OceanStor UltraPath for Windows

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User Guide

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About This Document

Intended Audience

This document details the functions, pre-installation preparations, procedures for installation and uninstallation, and common commands and their usage for the UltraPath for Windows software.

This document is intended for:

- Technical support engineers
- Maintenance engineers

Conventions

As part of an effort to improve and enhance the product performance and capabilities, Huawei periodically releases revisions of the hardware and software. Therefore, some functions described in this document may not be supported by all versions of the software or hardware currently in use. For the most up-to-date information about product features, refer to the product release notes.

If a product does not function as described in this document, contact Huawei technical support engineers.

To obtain the Open Source Software Notice, go to the following website: **http://support.huawei.com/enterprise/**.

Change History

Updates between document issues are cumulative. Therefore, the latest document issue contains all updates made in previous issues.

Issue 03 (2016-12-20)

This issue is the third official release.

Optimized the document structure and the description of software functions.

Issue 02 (2016-09-20)

This issue is the second official release.

Added description of software functions.

Issue 01 (2016-05-20)

The first official release.

Contents

1 Overview

About This Chapter

UltraPath for Windows is an application server program based on the Windows MultiPath Input Output (MPIO) architecture. It is used to control and manage paths between the application server and the storage system.

1.1 Introduction to UltraPath Console

As a multi-path management platform for storage devices, UltraPath Console helps manage multiple paths of the storage system. The user-friendly interface that presents detailed system messages of UltraPath Console helps minimize misoperations and maintenance costs.

1.2 Availability

You can obtain UltraPath for Windows installation program from the CD-ROM delivered with the product.

1.3 Application Scenarios

To enhance the data transfer reliability, an application server and a storage device are connected over multiple paths.

1.4 Function Description

UltraPath for Windows provides path selection, failover, and I/O load balancing, and server cluster functions.

1.5 UltraPath Security Feature

This chapter describes UltraPath security feature.

1.1 Introduction to UltraPath Console

As a multi-path management platform for storage devices, UltraPath Console helps manage multiple paths of the storage system. The user-friendly interface that presents detailed system messages of UltraPath Console helps minimize misoperations and maintenance costs.

UltraPath Console main window

Figure 1-1 illustrates the UltraPath Console main window.

Figure 1-1 UltraPath Console main window
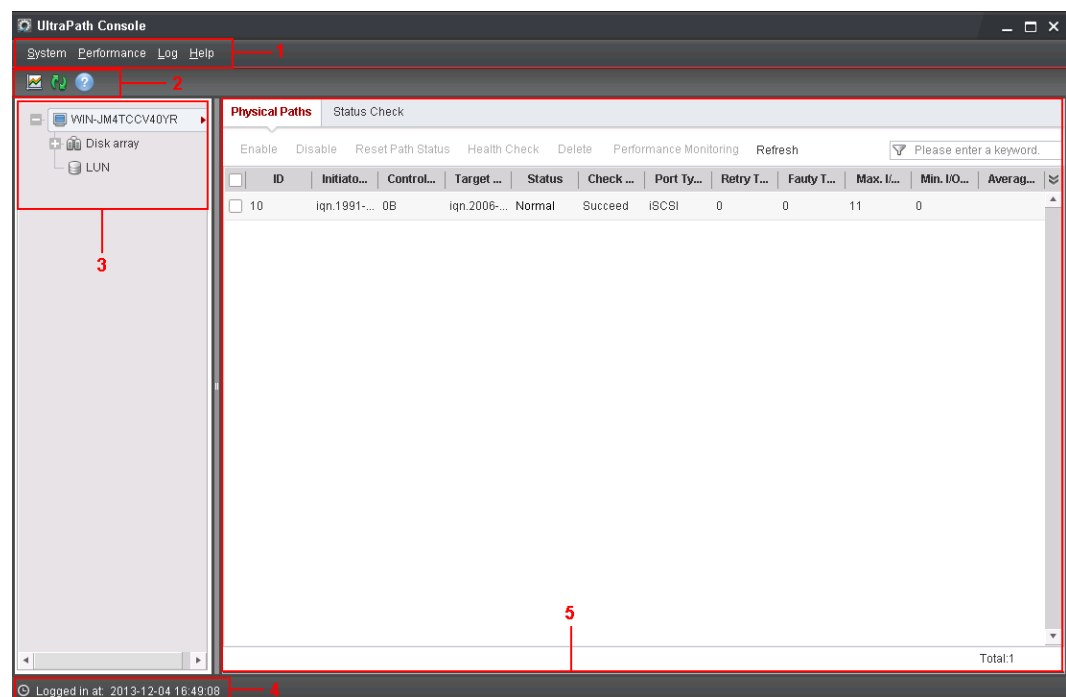
Table 1-1 describes the interface components of UltraPath Console.

Table 1-1 Components of UltraPath Console main window

No.	Name	Description
1	Menu bar	The menu bar provides access to four options: **System**, **Performance**, **Log** and **Help**.
2	Toolbar	The toolbar provides quick-access icons for common tasks.
3	Navigation tree	The navigation tree of UltraPath Console lists all nodes in the UltraPath system, and logically divides the UltraPath system into several modules.
4	Status bar	The status bar shows the current status and login time of UltraPath Console.

No.	Name	Description
5	Function pane	The function pane shows the current operations.

1.2 Availability

You can obtain UltraPath for Windows installation program from the CD-ROM delivered with the product.

License Requirement

You do not need to purchase a license for UltraPath for Windows.

Hardware Requirement

The memory of the application server must not be smaller than 4 GB.

Operating System Requirement

UltraPath for Windows can run on the following operating systems:

- Windows Server 2003 (X86/X64) SP2
- Windows Server 2003 R2 (X86/X64) SP2
- Windows Server 2008 (X86/X64) SP1/SP2
- Windows Server 2008 R2 X64 SP1
- Windows 7 (X86/X64) SP1
- Windows 8 (X86/X64)
- Windows 8.1 (X86/X64)
- Windows Server 2012 X64
- Windows Server 2012 R2 X64
- Windows Small Business Server 2011 X64
- Windows Server 2008 Core (X86/X64)
- Windows Server 2008 R2 Core X64
- Windows Server 2012 Core X64
- Windows Server 2016 X64
- Windows Server 2016 Core X64

If the clustering function is required, use the following operating systems:

- Windows Server 2003 (X86/X64) SP2
- Windows Server 2003 R2 (X86/X64) SP2
- Windows Server 2008 (X64) SP1/SP2
- Windows Server 2008 R2 X64 SP1
- Windows Server 2012 X64

- Windows Server 2012 R2 X64

- Windows Server 2016 X64

⚠ **CAUTION**

- UltraPath for Windows is incompatible with Windows Server 2003 Enterprise Edition x64 SP1. If you have to install UltraPath for Windows on this operating system, upgrade the system to Windows Server 2003 Enterprise Edition x64 SP2.

- A software version upgrade may cause the installation path for UltraPath for Windows to vary from that described in this document. Select the actual installation path.

- If you choose Windows Server 2008 (X86/X64) SP1/SP2 and an iSCSI network, related network adapter patch is required. Visit the following website to download the patch: **http://support.microsoft.com/kb/970658/en-us**.

📖**NOTE**

After UltraPath is upgraded, its requirements on the operating system may change. Log in to Huawei technical support website (**http://support.huawei.com/enterprise/**), choose **Support** > **Downloads** > **IT** > **Storage** > **Unified Storage** > **UltraPath**, and view the *Release Notes* specific to the UltraPath version.

1.3 Application Scenarios

To enhance the data transfer reliability, an application server and a storage device are connected over multiple paths.

Context

If not supported by multipathing software, the multipathing connection results in:

- Incorrect mapping display

  When a LUN on a storage device is mapped to an application server over multiple paths, what is displayed on the application server are multiple physical disks instead of a LUN.

- Failure in utilizing path redundancy to best advantage

  Although the application server and the storage device are physically connected over multiple paths, the operating system on the application server cannot identify when to use a redundant path. Therefore, the path redundancy function is underused.

- Compromised data security

  The operating system cannot distinguish between physical disks mapped to the application server. In this case, storing data on hard disks may mistakenly overwrite the existing data or trigger I/O errors.

The UltraPath software can resolve the previous problems:

Typical Networking

Figure 1-2 and **Figure 1-3** shows the typical topologies.

Figure 1-2 Topology 1
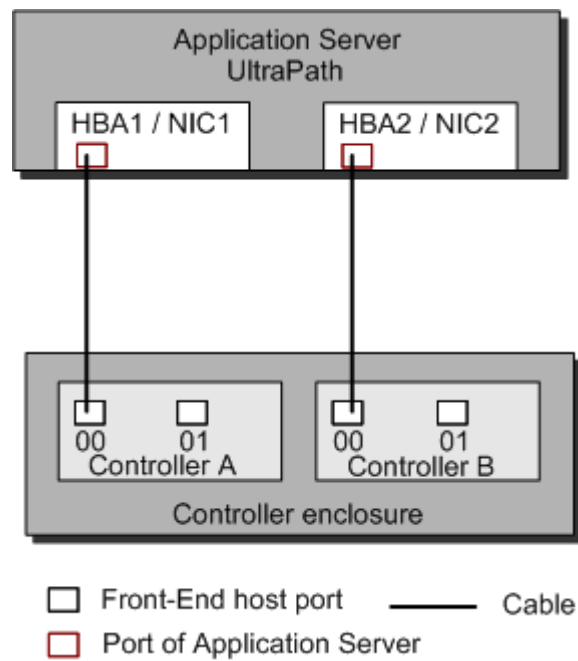
NOTE

- HBA: Host Bus Adapter
- NIC: Network Interface Card

Figure 1-3 Topology 2
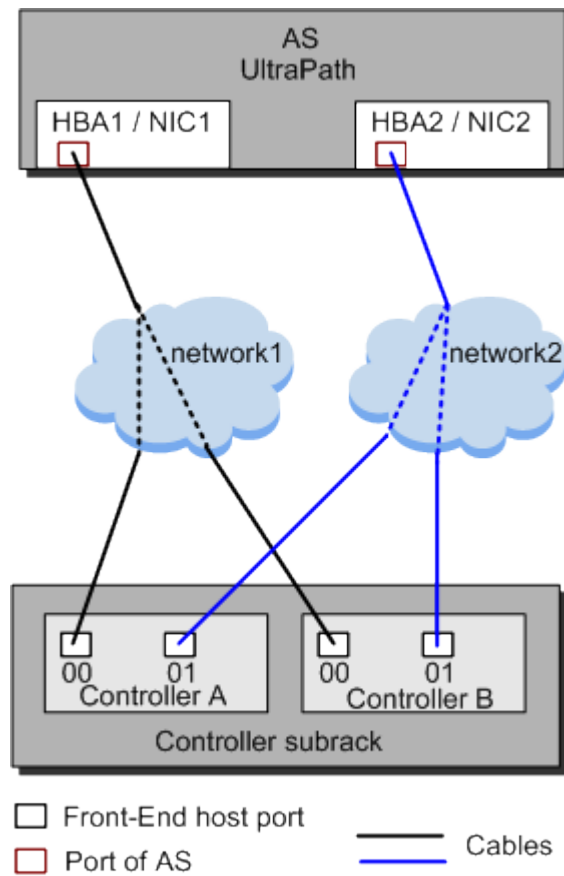
1.4 Function Description

UltraPath for Windows provides path selection, failover, and I/O load balancing, and server cluster functions.

Each function is detailed as follows:

- Path selection

  UltraPath for Windows enables the application server to select an optimal path to communicate with the storage device.

- Failover

  To ensure a reliable data transfer, multiple paths are established between the application server and the storage system. When a path fails, the failover function provided by UltraPath for Windows automatically switches services over to the alternate path, avoiding a service interruption due to a single point of failure.

  □NOTE

  When LUNs are created on the storage device, each LUN is specified to an owning controller. The path by which a LUN is mapped to an application server that is connected to the owning controller of the LUN is the preferred path and other redundant paths are alternate paths. Using the preferred path as the working path maximizes the I/O performance.

- Failback

  When the preferred path fails, the I/O services on the faulty path are switched to an alternate path. When the fault on the preferred path is rectified, the function provided by UltraPath for Windows automatically switches the I/O services from the alternate path back to the preferred path.

- I/O load balancing

  The I/O load balancing function enables I/O traffic to be evenly distributed to multiple paths so that the heavy pressure on network bandwidth is greatly reduced. If there are more than two paths connecting an application server to a controller on the storage device, you can set the load balancing function on UltraPath Console for Windows.

- Server cluster

  A server cluster consists of a set of servers that run cluster service applications to monitor storage resources and application servers and automatically identify and rectify failures.

- Auto-save log files

  UltraPath uses three text files to keep kernel log, When the text files is over 60M. The two text files without accessing will be saved to the log directory of UltraPath. When historical alarms are more than 100 items, UltraPath will save historical alarms log to the log directory of UltraPath, to avoid data lost.

1.5 UltraPath Security Feature

This chapter describes UltraPath security feature.

- Only users with **administrator** permissions can operate UltraPath.
- All non-query operations are recorded in logs. These logs can be accessed by user **administrator** only.
- The inputs of all users are verified to prevent unauthorized inputs.
- Interaction data of arrays are verified to prevent attacks.
- Ports are not listened and personnel data and sensitive data are not accessed.

2 UltraPath for Windows Installation

About This Chapter

This chapter provides procedures for installing UltraPath for Windows.

2.1 Pre-Installation Preparations
Before installing UltraPath for Windows, learn about the application server's operating system version, driver version, port type of the storage device, and software package, and ensure that they match each other.

2.2 Procedure for Installing UltraPath for Windows
This chapter describes the procedure for installing UltraPath for Windows.

