



# EMC<sup>®</sup> PowerPath<sup>®</sup> and PowerPath/VE for Microsoft Windows

Version 5.7 and Minor Releases

## Installation and Administration Guide

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REV 04

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For the most up-to-date regulatory document for your product line, go to the technical documentation and advisories section on the EMC Online Support website.

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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.*

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**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.

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## Purpose

This document describes how to configure and use EMC PowerPath.

## Audience

This manual is part of the PowerPath documentation set. It is intended for use by storage administrators and other information system professionals responsible for installing, using, and maintaining PowerPath software.

Readers of this manual are expected to be familiar with the host operating system, storage system management, and the applications used with PowerPath software.

## Related documentation

Here is the complete set of PowerPath documentation. All manuals are available on the EMC Online Support website:

- ◆ *EMC PowerPath Family Product Guide*
- ◆ *EMC PowerPath Family CLI and System Messages Reference Guide*
- ◆ *EMC PowerPath and PowerPath/VE Family for Microsoft Windows Release Notes*
- ◆ *EMC PowerPath Encryption with RSA User Guide*
- ◆ *EMC PowerPath Migration Enabler User Guide*
- ◆ *EMC PowerPath Management Pack for Microsoft Operations Manager User Guide*

If your environment includes EMC Symmetrix storage systems, refer also to the EMC host connectivity guides, which are available on the EMC Online Support website

<https://support.emc.com>

If your environment includes EMC VNX and CLARiiON storage systems, refer also to the following manuals:

- ◆ EMC host connectivity guides
- ◆ VNX Storage-System Support website ([www.EMC.com/vnxsupport](http://www.EMC.com/vnxsupport))
- ◆ CLARiiON Storage-System Support website ([www.EMC.com/clariionsupport](http://www.EMC.com/clariionsupport))

## Revision history

The following table presents the revision history of this document.

**Table 1** Revision history

| Revision | Date              | Description  |
|----------|-------------------|--|
| 04       | January 21, 2014  | Release of PowerPath for Windows 5.7 SP2. <ul style="list-style-type: none"> <li>• Support for EMC XtremIO firmware Version 2.2 and later.</li> <li>• Native LAM support for NetApp storage arrays FAS2240.</li> <li>• Support for enabling or disabling the Automatic Host-Array Registration feature.</li> </ul> |
| 03       | October 18, 2013  | Updated the section <a href="#">“PowerPath uninstallation troubleshooting” on page 51</a> for OPT 427143.  |
| 02       | June 28, 2013     | Added a new MSCS cluster functionality beginning with PowerPath 5.7 SP1 for Windows.   |
| 01       | February 22, 2013 | First release of the EMC PowerPath for Windows Version 5.7.  |

## Conventions used in this document

EMC uses the following conventions for special notices:

### CAUTION

**CAUTION**, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

### 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.

## Typographical conventions

EMC uses the following type style conventions in this document:

|                       |   |
|-----------------------|---|
| <b>Normal</b>         | Used in running (nonprocedural) text for: <ul style="list-style-type: none"> <li>Names of interface elements, such as names of windows, dialog boxes, buttons, fields, and menus</li> <li>Names of resources, attributes, pools, Boolean expressions, buttons, DQL statements, keywords, clauses, environment variables, functions, and utilities</li> <li>URLs, pathnames, filenames, directory names, computer names, links, groups, service keys, file systems, and notifications</li> </ul> |
| <b>Bold</b>           | Used in running (nonprocedural) text for names of commands, daemons, options, programs, processes, services, applications, utilities, kernels, notifications, system calls, and man pages<br><br>Used in procedures for: <ul style="list-style-type: none"> <li>Names of interface elements, such as names of windows, dialog boxes, buttons, fields, and menus</li> <li>What the user specifically selects, clicks, presses, or types</li> </ul>   |
| <i>Italic</i>         | Used in all text (including procedures) for: <ul style="list-style-type: none"> <li>Full titles of publications referenced in text</li> <li>Emphasis, for example, a new term</li> <li>Variables</li> </ul>   |
| <b>Courier</b>        | Used for: <ul style="list-style-type: none"> <li>System output, such as an error message or script</li> <li>URLs, complete paths, filenames, prompts, and syntax when shown outside of running text</li> </ul>  |
| <b>Courier bold</b>   | Used for specific user input, such as commands  |
| <i>Courier italic</i> | Used in procedures for: <ul style="list-style-type: none"> <li>Variables on the command line</li> <li>User input variables</li> </ul>   |
| < >                   | 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 information about EMC products, licensing, and service, go to the EMC Online Support website (registration required) at:

<https://support.emc.com>

**Technical support** — For technical support, go to EMC Online Support and select Service Center. On the Support page, you will see several options, including one to create a service request. Note that to open a service request, you must have a valid support agreement. Contact your EMC sales representative for details about obtaining a valid support agreement or with 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](mailto:techpubcomments@emc.com)

# CHAPTER 1

## Installing PowerPath

This chapter includes the following sections:

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## Before you install

The sequence of steps to configure a storage system and install EMC® PowerPath® or PowerPath/VE for Windows Hyper-V on a host depends on the storage system you use.

---

**Note:** Throughout this document, all references to PowerPath refer to PowerPath and PowerPath/VE for Windows Hyper-V, unless otherwise noted. PowerPath/VE for Windows Hyper-V provides the same multipathing functionality as PowerPath for Windows in nonvirtual environments, and it supports Migration Enabler and PowerPath Encryption with RSA.

---

## EMC Symmetrix storage systems

Install PowerPath after you set up the EMC Symmetrix® storage system and verify that it is working properly.

## EMC VNX and CLARiiON storage systems

PowerPath installation is an integral part of an EMC VNX™ Operating Environment (OE) and CLARiiON® setup and configuration procedure.

For information on when to install PowerPath on a host attached to a VNX or CLARiiON storage system, refer to the:

- ◆ VNX Storage-System Support website ([www.emc.com/vnxsupport](http://www.emc.com/vnxsupport))
- ◆ CLARiiON Storage-System Support website ([www.emc.com/clariionsupport](http://www.emc.com/clariionsupport)). From the home page, select your storage system type, then use the Attach server link (CX4 systems) or the Install link (all other systems) to generate step-by-step instructions.

CLARiiON AX-series installation, planning, and troubleshooting documents are located on the AX-series support website. For information on accessing the site, refer to the support documentation that shipped with your storage system. Refer to these documents for prescribed installation information only when AX-series storage systems are used.

## XtremIO storage arrays

This section describes the support for EMC® XtremIO™ storage arrays introduced beginning with PowerPath for Windows 5.7 SP2.

PowerPath Version 5.7 SP1 is the last version for Windows to include qualified support for XtremIO Version 1.05 through generic LAM. PowerPath Version 5.7 SP2 and above only supports XtremIO Version 2.2 and later.

If you are upgrading from PowerPath Version 5.7 SP1 to PowerPath Version 5.7 SP2 through the GUI method, and if generic XtremIO Version 1.05 support is installed as part of the 5.7 SP1 package, PowerPath installer provides an option to either continue with the installation or abort the installation. If you are performing a silent upgrade through the CLI method, you need to pass the **XTREMIO\_NATIVE\_ONLY=1** command line switch to the installer to continue with the installation. The ["CLI parameters" on page 25](#) provides the required information.

If you continue with the installation, XtremIO Version 1.05 devices will not be managed by PowerPath Version 5.7 SP2.

## NetApp storage arrays

This section describes the support for NetApp storage array introduced in PowerPath for Windows 5.7 SP2.

PowerPath reports NetApp ID in powermt output and in user interface only if the **Report SCSI Name String Inquiry Descriptor** setting is enabled for the initiator group through which host is connected to LUNs.

The setting is disabled by default for Windows-based initiator groups, and enabled by default for all the other operating system types. Use the following NetApp commands to check the current value of the setting:

```
igroup show -v igroup_name
```

For example,

```
system1> igroup show -v <initiator group name>
<Initiator group name> (FCP):
OS Type: windows
Member: 10:00:00:00:c9:ac:58:ec (logged in on: vtic)
Member: 10:00:00:00:c9:ac:58:ed (logged in on: vtic, 1b)
UUID: 4e4eb665-fff8-11e2-98b7-123478563412
ALUA: Yes
Report SCSI Name in Inquiry Descriptor: Yes
```

Use the following command to enable report\_scsi\_name

```
igroup set igroup_name report_scsi_name yes
```

For a NetApp HA pair, the following property settings must be set for an initiator group before installing PowerPath:

- ◆ The **report\_scsi\_name** property must be enabled (set to **yes**) for both controllers of the pair.
- ◆ The **ALUA** property, set using the **igroup** command must be the same for two controllers of the pair, that is, it should either be **yes** or **no** for both the controllers.

For example,

```
igroup set <ig name> alua yes
```

OR

```
igroup set <ig name> alua no
```

## Obtain up-to-date information

Check the EMC Online Support website for current information:

- ❑ PowerPath documentation — EMC updates PowerPath documentation when it releases new features with a service pack or when documentation errors are reported. To obtain updated PowerPath documentation on EMC Online Support, select **Support by Product > Documentation**.

- ❑ Service packs and upgrades — You can download PowerPath service pack software from EMC Online Support. Determine which service packs (if any) to install after PowerPath, and whether those service packs have any additional installation prerequisites. To obtain service packs on EMC Online Support, select **Downloads**.

## Choose a convenient time

Installing PowerPath requires that you reboot the host. Plan to install or upgrade PowerPath when a reboot will cause minimal disruption to your site.

## Activate your license

Effective February 15, 2011, instead of the physical Right To Use (RTU), the default delivery method for PowerPath licenses is electronic. An electronic License Authorization Code (LAC) is sent by email in order to redeem the license key on the Powerlink Licensing portal. This does not affect upgrades because PowerPath retains existing license information.

Physical RTU cards are still available as an option. EMC Global Support, at 1-800-svc4emc or 1-800-782-4362, can provide more information.

PowerPath/VE for Windows Hyper-V and PowerPath for Windows require separate licenses. However, the licensing process for PowerPath/VE for Windows Hyper-V is the same as the licensing process for PowerPath for Windows.

The licensing process for both PowerPath/VE for Windows Hyper-V and for PowerPath for Windows is described in the EMC PowerPath Family Electronic License Ordering Process Technical Notes, available on EMC Online Support.

Take note of the following regarding licenses:

- ◆ In nonvirtual environments, installing PowerPath on a host connected exclusively to a CLARiiON AX-series array does not require a license. PowerPath provides full support, with or without a PowerPath license, when the host is connected exclusively to a CLARiiON AX-series array.
- ◆ If you are upgrading from an earlier version of PowerPath, you do not need to reregister. PowerPath will use your old key.
- ◆ PowerPath Migration Enabler does not require a separate product license. The PowerPath Multipathing license includes Migration Enabler functionality for all technology types (Host Copy, Open Replicator, TimeFinder/Clone, Encapsulation).
- ◆ Separate license keys are required to enable PowerPath Encryption with RSA® and PowerPath/VE for Windows Hyper-V. The PowerPath Encryption with RSA® license supports Host Copy data migration to or from encrypted devices without the need to install the PowerPath multipathing license. The PowerPath multipathing license is required when migrating with only plaintext devices (no encrypted devices as source or target).
- ◆ Type the registration number exactly as it appears on the card or letter. To reduce common typographical errors, the **License Key** field accepts either uppercase or lowercase letters, and certain numbers and letters are interchangeable. Specifically, an entry of the alphabetic letters O, I, S, and B is equivalent to an entry of the numbers, 0, 1, 5, and 8.

If you have additional questions about entering licenses, consult the online help file by pressing **F1** from the **EMC Licensing Tool**. You must have Internet Explorer 5.0 or later to view these files. If you do not have this browser installed, you may still view the help file, *EmcLicTool.chm*, directly from the \help folder on the PowerPath installation CD.

## Prepare the host and storage system

Prepare the host and storage system:

- ❑ Go to EMC Online Support and verify your environment meets the requirements found in the *EMC PowerPath and PowerPath/VE Family for Windows Release Notes* and the E-Lab™ Interoperability Navigator by running the PowerPath Configuration Checker (PPCC). For PPCC installation information, the *EMC PowerPath Configuration Checker User Guide*, available on EMC Online Support, provides additional information.
  - ❑ The *EMC PowerPath and PowerPath/VE Family for Windows Release Notes* includes the qualified Microsoft MPIO framework versions. For Windows Server 2003:
    - If the required MPIO framework is not installed on the host, the PowerPath installer installs MPIO during PowerPath installation. The PowerPath installer prompts you if an earlier or later MPIO version is present on the host.
    - If an unsupported version of the MPIO framework is installed on the host, the PowerPath installer prompts you to upgrade to the supported version. If you do not upgrade, the PowerPath installation aborts.
    - If a version of MPIO framework later than the supported version is installed, PowerPath provides the option to abort the installation.
- 
- Note:** MPIO technologies and functionality are unique to each operating system. Refer to the documentation provided by your operating system manufacturer for specific information.
- 
- ❑ Before installing PowerPath 5.7.x on a Windows Server 2003 operating system, ensure that you install Windows Server 2003 SP2 Microsoft STORPort hotfix Q957910.
    - Refer to the “Support Summary” section of the *EMC PowerPath and PowerPath/VE Family for Windows Release Notes* for a list of all Microsoft Hotfixes that are required to be installed, depending on your Windows Operating System.
  - ❑ Configure HBA drivers. Ensure that you follow the HBA driver configuration guidelines outlined in the E-Lab Interoperability Navigator and the HBA vendor documentation. The use of improper settings can cause erratic failover behavior, such as greatly increased I/O delays.
  - ❑ For hosts connected to storage arrays through a Fibre Channel switch (that is, a fabric), configure the HBAs by using persistent binding for SCSI target IDs.
  - ❑ For first-time installations, remove any version of EMC Navisphere® Application Transparent Failover (ATF) installed on the host.

### CAUTION

The procedure for migrating from ATF or CLARiiON Driver Extension (CDE) to PowerPath is not straightforward. Contact EMC Professional Services for assistance on performing the migration. If you perform the migration yourself, you risk the loss of data.

---

## Booting from a storage array device

The following documents provide instructions for configuring a storage array device as the boot device:

- ◆ *EMC Fibre Channel with Emulex Host Bus Adapters in the Windows Environment*, available on the Emulex website.
- ◆ *EMC Fibre Channel and iSCSI with QLogic Host Bus Adapters in the Windows Environment*, available on the QLogic website.

## Preparing a cluster environment

[Chapter 5, "PowerPath in an MSCS Cluster,"](#) provides information on installing PowerPath in a new or existing cluster.

## Installing PowerPath before configuring the network

EMC recommends installing PowerPath after configuring the network.

PowerPath uses the network MAC address to establish a unique identifier for cluster reservations. If PowerPath is installed before any network connections are configured then PowerPath is unable to establish the unique host identifier.

To install PowerPath before configuring the network:

1. Install PowerPath.
2. Configure the network.
3. Run the **emcphostid** utility located in the `<installdir>\EMC\PowerPath` directory. The *EMC PowerPath Family CLI and System Messages Reference Guide* provides more information on the **emcphostid** utility.
4. Restart the host.

