



Basic Instructions for Using the Extensible Firmware Interface (EFI)

*for Server Configuration
on Intel® Server Boards and Intel® Server
Systems*

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1. Using EFI

1.1 Preparing removable media and making its format readable under EFI

You must format the media (USB key, CD, and hard drives) as FAT (16 or 32) in order for them to be readable from EFI.

- For a USB disk on key or hard drives, you can use Disk Management (available under the Computer Management option of Windows), DOS format, or any other third party software to format it to FAT or FAT32 format.
- For a writable CD, you must create the CD in FAT format.

If you use a popular CD burn software, you must first copy the files that need to go on the CD to a FAT or FAT32 file system partition, and then use the CD burn software to burn the contents to “CD-ROM (boot)”.

You may also choose any commercial CD burn software. You must make sure that the burned CD is FAT or FAT32 based so that EFI can read the CD contents. The instructions for creating the CD in FAT format are readily available on the Internet and in the documentation that comes with the commercial CD burn software (simply search on “build CD” or “build ISO”).

Note: If you want to use a CD to perform a System Firmware Update from EFI, you must copy/burn the System Firmware Update package contents to a writable CD.

1.2 Booting to the EFI Shell

All Intel® Server Boards using the 5000, 5400, 7000, 3000 and 3200 series chipsets support booting to an EFI shell without any additional operating system present.

To temporarily boot to the EFI shell:

1. Press `F2` when prompted during POST to enter the BIOS utility.
2. Within the BIOS utility, arrow over to the Boot Manager and press `<Enter>`.
3. Arrow down and highlight the EFI Shell option.
4. Press `<Enter>` to go directly to the EFI Shell.

By default, the EFI shell is the last item in the Boot Order list. It can be set as the first item in the Boot Order list so that the system always boots into EFI. To do this:

1. Press `F2` when prompted during POST to enter the BIOS utility.
2. Within the BIOS utility, arrow over to Boot Options and press `<Enter>`.
3. Highlight the first option and press `<Enter>`.

4. Arrow down to the EFI Shell option and press <Enter>.
5. Press F10 to save this configuration and reset.

Upon booting to the EFI shell, the embedded OS always looks for a file named startup.nsh (by searching through the defined “path”). Startup.nsh is the equivalent of autoexec.bat in the DOS/Windows environment. After running this startup script (if found), the following command line prompt appears:

```
Shell>
```

1.3 Basic EFI Commands

EFI commands are very similar to common DOS and Linux commands. The most frequently used commands include:

- **ls (or dir):** Lists the directory contents.
- **cd:** Changes the directory.
- **cp:** Copies one or more files/directories to another location.
- **move:** Moves one or more files/directories to the destination.
- **rm:** Deletes one or more files or directories.
- **map:** Displays, resets, or deletes mappings with the verbose option.
map -r: Commonly used to refresh mapped drives.
- **edit:** Starts a basic text editor with on-screen function key help.
- **set:** Displays (set), creates (set sname value), deletes (set -d), or changes EFI environment variables.
- **cls:** Clears the screen and can also change the background color.
- **echo:** Displays results on the screen.
- **help:** Displays help information.
- **exit:** Leaves the EFI shell and returns to the BIOS utility.
- **reset:** Resets the system with a warm reboot or complete shutdown.

Note: For most commands, EFI is not case sensitive. However, EFI can be case sensitive for file paths and names depending on the media.

For a full list of commands, see Appendix A.

1.4 Running the EFI script under the EFI Shell

- Change from the EFI shell to the USB device folder:

The first USB device found shows up in the mapping as fs0 (File system 0); the next device shows up as fs1, etc.

If you add a new media after the initial mapping or if you change it at any time while in the EFI shell, type the command:

```
map -r (This command refreshes the mounting and mapping).
```

To change from the shell to the media, type the fs# followed by a colon (:). The prompt displays the current directory.

```
shell> fs0: becomes fs0:>
```

Note: Once you have changed to media, you may change to other media including RAM disks (commonly fsz:) but there is no need to return to the base shell.

- Run the EFI script which is under the USB device.

An EFI script ends with .nsh. You can edit the .nsh script to add a bunch of commands to perform certain tasks.

As startup.nsh is the equivalent of autoexec.bat in the DOS/Windows environment, Intel usually provides the startup.nsh script in the System Firmware Update package. This script is used to perform all System Firmware Update tasks.

To manually run the startup.nsh script, type:

```
fs0:> startup.nsh
```

or

```
fs0:> startup
```

To run your own script, type:

```
fs0:> bios.nsh
```

or

```
fs0:> bios
```

1.5 EFI script examples

EFI script is not just the combination of some EFI commands; it may contain some batch only commands as well:

```
if...
...
endif

for...
...
endfor
```