2.1 Pre-Installation Preparations

Before installing UltraPath for Windows, learn about the application server's operating system version, driver version, port type of the storage device, and software package, and ensure that they match each other.

2.1.1 Preparing Application Servers

This section describes the operating system, Microsoft iSCSI Initiator, and host bus adapter (HBA) required for the application server that runs UltraPath for Window.

Items to Check

- Check that the Windows operating system and its patches running on the application server meet the requirement for installing UltraPath for Windows.

  📖 **NOTE**

  After UltraPath is upgraded, its requirements on the operating system may change. Log in to Huawei technical support website (**http://support.huawei.com/enterprise/**), choose **Support** > **Downloads** > **IT** > **Storage** > **Unified Storage** > **UltraPath**, and view the *Release Notes* specific to the UltraPath version.

- Check that the language of the operating system meets the requirements for installing and using UltraPath for Windows.

- Check that the latest version of UltraPath for Windows is installed on the application server. If an earlier version of UltraPath for Windows has been installed, uninstall it by referring to **4.3 UltraPath for Windows Uninstallation**.

- Check that the antivirus software remains disabled when you install UltraPath for Windows. After UltraPath for Windows has been installed, enable the antivirus software and set it to trusted software.

- Check whether the LUN mapping on the current server has been reported or deleted. If the LUN mapping has not been reported or deleted, wait the operation to complete. To check whether the LUN mapping has been reported or deleted, go to Device Manager and check whether the Device Manager is refreshing. If the Device Manager is not refreshing, the system is stable. You can manually refresh the system to make it stable.

- (Optional) If Fibre Channel HBA is installed on the application server, check that the Fibre Channel HBA meets the requirement for installing UltraPath for Windows by referring to **Requirements for the HBA**.

- After installing UltraPath, you need to reboot the application server. Therefore, stop services running on the application server before installing UltraPath.

Requirements for the HBA

⚠️ **NOTICE**

- On a Fibre Channel or Fibre Channel over Ethernet (FCoE) network, the application server requires a Fibre Channel or FCoE HBA.
- Each HBA must support StorPort driver.

UltraPath for Windows supports the Fibre Channel or FCoE HBA. For details on how to install an HBA on the application server, contact Huawei technicians for help.

When installing a Fibre Channel or FCoE HBA, note the following:

- Disable the failover and failback functions delivered with the HBA before installing UltraPath for Windows, because UltraPath for Windows cannot coexist with them. For details, see HBA driver manual *Read Me*.

- If UltraPath for Windows has been installed, a LUN cannot be mapped to different hosts through HBAs or iSCSI initiators that are from different vendors and with different models and firmware versions.

- Before installing UltraPath for Windows, ensure that the HBA driver has been properly installed.

- After the HBA driver has been installed on an application server, restart the application server for the HBA to take effect.

- If the system fails to detect physical LUNs, uninstall the HBA driver and reinstall it, eliminating problems caused by the plug and play (PnP) operation.

iSCSI Initiator Request

For Windows Server 2003 and Windows Server 2003 R2, if you use iSCSI for networking, install Microsoft iSCSI Software Initiator over 2.08 free version.

Storport Driver Requirement

If you are using Windows Server 2003, upgrade the Storport driver version to 5.2.3790.4485. To download the new version, visit **http://support.microsoft.com/kb/957910**.

Precautions for deploying the UltraPath on VMs

- If LUNs are allocated to a VM in Raw Device Mapping (RDM) mode or **pass-through** mode, the VM does not support the UltraPath.

- If you use a VM to access a LUN of the storage system in the Windows NPIV network, disable the alarm function of the UltraPath after installing the UltraPath.

2.1.2 Preparing Storage Devices

A storage device's controller enclosure requires the front-end host port so that it can connect to an application server through the port.

These ports as follows are supported:

- Fibre Channel host port, Fibre Channel over Ethernet host port and TOE host port

  Use an optical fiber to connect a storage device to an application server.

- iSCSI host port

  Use an Ethernet cable to connect a storage device to an application server.

- SAS host port

  Use a 3 Gbit/s SAS 4x cable to connect a storage device to an application server.

📖**NOTE**

For details about storage systems supported by UltraPath, log in to Huawei technical support website (**http://support.huawei.com/enterprise/**), choose **Support** > **Downloads** > **IT** > **Storage** > **Unified Storage** > **UltraPath**, and view the *Release Notes* specific to the UltraPath version.

2.1.3 (Optional) SAN Boot Environment Requirements

This chapter introduces the environment requirements for installing UltraPath when SAN Boot is configured.

If SAN Boot is configured for the host, in addition to doing the preceding work before installing UltraPath, the following requirements must also be met:

- Before installing the UltraPath, ensure that the network has been deployed.

- An operating system (OS) has been installed on the virtual LUN mapped to the host by the Huawei storage system.

- The virtual LUN running the host operating system must be a common virtual LUN.

⚠ NOTICE

- In SAN Boot scenarios, do not map the LUN that houses the host's operating system to two or more hosts. Otherwise, operating system data may be inconsistent.

- Dynamic disks do not support SAN Boot.

- After replication operations are complete, use the replicated LUNs to boot the host system. Then restart the host system.

- If you want to deploy an operating system on HyperMetro LUNs, deploy the operating system on common LUNs, install UltraPath, and convert the common LUNs into HyperMetro LUNs.

- In a SAN Boot scenario, you are advised to set the path that saves files **Pagefile** and **Dump** to a path on local disks. For details, see **5.3 What Can I Do If I Want to Configure the Path Where Files Pagefile and Dump Are Saved to a Path on Local Disks?**.

2.2 Procedure for Installing UltraPath for Windows

This chapter describes the procedure for installing UltraPath for Windows.

Precautions

Before installing UltraPath for Windows, log in to the application server that runs UltraPath for Windows as user with **administrator** permissions.

Procedure

Step 1 Copy the UltraPath for Windows installer to the application server.

📖 **NOTE**

- You can obtain UltraPath for Windows installer from the CD-ROM delivered with the product.
- A software version upgrade may cause the installation path for UltraPath for Windows to vary from that described in this document. Select an installation path based on site requirements.

Step 2 Use a digital signature verification tool to verify integrity of the software package.

📖 **NOTE**

Download the digital signature verification tool from **http://support.huawei.com/enterprise/** to verify integrity of the software package. If the verification fails, contact technical support engineers to obtain the correct and secure software package.

Step 3 Run UltraPath for Windows installer. The UltraPath for Windows welcome page is displayed, as shown in **Figure 2-1**.

Figure 2-1 Installation welcome page
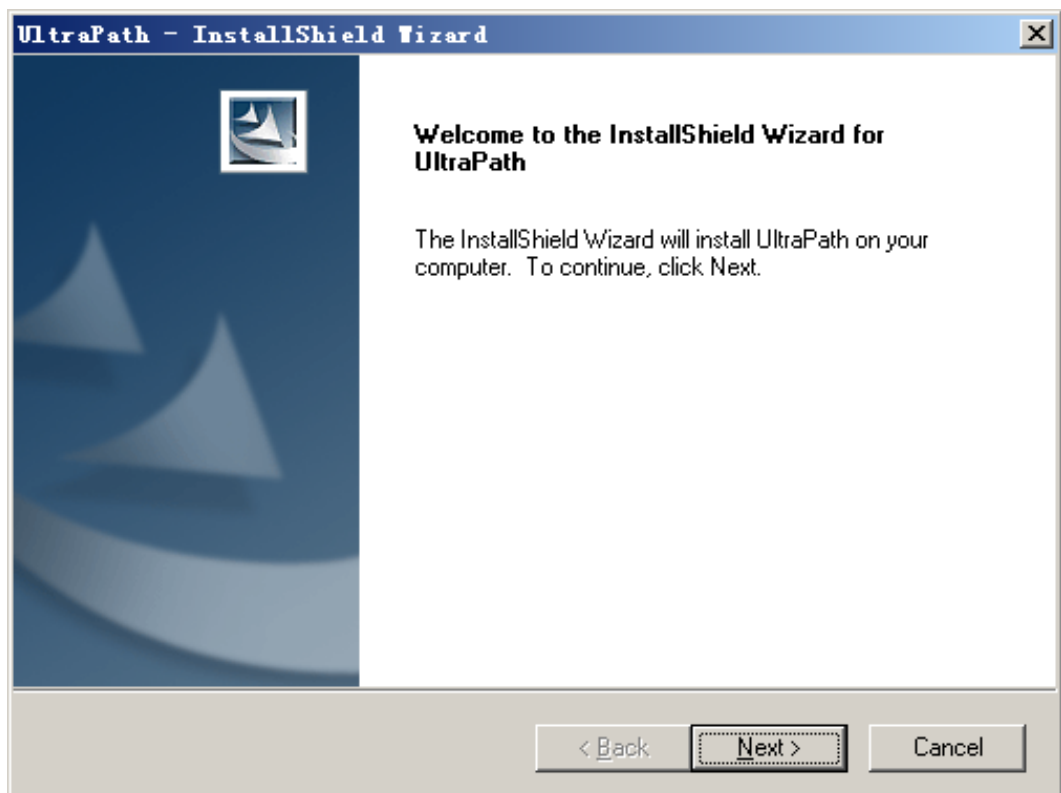
Step 4 Click **Next**. The **Customer Information** page is displayed, as shown in **Figure 2-2**.

2 UltraPath for Windows Installation

Figure 2-2 Customer Information page
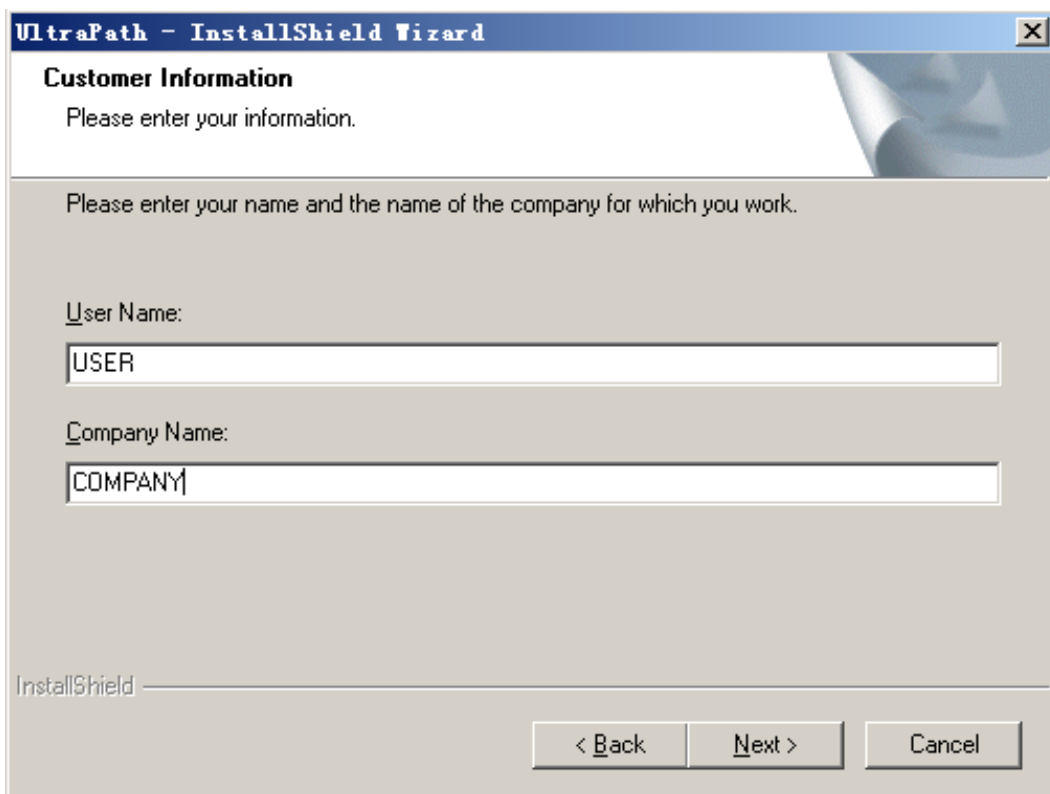
Step 5   In the **User Name** and **Company Name** test boxes, enter a user name and company name.

Step 6   Click **Next**. The **Ready to Install the Program** page is displayed, as shown in **Figure 2-3**.

Figure 2-3 Ready to Install the Program page
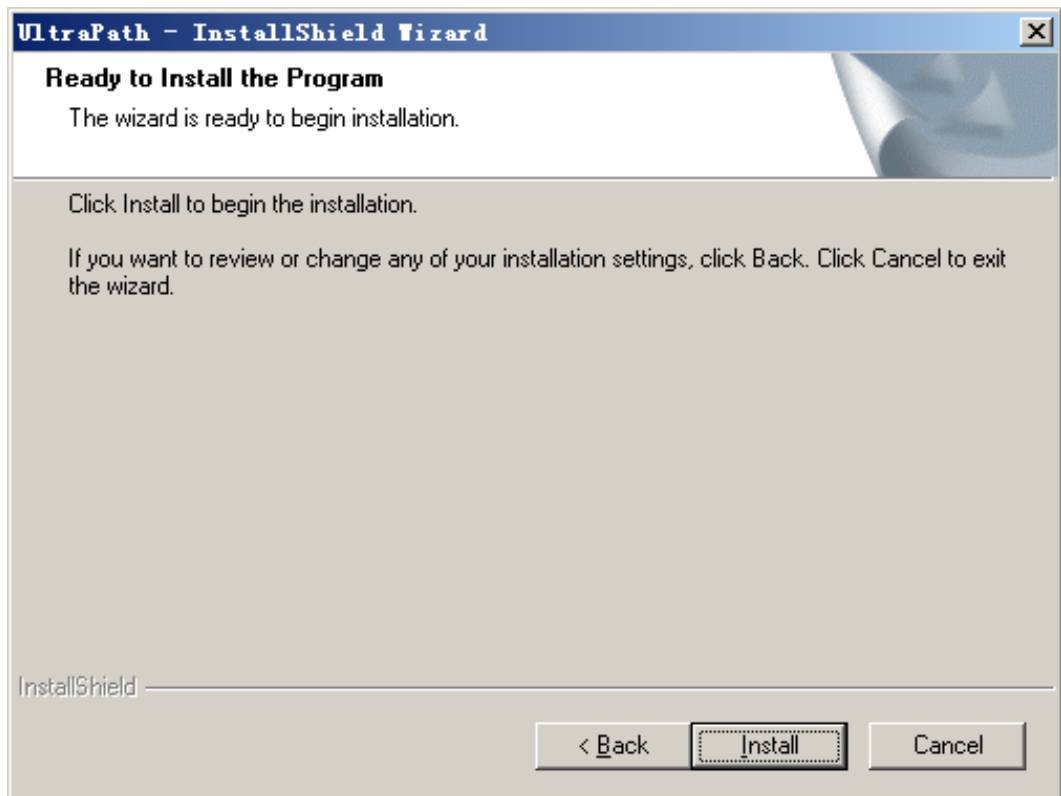
Step 7 Click **Install**. The **Setup Status** page is displayed, showing the installation progress.