## Installing in virtual environments

The procedure to install PowerPath in virtual environments is the same as the procedure to install in physical environments. You can follow the GUI or the CLI installation procedure described in this document.

EMC supports iSCSI connections directly attached to EMC storage using the Microsoft Initiator in a child partition. In this configuration PowerPath is supported in a child partition to manage multiple iSCSI paths. However, pass-through disks are not supported when running EMC PowerPath. For more information on the supported virtual environments, refer to the *EMC PowerPath and PowerPath/VE Family for Windows Release Notes* and the E-Lab Interoperability Navigator.

## Coexistence with third-party path management software

PowerPath can coexist with MPIO-based third-party path management software such as:

- ◆ Hitachi Dynamic Link Manager (HDLM)
- ◆ IBM Subsystem Device Driver (SDD)

- ◆ HP StorageWorks Secure Path
- ◆ HP StorageWorks AutoPath XP Virtual Array
- ◆ Microsoft MPIO (native multipathing)

PowerPath cannot co-manage devices with third-party path management software.

When PowerPath coexists with other multipathing software, the HBA cannot be shared between the two.

## Before you upgrade or apply a service pack

Before upgrading PowerPath or installing a service pack:

1. Go to EMC Online Support and do the following:
  - a. Check for the most current information. EMC updates release notes periodically and posts them on EMC Online Support.
  - b. Download the latest version of EMC Reports, available on EMC Online Support, and then run the PowerPath Configuration Checker (PPCC).
  - c. Download the PowerPath software on EMC Online Support at **Downloads** and save it to your local directory.
2. Save the current PowerPath configuration.
  - Run the **powermt save** command to ensure that you have saved the latest PowerPath configuration information.
  - or
  - In PowerPath Administrator, right-click the root node and select **All Tasks > Save Config as**. Then specify a file name and click **Save**.
3. Stop **powermt display** if it is running.
4. Uninstall any PowerPath hot fixes on the host. Use **Add/Remove Programs** or **Programs and Features** to verify if hot fixes are installed.
5. If upgrading, review the information in ["Supported upgrades" on page 28](#).
6. Install PowerPath.
7. If installing a service pack or patch, verify the configuration is correct and then save it. This ensures the configuration file is updated to the current format.

---

**Note:** PowerPath stores configuration information in a file that may be loaded at boot time. When using the PowerPath Administrator, the configuration file can be saved only under the default filename. After a service pack is applied, the format of the configuration file may change so it is no longer backward compatible.

---

## Installation procedures

You can install PowerPath for Windows with the default GUI method or through the CLI. Refer to one of the following procedures to install PowerPath.

---

**Note:** You must have administrative rights to install PowerPath.

---

- ◆ ["Interactive GUI installation \(default method\)" on page 20](#)
- ◆ ["CLI installation" on page 23](#)

PowerPath installation creates installation logs by default in:

- ◆ %ProgramData%\EMC\PowerPath\logs (Windows Server 2008 and later)
- ◆ %ALLUSERSPROFILE%\Application Data\EMC\PowerPath\logs (Windows Server 2003).

## Interactive GUI installation (default method)

To install PowerPath with the default interactive prompts:

1. If the PowerPath executable file is saved on your local system, go to [Step 2](#). To install from the software CD:
  - a. Load the CD. If autoplay is enabled, your browser launches the **Getting Started** page. If autoplay is not enabled, go to [Step 2](#).
  - b. Click the appropriate link for your operating system and then select **Run this program from its current location**.
  - c. Click **OK** and proceed to [Step 3](#). Continue to [Step 2](#) if autoplay is not enabled.

2. Double-click the PowerPath executable file, or click **Start** and select **Run**.

In the **Run** window, browse to or enter the name of the PowerPath installation program: `<drive>\<PowerPath_pkg_name>`

3. Select the language for this installation from the list and click **Next**.

Localized versions of the PowerPath installer are available in Brazilian Portuguese, Latin American Spanish, French, German, Italian, Japanese, Korean, and simplified Chinese.

4. If you are upgrading from PowerPath Version 5.7 SP1 to PowerPath Version 5.7 SP2 through the interactive GUI method, and if generic XtremIO Version 1.05 support is installed as part of the 5.7 SP1 package, a deprecation dialog box appears with an option to either continue or abort the installation process. Click **Yes** to continue the installation process.

---

**Note:** If you continue with the installation, XtremIO Version 1.05 devices will not be managed by PowerPath Version 5.7 SP2.

---

5. In the setup wizard welcome window, click **Next**.
6. In the **Custom Setup** dialog box, select the features for installation. By default, Multipathing, Migration Enabler, Management Component, and support for EMC storage arrays are selected. Clear unwanted default features or select additional features (such as Encryption with RSA or third-party storage arrays such as NetApp) and then click **Next**.

---

**Note:** If you are upgrading from PowerPath Version 5.7.x to PowerPath Version 5.7 SP2, XtremIO (EMC storage array) is selected for installation by default. NetApp (third-party storage array) is not selected for installation by default; however, you can install it by selecting it either from the **Custom Setup** dialog box or through the command line interface. The [“Add features through the CLI”](#) section provides the required information for adding features through command line interface.

---

- To select or clear features, click the arrow and select the appropriate option from the drop-down menu:
    - Will be installed on local hard drive
    - Entire feature will be installed on local hard drive
    - Entire feature will be unavailable
  - Click **Disk Usage** to view the required and available space needed to install selected features.
7. Click **Next**.
    - a. If you are upgrading from PowerPath version 5.7.x to PowerPath version 5.7 SP2, click **Update** on the **Install Update** dialog box to directly install PowerPath version 5.7 SP2 installation package.
  8. On Windows Server 2003, if you are installing PowerPath in a cluster environment and selected Migration Enabler as one of the feature to be installed, the **Migrate in an MSCS cluster environment** dialog box appears.
    - a. Select the **Configure all cluster groups on the current node** check box to add PowerPath Migration Enabler cluster resources for all the cluster groups owned by the current node. This will automatically configure PowerPath Migration Enabler cluster resources in an MSCS environment. Cluster groups owned by other nodes will not be affected.
    - b. Clear the **Configure all cluster groups on the current node** check box if you do not want Migration Enabler cluster resources to be configured.

#### NOTICE

If you do not configure PowerPath Migration Enabler cluster resources during installation, you can still configure them later using the **powermigcl** command through CLI. The *EMC PowerPath Family CLI and System Messages Reference Guide* provides additional information on the **powermigcl** command, its syntax, and the associated arguments.

---

9. In the **Ready to Install** dialog box, click **Install**.
  - a. If PowerPath detects that files that need to be updated are currently in use, select one of the following options:
    - Automatically close and attempt to restart applications.
    - Do not close applications (A reboot will be required.)
 If PowerPath does not detect files currently in use, proceed to [Step c](#).
  - b. Click **OK**.
  - c. On the Windows Security dialog box, click **Install** to install the device software.

Optionally, select **Always trust software from** <device vendor>.

- d. If there is no license in the registry, the EMC Licensing Tool appears.

When prompted by the EMC Licensing Tool, type your 24-digit registration number in the **License Key** field, and then click **Add**.

---

**Note:**

- *PowerPath for Windows* and *PowerPath/VE for Windows Hyper-V* each require a separate license. The licensing procedure is the same for each.
  - When upgrading PowerPath, the existing license key is saved and no input is required.
  - To enable PowerPath Encryption with RSA or additional array support, enter the license keys. Migration Enabler is enabled when you enter a valid multipathing license key.
- 

- e. Click **OK**.

10. In the installation Wizard Completed dialog box, if you want to change the Management Component default settings, click **Launch Management Component Configuration Utility**. Click **Finish**.

**NOTICE**

If you do not launch the Management Component Configuration utility during installation, you can configure the Management Component later by going to **Start > Programs > EMC > Configuration** and selecting **Management Component Configuration**.

If you launched the Management Component Configuration utility, review the following parameters. The *PowerPath Viewer Installation and Administration Guide* provides more information.

- Ensure that **Enable PowerPath Management Component** is selected. It is selected by default.
- In the **Port Number** field, maintain the default and recommended port value of 9083 or change the port value to a value between 49152 and 65535 if another application is already using the default port (9083).
- In the **Heartbeat Interval** field, maintain the default value of 10 minutes or change the heartbeat interval value to a value between 1 and 60. EMC recommends that the heartbeat interval be based on the number of hosts being managed.
- Click **Disable Single Path Symmetrix GateKeeper Setup Warnings** to maintain the default setting if you do not want Setup errors to be reported for Symmetrix gatekeeper devices that are configured with a single path. Otherwise, clear the check box if Symmetrix gatekeeper devices are multi-pathed in your data center.

---

**Note:** PowerPath supports both single-path and multi-path configured Symmetrix gatekeepers. Consult your network administrator for more information about your Symmetrix gatekeeper configuration.

---

- Click to make PowerPath performance metrics (PowerPath counters) available in the Windows Performance monitoring tools.

11. Click **Yes** to reboot now or **No** to reboot later.
12. (optional) If you installed Migration Enabler or Encryption with RSA, and if you are not planning to use these features, EMC recommends that you disable these services and change the Startup type to **disabled**.

---

**Note:** When Encryption services are enabled, Migration services are automatically enabled.

---

13. When the host restarts, follow the instructions in ["After you install or upgrade" on page 30](#).

## CLI installation

To install PowerPath using the more advanced command line interface, follow these steps. Use spaces to separate multiple properties.

1. Use this command syntax to install PowerPath:

```
<drive>:\<PowerPath_pkg_name> <install_parameters> /v"<Property>=<Value>"
```

- For a silent installation, which does not require user input, use this syntax:

---

**Note:** Silent installation errors are logged in *<logfile>*, the location specified in the installation command. No error message appears in the PowerPath Administrator GUI.

---

```
<drive>:\<PowerPath_pkg_name> /s /v"/L*v <logfile> <Property>=<Value>"
```

- For an interactive installation, which requires user input, use this syntax:

```
<drive>:\<PowerPath_pkg_name> /v"/L*v <logfile> <Property>=<Value>"
```

Where:

- *<drive>* is the drive letter, for example, C.
- *<PowerPath\_pkg\_name>* is the PowerPath package name. For example, EMCPower.X64.signed.5.7.SP2.bxxx.exe
- *<install\_parameters>* is one or more parameters described in [Table 2 on page 25](#).
- *<logfile>* creates the log file where the log message will be sent, for example, C:\logs\PPsetup.log.
- Ensure the specified directory exists within the specified path.
- *<Property>=<Value>* is one or more optional properties described under the */v* parameter in [Table 2 on page 25](#).

### Examples: Silent installation

To install all default PowerPath features (Multipathing, Migration Enabler, Management Component, and support for EMC storage arrays) using the silent installation method and to also set the PowerPath license and disable reboot, enter:

---

**Note:** Silent installations include the **/s** parameters.

---

```
C:\EMCPower.X64.signed.5.7.SP2.bxxx.exe /s /v"/L*v C:\logs\PPsetup.log
LICENSENUM=0000-0000-0000-0000-0000-0000 NO_REBOOT=1"
```

To install PowerPath using the silent installation method and to also disable reboot and install PowerPath Encryption with RSA, enter:

```
C:\EMCPower.X64.signed.5.7.SP2.bxxx.exe /s /v"/L*v C:\logs\PPsetup.log NO_REBOOT=1
ADDLOCAL=RSA"
```

### Example: Interactive installation

To install PowerPath using the interactive CLI method and to set the PowerPath license, copy, and install PowerPath files to C:\Test folder, disable reboot, and install components to support IBM ESS, Hitachi, and NetApp storage arrays, enter:

```
C:\EMCPower.X64.signed.5.7.SP2.bxxx.exe /v"/L*v C:\Install_IBM_HDS.log
LICENSENUM=0000-0000-0000-0000-0000-0000 INSTALLDIR=C:\Test NO_REBOOT=1
ADDLOCAL=IBM,HDS"
```

2. After installing PowerPath, restart the host and then follow the instructions in ["After you install or upgrade" on page 30](#).

---

**Note:** If you are performing a silent upgrade from PowerPath Version 5.7 SP1 to PowerPath Version 5.7 SP2, and if generic XtremIO Version 1.05 support is installed as part of the 5.7 SP1 package, you need to pass the **XTREMIO\_NATIVE\_ONLY=1** command line switch to the installer to continue with the installation. The ["CLI parameters" on page 25](#) provides the required information.

---

If you performed a complete install, and you are not planning to use the PowerPath Migration Enabler or PowerPath Encryption with RSA features, EMC recommends that you disable these services and change the Startup type to **disabled**.

---

**Note:** When Encryption services are enabled, Migration services are automatically enabled.

---

## CLI parameters

[Table 2 on page 25](#) describes command line parameters and options.

