

SSD FIRMWARE UPDATE PROCEDURE

Application Note

Document #AN0007 – Viking SSD Firmware Update Procedure | Rev. C



DRAM MEMORY & FLASH STORAGE
NVDIMM, SSD, DRAM, MCP & CUSTOM

for Embedded, Industrial, Defense & Aerospace

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1 Introduction

There are two common ways to upgrade SSD firmware.

1.1 *Updating SSD Firmware using SATA or SAS commands*

A field firmware upgrade for an SSD can be performed by using the standard SATA or SAS commands. Refer to section 2 below for details.

1.2 *Updating SSD Firmware using Linux-based hdparm utility*

A field firmware upgrade for an SSD in a Linux OS can be performed by using the standard Linux utility "hdparm". Refer to section 3 below for details.

2 Using Firmware Download commands

2.1 *Before getting started*

It will be necessary to provide Viking with the part number/serial number(s) of the drive(s) so that a newly tagged firmware package can be prepared to match the existing configuration of the SSD(s).

Also as a precaution, the drive(s) being updated should be backed-up and all other applications closed prior to downloading the firmware package.

WARNING: The sections on using the firmware download command are for advanced users only. If the download process is not done correctly, the drive(s) will not function properly.

2.2 *SATA SSD ATA "DOWNLOAD MICROCODE" Command*

The SSD Firmware download procedure for a fully functional SATA SSD is as follows.

1. Power on the drive
2. Issue the ATA "IDENTIFY DEVICE" command
3. Issue the ATA "DOWNLOAD MICROCODE" command
 - Load FW (Firmware) code
 - Specify Feature Register = 7
4. Power-cycle the drive to boot from the new firmware

The drive is now ready for data access.

2.3 SAS SSD SCSI WRITE BUFFER: Mode (5h) command

New revisions of firmware for SAS SSD's can be downloaded and written to the drive using the SCSI WRITE BUFFER Mode (5h) Download command. This allows an initiator to download new objects to an SSD that is in an operational state with the ability to accept a SCSI WRITE BUFFER command.

The WRITE BUFFER: MODE 5h, Download Microcode and Save command is used to download a firmware download file (.DLF) provided by Viking. In this mode, the firmware and settings are saved to the nonvolatile memory and become effective after a power cycle, hard reset, or soft reset. When the download microcode and save command has completed successfully, the SSD will generate a unit attention condition for the initiator port associated with all I_T nexuses (except the I_T nexus on which the WRITE BUFFER command was received) with the additional sense code set to MICROCODE HAS BEEN CHANGED.

The Data-out buffer contains the Download file (.dlf) and the PARAMETER LIST LENGTH must be equal to or greater than the length of the Download file. The SSD firmware objects are saved to flash and the CRC of the flash data must match the CRC of the data contained in the download file or the download fails.

The SCSI WRITE BUFFER download command and the ATA download microcode command time-outs are set to the download time-out during the execution of the download command.

If a download is started while a previous download-delayed reboot action is waiting to reboot, then the command will be terminated with CHECK CONDITION status, with the sense key set to ABORTED COMMAND, and the additional sense code set to LOGICAL UNIT NOT READY, OPERATION IN PROGRESS.

A successful download will save the dynamic log and the internal information to flash before rebooting. An unsuccessful download will save the dynamic log. The BUFFER ID and BUFFER OFFSET is ignored. The PARAMETER LIST LENGTH may be any size.

3 The “hdparm” Utility Tool for a Linux OS

3.1 Before getting started

It will be necessary to provide Viking with the part number/serial number(s) of the drive(s) so that a newly tagged firmware package can be prepared to match the existing

configuration of the SSD(s). The specific config ID of the drive (ie 15027) is needed so that Viking can prepare the specific FW files (.pad) for that configuration.

3.2 Instructions for Fedora 14 Linux

NOTE: The sections on using the Linux utility "hdparm is for advanced users and the instructions on how to update the SSD firmware under Fedora 14 Linux will be fairly similar to other Linux builds.

After you receive the FW files (firmwarefile.bin) from Viking, all drive(s) being updated should be backed-up and all other applications closed prior to downloading the firmware package. Shown below is the recommended update procedure:

- **BACKUP all user data**
- Download hdparm (.i.e. hdparm- 9.48)
- Extract tar to home directory
- Compile hdparm
- Copy Viking SSD firmware file to hdparm directory.
example: firmwarefile.bin
- Identify SSD device path. Use such utilities as "Disk Utility"
example "/dev/sdb"
- Take note of current firmware revision before upgrade
- Open terminal window and type su command for super user access
- Change directory to hdparm directory
- **NOTE: hdparm MUST use mode 7 to download firmware. Mode 3 is not supported and can cause data loss if used**
- Type exactly: hdparm --fwdownload-mode7 **fw_file.pad** --yes-i-know-what-i-am-doing --please-destroy-my-drive **/dev/sdb**
- **Make sure to put the correct filename and device path for your system**
- hdparm requires the user to type both
--yes-i-know-what-i-am-doing and
--please-destroy-my-drive
messages when doing a FW download
- Verify new firmware revision using the Disk Utility application.

Usage Example for Fedora 14 Linux:

```
[root@dvt hdparm-9.48]# hdparm --fwdownload-mode7 firmwarefile.bin  
--yes-i-know-what-i-am-doing --please-destroy-my-drive /dev/sdb
```

```
/dev/sdb:
```

```

fwdownload: xfer_mode=7 min=1 max=65535 size=447488
Done.
[root@dvt hdparm-9.48]#

```

4 Non-functional SSD's

If the SSD is non-functional or the firmware is corrupted to the point that it cannot support an ATA "DOWNLOAD MICROCODE" or SCSI WRITE BUFFER command, the SSD will not be field updateable and should be returned to Viking on an RMA.

5 Reference Documents

- hdparm at SourceForge.net
<https://sourceforge.net/projects/hdparm>
- Viking SSD Product Datasheets
<http://www.vikingtechnology.com/products/storage-overview/25ssd-2/>

6 About Viking Technology

Viking Technology develops and delivers innovative high-technology products that optimize the value and performance of our customers' applications. Founded in 1989, Viking Technology has been providing Original Equipment Manufacturers (OEMs) with industry leading designs, engineering, product support and customer service for 20 years. For more information visit <http://www.vikingtechnology.com>.

7 Revision History

Date	Edited by	Alteration to previous document revision
6/27/2011		Added Linux procedure
10/2/2011		Added FieldUpdater procedure
9/12/2016		Add new logo and change color scheme. Remove section 2 SATA Utility Tools: SSDupdate.exe and FieldUpdater.exe (no longer supported for EOL drives)
2/21/2018		Remove reference to NOR flash and window utility unavailability

Global Locations		
US Headquarters	India Office	Singapore Office
2950 Red Hill Ave. Costa Mesa, CA 92626 Main: +1 714 913 2200 Fax: +1 714 913 2202	A 3, Phase II, MEPZ-Special Economic Zone NH 45, Tambaram, Chennai-600045 India	No 2 Chai Chee Drive Singapore, 109840
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