If the option for ignoring driver signature is not selected, a dialog box shown in **Figure 2-4** is displayed many times. Click **Continue** or **Yes** every time this dialog box is displayed until installation of UltraPath for Windows is complete.

Figure 2-4 Security Alert dialog box

Step 8 **Figure 2-5** is displayed, when installation of UltraPath for Windows is complete.

Figure 2-5 Finish page
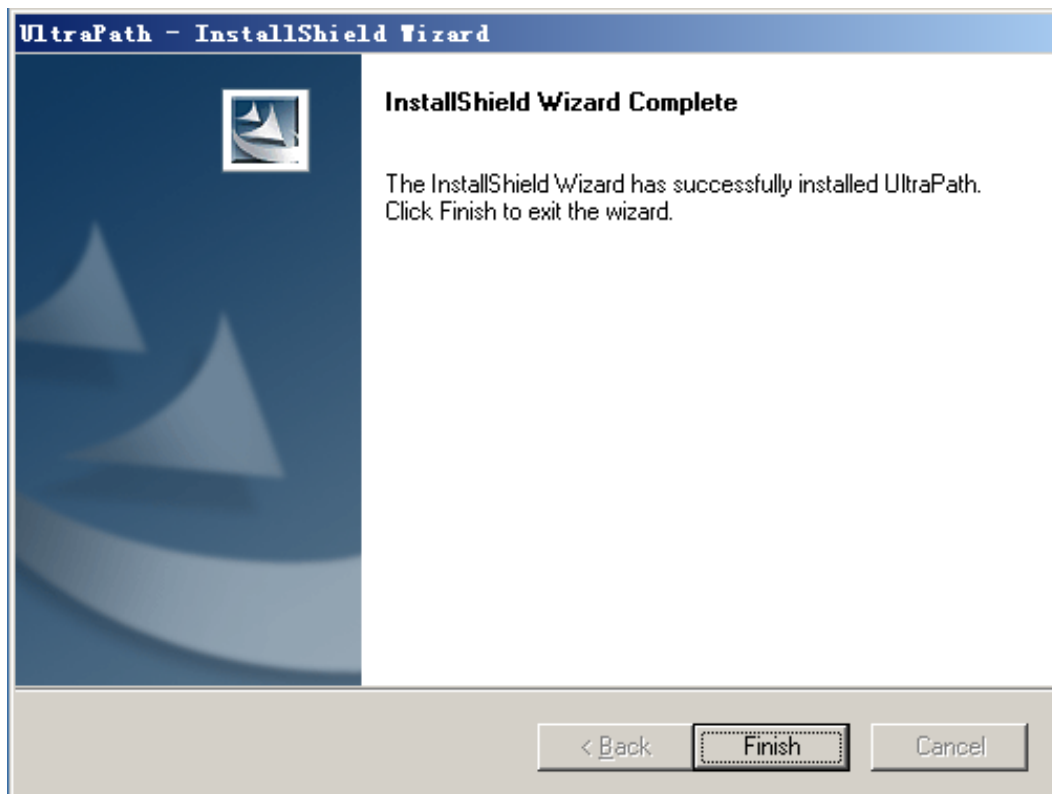
Step 9 Click **Finish**. A dialog box shown in **Figure 2-6** is displayed, asking you to restart your computer.

Figure 2-6 Restart page
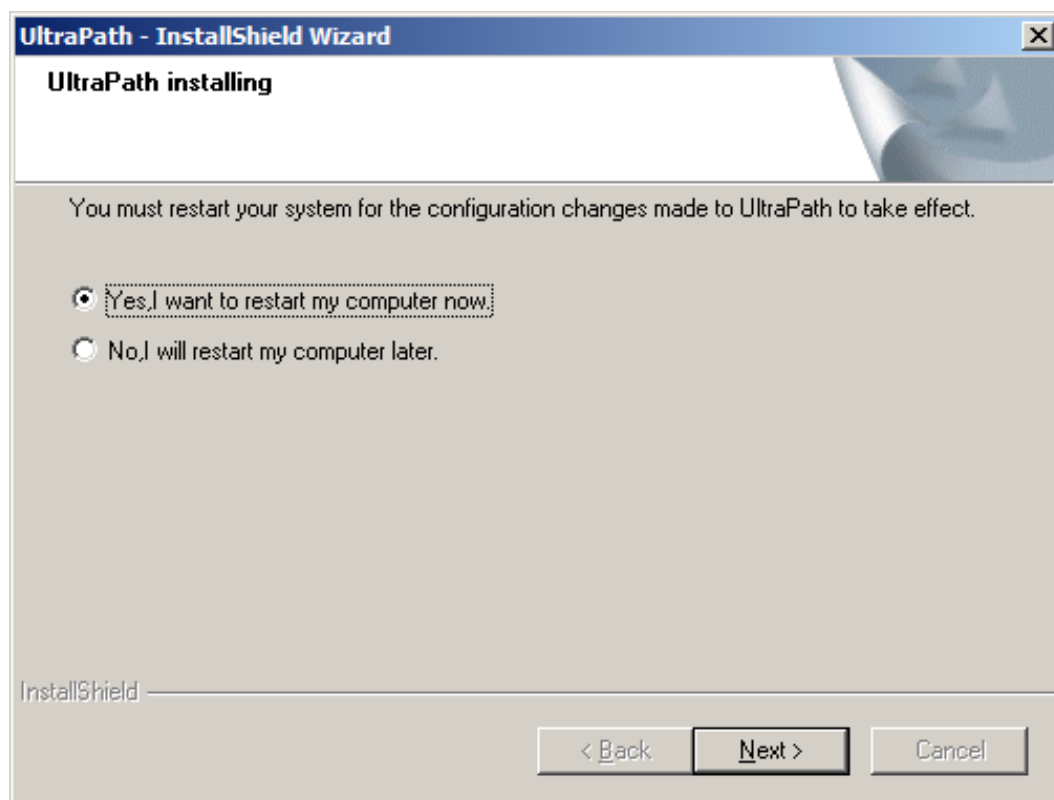
Step 10 Select **Yes, I want to restart my computer now**. Click **Next** to restart the computer.

☉NOTE

If you choose **NO ,I will restart my computer later**. The UltraPath will check whether the server restarted for every 15 minutes, if not, a information box will be displayed to notice restarting server.

----End

Follow-up Procedure

- To check whether UltraPath for Windows has been successfully installed, perform the following steps:

  Double-click the **UltraPath Console** shortcut on the desktop to verify that **UltraPath Console** can start properly.

  Then, perform the following steps:

  a. Open the **cmd** CLI and enter **devmgmt.msc** to open the **Device Manager**.

  b. In the **Device Manager** window, expand the **Storage controllers** node to check for **Ultra-Path Support**. If **Ultra-Path Support** is displayed as shown in **Figure 2-7**, the installation succeeded.

Figure 2-7 Device Manager window
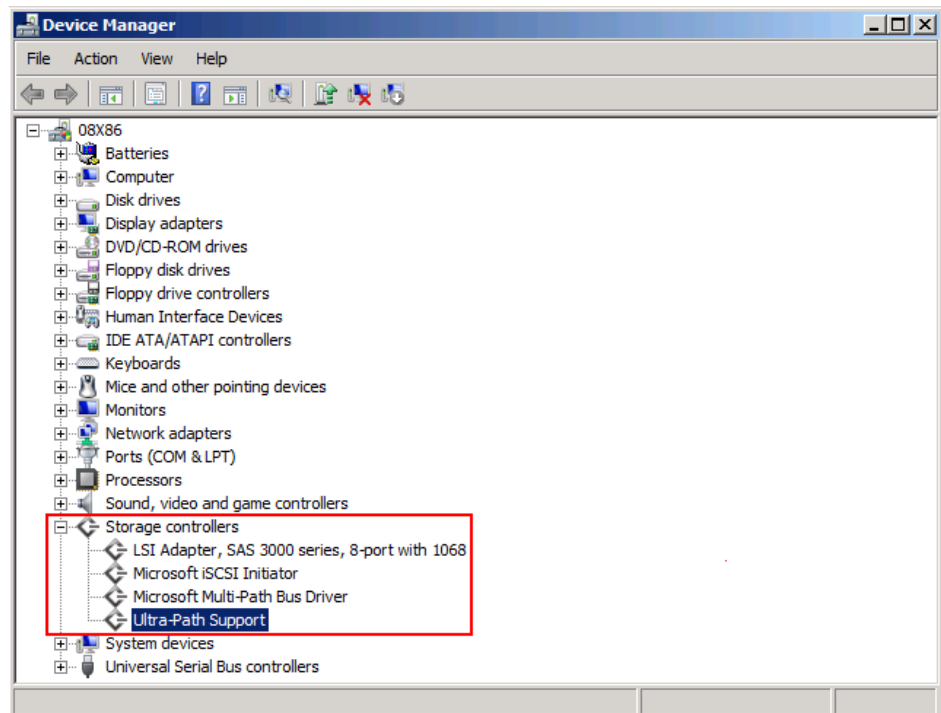
For Windows Server 2003, In the **Device Manager** window, expand the **SCSI and RAID controllers** node to check for **Ultra-Path Support**. If **Ultra-Path Support** is displayed as shown in **Figure 2-8**, the installation succeeded.

Figure 2-8 Windows Server 2003 **Device Manager** window
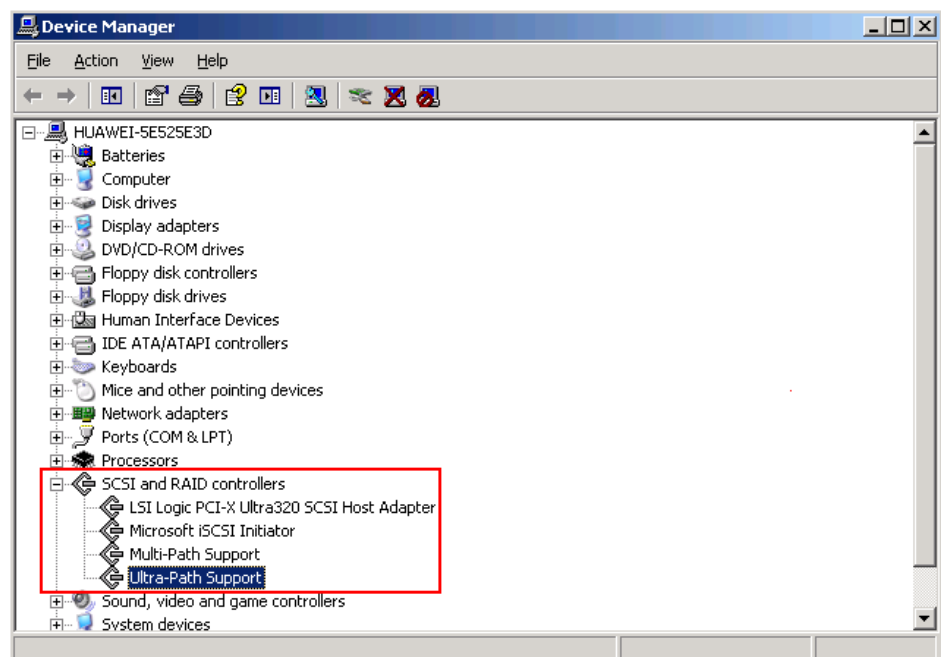
📖**NOTE**

- SCSI: Small Computer System Interface
- RAID: Redundant Array of Independent Disks

● In a SAN Boot scenario, check whether a yellow exclamation mark is displayed on an MPIO virtual disk. If the yellow exclamation mark is displayed, clear it.

⚠ NOTICE

In a SAN Boot scenario, if a yellow exclamation mark is displayed on an MPIO virtual disk after UltraPath is installed and the operating system is restarted, the dump file generation function of the Windows operating system will be adversely affected. Windows Server 2008 is used as an example here. For other Windows operating systems, the actual interface prevails.

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a. Open the **cmd** CLI and enter **devmgmt.msc** to open the **Device Manager**.

b. Expand the **Disk drives** node and check whether a yellow exclamation mark is displayed in **Multi-Path Disk Device**.

- If no, no action is required.
- If yes, go to **c**.

c. Choose **Start** > **All Programs** > **UltraPath** and repeatedly click **Driver Update** until the yellow exclamation mark disappears. Then restart the application server.

⚠ NOTICE

To maintain normal operation of UltraPath for Windows, do not move, modify, or delete any files in the UltraPath installation directory.

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3 UltraPath for Windows Configuration

About This Chapter

This chapter provides procedures for configuring UltraPath for Windows.