**Table 2** CLI parameters and properties (page 1 of 4)

| Parameter | Description   |
|-----------|---|
| /s        | Suppresses installation dialog boxes. Indicates a quiet installation (no user interaction). |

**Table 2** CLI parameters and properties (page 2 of 4)

| Parameter | Description   |  |
|-----------|---|--|
| /v        | <p>Directs installation to pass the specified string (enclosed in quotes) to the Microsoft Installer (MSI).</p> <p>Example:<br/> <code>/v"&lt;Property&gt;=&lt;Value&gt;"</code><br/>           Where:<br/> <code>&lt;Property&gt;</code> and <code>&lt;Value&gt;</code> descriptions follow.</p> |  |
|           | Property  | Value description  |
|           | LICENSENUM=<number1, [number2,...]>   | <p>Where <code>&lt;number1,[number2, ...]&gt;</code> must be a valid license or no license will be saved. Use commas to separate multiple entries.</p> <p><b>Note:</b> <i>PowerPath for Windows</i> and <i>PowerPath/VE for Windows Hyper-V</i> each require a separate license. The licensing procedure is the same for each.</p>   |
|           | INSTALLDIR=<path>   | <p>Where <code>&lt;path&gt;</code> is the location to copy and install PowerPath files.</p> <p>Examples:<br/> <code>INSTALLDIR=C:\Test</code><br/> <code>INSTALLDIR=C:\Program Files\EMC</code></p>  |
|           | NO_REBOOT=1   | <p>The value 1 specifies that the host will not reboot after PowerPath is installed.</p> <p><b>Note:</b> EMC recommends NO_REBOOT=1 so that you can manually restart at a convenient time.</p>   |
|           | AUTO_HOST_REGISTRATION=1  | <p>The value 1 specifies that the automatic host array registration is enabled. By default, it is enabled.</p> <p>If you want to disable the automatic host array registration, you must specify the value 0.</p>  |
|           | UPGRADE_MPIO=1  | <p>The value 1 specifies to upgrade the existing MPIO framework. Include this property if an MPIO version earlier than the one supported is installed. PowerPath installation aborts if the host has a version of the MPIO framework earlier than the supported version. Refer to the "Support Summary" section of the <i>EMC PowerPath and PowerPath/VE Family for Windows Release Notes</i> for supported versions.</p>  |
|           | XTREMIO_NATIVE_ONLY=1   | <p>The value 1 specifies to install support for XtremIO Versions 2.2 and later for PowerPath Version 5.7 SP2.</p> <p>This parameter is required in case of silent upgrade, when you are upgrading from PowerPath 5.7.x with generic XtremIO support installed to PowerPath 5.7 SP2 and later, which only supports XtremIO Version 2.2 and later.</p> <p>Example:<br/> <code>EMCPower.X64.signed.5.7.SP2.bxxx.exe /s /v"<br/>           XTREMIO_NATIVE_ONLY=1 NO_REBOOT=1"</code></p> |

**Table 2** CLI parameters and properties (page 3 of 4)

| Parameter                             | Description   |
|---------------------------------------|---|
| ADDLOCAL=<feature>                    | <p>Where &lt;feature&gt; can be any combination of the following items. Use commas to separate multiple entries, for example: ADDLOCAL=RSA,IBM</p> <ul style="list-style-type: none"> <li>If you do not pass ADDLOCAL values during command line installation, then PowerPath multipathing, Migration Enabler, Management Component, and support for EMC storage arrays is installed by default. If you pass ADDLOCAL values only the features you select are installed with PowerPath multipathing. For example, ADDLOCAL=RSA installs PowerPath Encryption with RSA and PowerPath multipathing.</li> <li>In the case of an upgrade, if you do not pass ADDLOCAL values during command line installation, PowerPath installs the features based on the previous version configuration. For example, if your previous version has Migration Enabler, HPXP, and IBM features installed then PowerPath upgrade selects these features for installation by default.</li> <li>ALL = Complete installation. Installs support for all PowerPath features.</li> <li>ME = Migration Enabler (selected for installation by default)</li> <li>RSA = Encryption with RSA</li> <li>HA = Management Component (selected for installation by default)</li> <li>IBM = IBM ESS and XIV arrays</li> <li>CELERRA = EMC Celerra and VNXe arrays (selected for installation by default)</li> <li>HDS = Hitachi arrays</li> <li>HPXP = HP XP Active-Active arrays, and HP EVA arrays with firmware VCS 4.0 or later</li> <li>INVISTA = EMC Invista and VPLEX arrays (selected for installation by default)</li> <li>XTREMIO = EMC XtremIO arrays firmware Version 2.2 or later (selected for installation by default)</li> <li>NETAPP = NetApp arrays (FAS2240)</li> </ul> |
| PX_DELETE_CUSTOM_CONFIGURATION=DELETE | The PowerPath installer provides an option to either keep or delete the existing powermt.custom file through GUI or CLI methods. By default, the existing powermt.custom file is preserved.   |
| PX_DELETE_CUSTOM_CONFIGURATION=KEEP   | For example, the CLI method provides the parameter<br>EMCPower.X64.signed.5.7.SP2.bxxx.exe /s /v"PX_DELETE_CUSTOM_CONFIGURATION=DELETE NO_REBOOT=1".  |
| FORCE_DRIVER_UPDATE=1                 | The value 1 will continue to install PowerPath and ignore the device manager check for any pending device installation or uninstallation activities.  |
| PPME_CLUSTER_GROUP=Group1,Group2      | GROUP = Configures PowerPath Migration Enabler cluster resources for the specified cluster groups. You can use comma-separated values for multiple entries.   |
| PPME_CLUSTER_GROUP=NONE               | <b>Note:</b> This CLI parameter is applicable only on Windows Server 2003.<br><br>NONE = No cluster groups will be configured for any cluster node. By default, this value is set.  |
| PPME_CLUSTER_GROUP=ALL                | ALL = Configures PowerPath Migration Enabler cluster resources on all available cluster groups on the current node.   |

**Table 2** CLI parameters and properties (page 4 of 4)

| Parameter | Description   |
|-----------|---|
|           | <p><code>/L*v &lt;logfile&gt;</code></p> <p>Directs the Microsoft Installer to write verbose output to the file specified with this option. The target directory for the log file must exist before starting a silent installation by using the logging option (as required by the Windows installer engine).</p> <ul style="list-style-type: none"> <li>On Windows Server 2008 and later MSI logs will be also available in: %ProgramData%\EMC\PowerPath\logs.</li> <li>On Windows Server 2003 MSI logs are collected automatically only when setup is launched using PowerPath bootstrapper, and will be available in: %ALLUSERSPROFILE%\Application Data\EMC\PowerPath\logs.</li> </ul> <p><b>Note:</b> These folders may be hidden in Windows Explorer.</p> |

## Supported upgrades

Before upgrading, ensure your environment meets these requirements :

- Do not remove redundant cable connections from the array.
- On Windows Server 2012, if you are upgrading to PowerPath 5.7 SP2 from any previous version of PowerPath other than PowerPath versions prior to 5.7.x, the installation will be aborted with the error message, “PowerPath upgrades are not supported. Uninstall your current PowerPath version and try installing PowerPath or contact EMC Customer Support for assistance”. [Table 3 on page 28](#) lists the supported upgrade paths.

To upgrade from a previous version of PowerPath on Windows Server 2012:

- Uninstall the current PowerPath version.
  - Reboot the host.
  - Install PowerPath 5.7.x on Windows Server 2012.
- ["Upgrading Windows operating systems" on page 35](#) provides information on upgrading Windows operating systems that have PowerPath installed.

If you have a version not listed in [Table 3 on page 28](#), uninstall that version of PowerPath (for example, PowerPath 2.1.3), reboot, and then perform a fresh installation of PowerPath 5.7.

**Table 3** Supported upgrade paths (page 1 of 2)

| Windows version  | You can upgrade directly from these versions | PowerPath iSCSI version |
|--|--|-------------------------|
| Windows Server 2003, x86-based version ( <i>minimum of SP2 and later</i> ) | 5.1.x, 5.2.x, 5.3.x, 5.5.x                   | 1.1 <sup>a</sup>        |
| Windows Server 2003, Itanium-based version ( <i>minimum of SP2</i> )       | 5.1.x, 5.2.x, 5.3.x, 5.5.x                   | Not supported           |
| Windows Server 2003, x64-based version ( <i>minimum of SP2 and later</i> ) | 5.1.x, 5.2.x, 5.3.x, 5.5.x                   | Not supported           |
| Windows Server 2008  | 5.1 SP2, 5.2.x, 5.3.x, 5.5.x                 | Not supported           |

**Table 3 Supported upgrade paths (page 2 of 2)**

| Windows version                 | You can upgrade directly from these versions | PowerPath iSCSI version |
|---------------------------------|--|-------------------------|
| Windows Server 2008 Server Core | 5.1 SP2, 5.2.x, 5.3.x, 5.5.x                 | Not supported           |
| Windows Server 2008 R2          | 5.3.x, 5.5.x                                 | Not supported           |
| Windows Server 2012             | 5.7.x  | Not supported           |
| Windows Server 2012 R2          | 5.7 SP2                                      | Not supported           |

a. If you have a valid PowerPath iSCSI 1.1 license key installed, it will be converted to a PowerPath base license, which provides the same protection as a PowerPath iSCSI license key.

- ◆ Windows Server Core 2008 and later — If PowerPath is installed through the GUI on the core version, the license key dialog box will not appear. Use the **emcprep** utility to add the license key before rebooting.
- ◆ Upgrading from 5.1.x to 5.7.x — If you are upgrading from PowerPath 5.1.x to 5.7.x, use either the interactive GUI or the interactive CLI method.
- ◆ Upgrading PowerPath in a boot-from-SAN environment — You can upgrade PowerPath in a boot from SAN environment using the same procedure you would use in other environments.

## Upgrading PowerPath custom file conversion

When the powermt.custom file is stored in a location other than the default location, the custom file will not be converted when upgrading PowerPath. This may cause error messages to appear after upgrading to PowerPath and running **powermt load**. If you upgrade PowerPath without converting the powermt.custom file, you must recreate the settings in PowerPath 5.7.x

In order for the upgrade to convert the powermt.custom file, perform the following before beginning the upgrade:

1. Copy the powermt.custom file to the default  
`<PowerPath_Installation_Directory>\PowerPath` directory.
2. During the upgrade, when prompted, select to keep the existing custom file.

After the upgrade and reboot, the settings saved in the powermt.custom file will be automatically loaded.

Beginning with PowerPath 5.7, the powermt\_custom.xml file (which is a new XML powermt custom file) is created by default in `<PowerPath_Installation_Directory>\PowerPath`.

---

**Note:** Without persistent binding, the SCSI ID of a LUN may change, leading to ghost paths appearing during a host reboot with a saved custom file configuration. This may cause powermt to display misleading information. You may also see dead paths in case these paths have different SCSI IDs. In such cases, you will also see more paths per LU than what was actually configured in your SAN environment.

---

## After you install or upgrade

This section describes post-installation tasks.

### First-time installations

If you are installing PowerPath for the first time on a host:

1. Power on the host. PowerPath is now fully configured, with multiple paths to logical devices.
2. If the environment is Fibre Channel, ensure zones are configured appropriately. The VNX and CLARiiON storage-system support websites and the *host connectivity guides* provide additional information.
3. If you have not already done so, check EMC Online Support for any service packs and install any required service packs.

### Verify the configuration

To verify the configuration:

1. Power on the host. PowerPath is fully configured with multiple paths to logical devices and (if appropriate) correct zones when you boot.
2. Verify the correctness of your configuration by running the following at the command prompt:

```
powermt display
powermt display dev=all
powermt display ports
```

---

**Note:** If PowerPath sees no devices, but the devices are seen by the operating system, verify that the devices are configured for PowerPath support.

---

### Verifying a patch installation

Once a patch is installed, it is listed as a subentry under the EMC PowerPath entry in **Add/Remove Programs** or **Programs and Features**:

Using **Add/Remove Programs** or **Programs and Features** verify that the PowerPath patch appears in the list of updated programs:

- ◆ Click **Show updates** in **Add/Remove Programs**.
- ◆ Click **View installed updates** in **Programs and Features**.

### Upgrading from generic XtremIO to XtremIO version 2.2 and later

PowerPath Version 5.7 SP1 is the last version for Windows to include qualified support for XtremIO Version 1.05 through generic LAM. PowerPath Version 5.7 SP2 and above only supports XtremIO Version 2.2 and later.

PowerPath provides support for either XtremIO Version 1.05 (installed as part of the PowerPath Version 5.7 SP1 package) or XtremIO Version 2.2 and later (installed as part of PowerPath Version 5.7 SP2 package). You can either have XtremIO Version 1.05 or XtremIO Version 2.2 and later, but not both.

If you are upgrading from PowerPath Version 5.7 SP1 to PowerPath Version 5.7 SP2, and if generic XtremIO Version 1.05 support is installed as part of the 5.7 SP1 package, the ["XtremIO storage arrays" on page 14](#) provides the required information.

## Configure the PowerPath Management Pack for Microsoft Operations Manager

You can configure the PowerPath management daemon to remotely monitor specific PowerPath events. This feature is available in a separate software package available on EMC Online Support. The management daemon integrates with Microsoft Operations Manager and allows you to retrieve license and version information from remote PowerPath hosts. It also can generate alerts when paths or volumes remain dead for a configurable time frame. The *EMC PowerPath Management Pack for Microsoft Operations Manager User Guide* provides more information on configuring and using the management daemon.

---

**Note:** If you plan to enable and configure PowerPath Management Component version 5.7 (which comes included in the PowerPath 5.7 for Windows package), you must manually remove any existing version of the PowerPath Management Component before installing or upgrading to PowerPath 5.7.

---

## Adding features to an existing installation

If PowerPath is installed on your host and you want to install additional features, such as PowerPath Encryption with RSA or components to support third-party arrays, follow one of these procedures:

- ◆ ["Add features through the GUI" on page 31](#)
- ◆ ["Add features through the CLI" on page 32](#)

### Add features through the GUI

To add features to an existing installation using the GUI:

1. Using **Add/Remove Programs** or **Programs and Features** select the installed version of PowerPath and click **Change**.
2. In the Setup wizard welcome window, click **Next**.
3. Select **Modify** and click **Next**.
4. Select the feature you want to install from the drop-down menu.

---

**Note:**

—A selected feature displays a hard drive icon next to it. A red X indicates the feature is not selected.

—The icon next to each feature name indicates the feature's install state. Click **Help** in the **Custom Setup** dialog box for more information about the icons.

---

5. Select the option to install the feature on the local hard drive and click **Next**.
6. Click **Install**.
7. Click **Finish**.
8. Click **Yes** to reboot now or **No** to reboot later.

---

**Note:** If the User Account Control (UAC) is configured in the Admin Approval mode, running the PowerPath setup program to change, repair, or to uninstall PowerPath 5.7 SP2 using **Add/Remove Programs** or **Programs and Features** through the control panel results in multiple elevation prompts.

---



---

**Note:** If you are installing Migration Enabler, Encryption with RSA, or Management Component then a reboot is not required. However, installing these features with any other feature requires a reboot.

---

## Add features through the CLI

To add features to an existing installation using the CLI method, use this command syntax:

```
<drive>:\<PowerPath_pkg_name> /s /v"/L*v <logfile> LICENSENUM=<license_key>
NO_REBOOT=1 ADDLOCAL=<feature>"
```

For example, to install PowerPath Encryption with RSA and Invista type the following on single line:

```
C:\EMCPower.X64.signed.5.7.SP2.bxxx.exe /s /v"/L*v C:\logs\PPsetup.log
LICENSENUM=0000-0000-0000-0000-0000-0000 NO_REBOOT=1 ADDLOCAL=RSA,INVISTA"
```

When the NO\_REBOOT=1 parameter is used, reboot manually after installation.

---

**Note:** If you are installing Migration Enabler, Encryption with RSA, or Management Component then a reboot is not required. However, installing these features with any other feature requires a reboot.

---

[Table 2 on page 25](#) describes the parameters and options.

## Repairing PowerPath installation

After installing PowerPath, if any of the PowerPath functionality is broken, you can repair the installation to resolve those issues.

The repair re-installs PowerPath and modifies only those components of the application that are missing or broken. It also re-installs all PowerPath drivers.

---

**Note:** Repairing PowerPath requires that you reboot the host.

---

Follow one of these procedures to repair PowerPath:

- ◆ ["Repair PowerPath installation through the GUI" on page 33](#)
- ◆ ["Repair PowerPath installation through the CLI" on page 33](#)

## Repair PowerPath installation through the GUI

To repair PowerPath installation through the GUI:

1. Using **Add/Remove Programs** or **Programs and Features**, select the installed version of PowerPath and click **Repair**.

OR

2. Using **Add/Remove Programs** or **Programs and Features**, select the installed version of PowerPath and click **Change**.
  - a. In the **Setup wizard welcome** window, click **Next**.
  - b. Select **Repair** and click **Next**.
  - c. Click **Repair**.
  - d. Click **Finish**.
3. Click **Yes** to reboot now or **No** to reboot later.

---

**Note:** If the User Account Control (UAC) is configured in the Admin Approval mode, running the PowerPath setup program to change, repair, or to uninstall PowerPath 5.7 SP2 using Add/Remove Programs or Programs and Features through the control panel results in multiple elevation prompts.

