invalid parameters will result in a “usage” message being displayed and the program exiting with an error code (see Table 3).

The command line switches are listed in the following table and they are accessed with a dash “-” or a slash “/”.

The basic command line format is:

```
sysfwupdt [Options]
```

Table 2: Command Line Switches

Parameter	Description
sysfwupdt	The name of the utility. Linux* is case sensitive.
[FileName]	Name of the binary file used for the update. The file path can be specified with the file name. There is no default file name or file extension. Either the “/u” or the “/i” option must always precede the FileName.
[Update Option]	Optional BIOS update option such as “ImmReset”, “UpdateNvram”, “Password=xxx”. Multiple strings should be concatenated with + character like “UpdateNvram+ImmReset”. -kcs is only valid when doing BMC and CPLD update Update Option should be at the end of command line. For detailed BIOS update options, refer to the BIOS Release Notes.
-h or -?	Displays command line help information. When this option is used, any other options on the command line are ignored. When using /? In Linux*, enclose within double quotes (“/?”)
-i	This option displays BIOS/ME/BMC/SDR/BaseBoard information in the system. If binary files are specified with this option, this option will display the corresponding version in binary files. This option is not valid with any other options. The syntax is: sysfwupdt -i <FileName> This option can also be used in conjunction with the –u option to display version information contained in the cfg file. The syntax is: sysfwupdt -i -u <xxx.cfg>
-kcs	Transfer data by kcs interface. This should be used in conjunction with -u <bmc cpld> Note: This is not valid in case of -u <bios>
-recovery	This option update firmware to the recovery area as well. This should be used in conjunction with the -u.
-u	Update system BIOS/BMC/CPLD/ITK. At least one binary file name must be specified with this option. An Update Option is optional. The syntax is: sysfwupdt -u [FileName] Sysfwupdt -u [FileName] <Update Option>
-d	Display FRU/SDR/SMBIOS information The syntax is: sysfwupdt -d [fru sdr smb]
/cfg xxx.cfg </nac>	Use custom CFG file to update FRUSDR

Parameter	Description
	When updating with cfg file, SDR data is, by default, automatically configured and updated in BMC, which does not need further user interactions. You can disable the default mode and use legacy SDR update process with the /nac option.
-fru [xxx.fru]	Force update FRU
-sdr [xxx.sdr]	Force update SDR
-rd [biosadminpassword]	Restore the default BIOS settings. A message will be displayed stating that a system reset must be done by the user in order to take effect of the update. if administrator password is not set, then null administrator password needs to be supplied as follows /rd ""
-set	Set different FRU area as below sysfwupdt /set "area name" "FRUFIELD" "value" Where area name can be "product", "chassis" or "board" depending on the FRU area to be modified.
-ccs	Clear BIOS customized settings.

3.1.1 Update System BIOS and Firmware

The following command updates the BIOS and Firmware from the bin files. Both single and multiple input files are supported. Following the update, the user must manually reset the machine before the update will take effect.

```
sysfwupdt -u BIOSfilename BMCfilename CPLDfilename
sysfwupdt -u BMCfilename CPLDfilename -kcs
```

With /kcs, user could choose KCS interface to do BMC|CPLD update.

To do recovery BIOS/BMC update:

```
sysfwupdt -u [File Name] -recovery
```

To force update Nvram region:

```
Sysfwupdt -u [File Name] UpdateNvram
```

To set immediate restart and force update Nvram region:

```
Sysfwupdt -u [File Name] UpdateNvram+ImmReset
```

Note: No option is allowed to be inserted between "-u" and "[File Name]". And multiple update option strings can be concatenated with + character.

To do ITK update:

```
Sysfwupdt -u ITKfilename.cap [Password=xxx]
```

Note: Password is only needed when system admin password is set.

3.1.2 Display Version Information

The following command displays the BIOS/ME/BMC/SDR /BaseBoard information of the system.

```
Sysfwupdt -i
```

To display FRUSDR version information contained in update package files:

```
Sysfwupdt -i -u xxx.cfg
```

To display the BIOS/BMC/ITK file version:

```
Sysfwupdt -i [BIOSfilename|BMCfilename|ITKfilename]
```

3.1.3 Update FRUSDR by cfg file

The following command will load the indicated CFG file. The utility uses the entries in the configuration file to probe the hardware and to select the proper Sensor Data Records and Field Replaceable Units to be programmed. If the argument `-cfg` is used without a filename, then the default file 'MASTER.CFG' will be used, if it exists.

```
Sysfwupdt -cfg xxx.cfg
```

With `/nac` option, the user can disable SDR auto-config feature that is, by default, enabled and switches to legacy SDR update process.

