EMC VFCache™

v1.5

Installation Guide

FOR VMWARE

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EMC²

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PREFACE

As part of an effort to improve its product lines, EMC periodically releases revisions of its software and hardware. Therefore, some functions described in this document might not be supported by all versions of the software or hardware currently in use. The product release notes provide the most up-to-date information on product features.

Contact your EMC representative if a product does not function properly or does not function as described in this document.

Note: This document was accurate at publication time. New versions of this document might be released on the EMC Online Support website. Check the EMC Online Support website to ensure that you are using the latest version of this document.

Purpose

This document describes how to install EMC VFCache™ in a VMware environment.

Audience

This document is intended for the host system administrator, system programmer, or operator who will be involved in managing VFCache.

This guide has the following chapters:

- Chapter 1, "Installing VFCache," describes how to install the VFCache components.
- Chapter 2, "Troubleshooting,"describes steps to take to troubleshoot problems that may arise.

Related documentation

The following EMC publications provide additional information:

- *EMC VFCache Installation and Administration Guide*
- *EMC VFCache VSI Plug-In for VMware Administration Guide*

Conventions used in this document

EMC uses the following conventions for special notices:

NOTICE

NOTICE is used to address practices not related to personal injury.

Note: A note presents information that is important, but not hazard-related.

IMPORTANT

An important notice contains information essential to software or hardware operation.

⚠WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

Typographical conventions

EMC uses the following type style conventions in this document:

Normal

Used in running (nonprocedural) text for:

- Names of interface elements, such as names of windows, dialog boxes, buttons, fields, and menus
- Names of resources, attributes, pools, Boolean expressions, buttons, DQL statements, keywords, clauses, environment variables, functions, and utilities
- URLs, pathnames, filenames, directory names, computer names, links, groups, service keys, file systems, and notifications

Bold

Used in running (nonprocedural) text for names of commands, daemons, options, programs, processes, services, applications, utilities, kernels, notifications, system calls, and man pages

Used in procedures for:

- Names of interface elements, such as names of windows, dialog boxes, buttons, fields, and menus
- What the user specifically selects, clicks, presses, or types

Italic

Used in all text (including procedures) for:

- Full titles of publications referenced in text
- Emphasis, for example, a new term
- Variables

`Courier`	Used for: • System output, such as an error message or script • URLs, complete paths, filenames, prompts, and syntax when shown outside of running text
`Courier bold`	Used for specific user input, such as commands
`Courier italic`	Used in procedures for: • Variables on the command line • User input variables
›	Angle brackets enclose parameter or variable values supplied by the user
[ ]	Square brackets enclose optional values
|	Vertical bar indicates alternate selections — the bar means “or”
{ }	Braces enclose content that the user must specify, such as x or y or z
...	Ellipses indicate nonessential information omitted from the example

Where to get help

EMC support, product, and licensing information can be obtained as follows.

Product information — For documentation, release notes, software updates, or for information about EMC products, licensing, and service, go to the EMC Online Support website (registration required) at:

http://support.EMC.com

Technical support — For technical support, go to EMC Online Support. To open a service request, you must have a valid support agreement. Please contact your EMC sales representative for details about obtaining a valid support agreement or to answer any questions about your account.

Your comments

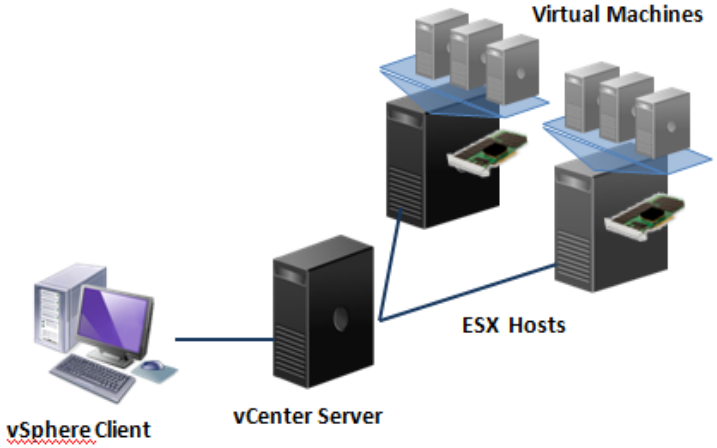
Your suggestions will help us continue to improve the accuracy, organization, and overall quality of the user publications. Send your opinions of this document to:

`techpubcomments@emc.com`

CHAPTER 1
Installing VFCache

EMC VFCache™ is a server flash caching solution that reduces latency and increases throughput to dramatically improve application performance by leveraging intelligent caching software and PCIe flash technology. VFCache accelerates reads and protects data by using a write-through cache to the networked storage to deliver persistent high availability, integrity, and disaster recovery. VFCache coupled with array-based EMC FAST software creates the most efficient and intelligent I/O path from the application to the data store. The result is a networked infrastructure that is dynamically optimized for performance, intelligence, and protection for both physical and virtual environments.

The VFCache installation is distributed over various components of the vSphere system. The following figure illustrates the location of these installed components.



This chapter describes how to install the VFCache components:

- "Installing the VFCache PCIe flash card on the ESX host" on page 16
- "Installing the VFCache software on a virtual machine" on page 23
- "Installing the VFCache plug-in on the management center" on page 34

Before you begin

This section describes the following issues to consider in your VFCache implementation:

"Recovering from snapshot" on page 10

"Enabling use of disks for DAS" on page 10

"Support for VFCache in the VMware HA/DRS/SRM Environment" on page 11

Note: You cannot use the system boot disk as a source disk.

Recovering from snapshot

Note: VFCache is not intended for use in active/active clusters or shared LUN configurations. For information about supported failover cluster configurations, refer to the *VFCache Installation and Administration Guide for Windows and Linux v1.5*.

Due to the persistence of cached data, in some recovery situations, data on the source device could become out of sync with the cached data.

VFCache purges the cache during a recover from snapshot in a VMware environment. This is done by automatically revoking the cache during the process of suspending a virtual machine.

To restore a LUN from a snapshot, you must first manually stop the caching, then perform the recovery operation, and then manually start the caching again.

Enabling use of disks for DAS

To enable this split card functionality, you must disable *interrupt mapping* on your ESX host, according to the following instructions. You can do this before or after installing the VFCache components.

Note: VMware has not reported the need for the following workaround in ESX 4.0.