---

## Repair PowerPath installation through the CLI

To repair PowerPath installation using the CLI method, use this command syntax:

```
<drive>:\<PowerPath_pkg_name> /s /v"/L*v <logfile> REINSTALL=ALL"
```

For example:

```
C:\EMCPower.X64.signed.5.7.SP2.bxxx.exe /s /v"/L*v C:\logs\PPrepair.log  
REINSTALL=ALL NO_REBOOT=1"
```

When the NO\_REBOOT=1 parameter is used, reboot manually after installation.

# PowerPath installation troubleshooting

Table 4 on page 34 lists PowerPath installation troubleshooting scenarios.

**Table 4** Troubleshooting your installation

| Problem  | Error message   | Suggested action  |
|--|---|---|
| While upgrading to PowerPath 5.7 SP2, the PowerPath installer may display a warning message if it finds that XtremIO Version 1.05 support is already installed as part of the 5.7 SP1 package. | Setup has detected support for EMC XtremIO storage systems installed by existing version of PowerPath. EMC PowerPath 5.7 Service Pack 2 only supports XtremIO version 2.2 or later. Refer to the Release Notes for support information. To continue, click Yes. | If you are upgrading from PowerPath 5.7 SP1 to PowerPath 5.7 SP2, and if generic XtremIO Version 1.05 support is installed as part of the 5.7 SP1 package, refer to the <a href="#">"XtremIO storage arrays" on page 14</a> for more information. |
| PowerPath drivers may be present on a host where a PowerPath package has been uninstalled.   | Incompatible files from a previous PowerPath version exist on the host. PowerPath recommends running PPRemoveAll with a reboot and then proceed with the PowerPath installation process. Run PPRemoveAll now?   | Perform the following:<br>1. Choose <b>Yes</b> to run <b>PPRemoveAll<sup>a</sup></b> . Otherwise, choose <b>No</b> and run the PPRemoveAll utility <sup>a</sup> manually.<br>2. Reboot the host.<br>3. Install PowerPath.                         |
| Upgrade of PowerPath may fail because PowerPath drivers are missing on the host.   | PowerPath detected a problem that is blocking the upgrade. Contact EMC Customer Support for assistance.   | Perform the following:<br>1. Run the PPRemoveAll utility to remove PowerPath.<br>2. Reboot the host.<br>3. Install PowerPath.<br><br><b>Note:</b> If the installation is still blocked, contact EMC Customer Support.                             |
| Upgrade of a PowerPath driver may fail.  | The PowerPath upgrade could not complete. PowerPath recommends running PPRemoveAll with a reboot and then proceed with the PowerPath installation process. Run PPRemoveAll now?   | Perform the following:<br>1. Choose <b>Yes</b> to run <b>PPRemoveAll<sup>a</sup></b> . Otherwise, choose <b>No</b> and run the PPRemoveAll utility <sup>a</sup> manually.<br>2. Reboot the host.<br>3. Install PowerPath.                         |
| Installation of a PowerPath driver may fail.   | PowerPath encountered a problem installing drivers and will roll back the installation changes. Contact EMC Customer Support for assistance.  | Contact EMC Customer Support.   |
| One or more PowerPath drivers may require a host reboot.   | One or more PowerPath drivers require a host reboot. Reboot the host and then proceed with the PowerPath installation process.  | Reboot the host and then install PowerPath.   |
|  | One or more PowerPath drivers require a host reboot. Reboot the host, and retry the repair.   | Reboot the host and then try driver repair again.   |
| Repair of a PowerPath driver fails.  | The PowerPath repair operation could not complete. Contact EMC Customer Support for assistance.   | Contact EMC Customer Support.   |
| PowerPath failed to enable MPIO.   | PowerPath installation failed to enable MPIO feature on Windows server 2008 or later host.  | Contact EMC Customer Support.   |

- a. The PPRemoveAll utility removes all PowerPath multipathing entries from the host. Use this option only when you encounter a problem with an existing installation or attempt a removal.

## Upgrading Windows operating systems

You can upgrade your Windows operating system to a major release (from Windows Server 2003 to Windows Server 2008 or Windows Server 2008 R2) or to its service pack.

---

**Note:** The EMC E-Lab Interoperability Navigator and the *EMC PowerPath and PowerPath/VE for Windows Release Notes* provide information on the required service packs on different operating systems, supported versions of PowerPath, and any other system information that may apply to the operating system you plan to install.

---

### Upgrading to Windows Server 2008 and later

When upgrading the operating system in one of the following scenarios:

- ◆ From Windows Server 2003 (with PowerPath installed) to Windows Server 2008 or Windows Server 2008 R2, or Windows Server 2012
- ◆ From Windows Server 2008 (with PowerPath installed) to Windows Server 2008 R2 or Windows Server 2012
- ◆ From Windows Server 2008 R2 (with PowerPath installed) to Windows Server 2012

The Windows operating system migration agent does not re-install most PowerPath drivers during the upgrade. After the upgrade, all PowerPath functionalities are disabled. When upgrading in a boot-from-SAN environment, the operating system upgrade may fail and the system may not reboot. This issue is also documented in EMC Knowledgebase Solution emc221704.

#### Procedure

To upgrade the Windows operating system:

1. Remove PowerPath.
2. Upgrade the Windows operating system.
3. Install PowerPath.

The *EMC PowerPath and PowerPath/VE Family for Windows Release Notes* provides additional information.

### Installing Windows operating system service packs

You do not need to uninstall PowerPath before installing an operating system service pack such as Windows 2008 SP1 on a Windows 2008 host.

## Unsupported installation changes

This section describes unsupported installation changes.

## Host reboot after installation changes

Uninstalling an earlier version of PowerPath without rebooting, and then installing a newer version may cause a system crash. To avoid this issue, reboot after installing, uninstalling, or upgrading PowerPath.

---

**Note:** When the system is not rebooted after installing, uninstalling, or upgrading PowerPath, the operating system confuses the uninstallation of old drivers with the installation of new drivers, causing a system panic.

---

## Downgrading PowerPath

Do not attempt to install an earlier version of PowerPath on hosts currently running a more recent version of PowerPath. If you want to run an earlier version of PowerPath, you need to downgrade PowerPath.

To downgrade PowerPath:

1. Uninstall the newer version of PowerPath.
2. Restart the host.
3. Install the earlier version of PowerPath.

# CHAPTER 2

## Configuring PowerPath

This chapter includes the following sections:

|  |    |
|--|----|
| ◆ Introduction .....   | 38 |
| ◆ Adding new paths to a PowerPath logical device .....               | 38 |
| ◆ Adding new logical devices to the PowerPath configuration .....    | 39 |
| ◆ Removing some paths to PowerPath logical devices .....             | 41 |
| ◆ Removing PowerPath logical devices .....                           | 42 |
| ◆ Configuring the Microsoft iSCSI Initiator for PowerPath .....      | 43 |
| ◆ Adding PowerPath PMI counters to Windows Performance Monitor ..... | 44 |

## Introduction

You must reconfigure PowerPath after making configuration changes that affect host-to-storage-system connectivity or logical device identification.

For example:

- ◆ Fibre Channel switch zone changes
- ◆ Adding or removing Fibre Channel switches
- ◆ Adding or removing HBAs or storage-system ports
- ◆ Adding or removing logical devices
- ◆ Redeploying existing logical devices

---

**Note:** If you do not reconfigure PowerPath after making configuration changes, many of these changes are treated as unintentional, and PowerPath tries to prevent them from affecting applications.

---

Many platform-specific and some PowerPath reconfiguration operations will fail if the affected logical devices are in use (either just marked alive or with I/O in progress). This is noted in the appropriate places in the procedures that follow.

After any reconfiguration, you must monitor the outcome of individual reconfiguration steps and confirm that the resulting changes are as expected, before relying on the new configuration. Otherwise, some paths may not be as expected.

Whenever you make any modification to the default settings, such as changing the default load-balancing policies, then you must run the **powermt save** command to ensure that the new settings persist across reboot.

## Adding new paths to a PowerPath logical device

This procedure adds new paths to a logical device already configured (with at least one path) in PowerPath.

This procedure can be done without interruption to running applications on Microsoft hosts.



**All operations must succeed for the reconfiguration to be successful. If any step fails, resolve that issue before proceeding. Do not use the new configuration until the entire procedure completes successfully.**

---

### Path limit

Do not configure more than 32 paths per logical device.

### Procedure

To add paths to a PowerPath logical device:

1. Run **powermt display** to confirm the current configuration.

2. Run **powermt display dev=all** to confirm the configuration of the logical devices to which new paths will be added.
3. Ensure that the number of logical devices, hardware paths, and I/O paths are as expected. The path state should be alive for known good paths and dead for known bad paths.  
If there is a problem, correct it before proceeding.
4. Make physical path additions as required:
  - a. Map the logical device to additional storage-system ports.
  - b. Add new HBAs. For details, refer to your vendor documentation.
  - c. Attach cables.
  - d. Rezone Fibre Channel switches.
5. If using SAN Manager, Volume Logix, or Access Logix, make new paths available to the host using those tools.
6. Scan for hardware changes in the device manager or alternately, reboot. In some cases, the operating system may prompt for a reboot after new devices are added.
7. Reconfigure PowerPath.
8. Inspect the new PowerPath configuration:
  - a. Run **powermt display dev=all**.  
The new paths should be displayed with a state of alive.
  - b. Run **powermt restore** to test all paths.
  - c. Scan operating system error logs to ensure no errors are logged against the new paths.
9. Correct any issues detected.
10. Run **powermt save** to save the new configuration.

## Adding new logical devices to the PowerPath configuration

This procedure adds new logical devices (with one or more paths) to be managed by PowerPath and applies to managed storage system classes only.

Logical devices can be added without interruption of service, since no existing application can be using a logical device that is not yet available.

After successful configuration, new pseudo devices can be used.

### CAUTION

**All operations must succeed for the reconfiguration to be successful. If any step fails, resolve that issue before proceeding. Do not use the new configuration until the entire procedure completes successfully.**

## Procedure

To add logical devices to the PowerPath configuration:

1. Run **powermt display** to confirm the current configuration. Ensure that the number of logical devices, hardware paths, and I/O paths are as expected. The path state should be alive for known good paths and dead for known bad paths.
2. Make logical device and physical path changes as required:
  - a. Create new logical devices.
  - b. Map logical devices to one or more storage-system ports.
  - c. Add new HBAs. For details, your vendor documentation will provide more details.
  - d. Attach cables.
  - e. Rezone Fibre Channel switches.
3. If using SAN Manager, Volume Logix, or Access Logix, make new paths available to the host using those tools.
4. Scan for hardware changes in the device manager. Alternately, reboot. In some cases, the operating system may prompt for a reboot after new devices are added.
5. Reconfigure PowerPath.
6. After adding LUNs to a storage group and scanning the disk via the device manager/diskpart scan operation or through a reboot, the **powermt display dev=all** command may return an error count of 1 for the new LUNs. Run the **powermt restore** command to reset the error count to 0.
7. Inspect the new PowerPath configuration:
  - a. Run **powermt display dev=all**.  
All paths associated with the new logical devices should be displayed with a state of alive.
  - b. Run **powermt restore** to test all paths to the new logical device.
  - c. Scan operating system error logs to ensure no errors are logged against the new paths and logical device.
8. Correct any issues detected, before saving the PowerPath configuration or using the new logical device.
9. Set PowerPath-specific options for the new logical devices, such as load-balancing and failover policy, path modes, write throttle enablement, and priority.
10. Reconfigure PowerPath.
11. Run **powermt save** to save the new configuration.
12. On the host where EMC ControlCenter is installed, run the command that refreshes the ControlCenter database of device information. Refer to the documentation for your version of ControlCenter.

## Removing some paths to PowerPath logical devices

This procedure removes some (but not all) paths to logical devices configured in PowerPath.

### CAUTION

Do not remove the last live path to a logical device unless you plan to remove the logical device entirely, as data access will be interrupted. If a PowerPath device is open, **powermt remove** does not remove that device or the last path to that device.

---

**Note:** Failure to follow all the steps in this procedure properly can result in data loss and errors that affect the operating system.

---

### Procedure

To remove some paths to PowerPath logical devices:

1. Run **powermt display dev=all** to confirm the configuration of the logical devices from which paths will be removed.
2. Check the number of existing paths.

The path state should be alive for known good paths and dead for known bad paths.

3. If there is a problem, correct it before proceeding.
4. Identify the physical paths to be removed or zoned out, and confirm that there are other paths to the affected logical devices. (Otherwise, applications using those logical devices could experience I/O errors when you proceed.)
5. Run **powermt display dev=all** to identify the PowerPath HBA number associated with the paths to be removed. In complex topologies, there can be multiple paths on an HBA.
6. Run **powermt set mode=standby** to set the mode to standby for all paths to be removed. If an HBA is to be removed, specify the HBA (instead of the device) when running **powermt set mode**.

7. Physically disconnect the paths or logically disconnect them by removing them from active zones.

As a result of this, the operating system may log some error messages. However, PowerPath prevents these errors from affecting applications.

8. Scan for hardware changes in the device manager. Alternately, reboot. In some cases, the operating system may prompt for a reboot after new devices are added.
9. Run **powermt restore**, and confirm that the paths listed as dead are the ones you intended to remove.
10. Run **powermt remove**, specifying both the **hba** and **dev** arguments.

### CAUTION

If you do not specify the **hba** argument, all paths to the specified logical device are removed.

---

11. Remove HBAs as required and reboot if needed.
12. Inspect the new PowerPath configuration:
  - a. Run **powermt display**.  
The output should show fewer total paths than before. All paths should have a state of optimal.
  - b. Run **powermt display dev=all**.  
All remaining paths associated with the affected logical devices should be displayed with a state of alive.
13. Correct any issues detected before saving the PowerPath configuration or using the new logical devices.
14. Run **powermt save** to save the new configuration.

### Cleaning up incorrect path or logical volume removal

1. Run **powermt display** to identify the removed volume and its paths. In the output these should all display as dead.
2. Run **powermt check dev =<dev>** for device in question.

## Removing PowerPath logical devices

This procedure removes logical devices (with all configured paths to those logical devices) configured in PowerPath. Logical devices can be removed without interruption of service only if no applications are using or configured to use the logical devices you are removing.

The procedure may fail if any application is using a device associated with the path to be removed.

### Procedure

To remove PowerPath logical devices:

1. Inspect the current PowerPath configuration:
  - a. Run **powermt display** to confirm the current configuration. Ensure that the total number of logical devices, hardware paths, and I/O paths are as expected.  
Since one or more paths may have failed, not all paths may be listed as optimal.
  - b. Run **powermt display dev=all** to confirm the configuration of the logical devices that will be removed.
  - c. Check the number of existing paths.  
The path state should be alive for known good paths and dead for known bad paths.
2. If either of the above displays indicates a problem, correct it before proceeding.
3. Identify the logical devices to be removed.
4. Identify the physical paths that also may be removed.

