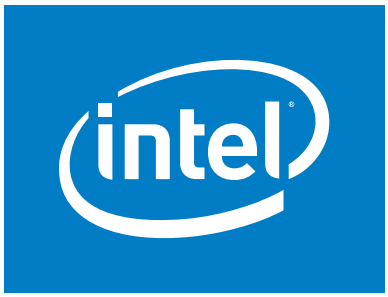
Intel® Storage System SSR212PP

Based on EMC AX150® Technology



PowerPath for Windows Version 4.5

Installation and Administration Guide

Intel Order Number D59959-001

Revision 1.0

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Contents

List of Figures

List of Tables

Preface

Some functions described in this manual may not be supported by all versions of PowerPath or the storage-system hardware it supports. For the most up-to-date information on product features, see your product release notes.

This guide describes how to install and remove PowerPath 4.5.*x* for Windows 2000 and Windows Server 2003. It also includes an introduction to the PowerPath Administrator.

Audience and Prerequisites

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.

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

Additional Information and Software

If you need more information about this product or information about the accessories that can be used with this storage system, use the following resources. These files are available at http://support.intel.com/support/motherboards/server/*SSR212PP*. Unless otherwise indicated in the following table, once on this Web page, type the document or software name in the search field at the left side of the screen and select the option to search "This Product."

For this information or software	Use this Document or Software
For in-depth technical information about this product	Intel® Storage System SSR212PP *Technical Product Specification*
If you just received this product and need to install it	Intel® Storage System SSR212PP *Quick Start User's Guide* in the product box
For virtual system tours and interactive repair information	A link to the SMaRT Tool is available under "Other Resources" at the right side of the screen at http://support.intel.com/support/motherboards/server/SSR212PP
Accessories and spacres	Intel® Storage System SSR212PP *Spares Installation Guide*

For this information or software	Use this Document or Software
Hardware (peripheral boards, adapter cards) and operating systems that have been tested with this product	Tested Hardware Operating Systems List (THOL)

Installing PowerPath 4.5 for Windows

1

This chapter describes procedures for installing and upgrading PowerPath on a Windows 2000 or Windows Server 2003 host. The topics include:

PowerPath and PowerPath iSCSI

PowerPath¤ for Windows software is available in two different packages: PowerPath for Windows and PowerPath iSCSI for Windows. It is important to know the differences between the two packages before deploying the software:

- **PowerPath for Windows** supports both Fibre Channel and iSCSI environments. PowerPath for Windows is Microsoft digitally certified *only* for Fibre Channel environments. PowerPath for Windows supports failover path management and load-balancing for up to 32 paths in heterogeneous storage environments.

  PowerPath for Windows is not currently supported by Microsoft for iSCSI implementations, although it is supported iSCSI storage systems.

- **PowerPath iSCSI for Windows** supports iSCSI storage systems. PowerPath iSCSI for Windows is Microsoft digitally certified and is built on the Microsoft MPIO framework. PowerPath iSCSI for Windows supports failover path management for up to 8 paths in iSCSI storage environments.

  Refer to *PowerPath iSCSI for Windows: Getting Started* for more information on PowerPath iSCSI for Windows. This guide is available on the SSR212PP support website (http://support.intel.com/support/motherboards/server/SSR212PP).

Before You Install

The sequence of steps to configure a storage system and install PowerPath on a host depends on the storage system you use.

- *SSR212PP-Series storage systems***.** PowerPath installation is an integral part of the setup and configuration procedure.

  SSR212PP-Series installation, planning, and troubleshooting documents are located on the SSR212PP support website. For information on accessing the site, refer to the support documentation that shipped with your storage system. Refer only to these documents for prescribed installation information when using SSR212PP-Series storage systems.

The rest of this section describes what to do before you install PowerPath on the host.

❑ Obtain up-to-date information. Check the SSR212PP support website for the most current information:

- *Release Notes*. We update the PowerPath release notes periodically and post them on the Web.
- *Patches and notices*. Review the patch ReadMe files to determine which patches (if any) you want to install after PowerPath, and whether those patches have any added prerequisites that must be met before you install PowerPath.
- *Check Microsoft-certified drivers*. To check whether a PowerPath driver is signed, refer to the procedure in Appendix A, .

❑ Choose a convenient time for the installation. Installing PowerPath requires you to reboot the host. Plan to install or upgrade PowerPath when a reboot will cause minimal disruption to your site.

Installing PowerPath on a host connected exclusively to SSR212PP-Series arrays does not require a license. PowerPath 4.5.x provides full support with or without a PowerPath license when the host is connected exclusively to SSR212PP-Series arrays.

❑ Verify that your environment meets the requirements in:

- *Environment and System Requirements* section of the *PowerPath Version 4.5 Release Notes*. That section describes minimum hardware and software requirements for the host and supported storage systems.
- Chapter 3, *PowerPath Configuration Requirements*, in the *PowerPath Product Guide*. That chapter describes the host-storage system interconnection topologies that PowerPath supports.

❑ Configure HBA drivers.

CAUTION

Be sure to follow HBA driver configuration guidelines outlined in the Support Matrix and product documentation. Using improper settings can cause erratic failover behavior, such as greatly increased I/O delays.

- For hosts connected to storage arrays via a Fibre Channel switch (that is, a fabric), configure the HBAs using persistent binding for SCSI target IDs.

CAUTION

Failure to do so could result in data loss or corruption of data.

- Do not connect multiple paths from the HBAs to the storage system interface ports, hubs, or switches, or zone multiple paths, until you have installed PowerPath and shut down the host.
- A failed redundancy state can occur if PowerPath is installed on a host with mirrored disks. This state only happens if disk management applications (that use the dmadmin service) are running when PowerPath is installed. To prevent this, it is recommended that you close all disk management applications (including diskmgmt.msc and diskpart.exe) and stop the dmadmin service before installing PowerPath.

Host Connected to a Third-Party Array

Take note of the following before installing PowerPath on a host connected to a third-party array:

- Uninstall any third-party multipathing software before installing PowerPath. This is necessary to avoid contention between the multipathing applications.
- If you do not want PowerPath to manage a third-party array, be sure that you do not select that array during the Custom Setup phase of PowerPath installation.

Booting from a Storage Array Device

Refer to the following documents for instructions on configuring a storage array device as the boot device:

- *Fibre Channel with Emulex Host Bus Adapters in the Windows Environment* (P/N 300-001-157), available on the Emulex website: http://www.emulex.com/ts/docoem/emc/pdfs/win.pdf.
- *Fibre Channel with QLogic Host Bus Adapters in the Windows Environment* (P/N 300-001-164), available on the Qlogic website: http://download.qlogic.com/drivers/31940/QLogic_Windows.pdf.

Install PowerPath after you have configured the storage array boot device. As noted above, there should only be a single path from the host to the storage array device when you install PowerPath. Connect the additional paths after installing PowerPath and rebooting the host (as indicated in the following installation instructions).

Prepare Clustered Environment

If you are installing PowerPath in a clustered environment:

- ❑ Prepare the cluster environment.

  Refer to Chapter 4, , for information on installing PowerPath in a new or existing cluster.

Prepare Browser

- ❑ If you do not have the proper browser installed, you may view help files directly from the installation CD.
- ❑ Check the online help for the Licensing Tool for help on registering PowerPath. If you do not already have a license in the registry, the Licensing Tool displays during the installation process; see STEP 10 on page 5 under "Installing PowerPath Using InstallShield" on page 4. Access online help for this application from the Help button or F1 key. If you do not have the proper browser installed, you may run this help file directly from the installation CD.

Installing PowerPath Using InstallShield

For a new PowerPath installation, do not connect multiple paths from the HBAs to the storage system interface ports or switches until you have installed PowerPath and shut down the host. The correct procedure is: Confirm that there is a single path from the host to each device on the array, install PowerPath, shut down the host, connect additional cables from the host to the array, and then power on the host, as described in this procedure.

STEP 1. To load the CD-ROM:

a. Insert the PowerPath installation CD-ROM in the CD-ROM drive.

If autoplay is enabled, your browser launches and displays the Getting Started page. You can install the software from the Installation section by clicking the appropriate link for your operating system. Choose Run this program from its current location (or a similar message depending on your browser) and click OK to proceed with the installation.

The message used in the prompt above varies according to which browser and version you have installed on your system.

b. If autoplay is not enabled, from the Start menu, select Run.

STEP 2. In the Run window, either browse to or enter the name of the PowerPath installation program and click OK.

STEP 3. On the Choose Language Setup screen, select the language for this installation from the drop down list and click OK. Localized versions of the PowerPath installer and licensing tool are available in Brazilian Portuguese, English, French, German, Italian, Korean, Japanese, Latin American Spanish, and simplified Chinese.

STEP 4. In the setup wizard welcome window, click Next.

STEP 5. On the AX150 Series screen, select Yes if this host connects exclusively to SSR212PP-Series arrays and click Next. Otherwise, select No and click Next.