ESX/ESXi 4.1

To disable interrupt mapping on ESX/ESXi 4.1, execute the following commands from a console or SSH session:

```
# esxcfg-advcfg -k TRUE iovDisableIR
# reboot
```

To verify that the interrupt mapping was disabled, execute the following command:

```
# esxcfg-advcfg -j iovDisableIR
```

The following output should be returned:

```
iovDisableIR=TRUE
```

ESXi 5.0

To disable interrupt mapping on ESXi 5.0, execute the following commands from a console or SSH session:

```
# esxcli system settings kernel set -s iovDisableIR -v
TRUE
# reboot
```

To verify that the interrupt mapping was disabled, execute the following command:

```
# esxcli system settings kernel list -o iovDisableIR
```

This will return output similar to the following:

```
Name          Type  Description                              Configured  Runtime  Default
-----------  ----  --------------------------------------  ----------  -------  --
iovDisableIR  Bool  Disable Interrrupt Routing in the IOMMU  TRUE         FALSE    FALSE
```

Support for VFCache in the VMware HA/DRS/SRM Environment

VMware provides the following tools to be used with ESX clusters:

- High Availability (HA)

  In the event of server failure, HA automatically restarts affected virtual machines on other host machines in the cluster.

- Distributed Resource Scheduler (DRS)

  DRS balances computing workloads with available resources in a virtualized environment.

- Fault Tolerance (FT)

  FT provides continuous availability for applications in the event of server failures, by creating a live shadow instance of a virtual machine that is in virtual lockstep with the primary instance.

- Site Recovery Manager (SRM)

  SRM enables simple replication of applications to a secondary site.

VFCache-enabled virtual machines can be part of ESX clusters with these features active.

The following section explains the issues to consider when planning such clusters.

VFCache with HA/DRS

In order to benefit from HA and DRS functions, disk resources used by the virtual machines must be shared across the cluster. VFCache-enabled virtual machines use flash-based hardware devices implemented as a local, non-shared disk on the ESX that hosts the virtual machine.

Thus, those specific virtual machines running VFCache, will not be monitored or automatically migrated when used in an HA/DRS cluster, according to the following designations:

- In a cluster enhanced with HA, when a VFCache-enabled virtual machine fails, no recovery attempt will be made, and no event will be created.
- In a cluster enhanced with DRS, policies will not cause a VFCache-enabled virtual machine to migrate, and, if DRS is set to manual-automation level, recommendations to migrate the VFCache machine will not be issued.

Even though the use of HA and DRS is not supported on VFCache-enabled virtual machines, you can still define the cluster as HA or DRS, it simply won't apply to those machines running VFCache. No warning or alerts will be issued for machines that are incompliant with the HA/DRS requirements unless you try to migrate them manually.

VFCache with FT

Fault Tolerance limits the number of virtual processors to one, whereas VFCache requires a minimum of four virtual processors. In addition, FT requires that the machines and their resources reside on storage that is shared by the cluster, whereas VFCache-enabled virtual machines use local storage.

For these reasons, FT is not compatible with VFCache-enabled virtual machines.

Even though the use of FT is not supported on VFCache-enabled virtual machines, you can still define the cluster as FT, it simply won't apply to those machines running VFCache.

VFCache with SRM

VFCache-enabled virtual machines use local datastores. SRM5 includes a new feature, vSphere Replication, which replicates the datastores, including local datastores. This enables SRM5 to support VFCache-enabled virtual machines. SRM4, however, relies on shared storage, and thus does not support VFCache-enabled virtual machines.

System requirements

Before installing VFCache components, ensure that your vSphere system meets the following requirements.

Note: The VFCache feature does not include the VSI plug-in framework. You must install the VSI Storage Viewer feature before installing the VFCache VSI plug-in.

Table 1 System requirements - host machine

Component	Minimum Required
VMware Host	**Operating System** • ESX 4.0, ESX 4.1, ESX 4.1i, or ESX 5.0. Refer to the vendor installation instructions. **Note:** The VMware hosts can be managed via vSphere client 4.1 or 5.0 only. For more information, refer to the following tables. **Hardware** • PCIe x8 slot available • PCIe flash card (supplied)
Windows Virtual Machine	• Windows Server 2008 R2 or Windows Server 2008 R2 SP1 • VMware tools package
Linux Virtual Machine	• Red Hat 5.6, 5.7, 5.8, 6.0, 6.1, or 6.2 installation • `chkconfig` package - standard in RHEL • `SysVinit` package - standard in RHEL • SE Linux disabled • No LVM • VMware tools package

Table 2 System requirements - vSphere client 4.1

Management Station	**Operating System** • Windows 7, Windows 2008 R2, or Windows 2008 R2 SP1 **Software** • VMware Power CLI 4.1.1 (Download from http://www.vmware.com/download/download.do?downloadGroup=sdkwin41) • JRE 1.6 or 1.7, 32-bit version (Download from http://www.oracle.com/technetwork/java/javase/downloads/index.html) • EMC Virtual Storage Integrator Storage Viewer 4.1 (Download from http://support.emc.com) • Microsoft chart controls for Microsoft .NET Framework 3.5 (Download from http://www.microsoft.com/download/en/details.aspx?id=14422) **Hardware** • Screen resolution: 1024x768

Table 3 System requirements - vSphere client 5.0

Management Station	**Operating System** • Windows 7, Windows 2008 R2, or Windows 2008 R2 SP1 **Software** • VMware Power CLI 5.0 (Download from http://www.vmware.com/download/download.do?downloadGroup=PCLI50) • JRE 1.6 or 1.7, 32-bit version (Download from http://www.oracle.com/technetwork/java/javase/downloads/index.html) • EMC Virtual Storage Integrator Storage Viewer 5.0 (Download from http://support.emc.com) • Microsoft chart controls for Microsoft .NET Framework 3.5 (Download from http://www.microsoft.com/download/en/details.aspx?id=14422) **Hardware** • Screen resolution: 1024x768

Installing the VFCache PCIe flash card on the ESX host

Your VFCache package includes a PCIe flash card. To install the card, perform the following steps on the ESX host:

- "Installing the physical card" on page 16
- "Installing the drivers" on page 18

The following sections describe these steps.

Installing the physical card

This section describes how to install the PCIe flash card in the ESX host machine.

To install the card, perform the following steps:

1. **Unpack the card and inspect it for damage.** Unpack the card in a static-free environment and follow good antistatic grounding procedures. Remove the card from the antistatic bag and carefully inspect the device for damage. If you notice any damage, or if any component is missing, contact EMC customer support.

IMPORTANT

Backup your data before changing your system configuration.

2. **Prepare the computer.** Turn off the computer, and disconnect the power cord from the power supply. Remove the cover from the chassis.

   ⚠WARNING

   To avoid electrical shock, disconnect the computer from the main power and from any networks before installing the controller card.

3. **Replace the mounting bracket (system dependent).** If required for your system, replace the full-length mounting bracket that ships on the card with the shorter bracket supplied. Save and reuse the two screws that attach the long bracket to attach the short bracket.

IMPORTANT

Before continuing the installation, it is *highly recommended* that you record the following information, found on the label that is affixed to the card:

- Serial number (SN): _____
- Part number (PN) : _____
- Revision number (REV) : _____

Recording this information *before* installing the card into your system can ease future troubleshooting operations.

