Intel® One Boot Flash Update Utility

User Guide

This User Guide serves as a reference document providing instruction on the use of Intel's One Boot Flash Update Utility (OFU).

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Document Revision History

Date Published	Revision	Revision Change Description
Nov 2016	1.00	First version
Nov 2016	1.01	Remove version 13.1, update to version 14.0 Modify Linux installation note Add new command 'Clears BIOS customized settings' Format change

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1. Introduction

The *Intel® One-Boot Flash Update Utility* (OFU) is used to update the BIOS and firmware on Intel® Server Boards while the operating system is running, which may be launched from a command prompt in either the Windows* or Linux* operating systems. In addition, this utility can also be executed remotely through a secure network connection either using a Telnet Client and Terminal Services in Windows* or a Telnet Client and Remote Shell under Linux*.

The *Intel® OFU Utility* is available in English only.

1.1 Scope

This User Guide serves as a reference document describing the features of the *Intel® OFU Utility and providing instruction on how to install and use the utility.*
The *Intel® OFU Utility* is only supported on the following Intel® Server Boards:
* Intel® Server Board based on Intel® Xeon® processor E5-1600/2600/4600 v2 product family
* Intel® Server Board based on Intel® Xeon® processor E5-2400 v2 product family
* Intel® Server Board based on Intel® Xeon® processor E5-2600 v3/v4 product family
* Intel® Server Board based on Intel® Xeon® processor E3-1200 v2/v3/v4/v5 product family
* Intel® Server Board based on Intel® Xeon® Phi™ product family

To find the latest Intel® OFU update package for your server, refer to
https://downloadcenter.intel.com/search?keyword=server+ofu

1.2 Supported Firmware Components

The *Intel® OFU Utility*, with the update package for your platform, can be used to update the following firmware components:
* System BIOS
* Management Engine (ME) firmware
* Field Replaceable Unit (FRU) firmware
* Sensor Data Record (SDR) firmware
* Baseboard Management Controller (BMC) firmware
* Intel® Remote Management Module 4 (Intel® RMM4) firmware

For the following platforms
* Intel® Server Board based on Intel® Xeon® processor E5-1600/2600/4600 v2 product family
* Intel® Server Board based on Intel® Xeon® processor E5-2400 v2 product family
* Intel® Server Board based on Intel® Xeon® processor E5-2600 v3/v4 product family
* Intel® Server Board based on Intel® Xeon® processor E3-1200 v2/v3/v4/v5 product family
* Intel® Server Board based on Intel® Xeon® Phi™ product family

1.3 When Updates Take Effect

Starting with Intel® Server Board platforms, the *Intel® OFU Utility* updates the FW and BIOS images passively via the BMC controller or BIOS. The utility hands off the required image files to the BMC Controller or to the BIOS. After verification of the images (signature verification and/or authenticity verification), the Base Board

Management Controller FW or BIOS will update the images by itself. When firmware update finishes:
- The firmware update takes take effect immediately.
- The BIOS update takes effect from the next reboot.

The FRU update has only one firmware area, so the update will take effect immediately when the utility executes. In some cases, the System BIOS, BMC FW, and SDR updates are programmed into their respective secondary flash areas and the utility sets an internal flag in the BIOS and BMC to indicate that the update occurred. After a system reset, the newer version of the System BIOS, BMC, and SDRs are validated and then activated.

Table 1. When Firmware Updates Take Effect

Firmware Component	When Updates Take Effect
BIOS	Immediate
BMC	Immediate
SDR	Immediate
FRU	Immediate
HSC/PSoC	Depending on platform; mostly next boot
Intel® RMM4	Depending on platform; mostly next boot
ME Firmware Update	Depending on platform

1.4 Supported Operating Systems

The *Intel® OFU Utility* runs on the Microsoft Windows*, Red Hat* Enterprise Linux, CentOS* and SuSE* Linux Enterprise Server operating systems unless otherwise noted in the *Intel® OFU Release Notes* or the *Supported Operating System List* for your specific Intel® Server Platform. Both IA-32 and Intel® 64 Architecture versions are supported for the operating systems listed below. The following table shows the supported operating systems and platforms when this document is published.