STEP 6. Enter your name and organization on the Customer Information screen and click Next.

STEP 7. Use the Custom Setup screen to configure PowerPath support for EMC Invista devices and/or third party arrays, and to install PowerPath in a directory other than the default directory (if desired).

It is recommended that you install PowerPath in the default directory. No action is required to install in the default directory.

To install PowerPath in a different (non-default) directory, click Change. The setup wizard prompts you to browse to your destination folder. Select the destination folder, and click OK.

CAUTION

Do not specify the Windows System directory for your system (specified by the %SYSTEMROOT% environment variable). PowerPath will not function correctly if it is installed in this directory.

STEP 8. Click Next.

STEP 9. In the Ready to Install the Program dialog box, click Install.

If you do not already have a license in the registry, the EMC Licensing Tool displays.

The EMC Licensing Tool does not display when PowerPath is being installed on a host connected exclusively to SSR212PP-Series arrays. Continue with **STEP 11**.

STEP 10. When prompted by the EMC Licensing Tool, enter your 24-digit registration number in the License Key field. Click Add, and then OK.

You may enter multiple registration numbers as PowerPath is supported on different storage devices. If you are upgrading from a previous version, PowerPath saves the existing 12-digit license key, and no input is required.

Type the registration number exactly as written on the card. To reduce common typographical errors, the License Key field accepts either uppercase or lowercase letters, and certain numbers and letters are interchangeable. Specifically, entering the alphabetic letters O , I , S , and B is equivalent to entering 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 higher 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.

STEP 11. In the InstallShield Wizard Completed dialog box, click Finish.

STEP 12. When the setup wizard asks whether you want to reboot the host, click No.

STEP 13. From the Start menu, select Shut Down.

STEP 14. In the Shut Down Windows dialog box, select Shut Down from the list, and click OK.

After the host shuts down, follow the instructions in "After You Install" on page 9 to connect additional paths from the host to the array.

Installing PowerPath from the Command Line

PowerPath supports two types of CLI installations:

- **Silent installations** Unattended PowerPath installation using command-line parameters; does not require any user input.
- **Interactive installations** Attended PowerPath installation that requires user input.

For a new PowerPath installation, do not connect multiple paths from the HBAs to the storage system interface ports or switches until you have installed PowerPath and shut down the host. The correct procedure is: Confirm that there is a single path from the host to each device on the array, install PowerPath, shut down the host, connect additional cables from the host to the array, and then power on the host.

Silent Installation

To perform a silent PowerPath installation, use a command line in the following format (type all on one line):

drive:*folder*\EMCPP.*platform*.4.5.*x*.GA.exe /s /v"/q /L*v *pathToLogfile* [*property*=*propertyValue*]* "

where:

- *drive* is the CD drive letter, for example, C.
- *folder* is either W2000 or W2003.
- *platform* is either W2000, W2003_32, W2003_ia64, or W2003_x64.
- *x* is the release level, for example, 0.
- *pathToLogfile* is the complete path to the log file, for example, C:\logs\PPremove.log.
- *property*=*propertyValue* is one or more optional properties.

Table 1, "Silent Installation Variables" describes the variables used in the syntax above. Table 2, "Optional Properties" describes the optional properties.

TABLE 1. Silent Installation Variables

Variable	Function
/s	Informs InstallShield that this is a silent installation.
/v	Directs InstallShield to pass the following information string (enclosed in quotes) to the Microsoft Installer (MSI).
/q	Informs the Microsoft Installer that is a quiet installation (no user interface).
/L*v *file*	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 using the logging option (as required by the Windows installer engine).

TABLE 2. Optional Properties

Property[1]	Description
LICENSENUM=*licenseKey*	The value must be a valid license or no license will be saved.
INSTALL_DRIVE=*drive*	The drive on which PowerPath will be installed. By default, PowerPath is installed on the C: drive. ¥ The installation only uses first character entered and must be a valid drive letter or the default drive will be used. ¥ TheINSTALL_DRIVE value will be ignored if the same version of PowerPath is already installed on the host.
NO_REBOOT=1	If NO_REBOOT=1, the host will not reboot after PowerPath is installed.

NOTES:
1. All properties must be in capital letters or the information will not be passed to installer.

After PowerPath is installed, shut down the host and follow the instructions in "After You Install" on page 9 to connect additional paths from the host to the array.

Examples of Silent Installations

The following are all valid command lines for silent installations:

- Silent installation logging, set the PowerPath License, set the PowerPath install drive, disable reboot at completion:

  EMCPP.*platform*.4.5.*x*.GA.exe /s /v"/q /L*v C:\logs\PPsetup.log LICENSENUM=0000-0000-0000-0000-0000-0000 INSTALL_DRIVE=Z NO_REBOOT=1"

- Silent installation with no logging, set the PowerPath License, disable reboot at completion:

  EMCPP.*platform*.4.5.*x*.GA.exe /s /v"/q LICENSENUM=0000-0000-0000-0000-0000-0000 NO_REBOOT=1"

Interactive Installation

To perform an interactive installation of PowerPath using the CLI, use a command line in the following format (type all on one line):

drive:*folder*\EMCPP.*platform*.4.5.*x*.GA.exe /v"/L*v *pathToLogfile* [*property*=*propertyValue*]* "

where:

- *drive* is the CD drive letter, for example, C.
- *folder* is either W2000 or W2003.
- *platform* is either W2000, W2003_32, W2003_ia64, or W2003_x64.
- *x* is the release level, for example, 0.
- *pathToLogfile* is the complete path to the log file, for example, C:\logs\PPremove.log.
- *property=propertyValue* is one or more optional properties.

Table 3, "Interactive Installation Variables" describes the variables used in the syntax above. See Table 2 "Optional Properties" on page -8 for a description of the optional properties.

TABLE 3. Interactive Installation Variables

Variable	Function
/v	Directs InstallShield to pass the following information string (enclosed in quotes) to the Microsoft Installer (MSI).
/L*v *file*	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 an interactive installation using the logging option (as required by the Windows installer engine).

After PowerPath is installed, shut down the host and follow the instructions in "After You Install" on page 9 to connect additional paths.

Examples of Interactive Installations

The following are all valid command lines for interactive installations:

- Interactive installation with logging, set the PowerPath License, set the PowerPath install drive, disable reboot at completion:

  EMCPP.*platform*.4.5.*x*.GA.exe /v" /L*v C:\logs\PPsetup.log
  LICENSENUM=0000-0000-0000-0000-0000-0000 INSTALL_DRIVE=Z NO_REBOOT=1"

- Interactive installation with no logging, set the PowerPath License, disable reboot at completion:

  EMCPP.*platform*.4.5.*x*.GA.exe /v"LICENSENUM=0000-0000-0000-0000-0000-0000
  NO_REBOOT=1"

After You Install

This section describes what to do after you install PowerPath on a Windows host:

- ❑ With the host shut down, connect the remaining cables from the HBAs to the storage system interface ports, hubs, or switches, or zone multiple paths. For cabling instructions, refer to the product guide for your storage system.
- ❑ Power on the host. PowerPath is now fully configured, with multiple paths to logical devices.
- ❑ If the environment is Fibre Channel, make sure zones are configured appropriately. If you have not already done so, check the SSR212PP support website for any patches to PowerPath 4.5.x, and install any required patches.

Verify and Save the Configuration

STEP 1. Power on the host. PowerPath is fully configured with multiple paths to logical devices and (if appropriate) correct zones when you boot.

STEP 2. Verify the correctness of your configuration by running the following at the command prompt:

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

STEP 3. Save the configuration to the file powermt.custom by running the following command:

```
powermt save.
```

For descriptions of powermt commands, refer to the *PowerPath Product Guide*.

If PowerPath sees no devices, but the devices are seen by the operating system, verify that the devices are configured for PowerPath support, as suggested in "Before You Install" on page 2.

Installing a PowerPath Patch

Every patch release is accompanied by a Readme file that describes how to install the patch. Before you install a patch, PowerPath 4.5.x for Windows 2000 and Windows Server 2003 must be installed on the host.

Patches and Configuration Files

PowerPath stores configuration information in a file that may be loaded at boot time. After a patch is applied, the format of the configuration file may change so it is no longer backward compatible. To avoid losing configuration information, follow the steps in the appropriate section below.

Saving and Loading Configurations from the Command Line

To save and load configurations with the powermt utility, follow the steps below. Refer to the *PowerPath Product Guide* for more information on the powermt utility.

- Before installing a patch, run the powermt save command back up your old configuration file. You can use the powermt load command to restore your configuration if you uninstall the patch later.
- After installing a patch and verifying the configuration is correct, run the powermt save command to save your configuration. This ensures the configuration file is updated to the current format.