4. **Insert the card in an available PCI Express slot.** Locate an empty PCI Express slot. Remove the blank bracket panel on the computer chassis that aligns with the empty PCI Express slot. Save the bracket screw, if applicable.

Align the card to a PCI Express slot. Press down gently, but firmly, to properly seat the card in the slot. Figure 1 on page 17 illustrates how to insert the card in a PCI Express slot.

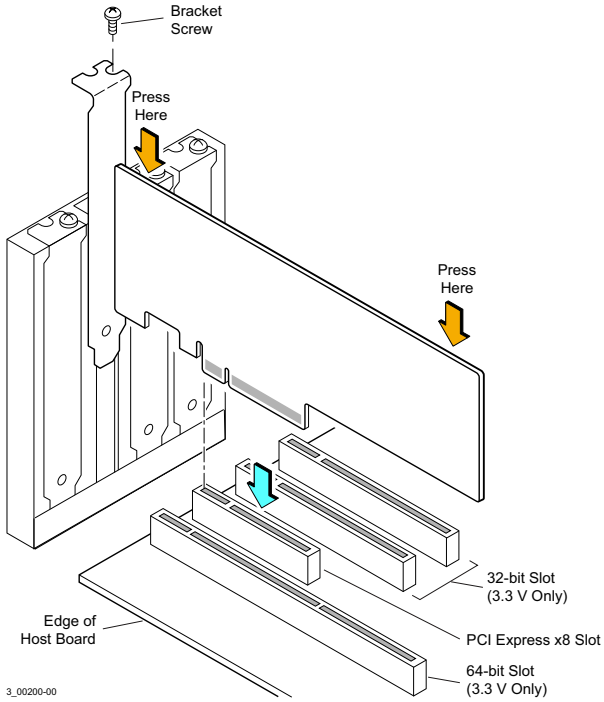


Figure 1 Installation of the PCIe card

Note: The card shape, size, and locations of components might vary from this figure.

5. **Secure the bracket to the system's chassis.** Install the bracket screw, if applicable, or engage the system retention mechanism to secure the card to the system's chassis.
6. **Replace the cover, the power cord, and power up the system.** Replace the system's cover, reconnect the power cord, and any network cables. Turn on the power.

The hardware installation is complete.

Before installing the drivers, verify the that the PCIe card is properly installed, by performing one of the following steps:

- In Windows, check for the card in the **Device Manager**.
- In Linux, execute one of the following commands:
  - For product # PCIEHHS-3XXL\2: **`lspci|grep -i lsi`**
  - For product # PCIEHHS-3XXM\2 or # PCIEHHS-7XXM: **`lspci | grep -iE '(crucial)|(micron)'`**

  Output, similar to the following lines should be displayed:

```
01:00.0 SCSI storage controller: LSI Logic / Symbios Logic LSI1064E (rev 08)
0d:00.0 Serial Attached SCSI controller: LSI Logic / Symbios Logic LSI
WarpDrive SSD (rev 03)
```

Installing the drivers

This section describes how to install the devices drivers for your PCIe card and your operating system. Proceed to the section that matches your product.

Note: Do not format the PCIe card after installing the driver.

- "Installing drivers for PCIEHHS-3XXL\2" on page 19
- "Installing drivers for PCIEHHS-3XXM\2" on page 20

Installing drivers for PCIEHHS-3XXL\2

This section describes how to install the device drivers for the PCIEHHS-3XL\2 product. To install the drivers, proceed to the section that matches your operating system.

- "Installing drivers for ESX 4.1/ESXi 4.1.0" on page 19
- "Installing drivers for ESXi 5.0" on page 20

Installing drivers for ESX 4.1/ESXi 4.1.0

The VFCache installation files are included on the installation media, or you can download them from the EMC Online Support website.

To install the device driver on the ESX host machine, perform the following steps from the ESX machine:

1. From the installation media, copy the following driver file to the ESX host:

   `vmware-esx-drivers-scsi-mpt2sas-400.11.00.00.00.2vmw-1vmw.2.17.00000.x86_64.vib`

2. Stop all virtual machines on the ESX host.
3. From the ESX host, as root user, enter maintenance mode by executing the following command:

   `vim-cmd hostsvc/maintenance_mode_enter`

4. Install the driver by executing the following command:

   `esxupdate update -b vmware-esx-drivers-scsi-mpt2sas-400.11.00.00.00.2vmw-1vmw.2.17.00000.x86_64.vib --nosigcheck`

5. Reboot the machine.
6. Exit maintenance mode by executing the following command:

   `vim-cmd hostsvc/maintenance_mode_exit`

Note: Do not format the PCIe card after installing the driver.

Continue the installation with "Installing the VFCache software on a virtual machine" on page 23.

Installing drivers for ESXi 5.0

The VFCache installation files are included on the installation media, or you can download them from the EMC Online Support website.

To install the device driver on the ESX host machine, perform the following steps from the ESX machine:

1. From the installation media, copy the following driver file to the ESX host:

   scsi-mpt2sas-11.00.00.00.2vmw-1OEM.500.0.0.472560.x86_64.vib

2. Stop all virtual machines on the ESX host.
3. From the ESX host, as root user, enter maintenance mode by executing the following command:

   vim-cmd hostsvc/maintenance_mode_enter

4. Install the driver by executing the following command:

   esxcli software vib install -v file:/tmp/LSI/esx5/scsi-mpt2sas-11.00.00.00.2vmw-1OEM.500.0.0.472560.x86_64.vib

   Note: You must use the full path.

5. Reboot the machine.
6. Exit maintenance mode by executing the following command:

   vim-cmd hostsvc/maintenance_mode_exit

Note: Do not format the PCIe card after installing the driver.

Installing drivers for PCIEHHS-3XXM\2

This section describes how to install the device drivers for the PCIEHHS-3XM\2 product. To install the drivers, proceed to the section that matches your operating system.

- "Installing drivers for ESX 4.1/ESXi 4.1.0" on page 21
- "Installing drivers for ESXi 5.0" on page 22

Installing drivers for ESX 4.1/ESXi 4.1.0

The VFCache installation files are included on the installation media, or you can download them from the EMC Online Support website.

To install the device driver on the ESX host machine, perform the following steps from the ESX machine:

1. From the installation media, copy the following driver file to the ESX host:

   `vmware-esx-drivers-block-mtip32xx-400.1.0.3-1OEM.x86_64.vib`

2. Stop all virtual machines on the ESX host.
3. From the ESX host, as root user, enter maintenance mode by executing the following command:

   `vim-cmd hostsvc/maintenance_mode_enter`

4. Install the driver by executing the following command:

   `esxupdate update -b vmware-esx-drivers-block-mtip32xx-400.1.0.3-1OEM.x86_64.vib --nosigcheck`

5. Reboot the machine.
6. Exit maintenance mode by executing the following command:

   `vim-cmd hostsvc/maintenance_mode_exit`

Note: Do not format the PCIe card after installing the driver.