Table 2. Supported Operating Systems

Platforms	OFU utility version	Operating Systems
• Intel® Server Board based on Intel® Xeon® processor E5-1600/2600/4600 v2 product family • Intel® Server Board based on Intel® Xeon® processor E5-2400 v2 product family • Intel® Server Board based on Intel® Xeon® processor E5-2600 v3/v4 product family • Intel® Server Board based on Intel® Xeon® processor E3-1200 v2/v3/v4/v5 product family • Intel® Server Board based on Intel® Xeon® Phi™ product family	14.0	Windows 2016 (EM64T) Windows* Server 2012 (32bit & EM64T) Windows Server 2012 R2 (EM64T) Windows Server 2008 R2 SP1 EM64T Windows Server 2008 (32bit & EM64T) Windows Server 2003 (32 bit SP2 & EM64T SP2) Windows 7 (32 bit & EM64T) for work station SKU's RHEL*6.x and 7.x (32 bit & EM64T) CentOS* 6.x (32 bit & EM64T) SuSE* Linux 11 SP1/SP2/SP3 and 12.x (32 bit & EM64T)

1.5 **Glossary of Terms**

The following abbreviations are used in this document:

Table 3. Glossary of Terms

Term	Definition
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)
FRU	Field Replaceable Unit
FW	Firmware
HSC	Hot-Swap Controller
IA	Intel® Architecture
ID	Identification
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
ME	Management Engine
OEM	Original Equipment Manufacturer
RPM	Red Hat* Package Manager
SDR	Sensor Data Record
SEL	System Event Log
URL	Universal Resource Locator

1.6 **Support Information**

World Wide Web

http://www.intel.com/content/www/us/en/support.html
For a support contact list, see
http://www.intel.com/content/www/us/en/support/contact-support.html

2 Installation and Uninstallation

2.1 Prerequisites before Installing the Intel® OFU

1. Boot to Windows* 2008 (R2/SP1) or Red Hat* 6, CentOS* 6 or SuSE* 11 operating system.

2. In order to use the Microsoft IPMI* driver or Open IPMI driver for the OFU to update the BIOS/BMC/FRU/SDR, enable the **Plug and Play BMC Detection** setting under **Server Management** in the BIOS F2 screen.

3. Install all the development and optional packages during RHEL*, CentOS* and SuSE* operating system installation.

4. In Red Hat* 6 OSes:

5. If the utility fails with the error message
"Error while loading shared libraries: libncurses.so.5: cannot open shared object file: No such file or directory"

> Then install libstdc++-4.4.4-13.el6.i686.rpm and ncurses-libs-5.7-3.20090208.el6.i686.rpm from the OS CD itself using the following commands:
> #rpm –ivh libstdc++-4.4.4-13.el6.i686.rpm
> #rpm –ivh ncurses-libs-5.7-3.20090208.el6.i686.rpm
>
> Example:
> rpm –ivh media\Packages\libstdc++-4.4.4-13.el6.i686.rpm
> where the CD/DVD is mounted to media directory.

6. If the utility fails with error message
"Error: /lib/ld-linux.so.2: Bad ELF interpreter: No such file or directory"
This indicates the development and optional packages are not installed. Install the necessary packages accordingly.

7. In RHEL* 6.4 (or above), CentOS* 6.x, UEFI aware Linux or other Linux:

8. There might be a driver confliction between internal driver and kernel. You need to start up OpenIPMI driver. If the utility fails with error message "FW interface failed" when updating BMC or "terminate called after throwing an instance of 'ResultStatus' Aborted (core dumped)" when updating SDR with CFG file, then start up OpenIPMI driver and make sure "/dev/ipmi0" device is existed.
Example, you can use the below command to start up OpenIPMI driver on RHEL* 6.4
#modprobe ipmi_devintf.

9. After enabling OpenIPMI, if utility still reports errors during BMC, FRU and SDR update, for example "Failed to write SDR file.", "SDR auto-update failed" and "Error : Error while parsing the cfg file", there might be a BMC watch dog conflict with OpenIPMI driver.
User needs to disable BMC watch dog, do update and enable it after update is finished.