Saving and Loading Configurations from the PowerPath Administrator

To save and load configurations from PowerPath Administrator, follow these steps:

- Before installing a patch, back up your configuration file. Use the backup to restore your configuration if you uninstall the patch later.
- After installing a patch and verifying the configuration is correct, save your configuration. This ensures the configuration file is updated to the current format.

Saving Configurations

From PowerPath Administrator, you can save your configuration any time. If you do not save your changes, they will be lost on reboot. You can save PowerPath Administrator settings to a configuration file. The file records the serial numbers, mode, policy, and priority for each configured path.

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 PowerPath Administrator settings. Saving the MMC console settings does not save your PowerPath configuration changes; therefore, these changes will be lost unless you follow the next procedure.

Use the following procedure to save a PowerPath configuration:

STEP 1. In the scope pane, select the PowerPathAdmin root node.

STEP 2. To save the configuration with the default filename, right-click the root node and select All Tasks ▸ Save Config for Reboot... .

To save the configuration with a different name, select Save Config as... . In the Save As dialog box, navigate to your desired directory, enter a filename, and click Save.

In the PowerPath Administrator, you can save your configuration at any time. However, the active PowerPath configuration on your desktop does not reflect the saved configuration until you run the Save Config for Reboot... or the Save Config as... command. Saving a configuration overwrites any previous configuration data.

Loading Configurations

You can load the last known reboot state or alternatively, a previously saved PowerPath Administrator configuration file. Use the following procedure to load a configuration:

STEP 1. In the scope pane, select the PowerPathAdmin root node.

STEP 2. To load a previously saved PowerPath configuration, right-click the root node and select All Tasks ▸ Load Config File... .

The first time you run PowerPath Administrator, there is a default configuration. If you make changes to this configuration using the PowerPath Administrator that you want to keep, save the configuration.

To load the last known reboot state, right click the root node and select All Tasks ▸ Load Reboot Config... .

Upgrading Windows Operating Systems

You can upgrade your Windows operating system from:

- Windows NT 4.0 to Windows 2000, see "Upgrading from Windows 2000 Systems" on page 12.
- Windows 2000 to Windows Server 2003, see "Upgrading from Windows 2000 Systems" on page 12.

Upgrading from Windows 2000 Systems

To upgrade your Windows 2000 operating system to Windows 2003, choose the scenario that applies:

- If you are running PowerPath versions 3.0.5 to 4.1.1 on Windows 2000 and wish to upgrade to the Windows Server 2003 platform, refer to the *PowerPath Windows Server 2003 Upgrade Package Release Notes* on the Powerlink website (http://powerlink.emc.com).

  The PowerPath Windows Server 2003 Upgrade Package alleviates the need for the removing and reinstalling PowerPath to perform the operating system upgrade.

- If you are running PowerPath versions 4.3 or later on Windows 2000 and wish to upgrade to the Windows Server 2003 platform, install the Windows Server 2003 operating system following the instructions in your Microsoft documentation.

  It is not necessary to remove PowerPath 4.5.x before upgrading your operating system.

Licensing Tool

Use the Licensing Tool to register PowerPath. The Licensing Tool is displayed during PowerPath installation when the host is *not* connected exclusively to SSR212PP-Series arrays. To manage licenses, you may launch it at any time, as well, by selecting PowerPath Licensing Tool from the Start ▸ Programs ▸ EMC menu.

Use the Licensing Tool to add or remove licenses. For more information, see the online help for the Licensing Tool (press **F1**) or launch the help file, EMCLicTool.chm, resident on the PowerPath CD under the \help directory.

You must have Internet Explorer 5.0 or higher to view the online help files from the Licensing Tool by pressing **F1**. If you do not have this browser installed, you may still view the help file directly from the online help file, EMCLicTool.chm, resident on the SSR212PP Resource CD under the \help directory.

Removing PowerPath 4.5 for Windows

2

This chapter describes how to remove the PowerPath software from a Windows 2000 or Windows Server 2003 host.

Before You Remove PowerPath

Before you remove PowerPath from the host:

- ❑ Check the SSR212PP support website for the most current information. We update release notes periodically and post them on the Web.
- ❑ Stop any application actively sending I/O. In addition, you may want to close any remaining applications and client files to avoid warning messages when rebooting after the uninstall.

Removing PowerPath from a Windows Host

CAUTION

Data corruption is possible if multiple paths remain on a system after PowerPath has been removed. Make sure that you remove any redundant paths during the uninstall process, following the instructions in this section.

You can remove PowerPath:

- Using the Add/Remove Programs wizard.
- From the command line.

Removing PowerPath Using Add/Remove Programs

STEP 1. Open the Control Panel, double-click Add/Remove Programs.

STEP 2. On the Add/Remove Programs panel, select the installed version of PowerPath and click Remove.

STEP 3. When prompted to remove PowerPath, click Yes.

STEP 4. When prompted to restart the host, click No.

STEP 5. Disconnect redundant paths to the storage systm:

a. From the Start menu, select Shut Down.

b. In the Shut Down Windows dialog box, select Shut Down from the list, and click OK.

c. With the host shut down, disconnect redundant cables from the HBAs to the storage system interface ports.

SAN configurations may have multiple logical configurations per physical connection. Ensure that no redundant paths exist.

d. Reboot the host. PowerPath is completely removed from the host.

Removing PowerPath from the Command Line

You can remove PowerPath from the command line:

- Silently, which requires no user input.
- Interactively, which requires user input.

Remember to disconnect redundant cables from the HBAs to the storage system interface ports after PowerPath has been removed and before the host is rebooted. SAN configurations may have multiple logical configurations per physical connection. Ensure that no redundant paths exist before rebooting.

Silent Removal

To perform a silent removal of PowerPath from the command line, use the following syntax (enter the entire command on one line):

drive:*folder*\EMCPP.*platform*.4.5.*x*.GA.exe /s /v"/q /L*v *pathToLogfile* [*property=propertyValue]** "

where:

- *drive* is the CD drive letter, for example, C.
- *folder* is either W2000 or W2003.

- *platform* is either W2000, W2003_32, W2003_ia64, or W2003_x64.
- *x* is the release level, for example, 0.
- *pathToLogfile* is the complete path to the log file, for example, C:\logs\PPremove.log.
- *property*=*propertyValue* is zero or more optional properties.

Table 4, "Silent Removal Variables", describes the variables used in the syntax above. Table 5, "Optional Properties" describes the optional properties.

TABLE 4. Silent Removal Variables

Variable	Function
/s	Informs InstallShield that this is a silent removal.
/v	Directs InstallShield to pass the following information string (enclosed in quotes) to the Microsoft Installer (MSI).
/q	Informs the Microsoft Installer that is a quiet removal (no user interface).
/L*v *file*\	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 using the logging option (as required by the Windows installer engine).

TABLE 5. Optional Properties

Property[1]	Description
NO_REBOOT=1	If NO_REBOOT=1, the host will not reboot after PowerPath is removed. Be sure to specify to NO_REBOOT=1. Otherwise, PowerPath will reboot before you can remove the redundant connections.
PPREMOVE=1	When PPREMOVE=1, PowerPath will be removed in the normal fashion, leaving driver files and corresponding registry entries.
PPREMOVE=2	When PPREMOVE=2, PowerPath will be removed. All driver files and corresponding registry entries will be removed as well.

NOTES:
1. All properties must be in capital letters or the information will not be passed to installer.

Silent Removal Example

The following is an example of a silent clean removal with logging enabled, reboot disabled:

```
EMCPP.platform.4.5.x.GA.exe /s /v"/q /L*v C:\logs\PPcleanremoval.log NO_REBOOT=1
    PPREMOVE=2"
```

Interactive Removal from the Command Line

To perform an interactive removal of PowerPath from the command line, use the following syntax (enter the entire command on one line):

drive:*folder*\EMCPP.*platform*.4.5.*x*.GA.exe /v" *pathToLogfile* [*property*=*propertyValue*]* "

where:

- *drive* is the CD drive letter, for example, C.

- *folder* is either W2000 or W2003.
- *platform* is either W2000, W2003_32, W2003_ia64, or W2003_x64.
- *x* is the release level, for example, 0.
- *pathToLogfile* is the complete path to the log file, for example, C:\logs\PPremove.log.
- *property=propertyValue* is zero or more optional properties.

Table 6, "Interactive Removal Variables", describes the variables used in the syntax above. See Table 5 "Optional Properties" on page -15 for a description of the optional properties.

TABLE 6. Interactive Removal Variables

Variable	Function
/v	Directs InstallShield to pass the following information string (enclosed in quotes) to the Microsoft Installer (MSI).
/L*v *file*	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 an interactive removal using the logging option (as required by the Windows installer engine).