1.5.1 Example of startup.nsh under System Firmware Update Package

```
@echo -off
mode 80 25
;foundimage section is simply to locate the correct drive
cls
if exist .\ipmi.efi then
  goto FOUNDIMAGE
endif
if exist fs0:\ipmi.efi then
  fs0:
  echo Found Update Packages on fs0:
  goto FOUNDIMAGE
endif
if exist fs1:\ipmi.efi then
  fs1:
  echo Found Update Packages on fs1:
  goto FOUNDIMAGE
endif
if exist fs2:\ipmi.efi then
  fs2:
  echo Found Update Packages on fs2:
  goto FOUNDIMAGE
endif
echo "Unable to find Update Packages".
echo "Please mount the drive with the update package".
echo ""
goto END
:FOUNDIMAGE
echo
=====
echo "This utility will allow you to update the BIOS and
firmware."
echo "If you want to do all these functions, press Enter. If not,
hit 'q'."
echo "if you want to update single components like BMC/BIOS
separately,"
echo "please go to the EFIscripits folder and execute the
specified scripts"
echo "separately."
echo "Do NOT reboot during this process until you see Updates
completed."
```

```

echo "Pre release updates may take significant time with a 20
minute HSC update."
echo
=====
pause
echo ""
echo ""
echo Update S5400SF BMC flash using FWPIAUPD utility
echo ""
fwpiaupd -u -o -b -pia -nopc -ni -p SFBMC07.hex
echo ""
echo " "
echo Updating the FRU and Sensor Data Records
frusdr -cfg MASTER.CFG
echo " "
echo ""
echo Updating SR1500 BP HSC FW to version 2.07
echo ""
fwpiaupd -u -b SR1500.hex
echo ""
echo Updating BIOS Images.....
iFlash32.efi R0025.Cap /u /ni
echo .....Done
echo
*****
*****
echo "Updates completed. Please reboot using the front panel
button."
:END

```

1.5.2 Example of bmc.nsh under System Firmware Update Package

```

echo -off
cls
echo ""
echo Updating BMC Firmware using FWPIAUPD utility
echo ""
fwpiaupd -u -o -b -pia -nopc -ni -p SFBMC07.hex
echo ""

```

By referencing the above examples, you can create your own script to avoid having to key in EFI commands one by one each time.

1.6 EFI environmental path

EFI, like DOS and Linux, can run programs that are listed in the environmental path from the root. You can add or remove directories from the path using the “set” command.

Example to set SYSCFG_PATH:

```
set SYSCFG_PATH fs0:\syscfg
```

where syscfg is the directory holding the utility in the root of your first USB drive.

Warning!: This command is case sensitive!

The path setting is valid until next reboot.

To clear something out of the path, type:

```
set -d (item to clear)
```

Appendix A: EFI Commands

This appendix lists the EFI commands. A document covering full syntax, variables, wildcards, redirection, error handling, etc., is available at

http://www.intel.com/software/products/college/efishell/images/efi_shell_cmdn_1_1.pdf.

Command	Description
alias	Displays, creates, or deletes aliases (can alias commands, drives, and executables)
attrib [+][a s h r] file directory	Displays or changes the attributes of files or directories
bcfg	Displays/modifies the driver/boot configuration
break	Executes a debugger break point
cd	Changes the directory
cls	Clears the screen and can change background color
comp file1 file2	Compares the contents of two files up to a maximum of 10 differences
connect	Binds an EFI driver to a device and starts the driver
cp [-r][-q] src file [dst]	Copies one or more files/directories to another location -r – Copies all recursively
date	Displays the current date or sets the date in the system
dblk	Displays the contents of blocks from a block device
devices	Displays the list of devices being managed by EFI drivers
devtree	Displays the tree of devices that follow the EFI Driver Model
dh	Displays the handles in the EFI environment
disconnect	Disconnects one or more drivers from a device
dmem	Displays the contents of memory
dmpstore	Displays all NVRAM variables
drivers	Displays the list of drivers that follow the EFI Driver Model
drvcfg	Invokes the Driver Configuration Protocol
drvdiag	Invokes the Driver Diagnostics Protocol
echo	Displays messages or turns command echoing on or off
edit	Edits an ASCII or UNICODE file in full screen
EfiCompress	Compresses a file
EfiDecompress	Decompresses a file
err	Displays or changes the error level
exit	Exits the EFI Shell
getmtc	Displays the current monotonic counter value
goto	Makes batch file execution jump to another location
guid	Displays all the GUIDs in the EFI environment
help [-b]	Displays commands list or verbose help of a command. -b – Displays one page at a time
hexedit	Edits with hex mode in full screen
load	Loads EFI drivers (e.g., Load ipmi.efi)
LoadBmp -w(seconds)	Displays a Bitmap file onto the screen
LoadPciRom	Loads a PCI Option ROM image from a file
ls [-b][-r][-a]	Display a list of files

Appendix A: EFI Commands Basic Instructions for Using the Extensible Firmware Interface (EFI)

Command	Description
	-b – Displays one page at a time -r – Displays recursively -a – Displays files of the attributes
map [-r -v -d]	Displays, resets, or deletes mappings with verbose option
memmap	Displays the memory map
mkdir dirname	Creates a directory at current location
mm	Displays or modifies MEM/IO/PCI
mode [row col]	Displays or changes console output
mount BlkDevice [sname]	Mounts a file system on a block device. The mounted names are lost at next map -r.
mv src dest	Moves one or more files/directories to destination
OpenInfo	Displays the protocols on a handle and the agents
pause	Prints a message and suspends for keyboard input. Options are q to quit or any other key resumes the script.
pci	Displays PCI devices or PCI function configuration space
reconnect	Reconnects one or more drivers from a device
reset [-w -s] [string]	Resets the system with warm reboot or complete shutdown. Can pass a string to the reset service.
rm [-q] file dir	Deletes one or more files or directories -q – Does not prompt for a confirmation
set [-d -v -b] [sname [value]]	Displays, deletes, changes, or creates environment variables set – Displays the environment variable set -d – Deletes the environment variable set sname value – creates the environment variable
setsize	Sets the size of a file
stall	Stalls the processor for some microseconds
time	Displays the current time or sets the time of the system
touch [-r] filename	Sets the time and date of a file to the current time and date
type [-a -u] file	Displays the contents of a file (ASCII or Unicode)
unload	Unloads a protocol image
ver	Displays the version information
vol [fs] [VolLabel]	Displays volume information of the file system