10. In Windows* Server 2008 OSes:

The utility will error out if the **Plug and Play BMC Detection** setting is disabled. In this case, install the Intel IPMI driver manually.

Example: Devicesetup.exe –v install imbdrv.inf *IMBDRV from the drivers folder.

11. Updating of BIOS, ME, FRUSDR and BMC is not supported by the utility if the BMC Firmware is in Transfer Mode.

12. It's recommended to do a direct FRU update in EFI/WinPE before doing a FRU Resize with ustomized CFG file.

2.2 Installing the Intel® OFU

If you downloaded the Intel® OFU package from the Intel support website, use one of the following procedures:

<u>In Windows*</u>

1. Copy the OFU zip package to a local folder.
2. Unzip the package to the local folder (example: .\flashupdt). Go to the flashupdt folder (cd flashupdt).
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 folder to execute flashupdt utility; the binaries are common for both x86 and x64 versions of Windows* operating system.
6. Now you can run the command with options (example: flashupdt -u C:\tmp\flashupdt.cfg).

<u>In Red Hat* Enterprise Linux or SuSE* Enterprise Server Linux</u>

A. Regular Installation

1. Copy the OFU zip package (for RHEL or SLES) to a local folder.
2. Unzip the package to the local folder (example: ./flashupdt). Go to the flashupdt folder (cd flashupdt).
3. # chmod 755 install.sh and # chmod 755 flashupdt
4. Install the utility using the command:

   #./install.sh
5. Go to the RHEL or SLES directory (based on operating system).
6. # chmod 755 chaff2l.sh
7. Unzip the flashupdt.zip file to get flashupdt executable for Linux* OS.
8. Now you can run the command with options (example: # ./flashupdt -u /tmp/flashupdt.cfg).

B. RPM Installation

1. Copy flashupdt rpm from Linux-RPM-package (for RHEL or SLES) to a local folder.
2. If there is another version already has been installed previously, uninstall that version first before installing the new version.
3. Install flasupdt utility by using rpm -ivh flashupdtxxx.rpm. This will install the utility in /usr/bin/flashupdt/.
4. In RHEL/SLES after installing the rpm, close the terminal from which rpm was installed and then execute the utility from a new terminal (example: # flashupdt -u /tmp/flashupdt.cfg).

   For HTTP and FTP based updates, execute the utility from /usr/bin/flashupdt/ because curl and chaff2l.sh files are needed for HTTP and FTP based updates.

2.3 Uninstalling the Intel® OFU

<u>In Windows*</u>

1. Run uninstall.cmd to uninstall all the drivers.
2. Remove the flashupdt folder structure.

<u>In Linux*</u>

Remove the flashupdt folder structure. Or unintsall the rpm using:

```
rpm –e flashupdt
```

3 Running the Intel® One Boot Flash Update

The Intel® OFU utility is run by executing the flashupdt command from a command prompt.

NOTES:

- In order to run this utility, you must first set the working directory to the directory where the utility is installed. This is required because the utility depends on certain files that are expected to be located in the working directory.

- The Intel® OFU requires Windows* administrative or Linux* root permissions.

- In case you see "Segment Fault" information or update failed related information, you are expected to verify whether the BIOS/BMC/FRU/SDR update works in UEFI mode to isolate hardware issue first. Otherwise, you are required to reference the OFU release notes to manually start the Open IPMI driver or update the BIOS/FW/FRUSDR one more time to isolate OFU software issue.

3.1 Command Line Syntax

Syntax:

<p align="center">flashupdt [-i] [-u <<i>URL or path</i>>] [-nac] [-h|?]</p>

Description:
Updates the System BIOS or firmware on the local server with the System BIOS or firmware specified in the Intel® OFU configuration file provided with the update package.
Options:

[–i]	Displays the version information for the currently running System BIOS, BMC, and SDR. If the –i option is specified with the –u option, the utility displays the version information of the update package files.
[–u]	Performs the System BIOS (including primary BIOS, backup BIOS and NVRAM) and firmware update. The *<URL or path>* parameter specifies the location where the files required for the update are located. The value of *<URL or path>* can be a local file system path, an FTP server, or an HTTP server. Examples of using the –u option: –u — Specifies the current local directory. –u http://*<IP address or URL>*/*<path>* — Specifies an HTTP server. –u ftp://*<login:password>*@*<server name or IP address>*/*<path>* — Specifies an FTP server. If –u is used in conjunction with –i, no update is performed. Only the package information is displayed.
[-nac]	**This parameter is only supported after Grantley.** When updating with cfg file, SDR data is, by default, automatically configured and updated in BMC, which do not need further user interactions. You can disable the default mode and use legacy SDR update process with the /nac option.
[–h|?]	Displays command line help information.

[-set]	Sets different FRU area as below (for BMC systems)
	flashupdt /set "areaname" "frufield" "value"
	Where areaname can be "product" or "chassis" depending on the FRU area to be modified.
	The following are the frufield parameters.
	    Pn – Indicates product name
	    Pnum – Indicates the part number
	    Pver – Indicates the product version
	    Snum – Indicates the serial number
	    Mn – Indicates the manufacturer name
	    At – Asset tag
	Note: For the chassis area, the fields "at", "pn", and "Pver" are not supported.

[-u] fru <FRU file name>	Performs a direct FRU update of platform with specific FRU file.
-ccs	Clears BIOS customized settings.

Syntax examples:

> **flashupdt –u ftp://ftp.example.com/UpdatePkg/ServerName/flashupdt.cfg**
> **flashupdt –u ftp://Kevin:87w09@ftp.example.com/UpdatePkg/ServerName/flashupdt.cfg**

- For Windows*

  flashupdt –u flashupdt.cfg

- For Linux*

  flashupdt –u /flashupdt.cfg
  flashupdt -set product Pn intelco
  flashupdt -set product At xx123456
  flashupdt -set chassis Mn intelco

NOTE: flashupdt.cfg can be found from Firmware Update Package for IDA, OFU, WinPE*, and EFI under https://downloadcenter.intel.com/search?keyword=server+ofu for each platform**.**

3.2 Updating the Server from a Remote Client

This utility can be executed remotely via a secure network connection using a Telnet Client and Terminal Services in Windows*, or using a Telnet Client and Remote Shell under Linux*. See your operating system documentation for further information on remotely logging-in and executing commands.

Once you have logged-in remotely, you can use the syntax described above. This process can be scripted to allow remote updates of multiple servers.

NOTES:

- After performing CFG based update using flashupdt utility, it is highly recommended to perform a power cycle. Continuous updates through CFG file without power cycle/reboot in between could cause system instability.

- Starting from Intel® Server Board platforms, the flashupdt utility or otherwise known as OFU utility supports preserving OEM data through CFG file based update. For details of usage and command refer to the white paper "*Supporting OEM Activation 2.x on Intel® Server Boards*".

- For CFG based update, it is assumed that the HTTP/FTP server does not require any username/password. In order to access password protected servers, change the chaff2l.sh or the batch file and include the username/password.
  The default in the .sh file:
  ./curl $1 -o $2 -s
  For password protected server, change the line above as follows:
  ./curl $1 --user admin:pwd -o $2 -s
  where admin and pwd are the username and password respectively.

Appendix A.   Error Exit Codes

The following error codes may be used when the *Intel® OFU Utility* is run from a script.

NOTE: the update configuration file (.cfg) may use the ERRORLEVEL command to override these values.

Table 4. Error Exit Codes

Value	Description
0	Successful termination
1	Invalid invocation or unknown command line argument
2	File was not found
3	Unable to read a file
4	A file in the update package is incompatible with the target server
5	A file in the update package is invalid or unsupported
6	Firmware interface failure (an error occurred when reading or writing to the BMC, setting the update notification, or updating the BMC, FRU, HSC, Intel® Local Control Panel, or SDR)
7	BIOS interface failure (an error occurred when reading the BIOS ID, setting the update notification, or updating the System BIOS)
8	Insufficient rights (the user must have Administrator or root rights)
9	Instance of another utility already running. If so, wait for the instance to finish and then start again.
10	Unknown error