Examples of Interactive Removals

The following are all valid command lines for interactive removals:

- Interactive removal with logging enabled, reboot disabled:

  EMCPP.*platform*.4.5.*x*.GA.exe /v" /L*v C:\logs\PPremove.log NO_REBOOT=1 PPREMOVE=1"

- Interactive clean removal with logging enabled, reboot disabled:

  EMCPP.*platform*.4.5.*x*.GA.exe /v" /L*v C:\logs\PPcleanremoval.log NO_REBOOT=1 PPREMOVE=2"

PowerPath 4.5 for Windows Administrator

3

The chapter introduces the PowerPath Administrator for Windows 2000 and Windows Server 2003. The topics include:

Overview

The PowerPath Administrator graphical user interface for Windows 2000 and Windows Server 2003 consists of two applications:

- **PowerPath Monitor** continuously monitors your PowerPath configuration and can alert you of status changes. See the following section, "PowerPath Monitor" on page 17.
- **PowerPath Administrator** provides a graphical user interface for configuring, monitoring, and managing PowerPath devices. See "PowerPath Administrator" on page 19.

PowerPath Monitor

PowerPath Monitor (on the taskbar of your Windows desktop) continuously monitors the status of your PowerPath configuration and 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 (see Table 8) and depending on the Notification settings you choose on the Options tab of the PowerPath Admin (root node) Properties dialog box (see PowerPath Administrator online help for Windows 2000 and Windows Server 2003), PowerPath Monitor may sound an alarm, restore the PowerPath Administrator Main Window, flash the taskbar icon, or any combination thereof.

Table 7 shows each taskbar icon and the status it represents.

TABLE 7. PowerPath Monitor Taskbar Icons

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

All non-Optimal monitor icons appear only if you have checked 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 being managed by PowerPath.

Launching MMC With the PowerPath Snap-in

You can use PowerPath Monitor to launch Microsoft Management Console (MMC) with the PowerPath Snap-in and to notify you of PowerPath status changes if you are running it on a local host.

The 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 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 under "Local or Remote Administration" on page 24.

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.
- Right click the PowerPath Monitor icon to display the following context menu options:
  - PowerPath Administrator launches PowerPath Administrator.
  - Close Monitor closes the PowerPath Administrator Monitor.
- From the Start menu, select Programs ▸ EMC ▸ PowerPath ▸ PowerPath Administrator.

PowerPath Administrator

For Windows 2000 and Windows Server 2003, 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. Refer to "Local or Remote Administration" on page 24.

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 displayed.

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 -21 and Table 9 on page -23 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.

Figure 1 shows a sample PowerPath Administrator display.

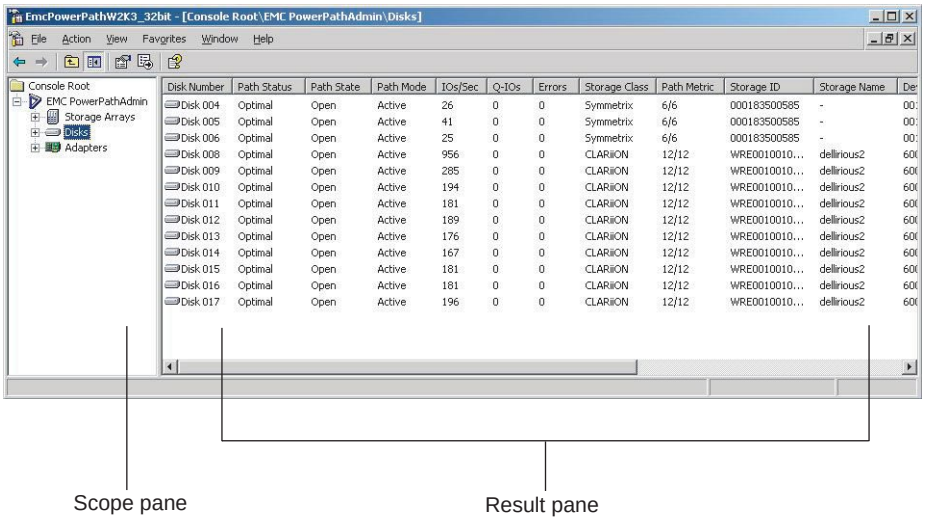


FIGURE 1. Sample PowerPath Administrator Display

PowerPath Administrator Device Properties Dialog Box

You can use most PowerPath Administrator functions through the tabs available from the device Properties dialog boxes of PowerPath objects:

- **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, and view array management information. To display this tab, select the root node in the scope pane, right-click, and select **Properties**.

  The root node is the top-level view of your configuration and represents the host being managed by PowerPath. The Root Node Properties dialog box contains a Details, Computer, and Options tab. (The Computer tab is present only when you are connected to a remote host). The Options tab contains a Notification box, an Auto-Restore box, and an Array Management Information box.

- **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.

The previous examples illustrate most common PowerPath Administrator functions. For complete information on using on using all PowerPath Administrator functions, refer to PowerPath Administrator online help for Windows 2000 and Windows Server 2003.

If you do not have the Internet Explorer 5.0 browser or higher installed on your system, you will be unable to launch the PowerPath online help files for Windows 2000 or Windows Server 2003 from the MMC console.

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. PowerPath Administrator Icons

Object	Standard Icon	Unlicensed Icon	Unknown Icon	Mismatched Icon
Root Node Graphical representation of the host and top level view of your configuration.				*Not Applicable*
Storage Array An attached storage system that provides logical devices which are managed by PowerPath.				*Not Applicable*
Storage Array Port Identifies a port within a specific storage array that provides I/O paths to the logical devices.				*Not Applicable*
Disk A logical device managed by PowerPath. Logical devices are disk devices presented by the storage system.				*Not Applicable*
Adapter 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.				*Not Applicable*
Path The logical or physical I/O path from the host to the storage system, including the HBA, cable, and interface port.				

See the online help for more information on icons and their significance.

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 also display in the result pane. These known failure icons represent configurations that are less than optimal.

Table 9 shows known failure icons; that is, icons for degraded; failed; unlicensed and degraded; and unlicensed and failed conditions. Degraded PowerPath objects are represented by a red slash through the standard object icon. (Since 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 . For example, an unlicensed version of PowerPath with degraded or failed paths displays icons combining elements of both the unlicensed and degraded icons.

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

TABLE 9. **PowerPath Administrator Object Icons**

Object	Degraded Icon	Failed Icon	Unlicensed and Degraded Icon	Unlicensed and Failed Icon
Root Node	 PowerPath Administrator is identifying a degradation within the managed environment.	 PowerPath Administrator is in a failed state.	 PowerPath Administrator is unlicensed and identifying a degradation within the managed environment.	 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.	 PowerPath Administrator is unlicensed. One or more (but not all) paths to the array have failed or are in a degraded state.	 PowerPath Administrator is unlicensed. All paths to the specific array have failed.This disk 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.	 PowerPath Administrator is unlicensed. One or more (but not all) paths to the array port have failed or are in a degraded state.	 PowerPath Administrator is unlicensed. All paths to the specific array port have failed. This disk 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.	 PowerPath Administrator is unlicensed. One or more (but not all) paths to the disk device have failed.	 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 Adapters folder in the scope pane. One or more (but not all) paths have failed on the specific adapter. Displays in the individual adapter folders under Adapters in the scope pane or in the result pane when Adapters is selected from the scope pane.	 All paths on this adapter to this disk have failed.	 PowerPath Administrator is unlicensed. One or more (but not all) adapters have either failed or degraded. Displays in the Adapters folder in the scope pane. One or more (but not all) paths have failed on the specific adapter. Displays in the individual adapter folders under Adapters in the scope pane or in the result pane when Adapters is selected from the scope pane.	 PowerPath Administrator is unlicensed. All paths on this adapter to this disk 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*	 PowerPath Administrator is unlicensed and one or more of the hardware components that comprise the path has failed, therefore, the entire path fails.

Local or Remote Administration

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

- **Local Administration** 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, from the Start menu, select Programs ▸ EMC ▸ PowerPath ▸ EMC PowerPathAdmin.
  - The above 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. To add the PowerPath Snap-in to the MMC console to monitor a local host, refer to "Set Local Host Option" on page 24.
- **Remote Administration** If you want to monitor a remote host that has PowerPath 3.0.5 or higher for Windows 2000 or Windows Server 2003 installed, you may supply the credentials for remote access to that host. To add the PowerPath Snap-in to monitor a remote host with PowerPath 3.0.5 or higher installed, refer to "Set Remote Host Option" on page 28.

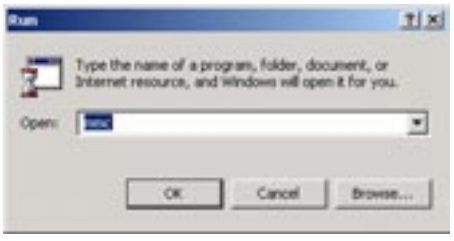
When PowerPath 3.0.5 or higher is installed for Windows 2000 or Windows Server 2003 on more than one host, you may use the Remote Host Option to monitor any host from any other host.