Continue the installation with "Installing the VFCache software on a virtual machine" on page 23.

Installing drivers for ESXi 5.0

This section describes how to install the device driver for the ESXi 5.0. This task may require multiple reboots.

The VFCache installation files are included on the installation media, or you can download them from the EMC Online Support website.

To install the device driver on the ESX host machine, perform the following steps from the ESX machine:

1. From the installation media, extract and copy the following file from `mtip32xx-offline_bundle-728347.zip` to the ESX host:

   `Micron_bootbank_block-mtip32xx_1.0.2-1OEM.500.0.0.472560.vib`

2. Stop all virtual machines on the ESX host.
3. From the ESX host, as root user, enter maintenance mode by executing the following command:

   `vim-cmd hostsvc/maintenance_mode_enter`

4. Enable community supported drivers by executing the following command:

   `esxcli software acceptance set --level=CommunitySupported`

5. Install the driver by executing the following command:

   `esxcli software vib install -v <full_path_to_vib> Micron_bootbank_block-mtip32xx_1.0.2-1OEM.500.0.0.472560.vib`

   Note: You must use the full path. If the driver is not signed, add the additional **`-no-sig-check`** flag

6. Reboot the machine.
7. Exit maintenance mode by executing the following command:

   `vim-cmd hostsvc/maintenance_mode_exit`

Note: Do not format the PCIe card after installing the driver.

Installing the VFCache software on a virtual machine

You can install the VFCache software on a Windows or Linux virtual machine.

To install VFCache on a Windows virtual machine, refer to "Installing VFCache on a Windows virtual machine" on page 23.

To install VFCache on a Linux virtual machine, refer to "Installing VFCache on a Linux virtual machine" on page 28.

Installing VFCache on a Windows virtual machine

On the virtual machine, you need to install the VFCache driver and the VFCache agent.

Installing the VFCache driver

Install the VFCache driver using the installation wizard. The VFCache installation files are included on the installation media, or you can download them from the EMC Online Support website.

To use the wizard, perform the following:

1. From the installation media, double-click `EMC-VFCache-1.5.0.XX.msi`. The installation wizard begins.
2. Accept the default settings. If you need to, you can change the installation directory.
3. After installation is complete (about 2 minutes), reboot the host. The VFCache driver will start up during the reboot.

After You Install

After installing and rebooting, verify the installation by running the following command:

`vfcmt version`

If the VFCache driver is installed, the following information will be displayed:

```
vfcmt for EMC Server Flash Cache © Version 1.5 (build nn)
```

File Changes

During installation, the following files are added:

Table 4 Files added during VFCache installation - Windows

Path	Files Added
C:\Program Files\EMC\SFC\	• Emcsfc.cat • Emcsfc.inf • Emcsfc.sys • Emcvfcagent.exe • Emcvfclog.dll • ReadSSD-API.dll • Sfc_cppinfra.dll • Sfc_cppwrap.dll • Sfc_lsi_api.dll • Sfc_micron_api.dll • Sfc_syslog.dll • Storelibir-2.dll • VfcLogMsgs.dll • Vfcmt.exe
C:\Windows\System32\drivers	• Emcsfc.sys

Installing the VFCache agent

To install the VFCache agent, you must perform the following tasks:

- "Installing the VFCache agent" on page 25
- "Configuring VFCache agent user credentials" on page 25
- "Enabling access to ports" on page 27

Note: If you do not plan on using the VSI plug-in to manage VFCache, or if you are unable to open firewall ports, you do not need to install the VFCache agent or the VSI plug-in. Proceed to "Using VFCache without the VSI plug-in" on page 34.

Installing the VFCache agent

To install the VFCache agent, run the installation wizard. The VFCache installation files are included on the installation media, or you can download them from the EMC Online Support website.

To use the wizard, perform the following:

1. From the installation media, double-click `EMC-VFCache-Agent-1.5.0.XX.msi`. The installation wizard begins.
2. Accept the default settings. If you need to, you can change the installation directory.

IMPORTANT

If a warning is displayed after installing the VFCache agent, you must use the VMware tools to install the following scripts to run upon a suspend operation:

```
C:\Program Files\EMC\VFC\vfcmt\resume-emc-vfc.bat
C:\Program Files\EMC\VFC\vfcmt\suspend-emc-vfc.bat
```

For more information, refer to the *Installing and Configuring VMware Tools* guide.

Configuring VFCache agent user credentials

After finishing the installation, you are prompted to run a batch file. Running this file creates a password lockbox, users and roles, and the passwords that are necessary to ensure communication between the VFCache agent running on the server and the management machines.

Note: You can also use the *cstadmin* tool to configure the security credentials.

To create these credentials, run the following command from a command prompt:

<*Install_dir*>\vfcmt\set-credentials-emc-vfc.bat

‹*lockbox_password*› ‹*admin_user_password*› ‹*VFCacheUser_admin_password*›

Variable	Description
Install_dir	The full path to the directory where the VFCache agent is installed.
lockbox_password	The password to assign to the password lockbox.
admin_user_password	The password to assign to the user with the *admin* role. This user can create other users and assign their roles. It is highly recommended to use the same password over all VFCache hosts.
VFCacheUser_admin_password	The password to assign to the VFCache admin user with the *vmadmin* role. This user can access VFCache Admin functions, and is configured in the VSI Plug-in for remote management. It is highly recommended to use the same password over all VFCache hosts.

You must provide values for all of the passwords.

The password creation rules may vary from site to site, thus it is not possible to codify how to create the passwords. If the values entered for the passwords are not valid, an error message will appear and you can run the batch file again.

⚠WARNING

Running the batch file deletes all local users, even if they are not related to VFCache. In addition, the batch file overwrites the default password, as well as any other previously-defined passwords.

After successful password configuration, the following message appears:

```
VFCache Agent user credentials configured successfully
```

You can verify that the VFCache agent listener is working by executing the following command:

```
netstat -a | findstr 59
```

The default ports are 5985, 5986, 5988, 5989. One, or more of the following lines should be displayed:

```
TCP    0.0.0.0:5985          WIN2008R2SP1:0        LISTENING
TCP    0.0.0.0:5986          WIN2008R2SP1:0        LISTENING
TCP    0.0.0.0:5988          WIN2008R2SP1:0        LISTENING
TCP    0.0.0.0:5989          WIN2008R2SP1:0        LISTENING
```

IMPORTANT

Before you can use the VFCache VSI plug-in, you must enter the new VFCacheAdmin user and password into the VFCache authentication screen in VMware vSphere. For more information, refer to the *VFCache VMware Plug-In Administration Guide*.