> **NOTE**
>
> After UltraPath global settings, parameters of the storage arrays and VLUNs managed by UltraPath will be automatically configured. In the mean time, after UltraPath global settings, you can configure parameters for a storage array or VLUN. However, subsequent global settings will not apply to the storage array or VLUN.

3.1 Common Settings
This section describes how to set the general parameters of UltraPath for Windows.

3.2 Advanced Settings
This section describes how to set the advanced parameters of UltraPath for Windows.

3.3 Link Reliability Settings
This section describes how to set the link parameters of UltraPath for Windows.

3.4 Timeout Parameter Settings upon a Link Down Failure
This chapter describes how to set the timeout parameters upon a link down failure of an iSCSI initiator and some mainstream HBAs.

3.1 Common Settings

This section describes how to set the general parameters of UltraPath for Windows.

Procedure

Step 1 On the menu bar of the UltraPath Console, choose **System** > **Global Settings**.

The **Settings** dialog box is displayed.

Step 2 Click the **Common Settings** tab and set the general parameters in the **Common Settings** area. The following table describes the parameters:

Parameter	Description	Value
Load balancing mode	Load balancing mode of UltraPath for Windows. The value is either **Within controller** or **Between controllers**.	[Default value] Within controller [Example] Within controller
Load balancing algorithm	Path selection algorithm of UltraPath for Windows. The value can be **Minimum queue depth**, **Minimum task**, or **Round robin**.	[Default value] Minimum queue depth [Example] Minimum queue depth
Load balancing continuous I/O queue	Number of consecutive I/Os for load balancing. The value ranges from 1 to 10,000.	[Default value] 1 [Example] 1
LUN trespass	Enabling or disabling LUN switchover. The value can be either **Enable** or **Disable**.	[Default value] Enable [Example] Enable

Step 3 Click **OK**.

📖**NOTE**

If you want to restore the default global settings, click **Reset**.

----End

3.2 Advanced Settings

This section describes how to set the advanced parameters of UltraPath for Windows.

Procedure

Step 1 On the menu bar of the UltraPath Console, choose **System** > **Global Settings**.

The **Settings** dialog box is displayed.

Step 2 Click the **Advanced Settings** tab.

Step 3 In the **I/O Retry Settings** area, set the I/O retry parameters. The following table describes the parameters:

Parameter	Description	Value
Retry Times	I/O retry times. The value ranges from 0 to 60.	[Default value] 10 [Example] 10
Retry interval (s)	I/O retry interval. The value ranges from 0 to 10.	[Default value] 0 [Example] 0

Step 4 In the **Routine Path Test Settings** area, set the path routine test parameters. The following table describes the parameters:

Parameter	Description	Value
Idle path routine test interval (s)	Routine test interval of idle paths. The value ranges from 1 to 2,592,000.	[Default value] 60 [Example] 60
Faulty path routine test interval (s)	Routine test interval of faulty paths. The value ranges from 1 to 2,592,000.	[Default value] 10 [Example] 10

Step 5 In the **HyperMetro Settings** area, set the HyperMetro parameters. The following table describes the parameters:

Parameter	Description	Value
HyperMetro Mode	HyperMetro working mode. The value can be either **Priority** or **Balance**.	[Default value] Priority [Example] Priority

Parameter	Description	Value
Primary Array Sn	The SN of the primary array.	[Default value] None [Example] 210235G6GRZ0B5000024
Split Size	Fragment size. The value ranges from 512 bytes to 1 GB.	[Default value] 128MB [Example] 128MB

Step 6 In the **Others** area, set other advanced parameters. The following table describes the parameters:

Parameter	Description	Value
Failback latency time (s)	Latency for path failover. The value ranges from 0 to 3,600. **NOTE** If you set the value to **0**, failback latency is closed.	[Default value] 600 [Example] 600
I/O suspension period (s)	I/O suspension period. The value ranges from 0 to 2,592,000.	[Default value] 60 [Example] 60
Max. I/O timeout period (s)	Maximal I/O timeout period of a LUN The value ranges from 1 to 2,592,000.	[Default value] 1800 [Example] 1800

Step 7 Click **OK**.

📖**NOTE**

If you want to restore the default global settings, click **Reset**.

----End

3.3 Link Reliability Settings

This section describes how to set the link parameters of UltraPath for Windows.

Procedure

Step 1 On the menu bar of the UltraPath Console, choose **System** > **Global Settings**.

The **Settings** dialog box is displayed.

Step 2 Click the **Link Reliability** tab.

Step 3 In the **Timeout Isolation Settings** area, set the timeout parameters. The following table describes the parameters:

Parameter	Description	Value
Time window for I/O timeout isolation statistics (s)	The value ranges from 60 to 2,592,000.	[Default value] 600 [Example] 600
I/O timeout isolation threshold	The value ranges from 0 to 65,535.	[Default value] 1 [Example] 1
I/O timeout path recovery time (s)	The value ranges from 1,800 to 2,592,000.	[Default value] 1800 [Example] 1800

Step 4 In the **Discrete Error Isolation Settings** area, set the discrete error isolation parameters. The following table describes the parameters:

Parameter	Description	Value
Time window for I/O discrete error isolation statistics (s)	The value ranges from 60 to 2,592,000.	[Default value] 300 [Example] 300
Min. I/Os for I/O discrete error isolation	The value ranges from 5,000 to 65,535.	[Default value] 5000 [Example] 5000
I/O discrete error isolation threshold (%)	The value ranges from 0 to 100.	[Default value] 20 [Example] 20

Parameter	Description	Value
I/O discrete path recovery time (s)	The value ranges from 1,800 to 2,592,000.	[Default value] 1800 [Example] 1800

Step 5 In the **Path Intermittent Settings** area, set the intermittent error isolation parameters. The following table describes the parameters:

Parameter	Description	Value
Time window for intermittent path failure statistics (s)	The value ranges from 60 to 2,592,000.	[Default value] 1800 [Example] 1800
Intermittent path failure isolation threshold	The value ranges from 0 to 65,535.	[Default value] 3 [Example] 3
Intermittent path failure recovery time (s)	The value ranges from 60 to 2,592,000.	[Default value] 3600 [Example] 3600

Step 6 In the **iSCSI Settings** area, set the iSCSI parameters. The following table describes the parameters:

Parameter	Description	Value
Time window for high latency path check statistics (s)	The value ranges from 60 to 18,000.	[Default value] 300 [Example] 300
High latency path isolation threshold (ms)	The value ranges from 0 to 65,535.	[Default value] 1000 [Example] 1000
High latency path recovery time (s)	The value ranges from 60 to 2,592,000.	[Default value] 3600 [Example] 3600

Step 7 In the **I/O Latency Threshold Settings** area, set the I/O latency threshold parameters. The following table describes the parameters:

Parameter	Description	Value
I/O Latency Threshold (ms)	The value ranges from 0 to 120,000.	[Default value] 20 [Example] 20

Step 8 Click **OK**.

📖**NOTE**

If you want to restore the default global settings, click **Reset**.

----End

3.4 Timeout Parameter Settings upon a Link Down Failure

This chapter describes how to set the timeout parameters upon a link down failure of an iSCSI initiator and some mainstream HBAs.

3.4.1 Parameter Setting Description

This section describes functions and scenarios of the timeout parameter settings upon a link down failure.

A link down failure triggers an I/O failover. This is a common fault mode. Under this condition, the time for the I/O failover consists of two parts: time for an initiator to sense the link down failure and timeout period of the link down failure of the initiator.

Time for an initiator to sense a link down failure indicates a period from the physical link down failure to the initiator's identification of the link down failure. This period varies based on different initiator hardware, driver versions, networks, and physical fault locations. Generally, HBAs sense a link down failure faster than an iSCSI initiator does. The speed for sensing a link down failure accelerates when the fault location is close to a host. The timeout period of a link down failure of an initiator indicates a period from the initiator's identification of the link down failure to I/O queue suspension. (After I/Os are suspended, the initiator returns I/Os that have the link down error code to UltraPath. UltraPath immediately switches I/O services to a standby path.) This timeout period depends on the timeout parameters of the initiator. You can control the time for an I/O failover by modifying the timeout parameters.

Typically, you can use the default timeout parameter configuration of an initiator upon a link down failure. However, some application services has special requirements on I/O latency. For example, Oracle RAC requires short I/O latency. Under this condition, you can set a short timeout period upon a link down failure. The timeout parameter value varies based on different service environments. If services have special requirements on an I/O failover, you are advised to set the timeout parameters based on the actual environment.

3.4.2 Setting Timeout Parameters for an iSCSI Initiator

UltraPath provides a tool used to check and change the timeout parameters for an iSCSI initiator.

3.4.2.1 Obtaining Help

The man pages of the **iscsiConfig** command can be queried by executing this command.

Format

iscsiConfig *help*

Parameters

None

Usage Guidelines

None

System Response

After this command is executed successfully, information similar to the following is displayed.

```
Use "iscsiConfig get timeout value" to get iSCSI MaxRequestHoldTime
Use "iscsiConfig set timeout xxx" to set iSCSI MaxRequestHoldTime
Use "iscsiConfig get linkdowntime value" to get iSCSI LinkDownTime
Use "iscsiConfig set linkdowntime xxx" to set iSCSI LinkDownTime
```

3.4.2.2 Querying the Timeout Value of an iSCSI Initiator

The timeout value of an iSCSI initiator can be queried by executing this command.

Format

iscsiConfig get timeout value

iscsiConfig get linkdowntime value

Parameters

None

Usage Guidelines

None

System Response

After this command is executed successfully, information similar to the following is displayed.

```
The operation completed successfully, MaxRequestHoldTime = 60s.
The operation completed successfully, LinkDownTime = 15s.
```

3.4.2.3 Setting Timeout Parameters

The timeout parameters for an iSCSI initiator can be set by executing this command. You can run the **set timeout** command to change **MaxRequestHoldTime**. If you do not obtain the expected result, run the **set linkdowntime** command to change **LinkDownTime**.

Format

iscsiConfig set timeout *xxx*

iscsiConfig set linkdowntime *xxx*

Parameters

xxx in this command is the preferred value you want to set. The unit is second.

Usage Guidelines

This setting do not take effect until you restart the computer.

System Response

After this command is executed successfully, information similar to the following is displayed.

```
The operation completed successfully, MaxRequestHoldTime = 5s.
Please restart your computer to make it take effect.

The operation completed successfully, LinkDownTime = 5s.
Please restart your computer to make it take effect.
```

3.4.3 Setting the Timeout Parameters for a QLogic HBA

This section explains how to set the timeout parameter for a QLogic HBA.

To set the timeout parameters for a QLogic HBA, use the SANsurfer tool provided by QLogic to change the **Port Down Retry Count** and **Link Down Timeout** values, as shown in **Figure 3-1**.

⚠ **NOTICE**

- If the timeout parameters are modified, the time required by the system to delete disks upon a link interruption failure is changed. A smaller value indicates that less time is required for deleting disks.

- This operation modifies driver parameters and applies to all storage device links on the host.

Figure 3-1 SANsurfer setting page
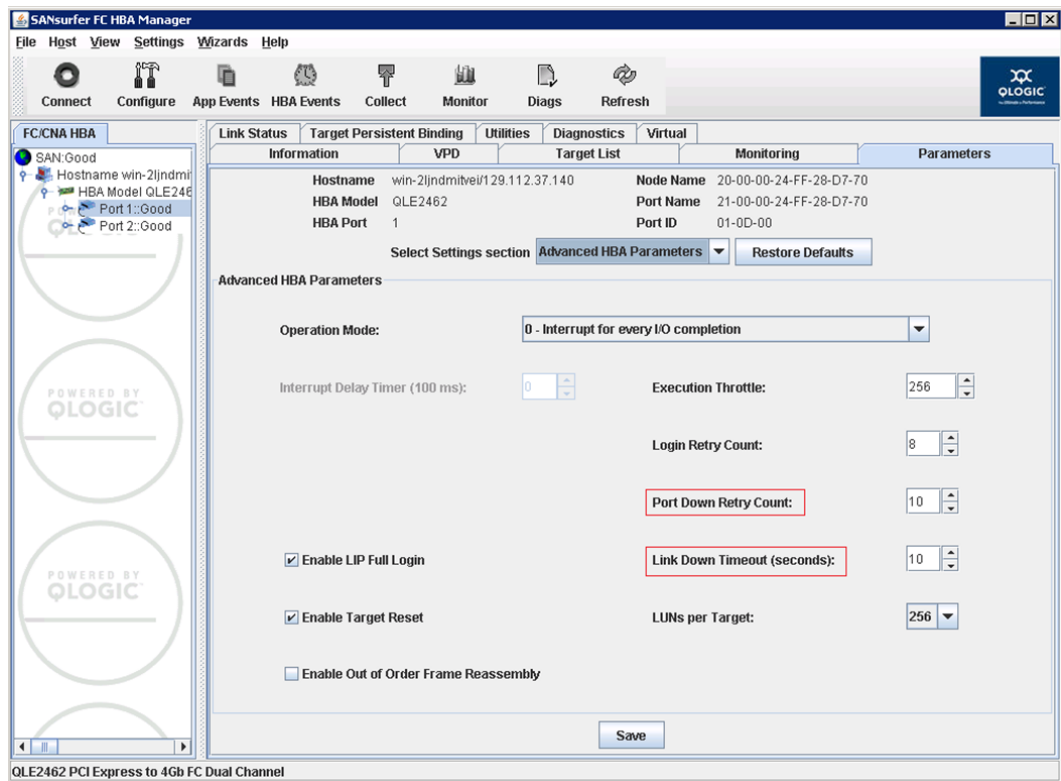
3.4.4 Setting Timeout Parameters for an Emulex HBA

This section explains how to set timeout parameters for an Emulex HBA.