Set Local Host Option

STEP 1. Open the MMC

a. From the Start menu, select Run... .

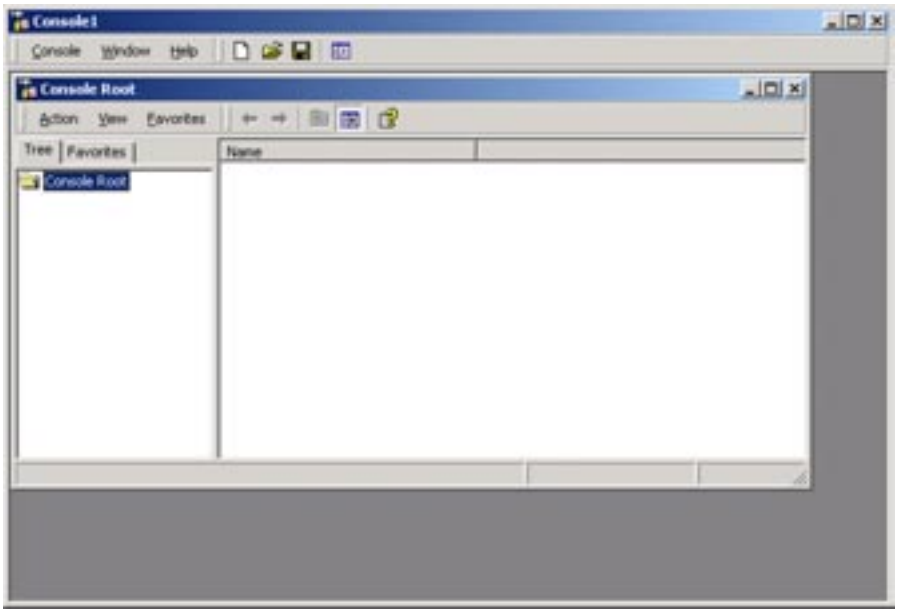
b. In the Open field of the Run dialog box, type: mmc



c. 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 PowerPath Administrator (and other snap-ins you may add)

and display them as expandable icons under the Console Root folder. See Figure 1 on page 19.



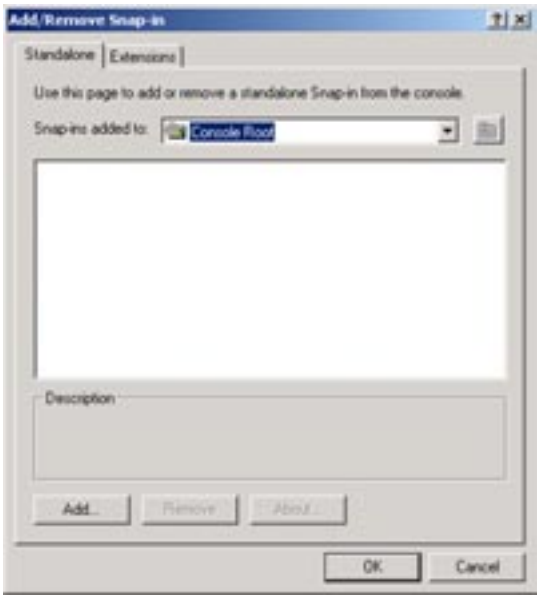
The figures used in this section and in the following section, *Set Remote Host Option* were taken from Windows 2000 systems. There may be slight differences between the MMC console running on Windows 2000 and the console running on Windows Server 2003. In these scenarios, the difference has been noted in these instructions.

STEP 2. Add the PowerPath Administrator Snap-in.

a. From the MMC console, select Console ▸ Add/Remove Snap-in... .

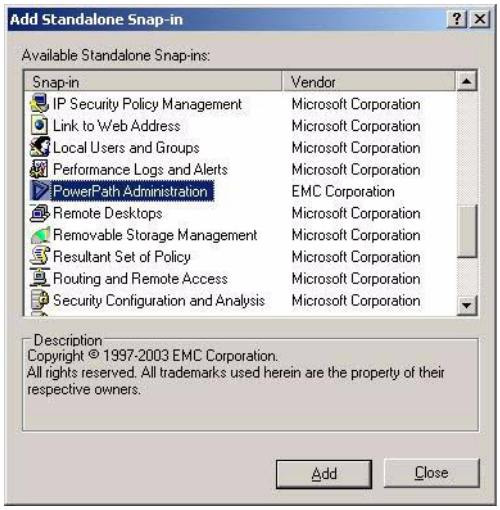
On Windows Server 2003 systems, select File ▸ Add/Remove Snap-in... .

The Add/Remove Snap-in window appears:

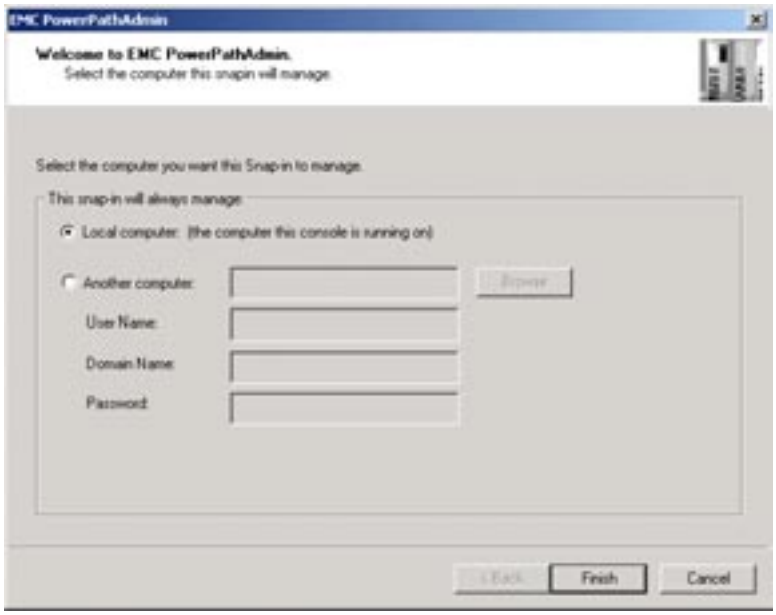


b. In the Add/Remove Snap-in window, click Add.

c. From the Add Standalone Snap-in window, select PowerPath Administration and click Add.



d. In the PowerPathAdmin dialog box, select Local Computer.

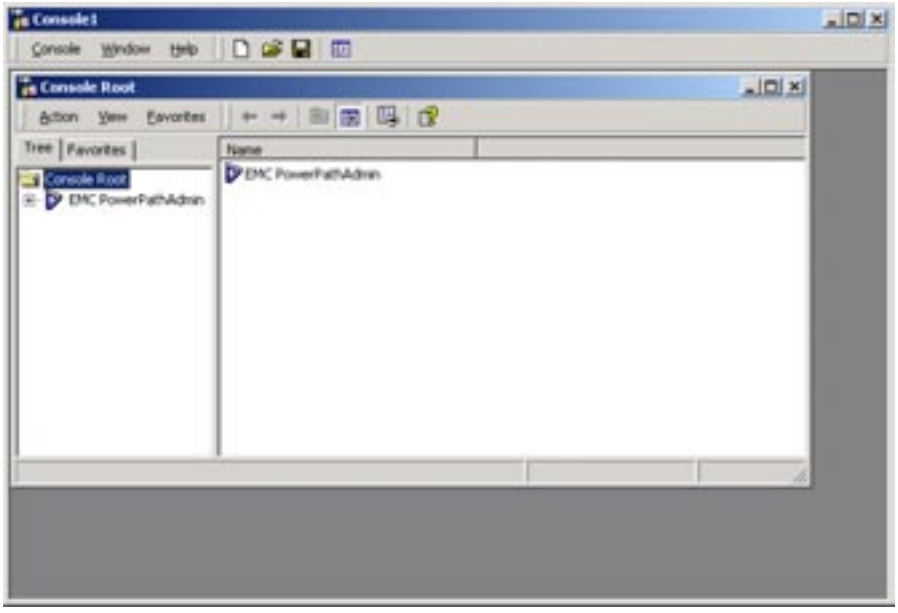


e. Click Finish.

f. In the Add Standalone Snap-in dialog box, click Add to add another snap-in or click Close.

g. In the Add/Remove Snap-in dialog, click OK.

PowerPath Administrator is now added to the MMC console.



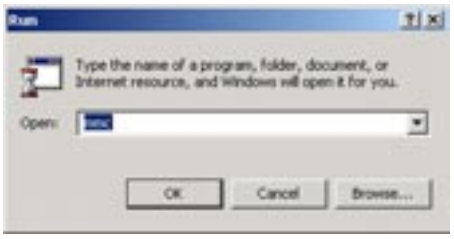
You can now use PowerPath Administrator to configure, manage, and monitor PowerPath devices. Once you have changed your configuration, you can save this configuration. Refer to "Saving and Loading Configurations from the PowerPath Administrator" on page 10.