Enabling access to ports

After completing the password configuration, enable access to the following ports: 5988, 5989. This must be done in all existing firewalls.

Continue the installation with "Installing the VFCache plug-in on the management center" on page 34.

File Changes

During installation, files are installed into the following folders:

- C:\Program Files\EMC\VFC
- C:\Program Files\EMC\VFC\cst_2.0.2
- C:\Program Files\EMC\VFC\lib
- C:\Program Files\EMC\VFC\toolkit
- C:\Program Files\EMC\VFC\vfcmt

Installing VFCache on a Linux virtual machine

On the virtual machine, you need to install the VFCache driver and the VFCache agent. The VFCache installation files are included on the installation media, or you can download them from the EMC Online Support website.

Installing the VFCache driver

To install the VFCache driver, execute the following command:

RHEL 5.x - **`rpm -ivh EMC-VFCache-RHEL5-1.5.0-XX.x86_64.rpm`**
RHEL 6.x - **`rpm -ivh EMC-VFCache-RHEL6-1.5.0-XX.x86_64.rpm`**

File Changes

During installation, the following files are added:

Table 5 Files added during installation - Linux

Files added
• /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17 • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/.sfc_build_version • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/.sfc_vendor • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/.sfc_version • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/EULA.pdf • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/SFC • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/SFCdaemon • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/VFCache_Cluster_Support_1.5.zip • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/.cmds • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/.drivers_base • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/.sharedlibs • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/.staticlibs • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/.tplibs • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/cmds • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/cmds/sfc_cached • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/cmds/vfcmt • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/driver • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/driver/rhel5_x8664 • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/driver/rhel5_x8664/emcsfc.ko • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/lib • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/lib/libemcvfclog.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/lib/libsfc_cache_api.so

Table 5 Files added during installation - Linux (continued)

Files added
• /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/lib/libsfc_core.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/lib/libsfc_cppinfra.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/lib/libsfc_cppwrap.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/lib/libsfc_event.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/lib/libsfc_i18n.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/lib/libsfc_kmd.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/lib/libsfc_lock.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/lib/libsfc_lsi_api.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/lib/libsfc_micron_api.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/lib/libsfc_syslog.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/lib/libsfc_vendor.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/lib/libsfcmt_api.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/sfc_daemon_adm • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/ddoemcli • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/libRealSSD-API.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/libbatchAnalysis.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/libformattedDump.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/liblttvtraceread-2.6.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/liblttvtraceread.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/libstorelibir-2.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/libsysfs.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/libtextFilter.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/liburcu-bp.so.1.0.0 • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/liburcu-common.so.1.0.0 • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/libust-initializer.o • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/libust.so • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/libust.so.0.0.0 • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/libustconsumer.so.0.0.0 • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/libustctl.so.0.0.0 • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/libustfork.so.0.0.0 • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/libustinstr-malloc.so.0.0.0 • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/lttv • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/ust-consumerd • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/ustctl • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/usttrace • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/vfctrace • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/vfctracefmt • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/bin/tplibs/xustctl • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/enable

Table 5 Files added during installation - Linux (continued)

Files added
• /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/de • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/de/LC_MESSAGES • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/de/LC_MESSAGES/EMCsfc.mo • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/es • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/es/LC_MESSAGES • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/es/LC_MESSAGES/EMCsfc.mo • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/fr • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/fr/LC_MESSAGES • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/fr/LC_MESSAGES/EMCsfc.mo • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/it • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/it/LC_MESSAGES • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/it/LC_MESSAGES/EMCsfc.mo • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/ja • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/ja/LC_MESSAGES • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/ja/LC_MESSAGES/EMCsfc.mo • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/ko • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/ko/LC_MESSAGES • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/ko/LC_MESSAGES/EMCsfc.mo • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/pt • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/pt/LC_MESSAGES • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/pt/LC_MESSAGES/EMCsfc.mo • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/zh • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/zh/LC_MESSAGES • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/i18n/catalog/zh/LC_MESSAGES/EMCsfc.mo • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/man • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/man/.man • /etc/opt/emcsfc/EMCsfc.LINUX-1.5.0.17/man/vfcmt.1

Installing the VFCache agent

To install the VFCache agent, you must perform the following tasks:

- "Installing the VFCache agent" on page 31
- "Configuring VFCache agent user credentials" on page 31
- "Enabling access to ports" on page 33

Note: If you do not plan on using the VSI plug-in to manage VFCache, or if you are unable to open firewall ports, you do not need to install the VFCache agent or the VSI plug-in. Proceed to "Using VFCache without the VSI plug-in" on page 34.

Installing the VFCache agent

The VFCache installation files are included on the installation media, or you can download them from the EMC Online Support website.

To install the VFCache agent, perform the following steps:

1. From the installation media, install the VFCache agent package by executing the following command:
   - RHEL 5.x - **`rpm -ivh EMC-VFCache-Agent-RHEL5-1.5.0.XX-Release.x86_64.rpm`**
   - RHEL 6.x - **`rpm -ivh EMC-VFCache-Agent-RHEL6-1.5.0.XX-Release.x86_64.rpm`**
2. Enable access to the following ports: 5988, 5989. This must be done in all existing firewalls.

To verify the installation of the VFCache agent, perform the following steps:

1. Check the VFCache agent version by executing the following command:

   `cat /etc/ecom_version`
2. Verify that the VFCache agent service is running by executing the following command:

   `service ecom stat`

Configuring VFCache agent user credentials

After finishing the installation, you are prompted to run a script. Running this file creates a password lockbox, users and roles, and the passwords that are necessary to ensure communication between the VFCache agent running on the server and the management machines.

Note: You can also use the *cstadmin* tool to configure the security credentials.

To create these credentials, run the following script:

```
/opt/ECOM/util/set-credentials-emc-vfc
"<lockbox_password>" "<admin_user_password>"
"<VFCacheUser_admin_password>"
```

Variable	Description
lockbox_password	The password to assign to the password lockbox.
admin_user_password	The password to assign to the user with the *admin* role. This user can create other users and assign their roles. It is highly recommended to use the same password over all VFCache hosts.
VFCacheUser_admin_password	The password to assign to the VFCache admin user with the *vmadmin* role. This user can access VFCache Admin functions, and is configured in the VSI Plug-in for remote management. It is highly recommended to use the same password over all VFCache hosts.

You must provide values for all of the passwords, each value placed within quotation marks.

The password creation rules may vary from site to site, thus it is not possible to codify how to create the passwords. If the values entered for the passwords are not valid, an error message will appear and you can run the script again.

⚠WARNING

Running the script deletes all local users, even if they are not related to VFCache. In addition, the script overwrites the default password, as well as any other previously-defined passwords.