3.1.4 Force update FRUSDR

The following command forces an update of FRU or SDR. The first time a FRU file should be programmed in manufacturing. The utility does not support first time programming of FRU areas.

```
Sysfwupdt -fru xxx.fru
Sysfwupdt -sdr xxx.sdr
```

3.1.5 Modify Specified FRU Field Through Command Line

This command is to modify the FRU fields of chassis and product area without using a CFG file.

```
Sysfwupdt -set "area name" "FRUFIELD" "value"
```

Where area name can be "product", "chassis" or "board" depending on the FRU area to be modified. The following are the frufield parameters:

```
"CT", "Chassis Type"
"MN", "Manufacturer Name"
"PN", "Product Name"
"P#", "Part Number"
"S#", "Serial Number"
"PV", "Product Version"
"AT", "Asset Tag"
"ID", "Manufacturer ID"
"MD", "Manufacturer Date & Time"
"AMx", "Additional Manufacturer Field"
```

Note: For the chassis area, the fields "At", "Pn" and over are not supported. For the board area, only "Pn" field is supported

3.1.6 Displays Given Area of FRUSDR and SMBIOS

This command displays the indicated area given by argument. If the given display function fails because of an inability to parse the data present or hardware failure, the utility displays an error message. For example, if the sensor data record area is empty, the utility displays an error message saying, “No Sensor Data Records found on the server”.

```
Sysfwupdt /d [FRU|SDR|SMB]
```

3.1.7 Restore BIOS Defaults

Following Command will restore the BIOS default settings.

```
Sysfwupdt -rd [biosadminpassword]
```

If BIOS admin password is not set, use null string as BIOS admin password.

```
Sysfwupdt -rd ""
```

3.1.8 Clear BIOS Customized Settings

Following Command clears BIOS customized settings.

```
Sysfwupdt -ccs
```

3.1.9 Configuration (CFG) File Description

The CFG file is an ASCII text file that consists of commands and data fields, which enable this utility to gather information about the target by identifying all the boards, subassemblies, and components of the product. The **Configuration File Format EPS** contains a full description of this file.

The FRUSDR package contains a *master.cfg* file that can be used by the sysfwupdt utility as an input configuration file. This file provides update and modification of the FRU and SDR information only.

- The master configuration file *master.cfg*, used by the System Firmware Update utility, is based on the Configuration File Specification. For more information on configuration commands supported by sysfwupdt and the syntax, refer to the Configuration File Format EPS.

4. Installation and Un-installation

4.1 Windows* Installation

4.1.1 Installation

The System Firmware Update utility can be installed on Windows* using the following method:

1. Unzip zip package and copy the contents to external media.
2. Connect the external media to SUT (System Under Test).
3. Go to the Drivers\Win folder, choose x86 or x64 (depending on the operating system).
4. Run install.cmd to install the drivers.
5. Go to win_x86 or win_x64 folder.
6. Now run sysfwupdt.exe.

4.1.2 Uninstallation

1. Go to the Drivers\win\x86 folder or the Drivers\win\x64 folder.
2. Run uninstall.cmd (for uninstalling Sysfwupdt).
3. Reboot the system for the changes to take effect.

4.2 Linux* Installation

Prerequisites

The following prerequisites are needed to install and use the Sysfwupdt utility:

- Boot to Red Hat* Enterprise Linux*, SUSE* Linux* Enterprise Server, or the CentOS system.
- On Red Hat, CentOS, SUSE, UEFI-aware Linux, there might be a driver conflict between an internal driver and the kernel. Start the OpenIPMI driver and ensure the `/dev/ipmi0` device exists.

4.2.1 Installation

4.2.1.1 RPM Installation

1. Copy `sysfwupdt` rpm from corresponding folder to local folder.
 - > for RHEL older than 8.0, copy from Linux_x64\RHEL
 - > for RHEL8.0 and above, copy from Linux_x64\RHEL\RHEL8
 - > for SLES older than 15, copy from Linux_x64\SLES
 - > for SLES15 and above, copy from Linux_x64\SLES\SLES15
2. If another version has already been installed, uninstall that version first before installing the new version.
3. Install `sysfwupdt` utility by using "`rpm -ivh sysfwupdtxx.rpm`". This installs the utility in "`/usr/bin/sysfwupdt/`".
4. On RHEL/SLES after installing the rpm, close the terminal from which rpm was installed and then execute utility from a new terminal.