Set Remote Host Option

STEP 1. Open the MMC.

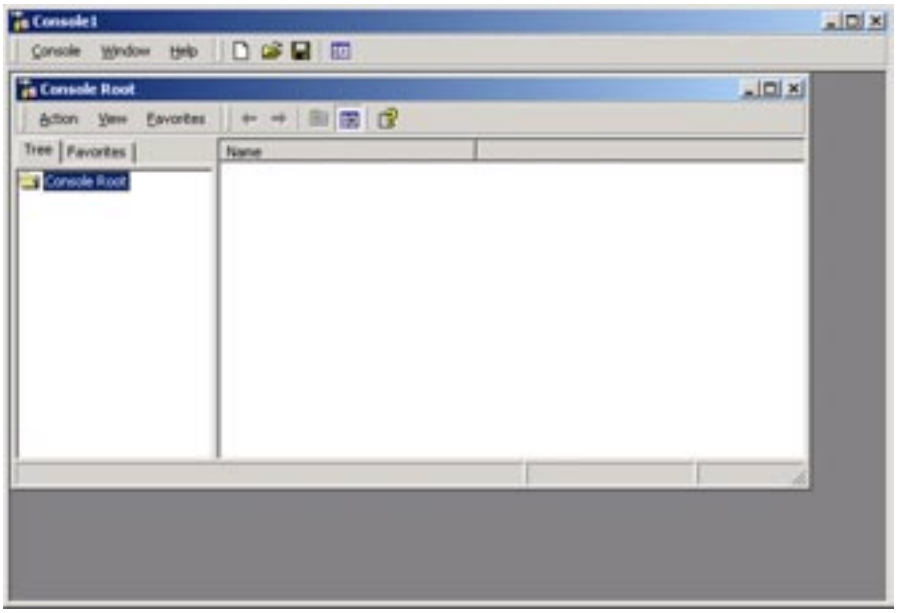
a. From the Start menu, select Run... .

b. In the Open field of the Run dialog box, type: mmc



c. 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 PowerPath Administrator (and other snap-ins you may add) and display them as expandable icons under the Console Root folder. See Figure 1 on page 19.



The figures used in this section and in the previous section, *Set Local Host Option* were taken from Windows 2000 systems. There may be slight differences between

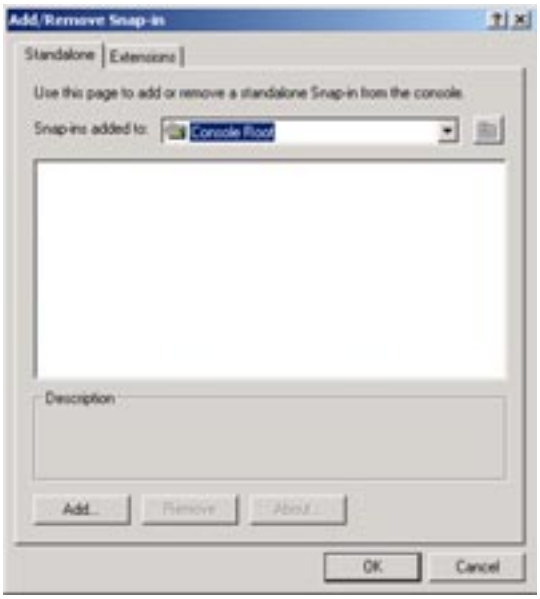
the MMC console running on Windows 2000 and the console running on Windows Server 2003. In these scenarios, the difference has been noted in these instructions.

STEP 2. Add the PowerPath Administrator Snap-in.

a. From the MMC console, select Console ▸ Add/Remove Snap-in... .

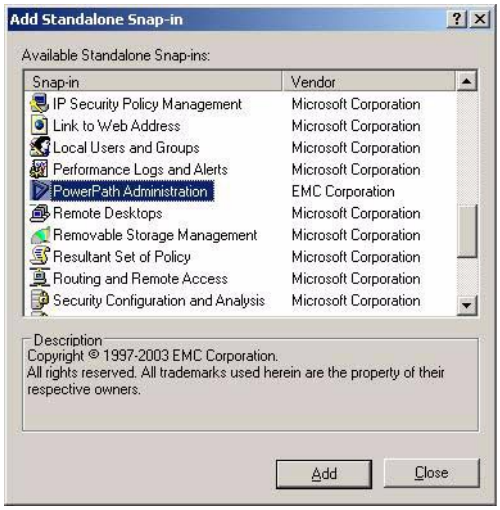
On Windows Server 2003 systems, select File ▸ Add/Remove Snap-in... .

The Add/Remove Snap-in window appears:

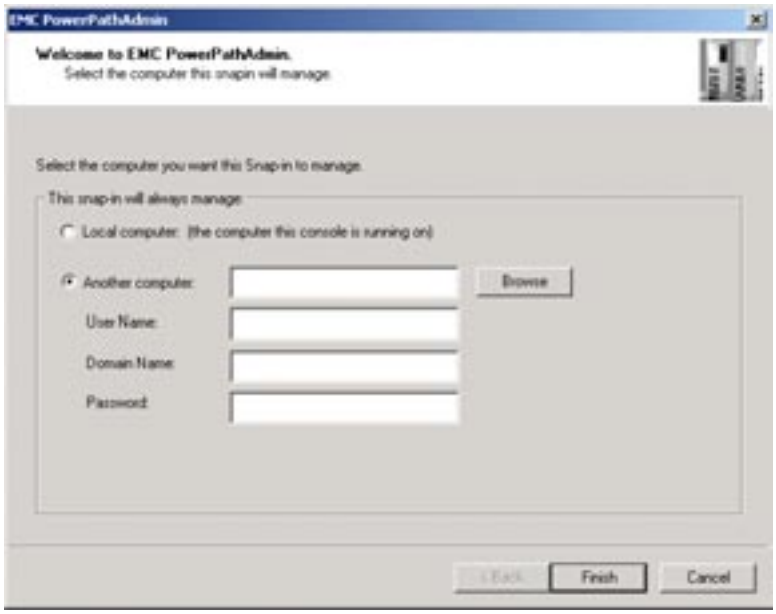


b. In the Add/Remove Snap-in window, click Add.

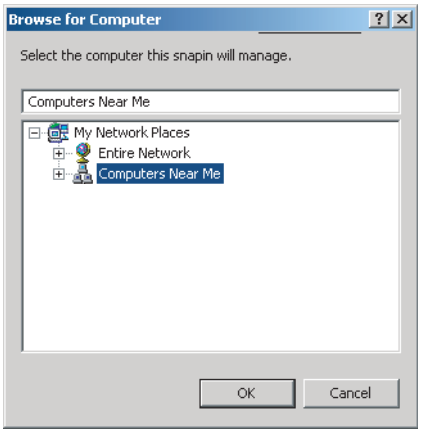
c. From the Add Standalone Snap-in window, select PowerPath Administration and click Add.



d. In the PowerPathAdmin dialog box, select Another Computer.

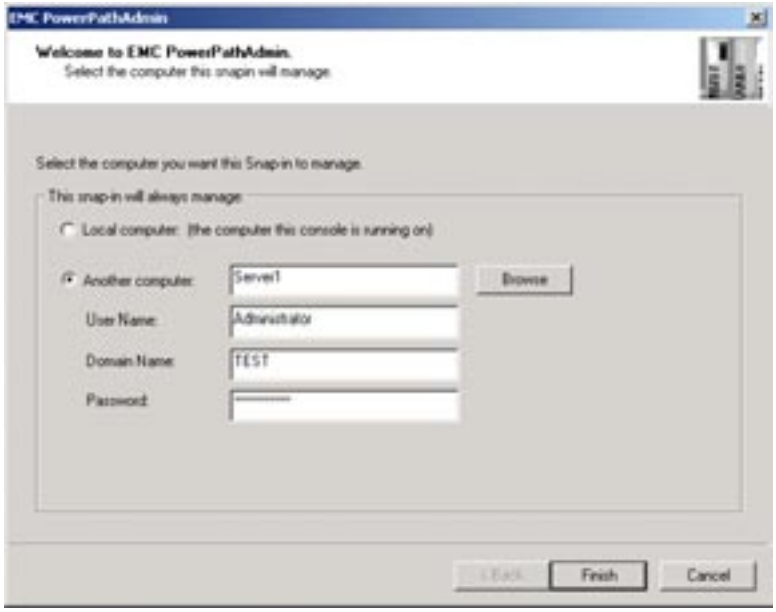


e. Enter the computer name or browse for the remote computer..



f. In the Browse for Computer dialog box, click OK.

g. Enter your User Name, Domain Name, and Password.