After successful password configuration, the following message appears:

```
VFCache Agent credential configuration succeeded
```

You can verify that the VFCache agent listener is working by executing the following command:

```
netstat -nltp |grep -i ecom
```

The default ports are 5985, 5986, 5988, 5989. One, or more of the following lines should be displayed:

```
tcp 0 0 0.0.0.0:5985                0.0.0.0:*                   LISTEN      31151/ECOM
tcp 0 0 0.0.0.0:5986                0.0.0.0:*                   LISTEN      31151/ECOM
tcp 0 0 0.0.0.0:5988                0.0.0.0:*                   LISTEN      31151/ECOM
tcp 0 0 0.0.0.0:5989                0.0.0.0:*                   LISTEN      31151/ECOM
tcp 0 0 127.0.0.1:33619             127.0.0.1:427               ESTABLISHED 31151/ECOM
unix 2 [ ACC ] STREAM LISTENING 531528 31151/ECOM /tmp/emc.ust-socks-root/31151.1339861841
```

IMPORTANT

Before you can use the VFCache VSI plug-in, you must enter the new VFCacheAdmin user and password into the VFCache authentication screen in VMware vSphere. For more information, refer to the *VFCache VMware Plug-In Administration Guide*.

Enabling access to ports

After completing the password configuration, enable access to the following ports: 5988, 5989. This must be done in all existing firewalls.

Continue the installation with "Installing the VFCache plug-in on the management center" on page 34.

File Changes

During installation, files are installed into the following directories:

- /etc/
- /etc/init.d/
- /etc/rc.d/init.d/
- /etc/vmware-tools/scripts/
- /opt/ECOM/
- /opt/ECOM/cst_2.0.2/
- /opt/ECOM/toolkit/

Installing the VFCache plug-in on the management center

The final part of the VFCache installation is installing the VSI plug-in on the VFCache management machine, a Windows workstation.

To install the VSI plug-in, see the *VFCache VMware VSI Plug-in Administration Guide*.

Using VFCache without the VSI plug-in

You can use VFCache in the VMware environment without installing the VSI plug-in. To do so, perform the following:

1. Install the VFCache components on the ESX host and virtual machines, as described in this chapter. You do not need to install the VFCache agent or the VSI plug-in.
2. Use the VMware tools to define a VMFS datastore, as described in the *VFCache VMware VSI Plug-in Administration Guide v1.5*.
3. Use the VMware tools to create Vdisks by performing the following:
    1. Right-click a virtual machine, and choose **Edit Settings**.
    2. Click **Add › Hard Disk** and accept the default settings.

Where to go from here

Now that the installation is complete, you are ready to use VFCache to start acceleration.

To use the VSI plug-in, refer to the *EMC VFCache VMware VSI Plug-In Administration guide*.

To use VFCache with the command line interface, refer to the *EMC VFCache Installation and Administration guide*.

Upgrading VFCache

This section describes the steps required to upgrade VFCache from version 1.0 to version 1.5.

To upgrade, you must perform the following steps, in the following order:

1. Updating the device driver on the ESX host.
2. Updating the firmware on the ESX host (may not be necessary).
3. Updating the VFCache driver and VFCache agent on the virtual machine.
4. Updating the VSI plug-in on the management center.

Note: Upgrading may require a system reboot. Plan to perform the upgrade during system downtime.

As part of the upgrade process, the standard VFCache configuration file is updated. If you have changed your configuration file, for example, to enter a specific IP, you must make this change to the new configuration file, too.

Proceed to the section that matches your VFCache product:

- "Upgrading PCIEHHS-3XXL\2" on page 35
- "Upgrading PCIEHHS-3XXM\2" on page 39

Note: If you upgrade your vSphere/PowerCLI from v4 to v5, you must also install the VSI plug-in that matches the new version. Perform these tasks in the following order:
1. Use Control Panel to uninstall the VSI plug-in.
2. Upgrade the vSphere and PowerCLI.
3. Install the matching version of the VSI plug-in.

Upgrading PCIEHHS-3XXL\2

Before you begin, download the firmware and device driver files for your PCIEHHS-3XXL\2 product and operating system from EMC Online Support.

Updating the device driver on the ESX host

To install the device driver, perform the following steps, while logged in as a root user:

1. Upload the downloaded VIB file to the `/tmp` directory on the ESX server.
2. Put the ESX host into maintenance mode by executing the following command:

   `vim-cmd hostsvc/maintenance_mode_enter`

3. Install the driver:
   - For ESX 4.0, execute the following commands:
     - **`cd/tmp`**
     - **`esxupdate update -b <driver_file> --nosigcheck`**

     where *driver_file* is the VIB file that was uploaded to the /tmp directory.
   - For ESX 5.0, execute the following commands:
     - **`Uesxcli software acceptance set --level=CommunitySupported`**
     - **`esxcli software vib install -v file:/tmp/scsi-mpt2sas-11.00.00.00.2vmw-1OEM.500.0.0.472560.x86_64.vib`**

Continue to the next section.

Updating the firmware on the ESX host

To update the device firmware, perform the steps for your operating system.

- "Updating firmware for ESX 4.x" on page 36
- "Updating firmware for ESX 5.0" on page 37

Updating firmware for ESX 4.x

Download the files that match your product and operating system from EMC Online Support.

You use the DDOEMCLI command line tool to update the firmware.

To update the firmware, perform the following steps:

1. Install the DDOEMCLI management tool by performing the following steps:
   1. Extract the following file: `DDOEMCLI_NO_PHASE-01.250.31.00.zip`.
   2. From the `ddmfgcli_linux_x86_rel` folder, upload the `ddoemcli` file to the `/opt/lsi/bin` directory (create that directory if necessary).
2. Execute the following command: **`chmod +x /opt/lsi/bin/ddoemcli`**
3. Upload `SLP-300_<xx.xx.xx.xx>.bin` to the ESX host.
4. Update the firmware by performing the following steps:
   1. Locate the card ID by executing the following command:
      `/opt/lsi/bin/ddoemcli -listall`
   2. Execute the following command:

      `/opt/lsi/bin/ddoemcli -c <card_ID#> -updatepkg <full_path_bin>`

      where *Card_ID#* is the ID number of the VFCache card

      where *full_path_bin* is the full path to the `SLP-300_<xx.xx.xx.xx>.bin` file
5. Verify that the package version was updated by executing the following command and verifying that the number of the new package appears:

   `/opt/lsi/bin/ddoemcli -listall`

Updating firmware for ESX 5.0

Download the files that match your product and operating system from EMC Online Support.

You use the DDOEMCLI command line tool to update the firmware.