4.2.1.2 Regular Installation

1. Copy the zip package (for RHEL or SLES) to local folder.
2. Unzip to local folder (example: `.\sysfwupdt`). Go to `sysfwupdt` folder (`cd sysfwupdt`).
3. `# chmod 755 install.sh`
4. Install the utility using the command: `"#./install.sh"`
5. Go to the RHEL or SLES directory (based on operating systems)
6. Unzip the file `sysfwupdt.zip` to get `sysfwupdt` executable for Linux* operating system
7. Now you can run command with options (example: `"# ./sysfwupdt -i"`)

4.2.2 Uninstall

To uninstall the `sysfwupdt` utility, remove the `sysfwupdt` folder structure.

For RPM uninstallation, run command `#rpm -e sysfwupdt` for RPM uninstallation.

4.3 UEFI Installation

Prerequisites

Download the latest System Firmware Update Package for the platform and install it.

For the latest System Firmware Update Package, go to <https://downloadcenter.intel.com/>.

4.3.1 Installation

The System Firmware Update utility can be installed on UEFI using the following method:

1. Unzip the package and copy the contents to external media.
2. Connect the external media to SUT (System Under Test)
3. Go to `UEFI_x64` folder.
4. Now run `sysfwupdt.efi`.

4.3.2 Uninstall

To uninstall the `sysfwupdt` utility, remove the `sysfwupdt` folder structure

Appendix A. Exit Error Codes

The following error codes are useful when executing the System Firmware Update utility from a script. The error messages displayed provide more information about the cause of the error.

The `ERRORLEVEL` command in the configuration file overrides the error codes described in the following table. The `ERRORLEVEL` command, described in the Configuration File Format EPS, causes the utility to exit immediately and return the error code specified.

Table 3: Exit Error Codes

Value	Interpretation	Suggested Actions
0	Successful termination.	
1	Invalid invocation or unknown command line argument.	Check whether the command line arguments are correct. Refer to Table 2: Command Line Switches for valid command line arguments.
2	File was not found.	Check whether files are present there. If not, place the files in the proper location and execute.
3	Unable to read a file.	Unable to read file.
4	File is mismatched with the target system.	Check whether the files used for the update belong to the target platform. If not, provide the files compatible with the target system.
5	File is invalid or its format is not supported by this version of the utility.	Check whether the file is corrupt or has an invalid format / file extension. If corrupt, then use proper files.
6	BIOS interface failed – this error can occur while reading / writing to BIOS.	Check whether the SMBIOS is populated correctly.
7	FW interface failed – this error can occur when reading or writing to the BMC, setting the update notification, or updating any of the FW components (BMC, FRU, SDR).	Check whether the BMC hardware is functioning properly. Check whether the BMC/SDR versions are displayed correctly in the BIOS setup. If not, contact the hardware vendor.
8	User has no Admin or root rights.	Check whether the user logged in has root/administrator privilege. If not, log in as administrator or root.
9	Utility is already running in another process.	Check whether another instance of the utility is already running. If running, wait for the instance to finish and then start again.
10	Memory allocate failed.	Memory Allocation Failed. Investigation required.
11	Password mismatched.	Admin password provided by user is mismatched to current system admin password.
11	Failed to access IO port.	Check UEFI secure boot status and ensure UEFI secure boot is disabled in BIOS F2 menu. If utility runs on Debian and SLES* 15 OS, user needs to add "iomem=relaxed" to grub boot option to enable IO memory map.

Appendix B. Glossary

Term	Definition
BCD	Binary Coded Decimal
BIOS	Basic Input Output System
BMC	Baseboard Management Controller. The primary microcontroller that controls the operation of the Intel® server management subsystem.
CFG	Configuration (file).
CHAFF2L	Copy HTTP And FTP Files To Local – program used by the One-Boot Flash Update utility to download files from http and ftp servers.
EAS	External Architecture Specification
EPS	External Product Specification
FRU	Field Replaceable Unit
FUD	Flash Update Driver
FW	Firmware
HW	Hardware
IA	Intel® Architecture
ID	Identification
IMB	Intelligent Management Bus
IPS	Internal Product Specification
IPMB	Intelligent Platform Management Bus. Name for the architecture, protocol, and implementation of a special bus that interconnects the baseboard and chassis electronics and provides a communications media for system platform management information.
IPMI	Intelligent Platform Management Interface
LCD	Local Control Display
ME	Management Engine
OEM	Original Equipment Manufacturer
Op Code	Operational Code
PIA	Platform Information Area
POST	Power On Self Test
RMM3	Remote Management Module
RPM	Red Hat Package Manager
SDR	Sensor Data Record
SEL	System Event Log
SM	Server Management
SMS	Server Management Software
URL	Universal Resource Locator