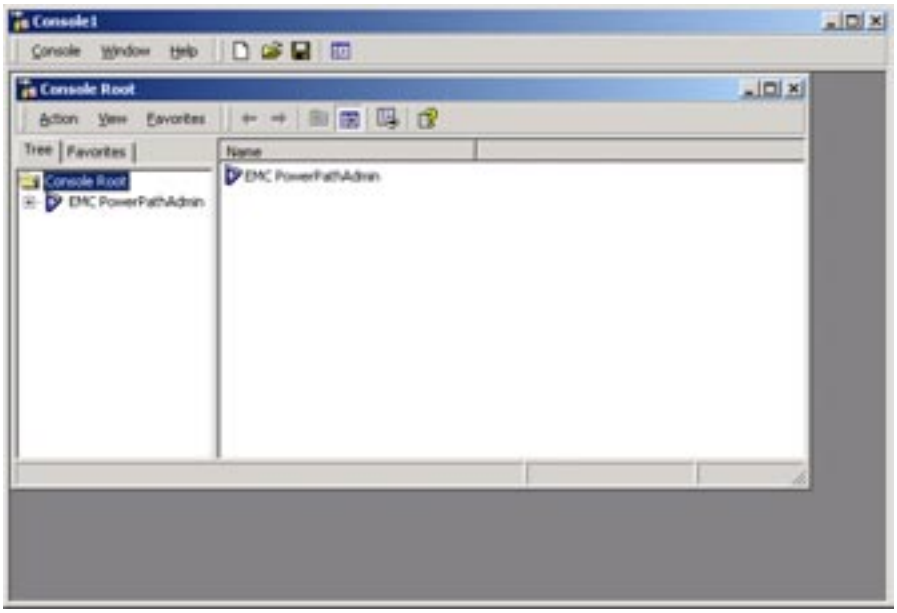
h. Click Finish.

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. For more information, refer to *Set Remote Host Options* topic in the PowerPath Administrator online help for Windows 2000 and Windows Server 2003.

---

i. In the Add Standalone Snap-in window, click Add to add another snap-in or click Close.

j. In the Add/Remove Snap-in window, click OK. PowerPath Administrator is now added to the MMC console.



You can now use PowerPath Administrator to configure, manage, and monitor PowerPath devices. Once you have changed your configuration, you can save this configuration. Refer to "Saving and Loading Configurations from the PowerPath Administrator" on page 10.

Saving 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, you may 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, Save console settings to <filename>.msc? Click Yes to save the latest console settings. By default, MMC console settings are saved as console1.msc in the %SystemDrive%\Programs\Administrative Tools folder.

You may 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, use the MMC console Console ▸ Save As menu option.

PowerPath in an MSCS Cluster

4

This chapter describes how to install PowerPath on a Microsoft Cluster Server (MSCS) cluster. The chapter covers the following topics:

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 having to disrupt cluster services at a later time. Refer to the Microsoft MSCS documentation for complete information on planning, configuring, managing, and troubleshooting MSCS.

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 s resources. Conversely, node B is the primary node for its resources and the failover node for node A s resources.

Refer to the Microsoft MSCS documentation for complete information on planning, configuring, managing, and troubleshooting MSCS.

If after installing PowerPath on the cluster, you test node failover by disconnecting all cables for a LUN or otherwise disrupting the path between the active host and the array, Windows logs event messages indicating 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 greater than two nodes. In these cases, the appropriate action is noted where applicable for nodes with greater than two clusters.

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

STEP 1. Move all resources to Node A.

a. Start the MSCS Cluster Administrator utility, select Start ▸ Programs ▸ Administrative Tools ▸ Cluster Administrator.

The Cluster Administrator window appears (Figure 2).

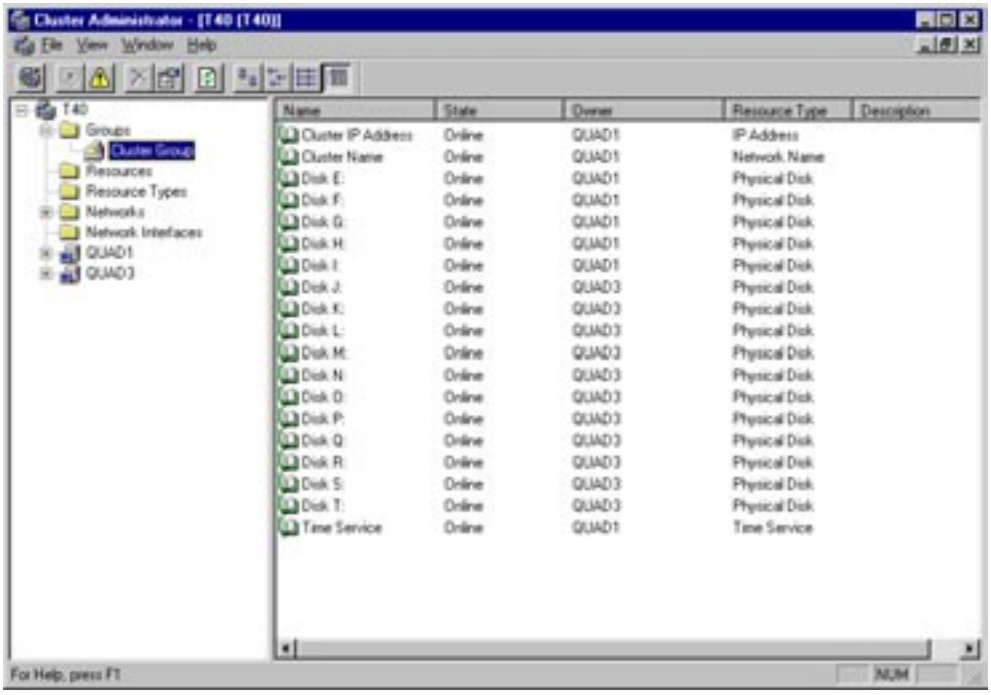


FIGURE 2. Cluster Administrator

b. In the left pane of the Cluster Administrator window, select all groups owned by node B.

c. To move the resources to node A, select File ▸ Move Group.

Alternatively, select Move Group by right-clicking all group names under Groups in the left pane.

d. To pause node B, click node B and select File ▸ Pause Node.

This keeps the node from participating in the cluster during PowerPath installation.

STEP 2. Install PowerPath on Node B:

a. Install PowerPath on node B, following the steps in *"Installing PowerPath Using InstallShield" on page 4*.

b. Shut down node B.

In a cluster with greater than two nodes, install PowerPath on these other nodes. For example, in a four-node cluster, replace node B with nodes B, C, and D in Step 4 of the previous section, *Move all resources to Node A.*, and also in Steps 1 and 2, above.

STEP 3. Configure additional paths between the storage system and Node B:

a. If necessary, reconfigure the storage system so its logical devices appear on multiple ports.

b. If necessary, install additional HBAs on node B.

c. Connect cables for new paths between node B and the storage system.

d. Power on node B.

e. To resume node B, click node B and select File ▸ Resume Node.

f. In a cluster with greater than two nodes, configure additional paths between the storage system and these other nodes. For example, in a four-node cluster, replace node B with nodes B, C, and D in steps **b**, **c**, **d**, and **e** above.

STEP 4. Move all resources to Node B:

a. In the left pane of the Cluster Administrator window, select all groups.

b. To move the resources to node B, select File ▸ Move Group.

In a cluster with greater 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. For example, you could move resources to nodes B and C or move them to B, C, and D, or any permutation of nodes B, C, and D taken alone or together.

c. To pause node A, click node A and select File ▸ Pause Node.

STEP 5. Install PowerPath on Node A:

a. Install PowerPath on node A, following the steps in *"Installing PowerPath Using InstallShield" on page 4*.

b. 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.

1. If necessary, install additional HBAs on node A.
2. Connect cables for new paths between node A and the storage system.
3. Power on node A.
4. To resume node A, click node A and select **File, Resume Node**.

Returning Node A's Resources to Node A

1. Using the MSCS Cluster Administrator utility, select all groups previously owned by node A.

5. To move the resources back to node A, select **File, Move Group**.

Appendix: WHQL Certification

A

This appendix describes the procedure to check whether a PowerPath driver is signed. The appendix contains the following section:

WHQL-Certified Driver

On Windows 2000 and Windows Server 2003, the PowerPath driver is WHQL certified. To view the PowerPath driver signature:

STEP 1. From the Start menu, select Settings ▸ Control Panel.

STEP 2. From the Control Panel, open the System applet.

STEP 3. Click the Hardware tab.

STEP 4. Click Device Manager.

STEP 5. Expand the SCSI and RAID controllers node.

STEP 6. Right-click EMS device bus.

STEP 7. In the EMS device bus dialog box, select Properties.

STEP 8. Click the Driver tab.

STEP 9. Check the Digital Signer field to see the driver signature information.

STEP 10. When the driver is signed, the field contains information about the organization that assigned the driver.