To set the timeout parameter for an Emulex HBA, use the HBAnyware tool provided by Emulex to change the **linktimeout** and **nodetimeout** values. Using **OneCommand Manager** as an example, set parameters for each port, as shown in **Figure 3-2**.

⚠ NOTICE

- If the timeout parameters are modified, the time required by the system to delete disks upon a link interruption failure is changed. A smaller value indicates that less time is required for deleting disks.

- This operation modifies driver parameters and applies to all storage device links on the host.

Figure 3-2 OneCommand Manager setting page
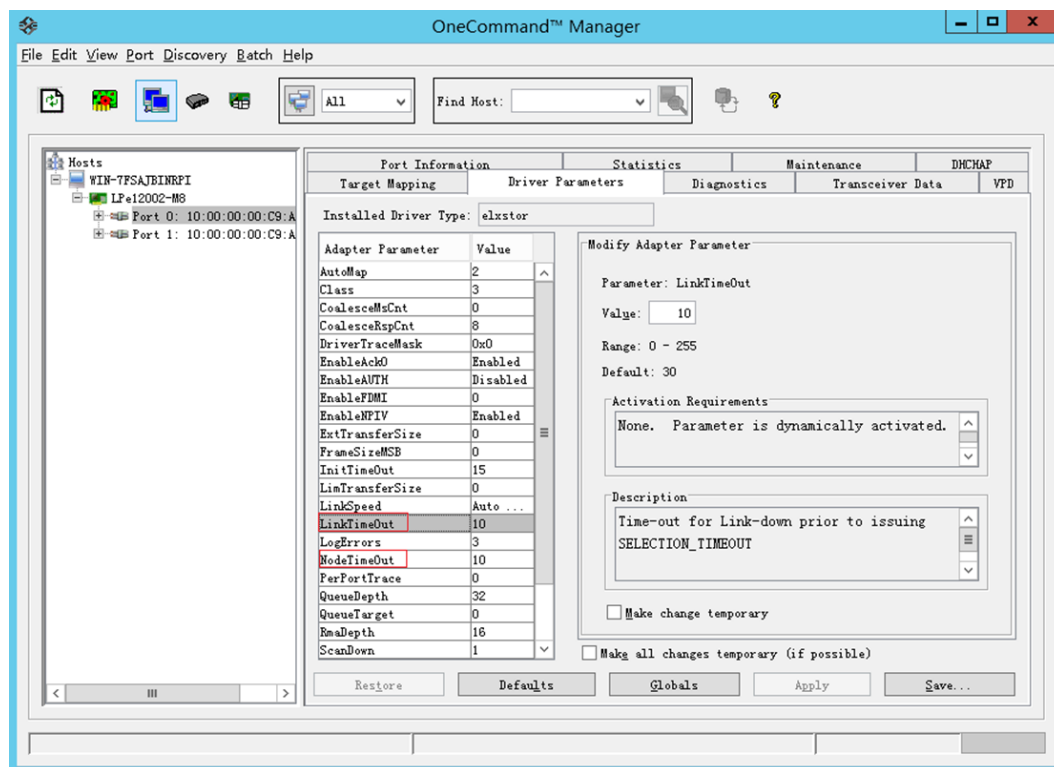
3.4.5 Setting Timeout Parameters for a QLogic CNA

This section use FCoE as an example to explain how to set timeout parameters for a QLogic CNA.

To set timeout parameters for an FCoE, you need to download the FCoE driver package from **http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/DefaultNewSearch.aspx**. The product name is **QLE8142** (choose a proper operating system). After the FCoE driver is installed, double-click the **QConvergeConsole CLI** shortcut to enter the CLI mode and set the parameters as follows:

```
CLI - Version 1.0.1 (Build 32)

    Main Menu

    1:  Adapter Information
    2:  Adapter Configuration
    3:  Adapter Updates
    4:  Adapter Diagnostics
    5:  Adapter Statistics
    6:  Refresh
    7:  Help
    8:  Exit


    Please Enter Selection: 2

    QConvergeConsole

    CLI - Version 1.0.1 (Build 32)

Adapter Type Configuration Selection
```

```
      1:  CNA Configuration


          (p or 0: Previous Menu; m or 98: Main Menu; ex or 99: Quit)
          Please Enter Selection: 1

          QConvergeConsole

          CLI - Version 1.0.1 (Build 32)

    Converged Network Adapter (CNA) Protocol Type Selection

    1:  CNA FCoE Configuration
    2:  CNA NIC Configuration


          (p or 0: Previous Menu; m or 98: Main Menu; ex or 99: Quit)
          Please Enter Selection: 1

          QConvergeConsole

          CLI - Version 1.0.1 (Build 32)

    Converged Network Adapter (CNA) FCoE Configuration

    1:  Adapter Alias
    2:  Adapter Port Alias
    3:  HBA Parameters
    4:  Target Persistent Binding
    5:  Boot Devices Configuration
    6:  Virtual Ports (NPIV)
    7:  Target Link Speed (iiDMA)
    8:  Driver Parameters
    9:  Selective LUNs
   10:  QoS
   11:  Export (Save) Configuration
   12:  Generate Reports


          (p or 0: Previous Menu; m or 98: Main Menu; ex or 99: Quit)
          Please Enter Selection: 3

          QConvergeConsole

          CLI - Version 1.0.1 (Build 32)

    Converged Network Adapter (CNA) FCoE Configuration

    CNA Model QLE8142 SN: RFC1002S77768
       1. Port  1 [Protocol(s): NIC FCoE]
          MAC Address: 00:C0:DD:13:E2:A0 Link Up
          WWPN: 21-00-00-C0-DD-13-E2-A1 Online
       2. Port  2 [Protocol(s): NIC FCoE]
          MAC Address: 00:C0:DD:13:E2:A2 Link Up
          WWPN: 21-00-00-C0-DD-13-E2-A3 Online


          (p or 0: Previous Menu; m or 98: Main Menu; ex or 99: Quit)
          Please Enter Selection: 1

          QConvergeConsole

          Version 1.0.1 (Build 32)

    HBA Parameters Menu

========================================================
CNA           : 0 Port: 1
```

```
SN            : RFC1002S77768
ENode MacAddr : 00:C0:DD:13:E2:A1
CNA Model     : QLE8142
CNA Desc.     : QLE8142 QLogic PCI Express to 10 GbE Dual Channel CNA (FCoE)
FW Version    : 5.02.01
WWPN          : 21-00-00-C0-DD-13-E2-A1
WWNN          : 20-00-00-C0-DD-13-E2-A1
Link          : Online
========================================================

    1:  Display HBA Parameters
    2:  Configure HBA Parameters
    3:  Restore Defaults


        (p or 0: Previous Menu; m or 98: Main Menu; ex or 99: Quit)
        Please Enter Selection: 2

        QConvergeConsole

        Version 1.0.1 (Build 32)

    Configure Parameters Menu


========================================================
CNA           : 0 Port: 1
SN            : RFC1002S77768
ENode MacAddr : 00:C0:DD:13:E2:A1
CNA Model     : QLE8142
CNA Desc.     : QLE8142 QLogic PCI Express to 10 GbE Dual Channel CNA (FCoE)
FW Version    : 5.02.01
WWPN          : 21-00-00-C0-DD-13-E2-A1
WWNN          : 20-00-00-C0-DD-13-E2-A1
Link          : Online
========================================================

    1:  Connection Options
    2:  Data Rate
    3:  Frame Size
    4:  Loop Reset Delay (seconds)
    5:  Enable BIOS
    6:  Enable Fibre Channel Tape Support
    7:  Operation Mode
    8:  Interrupt Delay Timer (100ms)
    9:  Execution Throttle
   10:  Login Retry Count
   11:  Port Down Retry Count
   12:  Link Down Timeout (seconds)
   13:  Enable Target Reset
   14:  LUNs per Target
   15:  Enable Receive Out Of Order Frame
   16:  Enable LR
   17:  Commit Changes
   18:  Abort Changes


        (p or 0: Previous Menu; m or 98: Main Menu; ex or 99: Quit)
        Please Enter Selection:
```

Input 11 and 12, and then set the delay time

Input 17 to commit changes as follow:

```
Please Enter Selection: 17
HBA Parameters Update Complete. Changes have been saved to HBA instance 0.

        Press <Enter> to continue:

        QConvergeConsole

        Version 1.0.1 (Build 32)
```

4 Management

About This Chapter

The Management of UltraPath includes performing routine maintenance , upgrading and uninstalling the UltraPath for Windows.

4.1 Routine Maintenance
UltraPath Console is used to implement multi-path management, such as checking UltraPath-related device information and alarm handling information, and monitoring each path's I/O performance in real time.

4.2 UltraPath for Windows Upgrade
There are two types of upgrade for UltraPath for Windows: C-version upgrade and R-version upgrade.

4.3 UltraPath for Windows Uninstallation
This chapter provides a procedure for uninstalling UltraPath for Windows.

4.1 Routine Maintenance

UltraPath Console is used to implement multi-path management, such as checking UltraPath-related device information and alarm handling information, and monitoring each path's I/O performance in real time.

Some arrays do not support query of some information. Such information is displayed as -- in UltraPath.

4.1.1 Managing Array

You can use UltraPath for Windows to view and set path status and disk array–related parameters.

4.1.1.1 Viewing Array Information

This section describes how to view details about disk arrays on the array management page of UltraPath for Windows.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **Host** > **Disk array**.

Step 2 Select the disk array whose information you want to view.

Step 3 In the right function pane, view details about the disk array.

Parameter	Description	Value
ID	ID of the storage array.	[Example] 0
Name	Name of the storage array.	[Example] SN_2004
Array SN	Serial No. of the storage array.	[Example] 21000022a10ac1bf
Vendor Name	Manufacturer of the storage array.	[Example] HUAWEI
Product Name	Name of the storage array.	[Example] S5500T

□ NOTE

In the upper part of the function pane, click **Refresh** to refresh information about disk arrays managed by UltraPath for Windows.

----End

4.1.1.2 Refresh

This operation allows you to keep device information up-to-date on the UltraPath Manager.

Procedure

Step 1 Refresh the UltraPath Console in any of the following ways:

- On the toolbar, click ⮂.

- On the menu bar, choose **System** > **Refresh**.

- Press **F5**.

- Select a node in the navigation tree and click **Refresh** to update the node information.

The **Information** dialog box is displayed.

Step 2 Click **OK**.

----End

4.1.1.3 Setting Disk Array Parameters

This section describes how to set parameters of a specified disk array.

Precaution

After storage array parameters settings, parameters of the VLUNs from the storage array will be automatically configured. Aggregation VLUNs do not be automatically configured. In the mean time, after storage array parameters settings, you can configure parameters for a VLUN from the storage array. However, subsequent storage array parameters settings will not apply to the VLUN.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **Host** > **Disk array**.

Step 2 Select the disk array that you want to set.

Step 3 In the right function pane, click **Settings**.
The **Disk Array Parameter Settings** dialog box is displayed.

Step 4 In the **Disk Array Parameter Settings** dialog box, set parameters for the disk array managed by UltraPath for Windows. The following table describes the parameters:

Parameter	Description	Value
Load Balancing Mode	Load balancing mode of UltraPath for Windows. The value is either **Within controller** or **Between controllers**.	[Default value] Within controller [Example] Within controller

Parameter	Description	Value
Load Balancing Algorithm	Load balancing algorithm of UltraPath for Windows. The value can be **Minimum queue depth**, **Minimum task**, or **Round robin**.	[Default value] Minimal queue depth [Example] Minimal queue depth
	Number of consecutive I/Os for load balancing. The value ranges from 1 to 10,000.	[Default value] 1 [Example] 1
LUN Trespass	Enabling or disabling LUN switchover. The value can be either **Enable** or **Disable**.	[Default value] Enable [Example] Enable
I/O Suspension Time	I/O suspension time. The value ranges from 0 to 2,592,000, expressed in seconds.	[Default value] 60 [Example] 60
Max I/O Retry Timeout	Maximum I/O timeout period of a virtual LUN. The value ranges from 1 to 2,592,000, expressed in seconds.	[Default value] 1800 [Example] 1800

Step 5 Click **OK**.

----End

4.1.1.4 Controller Management

Controller management includes viewing controller information and setting controllers.

4.1.1.4.1 Viewing Controller Information

This section describes how to view information about disk array controllers.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **Host** > **Disk array**.

Step 2 Select the disk array whose controller information you want to view.

Step 3 Click **Controller**.

Step 4   In the right function pane, view the detailed information about the controller. The following table describes related parameters:

Parameter	Description	Value
ID/Name	ID or Name of the controller.	[Example] 0A
Status	Status of the controller. The value can be either **Enable** or **Disable**.	[Example] Enable
Location	Location of the controller.	[Default value] Local Device [Example] Local Device

📖**NOTE**

In the upper part of the function pane, click **Refresh** to refresh information about disk arrays managed by UltraPath for Windows.

----**End**

4.1.1.4.2 Setting a Controller

This section describes how to set a disk array controller.

?.1. Enabling Controller

This section describes how to enable a disk array controller.

Procedure

Step 1   In the navigation tree of the UltraPath Console, choose **Host** > **Disk array**.

Step 2   Select the disk array that you want to enable.

Step 3   Click **Controller**.

Step 4   In the right function pane, select the controller you want to enable.

Step 5   In the upper part of the function pane, click **Enable**.

The **Information** dialog box is displayed, indicating that the operation succeeded.

Step 6   Click **OK**.

----**End**

?.2. Disabling Controller

This section describes how to disable a disk array controller.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **Host** > **Disk array**.

Step 2 Select the disk array that you want to disable.

Step 3 Click **Controller**.

Step 4 In the right function pane, select the controller you want to disable.