5. Run **powermt display dev=all** to identify the PowerPath HBA number associated with the paths to be removed. In complex topologies, there can be multiple paths on an HBA.
6. Reconfigure all applications that are using the logical devices to be removed, so they are no longer configured to use them.
7. Unmount file systems.
8. Remove the volume groups using the appropriate volume manager command.
9. Scan for hardware changes in the device manager. Alternately, reboot.
10. If using SAN Manager, Volume Logix, or Access Logix, remove access to the logical devices to be removed, using those tools.

As a result of this step, the operating system may log some error messages. These are expected and are harmless.

11. Run **powermt remove dev=all**.
12. Run **powermt save**.
13. Disconnect physical paths or zone out paths with switched fabric zone changes as required.
14. Run **powermt restore**, and confirm that the paths listed as dead are associated with the logical devices you intend to remove.
15. Depending on the type of HBA installed, scan for hardware changes in the device manager. Alternately, reboot.  
  
In some cases, the operating system may prompt for a reboot after new devices are added.
16. Inspect the new PowerPath configuration:
  - a. Run **powermt display**.  
  
The output should show fewer total paths than before. All paths should have a summary state of optimal.
  - b. Run **powermt display dev=all**.  
  
All remaining paths associated with the affected logical devices should be displayed with a state of alive.
17. Correct any issues detected above, before saving the PowerPath configuration or using the new logical devices.
18. Run **powermt save** to save the new configuration.

## Configuring the Microsoft iSCSI Initiator for PowerPath

To configure the Microsoft iSCSI initiator for PowerPath:

---

**Note:** Also refer to the recommended array and hardware guidelines.

---

1. On Windows 2003, obtain the Microsoft iSCSI initiator installation kit and launch the installation program.

2. Select **Microsoft MPIO Multipathing Support for iSCSI** and then click **Next**.
3. Select **Enable multi-path** while creating sessions on the target and then click **OK**.

---

**Note:** On Windows 2008 and later, the Microsoft iSCSI initiator is available by default, for enabling multi-path, start the service and follow [step 3](#) from the procedure listed above.

---

## Adding PowerPath PMI counters to Windows Performance Monitor

Path Management Insight (PMI) capabilities help performance monitoring by characterizing I/O patterns and diagnosing I/O problems.

The PMI counter and timers on the Performance Monitor framework is published by the V2 Performance Counter provider. The provider which is hosted by the PowerPath Management Service, is part of the PowerPath Management Component and is enabled by default.

Each PMI counter and timer is present in the perfmon. Two specific PowerPath PMI counters are displayed as part of the Windows Performance Monitoring tools under **Performance\Performance Tools\Performance Monitor**. These independent counters are also listed in the **Add Counters** wizard and display the following information:

- ◆ **PowerPath Volume PMI Data** — contains all counters and timers for Volumes
- ◆ **PowerPath Path PMI Data** — contains all counters and timers for Paths

Collection of data does not start until the **powermt set perfmon=<On>** command is set. Setting the perfmon command to **On** initializes the performance monitoring counter and measurements. Apart from **powermt set perfmon**, there are two more commands that can be used to collect insights for enhanced performance information:

- ◆ **powermt display perf dev**
- ◆ **powermt display perf bus**

The output of these commands provide:

- ◆ Read, Write, and Total Throughput
- ◆ Read, Write and All Average Response Time
- ◆ Latency Distribution
- ◆ Retry delta
- ◆ Error delta

For more information on these CLI commands, see the *EMC PowerPath Family 5.7 CLI and System Messages Reference Guide*.

---

**Note:** This is not supported on Windows 2003.

---

For more information on adding counters, refer to Microsoft Performance Monitoring documentation.

# CHAPTER 3

## Removing PowerPath

This chapter includes the following sections:

- ◆ Before you remove PowerPath ..... 46
- ◆ Uninstalling PowerPath with Windows OS tools ..... 46
- ◆ Uninstalling with the PowerPath command line ..... 48
- ◆ PowerPath uninstallation troubleshooting ..... 51
- ◆ Disconnecting redundant paths to the storage system..... 51

## Before you remove PowerPath

Before you remove PowerPath from the host:

- ❑ Check EMC Online Support for the most current information. EMC updates release notes periodically and posts them on EMC Online Support.
- ❑ Stop any application actively sending I/O. In addition, close any remaining applications and client files to avoid warning messages when rebooting after the uninstall.

---

**Note:** If you try to uninstall PowerPath when there are active migrations, the message "Migration(s) is (are) pending" appears and the uninstallation process aborts. Contact EMC Customer Support if you see the message "An internal error has occurred. Migrations may be pending."

---

## Removing PowerPath software or components

You can remove PowerPath and all related components, or you can remove specific features, such as Migration Enabler or PowerPath Encryption. You can also remove specific multipathing components you may no longer need, such as components to support third-party arrays.

You can use the Windows Add/Remove Programs or Programs and Features tools to remove PowerPath, or you can use the more advanced PowerPath command line interface. Use one of these methods to uninstall PowerPath software or features.

- ◆ ["Uninstalling PowerPath with Windows OS tools" on page 46](#)
- ◆ ["Uninstalling with the PowerPath command line" on page 48](#)

---

**Note:** EMC recommends that you reboot after removing PowerPath.

---

## Uninstalling PowerPath with Windows OS tools

The procedures in this section describe how to uninstall PowerPath software or components using Windows operating system tools.

- ◆ ["Complete PowerPath removal" on page 47](#) removes PowerPath multipathing and makes other PowerPath features unavailable for installation changes through the Windows GUI. Future installation changes can only be made through the PowerPath executable file or the PowerPath CLI once you complete this procedure.
- ◆ ["Feature-specific removal" on page 47](#) removes specific PowerPath features, such as Migration Enabler, PowerPath Encryption, Management Component, or components that provide support for third-party arrays.

## Complete PowerPath removal

Use this procedure to completely remove PowerPath.

1. Using **Add/Remove Programs** or **Programs and Features** uninstall the installed version of PowerPath.

For Windows Server 2008 and later:

- If User Account Control (UAC) is turned on, click **Yes** on the elevation.
- If you belong to the Administrative group, click **Allow** in the elevation.
- If you are a standard user, give the administrative credentials to uninstall.

2. When prompted to remove PowerPath, click **Yes**.
3. When prompted to reboot the host, click **No** to reboot later.

---

**Note:** You can reboot after disconnecting redundant cables.

---

4. Complete the steps in ["Disconnecting redundant paths to the storage system" on page 51](#).

## Feature-specific removal

Use this procedure to remove specific PowerPath features.

---

**Note:** You cannot uninstall PowerPath multipathing for EMC arrays using this procedure. Only the complete uninstall procedure removes default multipathing components.

---

1. Using **Add/Remove Programs** or **Programs and Features** select the installed version of PowerPath and click **Change/Remove**.
2. In the setup wizard welcome window, click **Next**.
3. Click **Change** and then click **Next**.
4. To select a feature to uninstall (such as, Encryption with RSA), click the drop-down arrow beside the feature on the **Custom Setup** dialog box:

---

**Note:**

—A selected feature displays a hard drive icon next to it. A red X next to it indicates features that are not selected.

—The icon next to the feature name indicates the install state of the feature. Click **Help** in the **Custom Setup** dialog box for more information about the icons.

---

- a. Select **Entire feature will be unavailable**.
  - b. Click **Next**.
5. In the **Ready to Modify the program** dialog box, click **Change**.
  6. Click **Finish**.
  7. When prompted to reboot the host, click **No** to reboot later. Feature removal (other than the Management Component) needs reboot.

8. If you removed multipathing support for any storage systems, complete the steps in ["Disconnecting redundant paths to the storage system" on page 51.](#)

## Uninstalling with the PowerPath command line

The command line method allows you to uninstall PowerPath multipathing and/or other features, such as Migration Enabler or PowerPath Encryption.

Use this procedure for complete PowerPath removal or for feature-specific removal.

1. Use this command syntax to uninstall PowerPath:

```
<drive>:\<PowerPath_pkg_name> <uninstall_parameters> /v"<Property>=<Value>"
```

- For a silent removal, which does not require user input, use this syntax:

---

**Note:** Silent uninstallation errors are logged in *<logfile>*, the location specified in the uninstallation command. No error message appears in the PowerPath Administrator GUI.

---

```
<drive>:\<PowerPath_pkg_name> /s /v"/L*v <logfile> <Property>=<Value>"
```

- For an interactive removal, which requires user input, use this syntax:

```
<drive>:\<PowerPath_pkg_name> /v"/L*v <logfile> <Property>=<Value>"
```

Where:

- *<drive>* is the drive letter, for example, C.
- *<PowerPath\_pkg\_name>* is the PowerPath package name. For example,

EMCPower.Net32.signed.5.7.SP2.bxxx.exe  
or

EMCPower.X64.signed.5.7.SP2.bxxx.exe

- *<uninstall\_parameters>* is one or more parameters described in [Table 5 on page 49.](#)
- *<logfile>* creates the log file where the log message will be sent, for example, C:\logs\PPsetup.log.

**Note:** Make sure the specified directory exists within the specified path.

- *<Property>=<Value>* is one or more optional properties described under the /v parameter in [Table 5 on page 49.](#)

### Example: Silent removal

The following example of a silent uninstall completely removes PowerPath. It also disables reboot.

```
C:\EMCPower.Net32.signed.5.7.SP2.bxxx.exe /s /v"/L*v C:\logs\PPremove.log NO_REBOOT=1  
PPREMOVE=CLEAN"
```

### Example: Interactive removal

The following example of an interactive uninstall disables reboot and removes components to support HP XP and Hitachi arrays.

```
C:\EMCPower.Net32.signed.5.7.SP2.bxxx.exe /v"/L*v C:\Uninstall_HPXP_HDS.log NO_REBOOT=1
PPREMOVE=HPXP,HDS"
```

The following example of an interactive uninstall removes only PowerPath Encryption with RSA:

```
C:\EMCPower.Net32.signed.5.7.SP2.bxxx.exe /v"/L*v C:\logs\Uninstall_RSA.log NO_REBOOT=1
PPREMOVE=RSA"
```

The following example should be used only in case if you encounter a problem with normal PowerPath uninstallation (interactive/silent uninstallation).

**Note:** EMC recommends using the PPREMOVE=CLEAN option as command line uninstall option (for complete removal of PowerPath).

The /r parameter replaces PPREMOVE=ALL. By default, a bootstrapper log is created in %ProgramData%\EMC\PowerPath\logs. Adding the /L\*v <logfile> parameter does not create a log file when using the PPRemoveAll utility.

```
C:\EMCPower.Net32.signed.5.7.SP2.bxxx.exe /r
```

2. After uninstalling, complete the steps in ["Disconnecting redundant paths to the storage system" on page 51](#).

**CLI parameters**    [Table 5 on page 49](#) describes the CLI parameters and properties.

**Table 5** CLI parameters and properties (1 of 2)

| Parameter | Description  |   |
|-----------|--|---|
| /s        | Suppresses installation dialog boxes. Indicates a quiet removal (no user interaction).   |   |
| /v        | Directs installation to pass the specified string (enclosed in quotes) to the Microsoft Installer (MSI).<br>Example:<br><code>/v"&lt;Property&gt;=&lt;Value&gt;"</code><br>Where:<br><Property> and <Value> descriptions follow. |   |
|           | Property   | Value description   |
|           | NO_REBOOT=1  | The value 1 specifies that the host will not reboot after PowerPath is installed.<br><br><b>Note:</b> EMC recommends NO_REBOOT=1 so that you can manually restart at a convenient time. |

**Table 5** CLI parameters and properties (2 of 2)

| Parameter | Description   |
|-----------|---|
|           | <p>PPREMOVE=&lt;feature&gt;</p> <p>Specifies the features to uninstall. Use commas to separate multiple entries, for example: PPREMOVE=ME,RSA</p> <ul style="list-style-type: none"> <li>• CLEAN = Removes PowerPath and all other features, such as Migration Enabler and PowerPath Encryption. It also removes driver files and corresponding registry entries.</li> <li>• ME = Migration Enabler</li> <li>• RSA = Encryption with RSA</li> <li>• HA = Management Component</li> <li>• IBM = IBM ESS and XIV arrays</li> <li>• CELERRA = EMC Celerra and VNXe arrays</li> <li>• HDS = Hitachi arrays</li> <li>• HPXP = HP XP Active-Active arrays, and HP EVA arrays with firmware VCS 4.0 or later</li> <li>• INVISTA = EMC Invista and VPLEX devices</li> <li>• XTREMIO = EMC XtremIO arrays firmware Version 2.2 or later</li> <li>• NETAPP = NetApp arrays (FAS2240)</li> </ul> |
|           | <p>FORCE_DRIVER_UPDATE=1</p> <p>The value 1 will continue to install PowerPath and ignore the device manager check for any pending device installation or uninstallation activities.</p>  |
|           | <p>/L*v &lt;logfile&gt;</p> <p>Directs the Microsoft Installer to write verbose output to the file specified with this option. The target directory for the log file must exist before starting a silent removal by using the logging option (as required by the Windows installer engine).</p> <ul style="list-style-type: none"> <li>• On Windows Server 2008 and later MSI logs will be also available in: %ProgramData%\EMC\PowerPath\logs.</li> <li>• On Windows Server 2003 MSI logs are collected automatically only when setup is launched using PowerPath bootstrapper, and will be available in: %ALLUSERSPROFILE%\Application Data\EMC\PowerPath\logs</li> </ul> <p>The PPRemoveAll utility does not create a logfile when using the /L*v parameter. Instead, a bootstrapper log is created by default in %ProgramData%\EMC\PowerPath\logs.</p>                            |
| /r        | <p><b>Notice:</b> Contact EMC Customer Support before using /r.</p> <p>Use this option only when you encounter a problem with either installation or uninstallation of PowerPath.</p> <p>This invokes the PPRemoveAll utility, which removes all PowerPath multipathing entries from the host. . This /r switch replaces PPREMOVE=ALL.</p> <p><b>Note:</b> You do not need any of the above parameters with the /r switch.</p>  |

## PowerPath uninstallation troubleshooting

Table 6 on page 51 lists PowerPath uninstallation troubleshooting scenarios.