Appendix: List of Files Changed by PowerPath

B

This appendix lists files that are added or modified by PowerPath installation and use. It also describes Registry changes that result from PowerPath installation. The topics include:

File Changes on Windows 2000 and Windows Server 2003

By default, PowerPath places the following files in the %SystemDrive%\Program Files(x86) directory on x64 platforms, and in the %SystemDrive%\Program Files directory on all other platforms (or another directory, if you specified one when installing PowerPath):

EMC\PowerCommon\EmcLicTool.exe
EMC\PowerCommon\EmcLicTool_CHS.dll
EMC\PowerCommon\EmcLicTool_FRA.dll
EMC\PowerCommon\EmcLicTool_DEU.dll
EMC\PowerCommon\EmcLicTool_ITA.dll
EMC\PowerCommon\EmcLicTool_JPN.dll
EMC\PowerCommon\EmcLicTool_KOR.dll
EMC\PowerCommon\EmcLicTool_PTB.dll
EMC\PowerCommon\EmcLicTool_ESP.dll

EMC\PowerCommon\Emcp_lic_rtl.dll
EMC\PowerPath\Emcp_cg_rtl.dll
EMC\PowerPath\Emcp_mp_rtl.dll
EMC\PowerPath\EmcPowerPath.msc

The file EmcPowerPath.msc is the MMC file for Windows 2000 and Windows Server 2003 (64-bit) .

The file EmcPowerPathW2K3_32bit.msc is the MMC file for Windows Server 2003 (32-bit) only.

EMC\PowerPath\EmcPowerPathW2K3_32bit.msc
EMC\PowerCommon\EmcPowMon.exe
EMC\PowerPath\EmcPowPN22.dll
EMC\PowerCommon\EmcPowRes.dll
EMC\PowerCommon\EmcPowSrv.exe

EMC\PowerPath\EmcAdminSvr.exe
EMC\PowerPath\EmcAdminProxy.dll
EMC\PowerPath\EmcPowerPathAdmin.dll
EMC\PowerCommon\EmcpSvcErr.dll
EMC\PowerPath\powermt.exe
EMC\PowerPath\powerprotect.exe

To support 32-bit applications (for example, Navisphere) on ia64-bit Windows Server 2003, PowerPath creates the following files and, by default, places them in the %SystemDrive%\Program Files (x86)\EMC\PowerPath directory (or another directory, if you specified one when installing PowerPath):

EMC\PowerPath\Emcp_mp_rtl.dll
EMC\PowerPath\EmcPowCG22.dll

Base Driver Files

The following PowerPath base driver files are copied during installation:

EMC\PowerCommon\Drivers\EmcpBase.sys
EMC\PowerCommon\Drivers\EmcpBase.cat
EMC\PowerCommon\Drivers\EmcpBase.inf
EMC\PowerCommon\Drivers\EmcpCoinst30.dll
EMC\PowerCommon\Drivers\EmcpCG.sys
EMC\PowerCommon\Drivers\EmcpMP.sys
EMC\PowerCommon\Drivers\EmcpMPC.sys
EMC\PowerCommon\Drivers\EmcpMPAA.sys
EMC\PowerCommon\Drivers\EmcpMPAP.sys
EMC\PowerCommon\Drivers\EmcpSAPI.sys
EMC\PowerCommon\Drivers\EmcpHR.sys

Class Driver Files

The following PowerPath class driver files are copied during installation:

EMC\PowerCommon\Drivers\EmcpClass.sys
EMC\PowerCommon\Drivers\EmcpClassCoinst.dll
EMC\PowerCommon\Drivers\EmcpHDSClass.inf
EMC\PowerCommon\Drivers\EmcpHDSClass.cat
EMC\PowerCommon\Drivers\EmcpHPClass.inf
EMC\PowerCommon\Drivers\EmcpHPClass.cat
EMC\PowerCommon\Drivers\EmcpHPQClass.inf
EMC\PowerCommon\Drivers\EmcpHPQClass.cat
EMC\PowerCommon\Drivers\EmcpIBMClass.inf
EMC\PowerCommon\Drivers\EmcpIBMClass.cat
EMC\PowerCommon\Drivers\EmcpInvistaClass.inf
EMC\PowerCommon\Drivers\EmcpInvistaClass.pnf
EMC\PowerCommon\Drivers\EmcpDGCClass.inf
EMC\PowerCommon\Drivers\EmcpDGCClass.cat
EMC\PowerCommon\Drivers\EmcpSYMMClass.inf
EMC\PowerCommon\Drivers\EmcpSYMMClass.cat

Driver Files Installed Into System Directories

The following PowerPath files are installed into system directories.

Driver Installation Information Files

The following PowerPath driver installation information files are installed by the operating system when the plug-n-play system completes the driver installation:

%systemroot%\inf\EmcpHDSClass.inf
%systemroot%\inf\EmcpHDSClass.pnf
%systemroot%\inf\EmcpHPClass.inf
%systemroot%\inf\EmcpHPClass.pnf
%systemroot%\inf\EmcpHPQClass.inf
%systemroot%\inf\EmcpHPQClass.pnf
%systemroot%\inf\EmcpIBMClass.inf
%systemroot%\inf\EmcpIBMClass.pnf
%systemroot%\inf\EmcpInvistaClass.inf
%systemroot%\inf\EmcpInvistaClass.pnf
%systemroot%\inf\EmcpDGCClass.inf
%systemroot%\inf\EmcpDGCClass.pnf
%systemroot%\inf\EmcpSYMMClass.inf
%systemroot%\inf\EmcpSYMMClass.pnf
%systemroot%\inf\EmcpBase.inf
%systemroot%\inf\EmcpBase.pnf

Base and Class Driver Coninstaller Files

The following PowerPath base and class driver files are installed by the operating system when the plug-n-play system completes the driver installation:

%systemroot%\System32\EmcpCoinst30.dll
%systemroot%\System32\EmcpClassCoinst.dll
%systemroot%\System32\drivers\EmcpBase.sys
%systemroot%\System32\drivers\EmcpMPC.sys
%systemroot%\System32\drivers\EmcpCG.sys
%systemroot%\System32\drivers\EmcpMP.sys
%systemroot%\System32\drivers\EmcpMPAA.sys
%systemroot%\System32\drivers\EmcpMPAP.sys
%systemroot%\System32\drivers\EmcpSAPI.sys
%systemroot%\System32\drivers\EmcpHR.sys
%systemroot%\System32\drivers\EmcpClass.sys

PowerPath Signed Catalog Files

The following PowerPath signed catalog files are installed by the operating system when the plug-n-play system completes the driver installation:

%systemroot%\System32\CatRoot\{F75OE6C3-38EE-11D1-85E5-00C04 FC295EE}\EmcpBase.cat
%systemroot%\System32\CatRoot\{F75OE6C3-38EE-11D1-85E5-00C04 FC295EE}\EmcpHPClass.cat
%systemroot%\System32\CatRoot\{F75OE6C3-38EE-11D1-85E5-00C04 FC295EE}\EmcpHPQClass.cat

%systemroot%\System32\CatRoot\{F75OE6C3-38EE-11D1-85E5-00C04 FC295EE}\EmcpHDSClass.cat
%systemroot%\System32\CatRoot\{F75OE6C3-38EE-11D1-85E5-00C04 FC295EE}\EmcpIBMClass.cat
%systemroot%\System32\CatRoot\{F75OE6C3-38EE-11D1-85E5-00C04 FC295EE}\EmcpInvistaClass.cat
%systemroot%\System32\CatRoot\{F75OE6C3-38EE-11D1-85E5-00C04 FC295EE}\EmcpDGCClass.cat[1]
%systemroot%\System32\CatRoot\{F75OE6C3-38EE-11D1-85E5-00C04 FC295EE}\EmcpSYMMClass.cat2

Start Menu Shortcut Files

PowerPath creates the following Start menu shortcuts and places them in the %SystemDrive%\Documents and Settings\All Users\Start Menu\Programs\EMC directory:

PowerPath\PowerPath Administrator.lnk
PowerPath Licensing Tool.lnk
PowerPath Monitor.lnk

PowerPath creates the following automatic startup file and places it in the %SystemDrive%\Documents and Settings\All Users\Start Menu\Programs\Startup directory:

PowerPath Monitor.lnk

Online Help Files

PowerPath copies the following online help files to the %systemroot%\Help directory:

EmcLicTool.chm
EmcPowerPathAdminMMC.chm
EmcLicToolCHS.chm
EmcLicToolFRA.chm
EmcLicToolDEU.chm
EmcLicToolITA.chm
EmcLicToolJPN.chm
EmcLicToolKOR.chm
EmcLicToolPTB.chm
EmcLicToolESP.chm

Registry Changes Caused by PowerPath Installation

Installing PowerPath on a host creates several entries in the Registry. The PowerPath installation program removes these Registry entries if PowerPath is subsequently uninstalled from your system. However, the Microsoft Installer also creates entries in the Registry. These operating system induced entries remain on your system after uninstalling PowerPath.

1. PowerPath 4.4.1 installations only.

Index