Step 5 In the upper part of the function pane, click **Disable**.

The **Danger** dialog box is displayed.

Step 6 Confirm the information in the dialog box and select **I have read the previous information and understand the subsequences of operation**.

Step 7 Click **OK**.

The **Information** dialog box is displayed, indicating that the operation succeeded.

Step 8 Click **OK**.

----End

4.1.1.4.3 Setting the Remote Controller Node of a VIS Disk Array

This section describes how to set the remote controller node of a VIS disk array so that host I/Os are delivered preferentially from the local VIS node, therefore shortening latency.

Context

If UltraPath for Windows manages a VIS disk array, the **Remote Node Settings** option is available.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **Host** > **Disk array**.

Step 2 Select the disk array that you want to set.

Step 3 Click **Controller**.

Step 4 Set the remote node of the VIS disk array.

1. Select the controller you want to set.

2. In the upper part of the function pane, click **Location**.
   The **Remote** dialog box is displayed.

3. In **Location**, set the controller status.
   The **Information** dialog box is displayed.

4. Confirm information in the **Information** dialog box and click **OK**.
   The **Information** dialog box is displayed, indicating that the operation succeeded.

5. Click **OK**.

----End

4.1.1.5 Physical Path Management

Physical path management includes viewing physical path information, enabling/disabling physical paths, resetting physical path status, checking path health status, and deleting faulty physical paths.

4.1.1.5.1 Viewing Physical Path Information

This section describes how to view the detailed information about a physical path.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **Host** > **Disk array**.

Step 2 Select the disk array whose path information you want to view.

Step 3 Click **Physical path**.

Step 4 In the right function pane, view the detailed information about a physical path. The following table describes related parameters:

Parameter	Description	Value
ID	ID of the physical path.	[Example] 0
Initiator Port	Name of an initiator port. **NOTE** For some arrays such as the S2600 and S5500, the initiator ports are displayed as the initiator port IDs in the SCSI address.	[Example] iqn. 1998-01.com.vmvare:localhost-51a7d306
Controller	ID or Name of a controller.	[Example] 0A
Target Port	Name of a target port. **NOTE** For some arrays such as the S2600 and S5500, the initiator ports are displayed as the initiator port IDs in the SCSI address.	[Example] iqn.2006-08.com.huawei:oceanstor: 21000022a10ac1bf::129.97.50.2-1020400
Port ID	Location of the port.	[Example] CTE0.B.H0

Parameter	Description	Value
Status	Working status of a physical path. The value can be **Normal**, **Fault**, **I/O discrete error degradation**, **Intermittent failure degradation**, **High latency degradation**, or **Disable**.	[Example] Normal
Check state	Health status of the physical path displayed when you initiate a query.	[Example] Checking
Port Type	Type of a link port.	[Example] iSCSI
I/O Retry Count	Number of I/O retry attempts.	[Example] 0
Path Fault Count	Number of times for which a path becomes faulty.	[Example] 0
MAX. I/O Latency (ms)	Maximum average I/O latency within a sampling period.	[Example] 200
Min. I/O Latency (ms)	Minimum average I/O latency within a sampling period.	[Example] 1
Average I/O Latency (ms)	Average I/O latency within a sampling period.	[Example] 1

NOTE

In the upper part of the function pane, click **Refresh** to refresh information about physical paths managed by UltraPath for Windows.

----End

4.1.1.5.2 Enabling or Disabling a Physical Path

This section describes how to enable or disable a physical path of a disk array.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **Host** > **Disk array**.

Step 2 Select the disk array that you want to set.

Step 3 Click **Physical path**.

Step 4 Enable or disable a physical path of the disk array.

1. In the right function pane, select a physical path you want to set.

2. In the upper part of the function pane, click **Enable** or **Disable**.

 – Enable: enables a physical path.

 – Disable: disables a physical path.

 📖**NOTE**

 The **Enable** and **Disable** options are available only when the port type is Fibre Channel. If the
 path type is iSCSI, you can set **State** of the path's controller to **Enable** or **Disable** the path.

 The **Danger** dialog box is displayed.

3. Confirm the information in the dialog box and select **I have read the previous
 information and understand the subsequences of operation.**

4. Click **OK**.

 The **Information** dialog box is displayed, indicating that the operation succeeded.

5. Click **OK**.

----End

4.1.1.5.3 Resetting the Status of a Physical Path

This section describes how to reset a physical path status of a disk array.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **Host** > **Disk array**.

Step 2 Select the disk array that you want to set.

Step 3 Click **Physical path**.

Step 4 Reset a path status.

1. In the right function pane, select a physical path you want to reset.

2. In the upper part of the function pane, click **Reset Path Status**.
 The **Warning** dialog box is displayed.

3. Confirm the information in the dialog box and click **OK**.

----End

4.1.1.5.4 Checking the Health Status of a Path

This section describes how to check the health status of a path.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **Host** > **Disk array**.

Step 2 Select the disk array that you want to set.

Step 3 Click **Physical path**.

Step 4 Check the health status of a path.

1. In the right function pane, select a physical path you want to check.
2. In the upper part of the function pane, click **Health Check**.
   The **Health Check** dialog box is displayed.

   📖**NOTE**

   > Read the instructions and precautions in the **Health Check** area.

3. Click **OK**.
   The **Information** dialog box is displayed.
4. Click **OK**.

----End

4.1.1.5.5 Deleting a Faulty Physical Path

This section describes how to delete a faulty physical path.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **Host** > **Disk array**.

Step 2 Select the disk array that you want to set.

Step 3 Click **Physical path**.

Step 4 Delete a faulty physical path.

1. In the right function pane, select a faulty physical path you want to delete.
2. In the upper part of the function pane, click **Delete**.
   The **OK** dialog box is displayed.
3. Confirm the information and click **OK**.

----End

4.1.1.6 Virtual LUN Management

Virtual LUN management includes viewing virtual LUN information and setting virtual LUNs.

4.1.1.6.1 Viewing Virtual LUN Information

This section describes how to view the detailed information about a virtual LUN.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **Host** > **VLUN**.

Step 2 On the function pane, view virtual LUN information. Related parameters are explained in the following table.

Parameter	Description	Value
ID	ID allocated by UltraPath for Windows to the virtual LUN.	[Example] 1
Disk	Name of the disk that corresponds to the virtual LUN on the operating system.	[Example] Disk1
Type	Type of the virtual LUN. The value can be **Common**, **HyperMetro**, or **Migration**.	[Example] Common
Capacity	Capacity of the virtual LUN.	[Example] 10.00 GB
Number of Paths	Number of logic paths of the virtual LUN.	[Example] 1
LUN WWN	WWN of the virtual LUN.	[Example] 60022a11000ac1bf0cb9754a0000016e

Step 3 In the function pane, select the virtual LUN whose information you want to view, click the **LUN** tab page. Details about this virtual LUN are displayed. Related parameters are explained in the following table.

Parameter	Description	Value
Name	Name of the virtual LUN. **NOTE** The name is specified when the LUN is created on its storage array.	[Example] LUN_01
Dev LUN ID	ID of the storage system LUN corresponding to the virtual LUN.	[Example] 001

Parameter	Description	Value
Status	Working status of the virtual LUN. The value can be **Normal**, **Fault**, **Degraded**, **Disabled**, or **--**. NOTE If the LUN on the array is in **Fault** state while the virtual LUN on the host is in **Normal** state (viewed by using UltraPath), the virtual LUN can be accessed by the host.	[Example] Normal
Working Controller	Working controller of the virtual LUN.	[Example] 0A
Owning Controller	Owning controller of the virtual LUN.	[Example] 0A
Number of Paths	Number of logic paths of the virtual LUN.	[Example] 1
LUN WWN	WWN of the virtual LUN.	[Example] 60022a11000ac1bf0cb9754a0000016e
Disk Array ID	ID of the storage system to which the virtual LUN belongs.	[Example] 0
Disk Array Name	Name of the storage system to which the virtual LUN belongs.	[Example] SN_2004
Array SN	Serial No. of the storage system to which the virtual LUN belongs.	[Example] 201235G6EAZ0C1000025
Vendor Name	Manufacturer of the storage system to which the virtual LUN belongs.	[Example] HUAWEI
Product Name	Name of the storage system to which the virtual LUN belongs.	[Example] S5500T

Step 4 **Optional:** Check path information about the virtual LUN.

1. In the upper part of the function pane, click the **Path** tab.

2. On the **Path** tab page, view the detailed information about the virtual LUN. The following table describes related parameters:

Parameter	Description	Value
ID	ID of the physical path.ID of the storage system to which the virtual LUN belongs.	[Example] 0
Disk Array ID	ID of the storage system to which the virtual LUN belongs.	[Example] 0
Initiator Port	Name of an initiator port.	[Example] iqn. 1998-01.com.vmvare:localhost-51a7d306
Controller	ID or Name of a controller.	[Example] 0A
Target Port	Name of a target port.	[Example] iqn.2006-08.com.huawei:oceanstor: 21000022a10ac1bf::129.97.50.2-1020400
Status	Working status of a physical path. The value can be **Normal**, **Fault**, **BUSY Degradation**, **I/O discrete error degradation**, **Intermittent failure degradation**, **High latency degradation**, or **Disable**.	[Example] Normal
Port Type	Type of a link port.	[Example] iSCSI

----End

4.1.1.6.2 Setting a Virtual LUN

This section describes how to set a virtual LUN.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **Host** > **VLUN**.

Step 2 In the right function pane, select the LUN you want to set.

Step 3 In the upper part of the function pane, click **Settings**.
The **LUN Parameter Settings** dialog box is displayed.

Step 4 In the **LUN Parameter Settings** area, set the basic parameters of UltraPath for Windows. The following table describes the parameters:

Parameter	Description	Value
Load balancing mode settings	Load balancing mode of UltraPath for Windows. The value is either **Within controller** or **Between controllers**.	[Default value] Load balancing within controllers [Example] Load balancing within controllers
Load balancing algorithm	Load balancing algorithm of UltraPath for Windows. The value can be **Minimum queue depth**, **Minimum task**, or **Round robin**.	[Default value] Minimal queue depth [Example] Minimal queue depth
	Number of consecutive I/Os for load balancing. The value ranges from 1 to 10,000.	[Default value] 1 [Example] 1
LUN trespass	Enabling or disabling LUN switchover. The value can be either **Enable** or **Disable**.	[Default value] Enable [Example] Enable
I/O suspension time	I/O Suspension Time. The value ranges from 0 to 2,592,000, expressed in seconds.	[Default value] 60 [Example] 60
Max I/O retry timeout	Maximum I/O timeout period of a virtual LUN. The value ranges from 1 to 2,592,000, expressed in seconds.	[Default value] 1800 [Example] 1800

Step 5 Click **OK**.

----End

4.1.1.6.3 Setting a Virtual HyperMetro LUN

This section describes how to set a virtual HyperMetro LUN.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **Host** > **VLUN**.

Step 2 In the right function pane, select the virtual HyperMetro LUN you want to set.

Step 3 In the upper part of the function pane, click **Settings**.
The **LUN Parameter Settings** dialog box is displayed.

Step 4 Click the **HyperMetro LUN Settings** tab.

Step 5 In the **HyperMetro LUN Settings** area, set the parameters of virtual HyperMetro LUN. The following table describes the parameters:

Parameter	Description	Value
HyperMetro Mode	Hypermetro working mode. The value can be either **Priority** or **Balance**.	[Default value] Priority [Example] Priority
Primary Array Sn	The SN of the primary array.	[Default value] None [Example] 210235G6GRZ0B5000024
Split Size	Fragment size. The value ranges from 512 bytes to 1 GB.	[Default value] 128MB [Example] 128MB

Step 6 Click **OK**.

----End

4.1.1.6.4 Managing I/O Count Information

You can query, refresh, and reset the I/O count information.

?.1. Querying I/O Count Information

This operation enables you to query the I/O count of all virtual LUNs or on logical paths of a specific virtual LUN. The I/O count information includes the error I/O count, queue I/O count, error command count, and queue command count.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **LocalHost** > **VLUN**.

Step 2 Query the I/O count of virtual LUNs.

- Query the I/O count of all virtual LUNs.

  a. In the function pane, click **I/O Count**.

     The **I/O Count** dialog box is displayed.

  b. In the **I/O Count** dialog box that is displayed, view count information about all virtual LUNs. Related parameters are explained in the following table.

Parameter	Description	Value
Error I/O Count	The number of error I/Os returned to UltraPath by a virtual LUN	[Example] 1
Queue I/O Count	The number of I/Os not returned to UltraPath by a virtual LUN	[Example] 1
Error Command Count	The number of UltraPath internal commands that receive execution errors from a virtual LUN	[Example] 1
Queue Command Count	The number of UltraPath internal commands that have not received execution results from a virtual LUN	[Example] 1

- Query the I/O count on logical paths of a specific virtual LUN.

    a. In the function pane, select the virtual LUN that you want to query.

    b. Click the **I/O Count** tab page and view the I/O count information about this virtual LUN.

Parameter	Description	Value
Error I/O Count	The number of error I/Os returned to UltraPath by a virtual LUN	[Example] 1
Queue I/O Count	The number of I/Os not returned to UltraPath by a virtual LUN	[Example] 1
Error Command Count	The number of UltraPath internal commands that receive execution errors from a virtual LUN	[Example] 1

Parameter	Description	Value
Queue Command Count	The number of UltraPath internal commands that have not received execution results from a virtual LUN	[Example] 1

----End

?.2. Refreshing I/O Count Information

This operation enables you to query the latest I/O count information.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **LocalHost** > **VLUN**.

Step 2 In the function pane, click **I/O Count**.
The **I/O Count** dialog box is displayed.

Step 3 Click **Refresh**. Then you can view the latest I/O count information on the page.