To update the firmware, perform the following steps:

1. Install the DDOEMCLI management tool:
   1. Extract the following file: `DDOEMCLI_NO_PHASE-01.250.31.00.zip`.
   2. From the `ddmfgcli_vmware_esx50_rel` folder, upload the file `vmware-esx-ddoemcli.vib` file to the `/tmp` directory.
   3. Install the VIB file by executing the following command:

      esxcli software vib install -v file:/tmp/vmware-esx-ddoemcli.vib
2. Upload `SLP-300_<xx.xx.xx.xx>.bin` to the ESX host.
3. Update the firmware by performing the following steps:
   1. Locate the card ID by executing the following command: **ddoemcli -listall**
   2. Execute the following command:

      ddoemcli -c <card_ID#> -updatepkg <full_path_bin>

      where *Card_ID#* is the ID number of the VFCache card

      where *full_path_bin* is the full path to the `SLP-300_<xx.xx.xx.xx>.bin` file
4. Verify that the package version was updated by executing the following command and verifying that the number of the new package appears:

   ./ddoemcli -listall

Updating the VFCache driver and the VFCache agent on the virtual machine

1. To update the VFCache driver, perform the following:
   - On a Windows virtual machine, run the VFCache driver MSI file.
   - On a Linux virtual machine, execute the following command:

     rpm -Uvh <*new_VFCache_Driver_rpm*>

     where *new_VFCache_Driver_rpm* is the full path to the VFCache driver RPM file

2. To update the VFCache agent, perform the following:
   - On a Windows virtual machine, run the VFCache agent MSI file.
   - On a Linux virtual machine, execute the following commands:
     - **rpm -Uvh --nopreun --nopostun <*new_VFCache_Agent_rpm*>**
     - **/etc/init.d/SFC start**

       where *new_VFCache_Agent rpm* is the full path to the VFCache agent RPM file

Updating the VFCache VSI Plug-in on the management center

To update the VFCache driver on the Windows management machine, run the VSI plugin MSI.

If you have made changes to the VFCache configuration file, such as entering a specific IP, you will need to edit the new configuration file, `EMC.VSI.VSphere4.Features.VFCache.Core.dll.config`, located in the `C:\Program Files (x86)\EMC\Virtual Storage Integrator\vSphere4\Features\VFCache` folder.

The upgrade process is complete.

Upgrading PCIEHHS-3XXM\2

Before you begin, download the firmware and device driver files for your PCIEHHS-3XXM\2 product and operating system from EMC Online Support.

Updating the device driver on the ESX host

To install the device driver, perform the following steps, while logged in as a root user:

1. Upload the downloaded VIB file to the `/tmp` directory on the ESX server.
2. Put the ESX host into maintenance mode by executing the following command:

   vim-cmd hostsvc/maintenance_mode_enter

3. Install the driver:
   - For ESX 4.0, execute the following commands:
     - **cd/tmp**
     - **esxupdate update -b <*driver_file*> --nosigcheck**

       where *driver_file* is the VIB file that was uploaded to the `/tmp` directory.
   - For ESX 5.0, execute the following commands:
     - **esxcli software acceptance set --level=CommunitySupported**
     - **esxcli software vib install -v file:/tmp/scsi-mpt2sas-11.00.00.00.2vmw-1OEM.500.0.0.472560.x86_64.vib**
4. Reboot the host.
5. Take the ESX host out of maintenance mode by executing the following command.

   vim-cmd hostsvc/maintenance_mode_exit

Continue with the next section.

Updating the device firmware on the ESX host

To update the device firmware, perform the following steps:

1. Upload the downloaded VIB file, `emc-vfc-1.5.0-<build-number>.x86_64.vib,` to `/tmp` on the ESX server.
2. Install the VIB file on the ESX host by executing the following command:

   esxcli software vib install <*VIB_path*>

   where *VIB_Path* is the full path to the VIB file
3. From the `/opt/emcsfc/bin/vfcmt` directory, update the firmware by executing the following command:

   vfcmt updatefirmware -device <*device*> -path <*path*>

   where *device* is the full path to the VFCache device

   where *path* is the full path to the .ubi firmware file

Updating the VFCache driver and the VFCache agent on the virtual machine

1. To update the VFCache driver, perform the following:
   - On a Windows virtual machine, run the VFCache driver MSI file.
   - On a Linux virtual machine, execute the following command:

     `rpm -Uvh <new_VFCache_Driver_rpm>`

     where *new_VFCache_Driver_rpm* is the full path to the new VFCache driver RPM file
2. To update the VFCache agent, perform the following:
   - On a Windows virtual machine, run the VFCache agent MSI.
   - On a Linux virtual machine, execute the following commands:
     - **`rpm -Uvh --nopreun --nopostun <new_VFCache_Agent_rpm>`**
     - **`/etc/init.d/SFC start`**

       where *new_VFCache_Agent_rpm* is the full path to the new VFCache agent RPM file

Updating the VFCache VSI Plug-in

To update the VFCache driver on the Windows management machine, run the VSI plugin MSI.

If you have made changes to the VFCache configuration file, such as entering a specific IP, you will need to edit the new configuration file, `EMC.VSI.VSphere4.Features.VFCache.Core.dll.config`, located in the `C:\Program Files (x86)\EMC\Virtual Storage Integrator\vSphere4\Features\VFCache` folder.

Removing VFCache components

The following section describes how to remove the various VFCache components.

Removing VFCache for Windows

To remove VFCache, you need to remove the VFCache agent and then the VFCache driver.

To remove the VFCache agent, perform the following:

1. From **Control Panel** › **Programs and Features**, double-click **EMC VFCache Agent**.

   The Install Wizard is displayed.

2. Follow the instructions in the wizard.
3. Reboot the computer.

Note: If you plan to remove the VFCache driver following the removal of the VFCache agent, you can postpone rebooting the computer in the previous step until after removing the VFCache driver.

To remove the VFCache driver, perform the following:

1. From **Control Panel** › **Programs and Features**, double-click **EMC Vfc 1.5 (64-bit)**.

   The Install Wizard is displayed.

2. Follow the instructions in the wizard.
3. Reboot the computer.

Note: Configuration files will remain in the `\Program Files\VFC` folder, and will be reused if you reinstall VFCache.

Removing VFCache for Linux

To remove the VFCache driver and VFCache agent on a Linux system, stop all source devices, stop all cache devices, and then execute the following commands:

- **`/etc/init.d/SFC stop`**
- **`rpm -qa | grep -i emc`**
- **`rpm -e <`*`the package output by the previous command`*`>`**
- **`cd /etc`**
- **`rm -rf emcsfc`**
- **`cd /`**

Removing the VSI plug-in on the management station

To remove the VSI plug-in on the management station, perform the following:

1. From **Control Panel › Programs and Features**, double-click **EMC VFCache VSI Plugin for VMware PowerCLI ‹version›**.

   The Install Wizard is displayed.

2. Follow the instructions in the wizard.

CHAPTER 2
Troubleshooting

This chapter describes the activities that can be performed to troubleshoot problems that may arise. Topics include:

Installation issues

To ensure an effortless installation, make sure that:

- You have all the prerequisites installed *before* starting the installation.
- You install the version of the VFCache feature that matches your version of powerCLI (version 4 or version 5). If you have several versions of powerCLI installed, install the VFCache VSI plug-in that matches the highest version.