**Table 6** Troubleshooting scenarios

| Problem   | Message   | Suggested action   |
|---|---|--|
| Uninstalling MPIO and PowerPath in a boot-from-SAN configuration on a Windows 2003 host with no other third party DSM installed requires two reboots. | In a boot-from-SAN configuration, two host reboots are required to uninstall PowerPath and MPIO. To uninstall PowerPath and MPIO, choose Yes. To uninstall PowerPath and leave MPIO installed, choose No. To exit, choose Cancel.   | <ol style="list-style-type: none"> <li>1. Click <b>Yes</b> to uninstall PowerPath and MPIO.</li> <li>2. Click <b>No</b> to uninstall only PowerPath.</li> <li>3. Click <b>Cancel</b> to abort uninstallation.</li> </ol>   |
| Uninstalling PowerPath in a boot-from-SAN configuration on a host that has Windows Server 2008 R2 or later requires two host reboots.                 | PowerPath cannot disable some of its devices because a page file is located in a LUN under PowerPath control or host is configured to boot from SAN. Under these scenarios, two host reboots are required to uninstall PowerPath. Click OK to proceed, or Cancel to exit. | <ol style="list-style-type: none"> <li>1. Go to <b>Control Panel</b> and select <b>Add/Remove Programs</b>.</li> <li>2. Select <b>PowerPath</b> from the list of programs.</li> <li>3. Click <b>Remove</b>.</li> <li>4. Reboot the host.</li> <li>5. Repeat steps 1 through 3.</li> <li>6. Reboot the host.</li> </ol> |
| MPIO is ready to be uninstalled in a boot-from-SAN configuration.   | PowerPath has prepared the system for uninstallation. You must restart your system and continue with PowerPath uninstallation.  | <ol style="list-style-type: none"> <li>1. Go to <b>Control Panel</b> and select <b>Add/Remove Programs</b>.</li> <li>2. Select <b>PowerPath</b> from the list of programs.</li> <li>3. Click <b>Remove</b>.</li> <li>4. Reboot the host.</li> <li>5. Repeat steps 1 through 3.</li> <li>6. Reboot the host.</li> </ol> |

## Disconnecting redundant paths to the storage system

After uninstalling PowerPath, disconnect redundant paths to the storage system.

### CAUTION

Data corruption is possible if multiple paths remain on a system after PowerPath is removed.

To disconnect redundant paths:

1. In the **Shut Down Windows** dialog box, select **Shut Down** from the list, and click **OK**.
2. With the host shut down, disconnect redundant cables from the HBAs to the storage system interface ports.

**Note:** SAN (fabric) configurations may have multiple logical configurations per physical connection. Ensure that no redundant zoned paths exist.

3. Restart the host. PowerPath is completely removed from the host.



# CHAPTER 4

## Managing PowerPath

This chapter includes the following sections:

- ◆ Overview..... 54
- ◆ PowerPath Monitor..... 54
- ◆ PowerPath registration tools ..... 55
- ◆ PowerPath Administrator..... 56
- ◆ Local or remote administration..... 60
- ◆ Saving and loading Administrator settings ..... 62
- ◆ Saving MMC console settings..... 63
- ◆ PowerPath and Systems Management Server (SMS) ..... 64
- ◆ Traybar and UAC modifications..... 64
- ◆ Audit and error log messages ..... 64

## Overview

The PowerPath Administrator graphical user interface for Windows Server consists of two applications:

- ◆ **PowerPath Monitor** — Continuously monitors your PowerPath configuration and alerts you of status changes. The "[PowerPath Monitor](#)" section provides additional information.
- ◆ **PowerPath Administrator** — Configures, monitors, and manages PowerPath devices. The "[PowerPath Administrator](#)" on [page 56](#) provides additional information.

## PowerPath Monitor





PowerPath Monitor (on the taskbar of your Windows desktop) continuously monitors the status of your PowerPath configuration. PowerPath Monitor can be set to alert you with visual and audible cues when the status changes.

For example, if a path fails, the icon changes accordingly as seen in [Table 7 on page 54](#). Depending on the Notification settings you choose on the Options tab of the EMC PowerPath Admin (root node) Properties dialog box (see PowerPath Administrator online help for Windows Server), PowerPath Monitor may:

- ◆ Sound an alarm.
- ◆ Restore the PowerPath Administrator main window.
- ◆ Flash the taskbar icon.
- ◆ Or any combination thereof.

[Table 7](#) shows the taskbar icons and the status each represents.

**Table 7** PowerPath Monitor taskbar icons

| Taskbar Icon  | Status   |
|---|--|
|  | <b>Optimal</b> — All configured paths are operating properly.  |
|  | <b>Degraded</b> — Some but not all paths have failed.  |
|  | <b>All Failed</b> — All configured paths have failed.  |
|  | <b>Server Not Responding</b> — Cannot communicate with Monitor service. This occurs if the PowerPath Administrator Suite encountered errors during initialization. |

---

**Note:** All non-optimal monitor icons appear only if you have selected the Flash Taskbar Icon on the **Options** tab of the EMC PowerPath Admin (root node) Properties dialog box. The root node is the top-level view of your configuration and represents the host that is being managed by PowerPath.

---

## Launching MMC with the PowerPath snap-in

You can use PowerPath Monitor to do the following:

- ◆ Launch **Microsoft Management Console (MMC)** with the **PowerPath snap-in**.
- ◆ Notify you of PowerPath status changes if you are running it on a local host.

---

**Note:** The EMC PowerPath Administrator Monitor monitors the local host only. It does not remotely monitor the status of another host. The icon is only present on the Windows taskbar on the host with EMC PowerPath Administrator installed. If you are running PowerPath for the first time on a remote host, you must start the application according to the instructions at ["Local or remote administration" on page 60](#).

---

To launch the **Microsoft Management Console (MMC)** with the **PowerPath Snap-in**, do one of the following:

- ◆ Double-click the **PowerPath Monitor** icon on the Windows taskbar to launch the default MMC console with the PowerPath Snap-in.
- or
- ◆ Right-click the **PowerPath Monitor** icon to display the following context menu options:
  - **PowerPath Administrator** — Launches PowerPath Administrator.
  - **Close Monitor** — Closes the EMC PowerPath Administrator Monitor.

## PowerPath registration tools

You can use the PowerPath Licensing Tool or the `emcpreg` command to register PowerPath and related products.

### PowerPath Licensing Tool

The Licensing Tool is used to register PowerPath and other products, from the Windows GUI. The Licensing Tool is displayed during PowerPath installation (except when the host is connected to a CLARiiON AX-series array). To manage licenses, you can launch the tool by selecting **Start** > **All Programs** > **EMC** > **PowerPath Licensing Tool**.

This tool allows you to add or remove licenses. For more information, see the online help (press **F1**) or launch the help file, `EMCLicTool.chm`, from the PowerPath software CD or the \help directory.

---

**Note:** You must have Internet Explorer 5.1 or later to view the online help files. If you do not have this browser installed, you may still view the help file from the `EMCLicTool.chm` file.

---

## emcprep command

The **emcprep** command facilitates scripting options and is the only way to manage licenses with the Windows Server 2008 and later core versions. The **emcprep** command is supported with all supported Windows platform versions.

To add a license with **emcprep** command line, enter:

```
emcprep -add <key>
```

where *<key>* is the product license key.

The *PowerPath CLI and System Messages Reference* on EMC Online Support provides additional information.

## PowerPath Administrator

For Windows Server, the PowerPath Administrator runs as a snap-in program within Microsoft Management Console (MMC). You can use MMC and the PowerPath Snap-in to monitor a local or remote host. ["Local or remote administration" on page 60](#) provides additional information.

The PowerPath Administrator is a graphical user interface for configuring, monitoring, and managing PowerPath devices. The PowerPath Administrator continuously monitors a multipath storage-system environment and automatically updates the configuration information that appears.

You can use PowerPath Administrator to set up and change your device configuration and manage physical and logical path components. The PowerPath Administrator displays a hierarchical representation of paths, logical devices, and HBAs.

PowerPath Administrator displays the components of a PowerPath system as objects. PowerPath Administrator icons represent the PowerPath objects in your configuration. The type of icon reflects the state or status of the particular object selected. [Table 8 on page 58](#) and [Table 9 on page 59](#) display PowerPath Administrator icons.

## PowerPath Administrator panes

As part of MMC, the PowerPath Administrator has two panes:

- ◆ The *scope pane* displays PowerPath objects in a hierarchical list that can be expanded or collapsed.
- ◆ The *result pane* provides a view of configuration statistics for PowerPath objects selected in the scope pane.

## PowerPath Administrator device properties dialog box

You can access most of the PowerPath Administrator functions through the tabs available in the device Properties dialog box. Right-click the EMC PowerPathAdmin root node and then select **Properties**.

The PowerPath properties are as follows:

- ◆ PowerPath admin (root node) properties — Use this to:
  - Show root node details.

- Set local or remote host options.
- Set error notification options.
- Set Auto-Restore.
- View array management information.
- Set the path latency options.
- Manage the autostandby feature options.

---

**Note:** The root node is the top-level view of your configuration and represents the host that is being managed by PowerPath. The Root Node Properties dialog box contains the Details, Computer, and Options tabs. (The Computer tab is present only when you are connected to a remote host).

---

- ◆ Storage array properties — Use this to show storage array details. To display this tab, select a storage array, right-click, and select **Properties**.
- ◆ Storage array port properties — Use this to show storage array port details. To display this tab, select a storage array port, right-click, and select **Properties**.
- ◆ Adapter properties — Use this to show adapter details and change modes on the adapter. To display this tab, select an adapter, right-click, and select **Properties**.
- ◆ Disk properties — Use this to show disk details, change modes on the disk, and change load-balancing policies and priorities. To display this tab, select a disk, right-click, and select **Properties**.
- ◆ Path properties — Use this to show path details and change the mode of a path. To display this tab, select a path, right-click, and select **Properties**.

---

**Note:** The previous examples illustrate the most common PowerPath Administrator functions. The PowerPath Administrator online help for Windows Server provides complete information on using all the PowerPath Administrator functions.




















If you do not have Internet Explorer 5.1 or later installed on your system, you will be unable to launch the PowerPath online help files for Windows Server from the MMC console. If you want to view the help file without installing Internet Explorer, you can launch the EmcPowerPathAdminMMC.chm file directly from the \help folder on the PowerPath installation CD.

---

## Icons: standard, unlicensed, and unknown conditions

Table 8 shows icons for standard, unlicensed, unknown, and mismatched states. Standard icons represent a configuration in which PowerPath is optimal.

**Table 8** Icons on the PowerPath Administrator

| Object  | Standard Icon   | Unlicensed Icon  | Unknown Icon  | Mismatched Icon   |
|---|---|--|---|---|
| <b>Root Node</b> — Graphical representation of the host and top level view of your configuration.   |    |    |    | N/A   |
| <b>Storage Array</b> — An attached storage system that provides logical devices which are managed by PowerPath.   |    |    |    | N/A   |
| <b>Storage Array Port</b> — Identifies a port within a specific storage array that provides I/O paths to the logical devices.   |    |    |    | N/A   |
| <b>Disk</b> — A logical device managed by PowerPath. Logical devices are disk devices presented by the storage system.  |    |    |    | N/A   |
| <b>Adapter</b> — A device that provides an interface between the SCSI or Fibre Channel bus and the computer I/O bus. An adapter can have multiple paths associated with it. |   |   |   | N/A   |
| <b>Path</b> — The logical or physical I/O path from the host to the storage system, including the HBA, cable, and interface port.   |  |  |  |  |

**Note:** The online help provides more information on icons and their meaning.

## Icons: known failure conditions

When a path fails, the failure propagates through other PowerPath Administrator objects. These objects are displayed in a hierarchy in the scope pane and result pane. These known failure icons represent configurations that are less than optimal.

Table 9 on page 59 shows known failure icons. Icons for:























- ◆ Degraded conditions.
- ◆ Failed conditions.
- ◆ Unlicensed and degraded conditions.
- ◆ Unlicensed and failed conditions.

Degraded PowerPath objects are represented by a red slash through the standard object icon. (Because a path is either open or closed, the path icon is never shown as degraded.) Failed PowerPath objects are represented by a red X through the standard object icon.

The definition of degraded and failed status depends on the context shown in [Table 9 on page 59](#). For example, an unlicensed version of PowerPath with degraded or failed paths displays icons that combine elements of both the unlicensed and degraded icons.

Unless specified otherwise, all icons display in both the summary and details panes.

**Table 9** Icons of known PowerPath failure conditions







| Object             | Degraded Icon  | Failed Icon   | Unlicensed and Degraded Icon   | Unlicensed and Failed Icon   |
|--------------------|--|---|--|--|
| Root Node          |  EMC PowerPath Administrator is identifying a degradation within the managed environment.   |  EMC PowerPath Administrator is in a failed state.   |  EMC PowerPath is unlicensed and identifying a degradation within the managed environment.  |  EMC PowerPath Administrator is unlicensed and in a failed state.   |
| Storage Array      |  One or more (but not all) paths to the storage array have failed or are in a degraded state.   |  All paths to the specific array have failed. This array is not available.                                     |  EMC PowerPath Administrator is unlicensed. One or more (but not all) paths to the array have failed or are in a degraded state.      |  EMC PowerPath Administrator is unlicensed. All paths to the specific array have failed. This array is not available.   |
| Storage Array Port |  One or more (but not all) paths to the storage array port have failed or are in a degraded state.  |  All paths to the specific array port have failed. This array port is not available.                           |  EMC PowerPath Administrator is unlicensed. One or more (but not all) paths to the array port have failed or are in a degraded state. |  EMC PowerPath Administrator is unlicensed. All paths to the specific array port have failed. This array port is not available.                               |
| PowerPath device   |  One or more (but not all) paths to the disk device have failed.  |  All paths to the specific disk device have failed. This disk is not available.                              |  EMC PowerPath Administrator is unlicensed. One or more (but not all) paths to the disk device have failed.                         |  EMC PowerPath Administrator is unlicensed. All paths to the specific disk device have failed. This disk is not available.                                  |
| Adapter            |  One or more (but not all) adapters have either failed or degraded. Displays in the <b>Adapters</b> folder in the scope pane.<br><br>One or more (but not all) paths have failed on the specific adapter. |  All paths on this adapter have failed.  |  EMC PowerPath Administrator is unlicensed. One or more (but not all) paths have failed on the specific adapter.                    |  EMC PowerPath Administrator is unlicensed. All paths on this adapter have failed.  |
| Path               | Not applicable.  |  One or more of the hardware components that make up the path has failed; therefore, the entire path failed. | Not applicable.  |  EMC PowerPath Administrator is unlicensed, and one or more of the hardware components that comprise the path has failed; therefore, the entire path fails. |

## Undefined SP conditions

The following icons represent a rare condition on active/passive arrays, including VNX OE and CLARiiON, that produce a double link control card (LCC) failure. If you see these icons, the LCC fault light on the VNX OE or CLARiiON array should be amber. Refer to the VNX OE or CLARiiON documentation for troubleshooting information, or contact EMC Customer Support for information on replacing an LCC.

[Table 10 on page 60](#) shows icons and descriptions specific to CLARiiON arrays.

**Table 10** Icons of undefined SP PowerPath failure conditions

| Standard Icon   | Degraded Icon  | Failed Icon  | Unlicensed Icon   | Unlicensed and Degraded Icon   | Unlicensed and Failed Icon   |
|---|--|--|---|--|--|
|  The CLARiiON link control cards (LCC) have failed. The SP owning the disk is unknown and the disk is unavailable. |  The CLARiiON link control cards (LCC) have failed. The SP owning the disk is unknown and one or more (but not all) paths to the disk device has failed. The disk is unavailable. |  The CLARiiON link control cards (LCC) have failed. The SP owning the disk is unknown and all paths to the disk device has failed. The disk is unavailable. |  The PowerPath Administrator is unlicensed and the CLARiiON link control cards (LCC) have failed. The SP owning the disk is unknown and the disk is unavailable. |  The PowerPath Administrator is unlicensed and the CLARiiON link control cards (LCC) have failed. The SP owning the disk is unknown and one or more (but not all) paths to the disk device has failed. The disk is unavailable. |  The PowerPath Administrator is unlicensed and the CLARiiON link control cards (LCC) have failed. The SP owning the disk is unknown and all paths to the disk device has failed. The disk is unavailable. |

## Local or remote administration

With MMC and the PowerPath Snap-in, you can monitor a local host or a remote host.