Step 4 Click **OK**. The operation is complete.

----End

?.3. Resetting I/O Count Information

This operation enables you to clear all the I/O count information of virtual LUNs.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **LocalHost** > **VLUN**.

Step 2 In the function pane, click **I/O Count**.
The **I/O Count** dialog box is displayed.

Step 3 Click **Reset**.
The **Information** dialog box is displayed, indicating that the operation succeeded.

Step 4 Click **OK**.
The **I/O Count** dialog box is displayed.

Step 5 Click **OK**. The operation is complete.

----End

4.1.1.6.5 Managing I/O Latency Information

You can query and refresh the I/O latency information.

?.1. Querying I/O Latency Information

This operation enables you to query the latest I/O latency, max I/O latency, and average I/O latency of all virtual LUNs or on logical paths of a specific virtual LUN.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **LocalHost** > **VLUN**.

Step 2 Query the I/O latency of virtual LUNs.

- Query the I/O latency of all virtual LUNs.

    a. In the function pane, click **I/O Latency**.

    The **I/O Latency** dialog box is displayed.

    b. In the **I/O Latency** dialog box that is displayed, view latency information about all virtual LUNs. Related parameters are explained in the following table.

Parameter	Description	Value
Latest I/O Latency	Latency of the latest I/O returned from a virtual LUN to UltraPath The latency unit is millisecond.	[Example] 31
Max I/O Latency	Maximum latency among I/Os returned from a virtual LUN to UltraPath The latency unit is millisecond.	[Example] 45
Average I/O Latency	Average latency of I/Os returned from a virtual LUN to UltraPath in the last one minute The latency unit is millisecond.	[Example] 15

- Query the I/O latency on logical paths of a specific virtual LUN.

    a. In the function pane, select the virtual LUN that you want to query.

    b. Click the **I/O Latency** tab page and view the I/O latency information about this virtual LUN.

Parameter	Description	Value
Latest I/O Latency	Latency of the latest I/O returned from a virtual LUN to UltraPath The latency unit is millisecond.	[Example] 31
Max I/O Latency	Maximum latency among I/Os returned from a virtual LUN to UltraPath The latency unit is millisecond.	[Example] 45
Average I/O Latency	Average latency of I/Os returned from a virtual LUN to UltraPath in the last one minute The latency unit is millisecond.	[Example] 15

----End

?.2. Refreshing I/O Latency Information

This operation enables you to query the latest I/O latency information.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **LocalHost** > **VLUN**.

Step 2 In the function pane, click **I/O Latency**.
The **I/O Latency** dialog box is displayed.

Step 3 Click **Refresh**. Then you can view the latest I/O latency information on the page.

Step 4 Click **OK**. The operation is complete.

----End

4.1.1.7 Refreshing the Preferred Controller

This section describes how to refresh the preferred controller of a LUN.

4.1.1.7.1 Refreshing All LUNs

This section describes how to refresh the preferred controllers of all LUNs.

Procedure

Step 1 On the menu bar of the UltraPath Console, choose **System** > **Refresh Prior Controller**.

The **Information** dialog box is displayed, indicating that the operation succeeded.

Step 2 Click **OK**.

----End

4.1.1.7.2 Refreshing LUNs of a Specified Disk Array

This section describes how to refresh LUNs of a specified disk array to view their preferred controllers.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **Host** > **Disk array**.

Step 2 Select the storage array whose LUN you want to refresh.

Step 3 In the function pane, click **Refresh Prior Controller**.

The **Information** dialog box is displayed, indicating that the operation succeeded.

Step 4 Click **OK**.

----End

4.1.1.7.3 Refreshing a Specified LUN

This section describes how to refresh the preferred controller of a specified LUN.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **Host** > **VLUN**.

Step 2 In the function pane, select the LUN that you want to refresh.

Step 3 Click **Refresh Prior Controller**.

The **Information** dialog box is displayed, indicating that the operation succeeded.

Step 4 Click **OK**.

----End

4.1.2 Performance Management

This chapter explains how to manage storage devices' performance. The performance management page presents current device performance in an intuitive way.

4.1.2.1 Monitoring Performance

This section describes how to monitor the performance of a path in real time.

Procedure

Step 1 On the menu bar of the UltraPath Console, choose **Performance** > **Performance Monitoring**.

The **Performance Monitoring** dialog box is displayed.

📖**NOTE**

You can also perform the following operations to go to the **Performance Monitoring** page:

- On the toolbar, click .
- In the navigation tree, select a physical path or LUN that you want to monitor. In the upper part of the function pane, click **Performance Monitoring**.

The system automatically adds the selected physical path or LUN to the performance monitoring list as a monitoring object.

Step 2 Set the performance monitoring parameters. The following table describes the parameters:

Parameter	Description	Value
Monitoring Type	The value can be **Physical Path**, **Logic Path**, or **Logic Path**.	[Example] Physical Path
Select Object	Selecting an object to monitor.	[Example] Selecting a physical path to monitor
Measurement	The value can be **Total IOPS**, **Read IOPS**, **Write IOPS**, **Total Bandwidth**, **Read Bandwidth**, **Write Bandwidth**, **Total Response Time**, **Read Response Time**, or **Write Response Time**.	[Example] Total Bandwidth
Sampling Interval(s)	Maximum interval between every two sampling operations.	[Example] 1

Step 3 **Optional:** Export the performance report.

1. If you want to export the performance report, select **Export an performance report** and click **Start Monitoring**. Otherwise, go to **Step 4**.

   The **Performance Data Collection Setting** dialog box is displayed.

   The following describes related parameters.

Parameter	Description	Value
Collection interval (s)	Set the statistics time interval for the performance report. The value can be 5, 60, 120, 300, 1800, and 3600.	[Default value] 60 [Example] 60
Monitoring period (s)	Set the statistics duration for the performance report. The value ranges from 60 to 259,200.	[Default value] 900 [Example] 900
Report export path	Set a path to save the report. Click **Choose the path for saving report** to select a path to save the report.	[Example] C:\Program Files (x86)\UltraPath\log\perf_log
Report name	Set the name of the performance report.	[Example] perf_log_201601102

    2.   Click **OK**.

Step 4 Click **Start Monitoring**.

----End

4.1.2.2 Monitoring Physical Paths

This section describes how to monitor physical paths managed by UltraPath for Windows.

Prerequisites

Before monitoring physical paths, ensure that the performance monitoring function is disabled.

Procedure

Step 1 On the menu bar of the UltraPath Console, choose **Performance** > **Performance Monitoring**.

The **Performance Monitoring** dialog box is displayed.

Step 2 Select **Monitoring Type** from **Physical Path**.

The **Select physical path** dialog box is displayed.

📖**NOTE**

    If the dialog box is not displayed, click **Select Object** in **Performance Monitoring**.

Step 3 In the **Available Physical Paths** list, select a disk array whose performance you want to view.

Step 4 Select the physical paths that you want to monitor.

📖**NOTE**

> A maximum of eight paths can be selected at one time.

Step 5 Click ❯ .

The selected paths move from the **Available Physical Paths** area to the **Selected Physical Paths** area.

Step 6 Click **OK**.

----End

4.1.2.3 Monitoring Logical Paths

This section describes how to monitor logical paths managed by UltraPath for Windows.

Prerequisites

Before monitoring LUNs, ensure that the performance monitoring function is disabled.

Procedure

Step 1 On the menu bar of the UltraPath Console, choose **Performance** > **Performance Monitoring**.

The **Performance Monitoring** dialog box is displayed.

Step 2 Select **Logical Path** from **Monitoring Type**.

The **Select Logical Path** dialog box is displayed.

📖**NOTE**

> If the dialog box is not displayed, click **Select Object** in **Performance Monitoring**.

Step 3 In the **Step 1: Select LUN** list, select a disk array whose performance you want to view.

Step 4 On the **Step 1: Select LUN** page, select the LUN whose logical paths' performance you want to view.

Step 5 Click **Next**.

Step 6 In the **Available Paths** area on the **Step 2: Select Logical Path** page, select the logical paths whose performance you want to view.

📖**NOTE**

> A maximum of eight paths can be selected at one time.

Step 7 Click ❯ .

The selected paths move from the **Available Paths** area to the **Selected Paths** area.

Step 8 Click **OK**.

----End

4.1.2.4 Monitoring Logical LUNs

This section describes how to monitor managed LUNs.

Prerequisites

Before monitoring LUNs, ensure that the performance monitoring function is disabled.

Procedure

Step 1 On the menu bar of the UltraPath Console, choose **Performance** > **Performance Monitoring**.

The **Performance Monitoring** dialog box is displayed.

Step 2 Select **VLUN** from **Monitoring Type**.

The **Please select a VLUN** dialog box is displayed.

□**NOTE**

If the dialog box is not displayed, click **Select Object** in **Performance Monitoring**.

Step 3 In the **Available VLUNs** list, select a disk array whose performance you want to view.

Step 4 Select LUNs that you want to monitor.

□**NOTE**

A maximum of eight LUNs can be selected at one time.

Step 5 Click ❯ .

The selected LUNs move from the **Available VLUNs** area to the **Selected VLUNs** area.

Step 6 Click **OK**.

----End

4.1.3 Critical Event Management

By managing critical events, you can detect and troubleshoot device faults in a timely manner.

4.1.3.1 Viewing Critical Events

This section describes how to can locate and troubleshoot device faults by viewing critical events.

Procedure

Step 1 On the menu bar of the UltraPath Console, choose **Log** > **Critical Events**.
The **Critical Events** dialog box is displayed.

Step 2 View critical events. The following table describes related parameters:

Parameter	Description	Value
Level	Severity of a critical event.	[Example] Info
Description	Detailed description of a critical event, including the location of the module where the critical event occurs.	[Example] Add a path to disk {6}: Host Lun ID {6}, Initiator WWN {21000024ff368169}, Target WWN {20080022a1072163}.
Occurred At	Time of a critical event occurred.	[Example] 2013-02-14 12:35:42 CST
Disk Array	Name of the disk array where a critical event occurs.	[Example] HUAWEI S2600T
Type	Type of a critical event.	[Example] Add path to disk

□ NOTE

Click **Refresh** to view the latest critical events.

----End

4.1.3.2 Saving a Critical Event

This section describes how to save selected critical events on a local disk.

Procedure

Step 1 On the menu bar of the UltraPath Console, choose **Log** > **Critical Events**.
The **Critical Events** dialog box is displayed.

Step 2 Select the critical events that you want to save.

Step 3 Click **Save As**.

The **Save Log** dialog box is displayed.

Step 4 In **Save Location**, select a path for saving the critical events.

Step 5 In **Name**, enter a name for the file that saves the critical events.

The **Type** list shows file types. Select **CSV file (*.CSV)** as the file type.

Step 6 Click **Save**.
The **Information** dialog box is displayed, indicating that the operation succeeded.

Step 7 Click **OK**.

----End

4.1.4 Operation Log Management

By managing operation logs, you can view the settings performed by users on the UltraPath Console and the CLI of UltraPath for Windows.

4.1.4.1 Viewing an Operation Log

By viewing operation logs, you can view and locate operations performed by users.

Procedure

Step 1 On the menu bar of the UltraPath Console, choose **Log** > **Operation Log**.

The **Operation Log** dialog box is displayed.

Step 2 View an operation log. The following table describes related parameters:

Parameter	Description	Value
SN	Serial No. of the operation log.	[Example] 100
User ID	User ID.	[Example] Administrator
Severity	Severity of the operation log.	[Example] Warning
Description	Details about the operation.	[Example] Updated the disk driver
Result	Indicating whether the operation succeeded or not.	[Example] Succeeded
Occurred At	Time the operation was performed.	[Example] 2012-05-12 00:00:01 PDT
Source	Indication where the operation was performed.	[Example] GUI
ID	ID of the operation log.	[Example] 0x5341510c

NOTE

Click **Refresh** to view the latest operation logs.

----End

4.1.4.2 Saving Operation Logs

This section describes how to save selected operation events on a local disk.

Procedure

Step 1 On the menu bar of the UltraPath Console, choose **Log** > **Operation Log**.

The **Operation Log** dialog box is displayed.

Step 2 Select the operation logs that you want to save.

Step 3 Click **Save As**.

The **Save Log** dialog box is displayed.

Step 4 In **Save Location**, select a path for saving the critical events.

Step 5 In **Name**, enter a name for the file that saves the operation logs.

The **Type** list shows file types. Select **CSV file (*.CSV)** to be the alarm file type.

Step 6 Click **Save**.

The **Information** dialog box is displayed, indicating that the operation succeeded.

Step 7 Click **OK** to save the operation logs.

----End

4.1.5 Checking Host Status

This section describes how to checking host status.

Procedure

Step 1 In the navigation tree of the UltraPath Console, choose **Host**.

Step 2 In the right function pane, click **Status Check** tab.

Step 3 View the detailed information about the host status. The following table describes related parameters:

Parameter	Description	Value
Severity	Status information severity.	None
Disk Array	Status information source array.	None
Type	The type of status information.	None
Description	Description of status information .	None
Details	Details of status information. Click **View** to query details of status information.	None

📖**NOTE**

In the upper part of the function pane, click **Refresh** to refresh information about host status.

Step 4 **Optional:** Save status information.

1. Select the status that you want to set.

2. Click **Save As** to save status information.

----End

4.2 UltraPath for Windows Upgrade

There are two types of upgrade for UltraPath for Windows: C-version upgrade and R-version upgrade.

For details about how to perform C-version upgrade and R-version upgrade, see *Upgrade Guide* of UltraPath for Windows. Obtaining method is as follows:

Log in to Huawei technical support website (**http://support.huawei.com/enterprise/**), choose **Support** > **Downloads** > **IT** > **Storage** > **Unified Storage** > **UltraPath**, and view the *Upgrade Guide* specific to the UltraPath version.