VFCache agent installation issues

If you encounter issues during the installation or uninstallation of the VFCache agent in Windows, retry the installation or uninstallation using the following procedures before contacting customer support. These methods produce a log that is useful for troubleshooting the problem.

Installing VFCache agent with logging enabled

To install the VFCache agent with logging enabled, run the following command:

```
msiexec /lvoicewarmup <log-file> /i <msi-file>
```

where *log-file* is the location of where to create the log file.

where *msi-file* is the location of the MSI installation file.

Uninstalling VFCache agent with logging enabled

To uninstall the VFCache agent with logging enabled, run the following command:

```
msiexec /lvoicewarmup <log-file> /x <msi-file>
```

where *log-file* is the location of where to create the log file.

where *msi-file* is the location of the MSI installation file.

Card issues

This section describes the following issues that are relevant to the physical card:

- "Device "missing" errors" on page 46
- "Finding the card's serial number" on page 47
- "Replacing cards" on page 47

Device "missing" errors

This section answers common issues relating to missing, or otherwise unexpected device errors.

Problem: Your cache device does not appear after adding it to a virtual machine.

Solution: After adding a device to a virtual machine you must reboot the virtual machine for the changes to take effect. For Windows machines, you do not need to reboot, but you must initialize the disk via the Windows Disk Manager and then set it on-line.

Problem: Your device appears, but when trying to add a device as a cache or source device, the error *missing datastore details* appears.

Solution: From the Commands section of the VFCache management window, click **enable disk mapping to guest**, then shut down and restart the virtual machine.

Problem: The message *Cannot be displayed. Device may be mapped via RDM* appears for a device that is not RDM.

Solution: Make sure the machine was shut down and started again after you enabled "disk mapping to guest". Don't use "restart", but "shut down" and "start".

Finding the card's serial number

If you need service on your card, you should gather the following information before contacting EMC:

- Serial number (SN): _____
- Part number (PN) : _____
- Revision number (REV) : _____

This information is located on a sticker on the flash device and should have been written down as part of the installation process.

To determine this information, perform the following:

- For product PCIEHHS-3XXL/2, use the **ddoemcli** utility.
- For product PCIEHHS-3XXL/2 or 7XXL, use the **`rssdm - L`** command from the **rssdm** utility.

Replacing cards

This section describes how to replace a VFCache card.

Before changing your system configuration, back up your data.

If your VFCache card is partitioned and used for storage (DAS), back up this data before replacing the device.

Review this entire section before replacing a card.

To successfully replace cards, you must perform the following tasks:

- "Stopping the caching operations on the virtual machine" on page 47
- "Removing the VMFS datastore" on page 48
- "Replacing the physical card" on page 48
- "Creating a new VFCache datastore" on page 48
- "Configuring the VFCache devices" on page 48

Stopping the caching operations on the virtual machine

The first step in replacing a card is to remove all source and cache devices that are configured on the card to be replaced. You use the VFCache feature in the VSI plug-in to perform these tasks.

To stop the caching operations, perform the following steps:

1. Remove all source devices by selecting each source device that is being accelerated by the cache device and clicking **Remove**.
2. Remove the cache device by selecting the cache device that you are replacing and clicking **Remove**.

When these tasks complete, power off the virtual machine.

Repeat these steps on every virtual machine to which a portion of the VFCache card is allocated.

Removing the VMFS datastore

The next step is to remove the VMFS datastore that was created on the VFCache card.

To remove the VMFS datastore, perform the following steps:

1. Remove the datastore from the virtual machine:
    1. Right-click the virtual machine and choose Edit Settings.
    2. In the **Virtual Machine Properties** dialog box, select the hard disk to remove, click **Remove**, then click **OK**.
2. Remove the datastore from the ESX host:
    1. Select the **Configuration** tab from the host view and click **Storage**.
    2. Select the datastore to delete and click **Delete**.

When this task completes, shut down the ESX host.

Replacing the physical card

To replace the physical card and install the device drivers, follow the procedure documented in the *VFCache Installation Guide for VMware.*

Creating a new VFCache datastore

To create a new VFCache datastore, follow the procedure documented in the *VFCache VMware VSI Plug-in Administration Guide v1.5*.

Configuring the VFCache devices

To configure the cache device, follow the procedure documented in the *VFCache VMware VSI Plug-in Administration Guide v1.5*.

LED indicators

Three board-mounted, right-angle LEDs shine through holes in the PCI bracket. The meaning of these LEDs, listed as they appear top to bottom on the card bracket, is described in the following tables.

Table 6 LED indicator codes - Product PCIEHHS-3XXL\2

LED Name	LED Indications	Actions
Activity	Green – Indicates data activity on the card	Green – No action required
Drive Life	Green – Card has sufficient life remaining for programming and erasing the Flash memory Yellow – Card has approximately 20%, or less, of life remaining for programming and erasing the Flash memory Red – Card has no program or erase cycles left, and data can be read, but not written	Green – No action required Yellow – Plan for replacement Red – Backup data, copy to a new WarpDrive Acceleration card
Drive Status	Steady Green – Normal Blinking Green – Locate Yellow – Warning, includes: Incorrect operating system driver Component issues Red - Firmware fault code blink	Green – No action Yellow – Ensure that the WarpDrive OS driver is installed Red – If no information, reboot system and retry If no information, call your field application engineer
Activity	Green – Indicates data activity on the card	Green – No action required
Drive Life	Green – Card has sufficient life remaining for programming and erasing the Flash memory	Green – No action required

Table 7 LED indicator codes - Product PCIEHHS-3XXM\2 and PCIEHHS-7XXM

HHHL			Description
Green LED	**Amber LED**	**Red LED**	
Off	Off	Off	Indicates that power is off.
Green/amber flashing alternately (200ms)		Off	Firmware is rebuilding tables.
On	Off	Off	Power on, no host activity.

Table 7 LED indicator codes - Product PCIEHHS-3XXM\2 and PCIEHHS-7XXM

HHHL			Description
Green LED	**Amber LED**	**Red LED**	
Flashing (30ms)	Off	Off	Host, PCI, and NAND activity.
Flash error code	Flash error code	Flash error code	Indicates an error code. Error codes are three digits long and are displayed by blinking the first digit, then the second, then the third with pauses in between and a long pause before repeating. The drive is not operational. Firmware fatal error codes: **112**: Failure during DRAM initialization **113**: Not enough DRAM to run in the configured mode **313**: DRAM UECC error **441**: Error during chip initialization **411**: Incorrect drive parameters in the firmware image
Off	Flashing (30ms)	Off	Meta data is being saved.
Off	On	Off	Safe to power off.
Off	Off	On	Drive encountered critical error. Call support.