- ◆ Local administration — EMC PowerPath Administrator is installed on the local host by default. The installation process provides a preconfigured .msc file to launch the Microsoft Management Console (MMC). Once PowerPath is installed, you can use PowerPath to monitor the local host immediately.

To launch MMC with the PowerPath Snap-in:

Select **Start > All Programs > EMC > PowerPath > PowerPathAdmin**.

**Note:** The path starts the PowerPath Snap-in and the MMC console on the local host with no other action required. However, there may be scenarios in which you need to add the PowerPath Snap-in to a new MMC console. For example, you may want to create another instance of PowerPath Administrator on the local host or you may have deleted the PowerPath Snap-in and want to add it again. ["Setting a local host option" on page 61](#) provides additional information on how to add the PowerPath Snap-in to the MMC console to monitor a local host.

- ◆ Remote administration — If you want to monitor a remote host that has PowerPath for Windows Server 2003 installed, you may supply the credentials for remote access to that host. ["Setting a remote host option" on page 61](#) provides additional information on how to add the PowerPath Snap-in to monitor a remote host with PowerPath installed.

---

**Note:** When PowerPath 3.0.5 or later is installed for Windows Server 2003 on more than one host, you can use the Remote Host Option to monitor any host from any other host.

---

## Setting a local host option

Adding the PowerPath Snap-in to MMC and monitoring a local host is a two-part procedure.

### Part 1: Opening the MMC

1. Click **Start**
  - ◆ If you are using Windows Server 2003, from the **Start** menu select **Run**.
  - ◆ If you are using Windows Server 2008 or later, from the **Start** menu:
    - in the Start Search text box, type **mmc**.
    - in the Start Search text box, type **cmd** and then type **mmc**.
2. In the **Open** field, run **mmc** (32-bit OS versions) or **mmc/32** (64-bit OS versions).
3. Click **OK**.

An MMC Console appears. The MMC title bar displays **Console1**. Within this pane is the **Console Root**. Initially this folder is empty. However, once the snap-in is added, this folder will contain the EMC PowerPath Administrator (and any other added snap-ins) and is displayed as expandable icons under the **Console Root** folder.

### Part 2: Adding the EMC PowerPath Administrator snap-in

1. From the MMC console, select **File > Add/Remove Snap-in**.
2. Select **PowerPath Administration** and click **Add**.
3. Select **Local Computer**.
4. Click **Finish**.
5. In the **Add Standalone Snap-in** dialog box, click **Add** to add another snap-in or click **Close**.
6. In the **Add/Remove Snap-in dialog**, click **OK**.

EMC PowerPath Administrator is now added to the MMC console.

You can now use EMC PowerPath Administrator to configure, manage, and monitor PowerPath devices.

Once you have changed your configuration, save the configuration. ["Saving a configuration" on page 63](#) provides additional information.

## Setting a remote host option

Adding the PowerPath snap-in to MMC and monitoring a remote host [that has PowerPath 3.0.5 or higher for Windows Server 2003](#) installed is a two-part procedure.

## Part 1: Opening the MMC

To open the MMC:

1. Click **Start**
  - ◆ If you are using Windows Server 2003, from the **Start** menu select **Run**.
  - ◆ If you are using Windows Server 2008 or later, from the **Start** menu:
    - in the Start Search text box, type **mmc**.
    - in the Start Search text box, type **cmd** and then type **mmc**.
2. In the **Open** field, run **mmc** (32-bit OS versions) or **mmc/32** (64-bit OS versions).
3. Click **OK**.

An MMC Console appears. The MMC title bar displays **Console1**. Within this pane is the **Console Root**. Initially this folder is empty. However, once the snap-in is added, this folder will contain the EMC PowerPath Administrator (and other snap-ins you may add) and is displayed as expandable icons under the **Console Root** folder.

## Part 2: Adding the EMC PowerPath Administrator snap-in

1. From the MMC console, select **File > Add/Remove Snap-in**.
2. Select **PowerPath Administration** and click **Add**.
3. Select **Another Computer**.
4. Type the computer name or browse for the remote computer.
5. In the **Browse for Computer** dialog box, click **OK**.
6. Type your **User Name**, **Domain Name**, and **Password**.
7. Click **Finish**.

---

**Note:** The User Name, Domain Name, and Password fields are subsequently available for editing from the root node **Properties** page if you are using MMC to monitor a remote host. The section "*Set Remote Host Options*" in the PowerPath Administrator online help provides additional information.

---

8. In the **Add Standalone Snap-in** window, click **Add** to add another snap-in or click **Close**.
9. In the **Add/Remove Snap-in** window, click **OK**. EMC PowerPath Administrator is now added to the MMC console.

## Saving and loading Administrator settings

You can use EMC PowerPath Administrator to configure, manage, and monitor PowerPath devices. The first time you run EMC PowerPath Administrator, there is a default configuration. If you make changes, you can save them to a configuration file. The file records the serial numbers, mode, policy, and priority for each configured path. You can also load the last known configuration or a previously saved file.

---

**Note:** PowerPath configuration files are distinct from the Microsoft Management Console (MMC) configuration files. If you close the MMC window, MMC prompts you to save the MMC settings. These settings are not the same as the EMC PowerPath Administrator settings. Saving the MMC console settings does not save your PowerPath configuration changes. These changes will be lost unless you complete the following procedure.

---

## Saving a configuration

To save the current PowerPath Administrator settings:

---

**Note:** Saving the configuration may override an existing configuration file. Provide a unique file name and use the **Save As** option to avoid overriding an existing configuration file.

---

- ◆ Enter **powermt save [file=<pathname>]**  
or
- ◆ In PowerPath Administrator, right-click the root node and select **All Tasks > Save Configuration**. Specify a file name and click **Save**.

## Loading a configuration

You can load the last known reboot state or a previously saved EMC configuration file.

To load a configuration:

1. In the scope pane, select the **EMC PowerPath Admin** root node.
2. To load a previously saved PowerPath configuration, right-click the root node and select **All Tasks > Load Configuration File**.

To load the last known reboot state, right-click the root node and select **All Tasks > Load Reboot Configuration**.

## Saving MMC console settings

The MMC console enables you to display the PowerPath Snap-in data in many ways. If you change your MMC console configuration (for example, if you resize columns, change column displays, or change column sort order), you may want to save these new MMC console settings.

If you close the MMC console itself, or the PowerPath Snap-in within the MMC console, MMC prompts you with the following message:

Save console settings to <filename>.msc?

Click **Yes** to save the latest console settings. By default, the MMC console settings are saved as console1.msc in the folder:

%SystemDrive%\Programs\Administrative Tools

You can save the console settings anytime with the **Console, Save** menu option in the MMC console.

To save the file with a different name or to a different location, go to **MMC Console > Save As**.

## PowerPath and Systems Management Server (SMS)

PowerPath has been qualified with the Systems Management Server (SMS) software from Microsoft, which allows remote management of large groups of Windows-based systems. SMS allows you to remotely manage patches, distribute software, deploy operating systems, and perform software and hardware inventories.

The high level steps for deploying PowerPath using SMS are:

1. Create a PowerPath package in SMS.
2. Create a program for that PowerPath package.
3. Assign distribution points to that package.
4. Advertise the package to target clients by defining a collection.

See the Microsoft SMS product documentation for detailed instructions.

## Traybar and UAC modifications

Beginning with Windows Server 2008, Microsoft introduced modifications to the traybar monitor program and the User Account Control (UAC):

- ◆ The traybar monitor program now communicates to the PowerPath service where it previously communicated directly with the kernel driver. This means that if the PowerPath service is disabled or fails to start, the traybar monitor will not function and an error displays.
- ◆ For those tasks that require administrator privileges, you receive the elevated prompt when:
  - Opening the GUI from the traybar monitor.
  - Launching admin GUI from a program group.
  - Starting the license tool.

When the license tool is launched from the Installation program, you do not receive an elevation prompt.

---

**Note:** The above information is valid only for built in administrator accounts and any accounts which are part of the administrator group, if UAC is turned on.

---

## Audit and error log messages

The *EMC PowerPath Family CLI and System Messages Reference* on EMC Online Support describes audit logging, including instructions for setting up logging in your environment. It also lists error messages, descriptions, and suggested corrective action.

# CHAPTER 5

## PowerPath in an MSCS Cluster

This chapter includes the following sections:

- ◆ [Installing PowerPath and MSCS.....](#) 66
- ◆ [Integrating PowerPath into an existing MSCS cluster .....](#) 66

## Installing PowerPath and MSCS

If you are installing PowerPath and MSCS for the first time, install PowerPath first, and then install MSCS. Installing PowerPath first avoids disruption of cluster services at a later time. The Microsoft MSCS documentation provides complete information on planning, configuring, managing, and troubleshooting MSCS.

After installing PowerPath and MSCS, run the **emcphostid check** command to check for host conflicts. If the host IDs are not unique, run the **emcphostid set** command to set a unique host ID.

## Integrating PowerPath into an existing MSCS cluster

You can integrate PowerPath into an existing MSCS cluster, without shutting down the cluster, if there is close coordination between the nodes and the storage system.

Each node in a cluster can own a distinct set of resources. Node A is the primary node for its resources and the failover node for node B resources. Conversely, node B is the primary node for its resources and the failover node for node A resources.

The Microsoft MSCS documentation provides complete information on planning, configuring, managing, and troubleshooting MSCS.

---

**Note:** After installing PowerPath on the cluster, any testing involving node failover by disconnecting all cables for a LUN or otherwise disrupting the path between the active host and the array logs an event message in Windows. These event messages will indicate hardware or network failure and possible data loss. If working correctly, the cluster will failover to a node with an active path and you can ignore the messages from the original node as logged in the event log.

You should check the application generating I/O to see if there are any failures. If there are none, everything is working normally.

---

The following procedure describes how to install PowerPath on a two-node cluster. You can also install PowerPath on clusters with more than two nodes. In these cases, the appropriate action is noted where applicable for clusters with more than two nodes.

To add PowerPath to an existing MSCS cluster (with MSCS running on both nodes), follow these procedures:

- ◆ ["Moving all resources to node A" on page 67](#)
- ◆ ["Installing PowerPath on node B" on page 67](#)
- ◆ ["Configuring additional paths between the storage system and node B" on page 67](#)
- ◆ ["Moving all resources to node B" on page 67](#)
- ◆ ["Installing PowerPath on node A" on page 67](#)
- ◆ ["Configuring additional paths between the storage system and node A" on page 68](#)
- ◆ ["Returning node A resources to node A" on page 68](#)
- ◆ ["Checking for host ID uniqueness" on page 68](#)

## Moving all resources to node A

1. Start the MSCS Cluster Administrator utility (Windows Server 2003) or the Windows Server Failover Cluster Manager Console (Windows Server 2008 and later).
2. Select all groups owned by node B.
3. Move the resources to node A.
4. Pause node B. This keeps the node from participating in the cluster during PowerPath installation.

## Installing PowerPath on node B

1. Install PowerPath on node B.
2. Shut down node B.

In a cluster with more than two nodes, install PowerPath on these other nodes (steps [1](#) and [2](#)). For example, in a four-node cluster, replace node B with nodes B, C, and D as shown in step [4](#) in the section ["Moving all resources to node A" on page 67](#).

## Configuring additional paths between the storage system and node B

1. If necessary, reconfigure the storage system so its logical devices appear on multiple ports.
2. If necessary, install additional HBAs on node B.
3. Connect cables for new paths between node B and the storage system.
4. Power on node B.
5. To resume node B, click on node B and do the following:
  - a. On Windows Server 2003 select **File > Resume Node**.
  - b. On Windows Server 2008 and later, right-click > **Resume**.

In a cluster with more than two nodes, configure additional paths between the storage system and these other nodes. In a four-node cluster, replace node B with nodes B, C, and D in steps 2, 3, 4, and 5 above.

## Moving all resources to node B

1. In the left pane of the **Cluster Administrator** window, select all groups.
2. Move the resources to node B.

In a cluster with more than two nodes, move all resources to any of the remaining nodes. For example, in a four-node cluster, replace node B with any combination of nodes B, C, and D to which you want to move resources.

3. Pause node A.

## Installing PowerPath on node A

1. Install PowerPath on node A.

2. Shut down node A.

## Configuring additional paths between the storage system and node A

1. If necessary, configure the storage system so its logical devices appear on multiple ports.
2. If necessary, install additional HBAs on node A.
3. Connect cables for new paths between node A and the storage system.
4. Power on node A.
5. Resume node A.

## Returning node A resources to node A

1. Using the MSCS Cluster Administrator utility (Windows Server 2003) or the Windows Server Failover Cluster Manager (Windows Server 2008 and later), select all groups previously owned by node A.
2. Move the resources back to node A.

## Checking for host ID uniqueness

Run the **emcphostid check** command to check for host uniqueness. If the host IDs are not unique, run the **emcphostid set** command to set unique host IDs.

# CHAPTER 6

## PowerPath in a Veritas Cluster Server

This chapter includes the following sections:

- ◆ Installing PowerPath and VCS..... 70
- ◆ Installing PowerPath in an existing VCS environment..... 70

## Installing PowerPath and VCS

If you are installing PowerPath and VCS for the first time, install PowerPath first, and then install VCS. Installing PowerPath first avoids disruption to the cluster services at a later time. The Veritas Storage Foundation High Availability (SFHA) documentation provides complete information on planning, configuring, managing, and troubleshooting VCS.

After installing PowerPath and VCS, run the **emcphostid check** command to check for host conflicts. If the host IDs are not unique, run the **emcphostid set** command to set a unique host ID.

## Installing PowerPath in an existing VCS environment

### ⚠ CAUTION

Ensure that you follow these steps to manage your cluster environment. Failure to do so can result in data corruption and data loss. Refer to the VCS documentation on how to configure and manage VCS in a clustered environment.

To install PowerPath in an existing VCS:

1. In the **Cluster Administrator** window, ensure all resources are on the primary node in the cluster. When the cluster resources are on the primary node, the ClusterService in the **Status View** dialog box appears as online.

---

**Note:** The procedure for setting up VCS on Windows Server 2008 may differ from Windows Server 2003. The Veritas documentation provides additional information. The procedure for installing PowerPath on VCS follows the same steps as mentioned for VCS on Windows Server 2003.

---

2. From the navigation pane on the left, right-click **ClusterService** and select **Disable**. This disables the secondary node in the VCS configuration.
3. Install PowerPath on the secondary node. Follow the procedures in [“Installation procedures” on page 19](#).
4. After installation and reboot of the secondary node, right-click **ClusterService** and select **Enable** to re-enable the node in the VCS configuration.
5. Right-click **ClusterService**, select **Switch to**, and then select the secondary node to move all cluster resources over to the secondary node.
6. Run **vxdisk list**. You will see the devices are in the BasicGroup and RAW group.  
The **vxdisk list** command will display the proper **DiskType** and **DiskGroup** information.
7. Once the resources are available on the secondary node:
  - a. Run **vxassist rescan**.
  - b. Run **vxdisk list** to verify the disks are now in the proper disk group and show **MBR**.

If there are additional nodes in the cluster configuration, repeat steps 2 through 7 for each node.

8. Run the **emcphostid check** command to check for host uniqueness. If the host IDs are not unique, run the **emcphostid set** command to set unique host IDs.

## DiskType and DiskGroup information

The **vxdisk list** command displays DiskType as RAW instead of MBR and all disks appear to be in the default DiskGroup 'BasicGroup' after the installation of PowerPath.

```
C:\Documents and Settings\Administrator>vxdisk list
```

| Name      | MediaName | Diskgroup  | DiskStyle | Size(MB) | FreeSpace(MB) | Status        | EnclosureID    | P#C#T#L# |
|-----------|-----------|------------|-----------|----------|---------------|---------------|----------------|----------|
| Harddisk0 |           | BasicGroup | MBR       | 156327   | 127327        | Uninitialized | DISKS@lhclu056 | P0C0T0L0 |
| Harddisk1 | Disk1     | dg1        | RAW       | 10236    | 0             | Imported      | DGC0           | P2C0T0L0 |
| Harddisk2 | Disk2     | dg1        | RAW       | 10236    | 0             | Imported      | DGC0           | P2C0T1L1 |
| Harddisk3 | Disk3     | dg1        | RAW       | 10236    | 5118          | Imported      | DGC0           | P2C0T0L2 |
| Harddisk4 | Disk4     | dg1        | RAW       | 10236    | 5118          | Imported      | DGC0           | P2C0T1L3 |

```
C:\Documents and Settings\Administrator>vxassist rescan
Successfully rescanned
```

Note: Notice disk now properly show diskstyle as MBR

```
C:\Documents and Settings\Administrator>vxdisk list
```

| Name      | MediaName | Diskgroup  | DiskStyle | Size(MB) | FreeSpace(MB) | Status        | EnclosureID    | P#C#T#L# |
|-----------|-----------|------------|-----------|----------|---------------|---------------|----------------|----------|
| Harddisk0 |           | BasicGroup | MBR       | 156327   | 127327        | Uninitialized | DISKS@lhclu056 | P0C0T0L0 |
| Harddisk1 | Disk1     | dg1        | MBR       | 10236    | 0             | Imported      | DGC0           | P2C0T0L0 |
| Harddisk2 | Disk2     | dg1        | MBR       | 10236    | 0             | Imported      | DGC0           | P2C0T1L1 |
| Harddisk3 | Disk3     | dg1        | MBR       | 10236    | 5118          | Imported      | DGC0           | P2C0T0L2 |
| Harddisk4 | Disk4     | dg1        | MBR       | 10236    | 5118          | Imported      | DGC0           | P2C0T1L3 |

1. Disable the primary node in the VCS configuration and install PowerPath as described in [“Installation procedures” on page 19](#).
2. After installing PowerPath, reboot the primary node.
3. Re-enable the node in the VCS configuration.
4. Move all cluster resources over to the primary node. Once the resources are available, run **vxassist rescan**.



# APPENDIX A

## WHQL Certification

The appendix includes the following section:

- ◆ WHQL-certified driver ..... 74

## WHQL-certified driver

On Windows Server, the EMC PowerPath driver is WHQL-certified. To view the PowerPath driver signature:

1. Select **Start > Control Panel > System**.
2. Click **Device Manager**.
3. Expand the **Storage controllers** node.
4. Right-click **EMS device bus** and then select **Properties**.
5. Click **Driver > Driver Details** to see the driver signature information.

When the driver is signed, the field contains information about the organization that assigned the driver.

# APPENDIX B

## Files Changed by PowerPath

The appendix includes the following section:

- ◆ Files created by PowerPath installation..... 76

## Files created by PowerPath installation

The following files are added when PowerPath is installed on 32-bit and 64-bit hosts. These file locations can change if you do not install to the default locations during PowerPath installation. Hence <Install directory> is denoted as a variable in the following sections.

---

**Note:** All driver files (.sys, .cat, and .inf) are copied to the internal system directories by the operating system when they are installed.

---

### <Install directory>\PowerPath

- ◆ ckmadm.exe
- ◆ db\_recover.exe
- ◆ db\_recover.exe.manifest
- ◆ DIFxAPI.dll
- ◆ EMC\_PowerPath\_Console.msc
- ◆ EmcAdminProxy.dll
- ◆ EmcAdminSvr.exe
- ◆ emcp\_mp\_rtl.dll
- ◆ emcp\_mpio\_win.dll
- ◆ emcp\_xcryptd.exe
- ◆ emcphostid.exe
- ◆ EmcpLogMsgs.dll
- ◆ EmcpMgmtComp.exe
- ◆ EmcpPerfmonPmiPrvdr.dll
- ◆ EmcPowerPathAdmin.dll
- ◆ EmcPowPN22.dll
- ◆ emcpreg.exe
- ◆ Install.exe
- ◆ libdb51.dll
- ◆ libdb51.dll.manifest
- ◆ libxml2.dll
- ◆ ManagementComp\_Config.exe
- ◆ powerpath.man
- ◆ powermig.exe
- ◆ powermigcl.exe
- ◆ powermt.exe
- ◆ powervt.exe
- ◆ PowMigSrv.exe
- ◆ ppinstall.exe
- ◆ ppme.dll
- ◆ pthreadVC2.dll
- ◆ RKM\_Config.exe
- ◆ RKM\_Config\_CHS.dll
- ◆ RKM\_Config\_DEU.dll
- ◆ RKM\_Config\_ESP.dll
- ◆ RKM\_Config\_FRA.dll
- ◆ RKM\_Config\_ITA.dll
- ◆ RKM\_Config\_JPN.dll
- ◆ RKM\_Config\_KOR.dll

- ◆ RKM\_Config\_PTB.dll
- ◆ rkmc\_cache\_conv.exe
- ◆ EmcLicTool.exe
- ◆ EmcLicTool\_CHS.dll
- ◆ EmcLicTool\_DEU.dll
- ◆ EmcLicTool\_ESP.dll
- ◆ EmcLicTool\_FRA.dll
- ◆ EmcLicTool\_ITA.dll
- ◆ EmcLicTool\_JPN.dll
- ◆ EmcLicTool\_KOR.dll
- ◆ EmcLicTool\_PTB.dll
- ◆ emcp\_lic\_rtl.dll
- ◆ emcp\_mpapi\_rtl.dll
- ◆ EmcPowMon.exe
- ◆ EmcPowRes.dll
- ◆ EmcPowSrv.exe
- ◆ EmcpSvcErr.dll
- ◆ libeay32.dll
- ◆ server.pem
- ◆ ssleay32.dll

⟨Install directory⟩\PowerPath\X86 (X64 and IA64 hosts only)

- ◆ emcp\_lic\_rtl.dll
- ◆ emcp\_mpapi\_rtl.dll
- ◆ EmcPowPN22.dll
- ◆ pthreadVC2.dll

⟨Install directory⟩\EMC\PowerPath\Drivers

- ◆ EmcpBase.cat
- ◆ Emcpbase.inf
- ◆ EmcpBase.sys
- ◆ EmcpClass.cat
- ◆ EmcpClass.inf
- ◆ EmcpClass.sys
- ◆ EmcpCoinst30.dll
- ◆ emcpdm.cat
- ◆ emcpdm.inf
- ◆ EmcpDm.sys
- ◆ emcpgpx.cat
- ◆ emcpgpx.inf
- ◆ EmcpGpx.sys
- ◆ EmcpMd.cat
- ◆ EmcpMd.inf
- ◆ EmcpMd.sys
- ◆ EmcpMpx.cat
- ◆ EmcpMpx.inf
- ◆ EmcpMpx.sys
- ◆ EmcpXcr.cat
- ◆ EmcpXcr.inf
- ◆ EmcpXcr.sys

- ◆ LamClar.cat
- ◆ LamClar.inf
- ◆ LamClar.sys
- ◆ LamEss.cat
- ◆ LamEss.inf
- ◆ LamEss.sys
- ◆ LamGen.cat
- ◆ LamGen.inf
- ◆ LamGen.sys
- ◆ Lamhit.cat
- ◆ Lamhit.inf
- ◆ Lamhit.sys
- ◆ Lamhpxp.cat
- ◆ Lamhpxp.inf
- ◆ Lamhpxp.sys
- ◆ Lamhpsx.cat
- ◆ Lamhpsx.inf
- ◆ Lamhpsx.sys
- ◆ LamInv.cat
- ◆ LamInv.inf
- ◆ LamInv.sys
- ◆ LamSymm.cat
- ◆ LamSymm.inf
- ◆ LamSymm.sys
- ◆ Lamnet.sys
- ◆ Lamnet.inf
- ◆ Lamnet.cat
- ◆ Lamxtremio.sys
- ◆ Lamxtremio.inf
- ◆ Lamxtremio.cat
- ◆ RSA\_CK.cat
- ◆ RSA\_CK.inf
- ◆ RSA\_CK.sys

⟨Install directory⟩\EMC\PowerPath\32bit\RSA\CST\lib (IA64 hosts)

- ◆ aceclnt.dll
- ◆ ccme\_base.dll
- ◆ ccme\_ecc.dll
- ◆ ccme\_eccaccel.dll
- ◆ ccme\_eccnistaccel.dll
- ◆ cryptocme2.dll
- ◆ cryptocme2.sig
- ◆ CSP.dll
- ◆ CSP-AuthenticationService.dll
- ◆ CSP-C.dll
- ◆ CSP-CatalogPosix.dll
- ◆ CSP-CatalogService.dll
- ◆ CSP-CatalogWindows.dll
- ◆ CSP-CertService.dll
- ◆ CSP-Configuration.dll
- ◆ CSP-DestinationAlert.dll

- ◆ CSP-DestinationEventLog.dll
- ◆ CSP-DestinationFile.dll
- ◆ CSP-DestinationODBC.dll
- ◆ CSP-DestinationSyslog.dll
- ◆ CSP-EventSource.dll
- ◆ CSPI.dll
- ◆ CSPJNIWrappers.dll
- ◆ CSP-LayoutFlat.dll
- ◆ CSP-LayoutRaw.dll
- ◆ CSP-LayoutXML.dll
- ◆ CSP-lb.dll
- ◆ CSP-LDAP.dll
- ◆ CSP-LDAPClient.dll
- ◆ CSP-LocalDirectory.dll
- ◆ CSP-LocalizationService.dll
- ◆ CSP-LogService.dll
- ◆ CSP-MessageCatalog.dll
- ◆ CSP-OSLogin.dll
- ◆ CSP-PositionalFormatter.dll
- ◆ CSP-RoleManagement.dll
- ◆ CSP-RT.dll
- ◆ CSP-SecurID.dll
- ◆ CSP-Security.dll
- ◆ CSP-SM.dll
- ◆ CSP-SprintfFormatter.dll
- ◆ CSP-TrustedUser.dll
- ◆ CSP-UserManagement.dll
- ◆ CSP-XML.dll
- ◆ CST-admin.dll
- ◆ cstadmin.exe
- ◆ expat.dll
- ◆ LBJNIWrappers.dll
- ◆ osysrt.dll
- ◆ osysrtxml.dll
- ◆ RKM\_Config.bat
- ◆ sdmsg.dll

<Install directory>\EMC\RSA\CST\xml

- ◆ Config.xml
- ◆ Config-Template.xml
- ◆ CSP.xml
- ◆ CSP-Admin.xml
- ◆ csp-app.xml
- ◆ CSP-Authn.xml
- ◆ CSP-CatalogPosix.xml
- ◆ CSP-CatalogService.xml
- ◆ CSP-CatalogWindows.xml
- ◆ CSP-CertificateManagement.xml
- ◆ CSP-Config.xml
- ◆ CSP-DestinationAlert.xml
- ◆ CSP-DestinationEventLog.xml

- ◆ CSP-DestinationFile.xml
- ◆ CSP-DestinationODBC.xml
- ◆ CSP-DestinationSyslog.xml
- ◆ CSP-LayoutFlat.xml
- ◆ CSP-LayoutRaw.xml
- ◆ CSP-LayoutXML.xml
- ◆ CSP-LDAP.xml
- ◆ CSP-LocalDirectory.xml
- ◆ CSP-LocalizationService.xml
- ◆ CSP-Logging.xml
- ◆ CSP-OSLogin.xml
- ◆ CSP-PAM.xml
- ◆ CSP-PositionalFormatter.xml
- ◆ CSP-RoleManagement.xml
- ◆ CSP-saml-schema-assertion-1.1.xsd
- ◆ CSP-saml-schema-assertion-2.0.xsd
- ◆ CSP-SecurID.xml
- ◆ CSP-SM.xml
- ◆ CSP-SprintfFormatter.xml
- ◆ CSP-TrustedUser.xml
- ◆ CSP-UserManagement.xml
- ◆ CSP-xenc-schema.xsd
- ◆ xmldsig-core-schema.xsd

⟨Install directory⟩\EMC\RSA\Rkm\_client\config

- ◆ rkm\_init.conf.tmpl
- ◆ rkm\_keyclass.conf.tmpl
- ◆ rkm\_registration.conf.tmpl
- ◆ rkm\_svc.conf.tmpl

⟨Install directory⟩\EMC\RSA\Rkm\_Client\lib (32-bit)

- ◆ ccme\_base.dll
- ◆ ccme\_ecc.dll
- ◆ ccme\_eccaccel.dll
- ◆ ccme\_eccnistaccel.dll
- ◆ cryptocme2.dll
- ◆ cryptocme2.sig
- ◆ CSP-lb.dll
- ◆ CSP-Security.dll
- ◆ kmclient\_shared.dll
- ◆ kmcryptolib.dll
- ◆ kmsvcshlib.dll

---

**Note:** On an IA 64 host, the above files will be copied under ⟨Install directory⟩\EMC\PowerPath\32bit\RSA\Rkm\_Client\lib (IA64 hosts).

---

Windows\Help

- ◆ EmcLicTool.chm
- ◆ EmcLicToolCHS.chm
- ◆ EmcLicToolDEU.chm

- ◆ EmcLicToolESP.chm
- ◆ EmcLicToolFRA.chm
- ◆ EmcLicToolITA.chm
- ◆ EmcLicToolJPN.chm
- ◆ EmcLicToolKOR.chm
- ◆ EmcLicToolPTB.chm
- ◆ EmcPowerPathAdminMMC.chm

## Windows\Cluster

- ◆ ppme.dll

## %ALLUSERSPROFILE%\EMC\PowerPath

- ◆ bootstrapper\_\*.log
- ◆ msi\_\*.log
- ◆ ppinstall\_\*.log
- ◆ vcredist\_<platform>\_\*.log



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