4.3 UltraPath for Windows Uninstallation

This chapter provides a procedure for uninstalling UltraPath for Windows.

Precautions

● Stop applications related to the UltraPath such as UltraPath Console and updam before removing the UltraPath.

● Removing UltraPath software from a multipath hardware configuration can cause data loss or corruption. Make sure that you disconnect the server from the storage or eliminate all but one path to the storage from the server before removing the UltraPath. In a SAN Boot environment, before removing the UltraPath, ensure that there are available paths between hosts and the storage devices where the operating systems reside.

● Stop Oracle services and processes that are running on the disk arrays.

● Maintain Oracle services and processes that are running on the application server.

● Restart the application server after UltraPath for Windows has been uninstalled.

Procedure

Step 1 Choose **Start** > **Control Panel**. In the **Control Panel** window, select **Add or Remove Programs**.

Step 2 Select **UltraPath for Windows** and click **Remove**. The **Add or Remove Programs** dialog box is displayed, as shown in **Figure 4-1**.

Figure 4-1 Add or Remove Programs dialog box
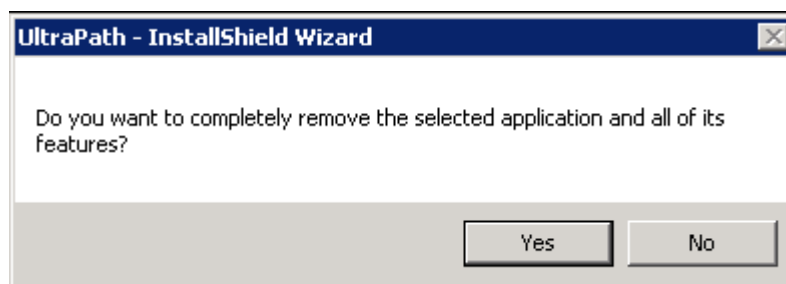
NOTE

> If you run UltraPath for Windows again, the **Add or Remove Programs** dialog box will be displayed too.

Step 3 Click **Yes**. The system starts uninstalling UltraPath for Windows. You can also click **No** to cancel the uninstallation.

Step 4 When uninstallation is complete, the dialog box shown in **Figure 4-2** is displayed. Click **Finish**. You are prompted to restart the computer.

Figure 4-2 Uninstall Complete dialog box
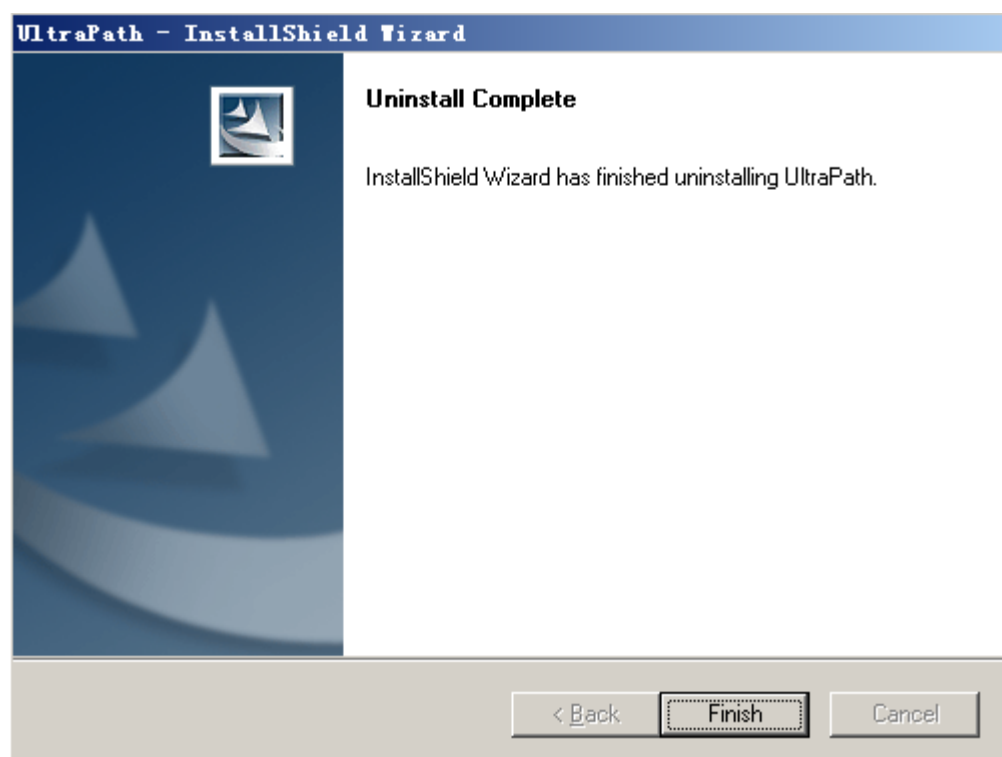
Step 5 Select **Yes, I want to restart my computer now** (recommended), as shown in **Figure 4-3**. Click **Next**. The application server restarts. You can also select **No, I will restart my computer later.** to defer the restart.

Figure 4-3 Restart dialog box

----End
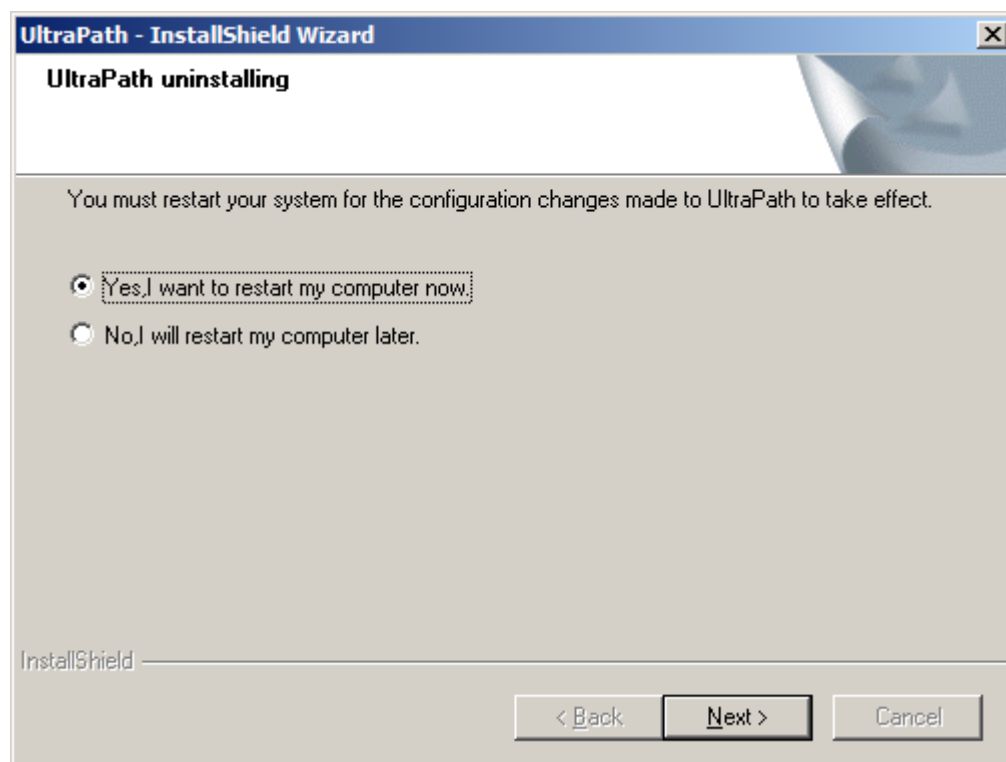
Follow-up Procedure

After UltraPath for Windows has been uninstalled,

- Restart the application server so that the operating system can work properly.
- Do not uninstall **Microsoft Multi-Path Bus Driver** delivered with Windows Server 2008, Windows Server 2008 R2, Windows Small Business Server 2011, Windows Server 2012, or Windows Server 2016, because **Microsoft Multi-Path Bus Driver** is used to enable UltraPath for Windows installation. To check for **Microsoft Multi-Path Bus Driver**, you can perform the following steps: Open the **cmd** CLI and enter **devmgmt.msc** to open the **Device Manager**, and expand the **Storage Controller** node to check for **Microsoft Multi-Path Bus Driver**.

5 FAQs

About This Chapter

This chapter provides answers to frequently asked questions about UltraPath for Windows configuration or management. You can refer to this chapter when troubleshooting similar problems.

5.1 How can I Manually Remove the MPIO Component?

Question

After UltraPath for Windows is uninstalled on Windows Server 2008 or Windows Server 2012, how can I manually remove the MPIO component?

Answer

When you install UltraPath for Windows on Windows Server 2008 or Windows Server 2012, the MPIO component is automatically installed. However, when you uninstall the software, the MPIO component needs to be manually uninstalled. Perform the following operations to manually uninstall the MPIO component:

- Windows Server 2008 R2:

    a. In the left navigation tree of **Server Manager**, select **Features**, as shown in **Figure 5-1**.

    Figure 5-1 Server Manager page of Windows Server 2008 R2
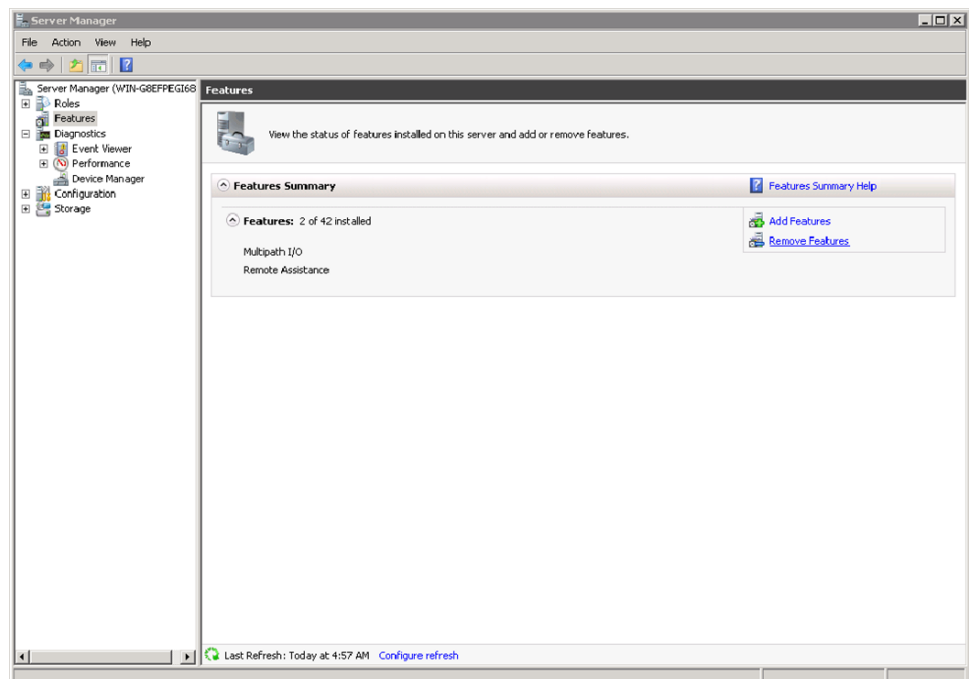
    b. Click **Remove Features**.

    The **Remove Features Wizard** dialog box is displayed, as shown in **Figure 5-2**.

Figure 5-2 Remove Features Wizard dialog box
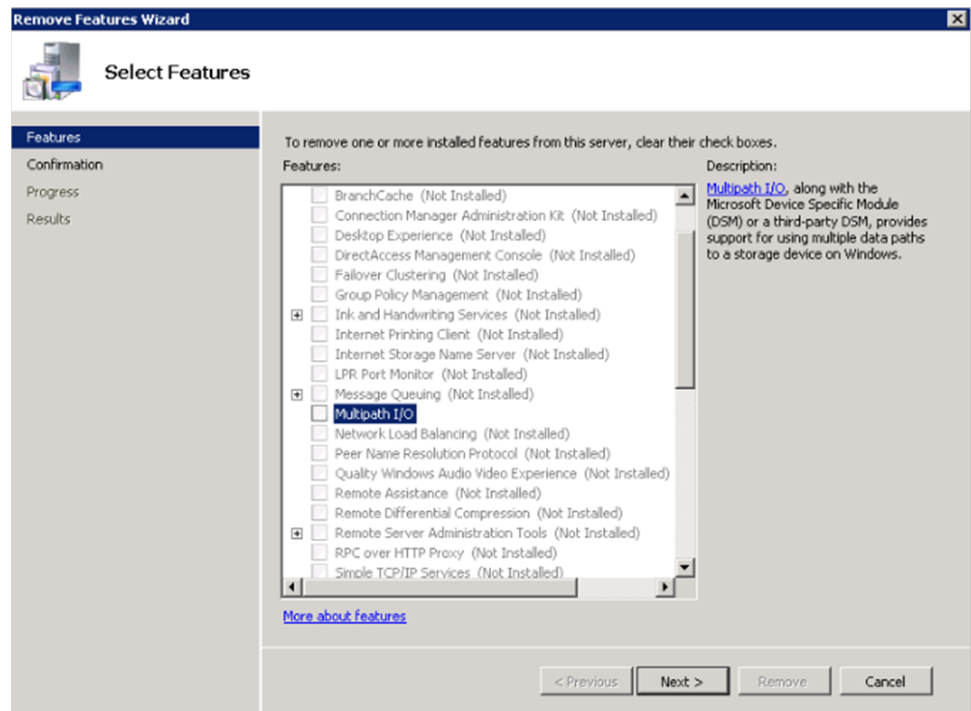
c.   Deselect **Multipath I/O** and click **Next**.

The **Confirm Removal Selections** page is displayed, as shown in **Figure 5-3**.

Figure 5-3 Confirm Removal Selections page
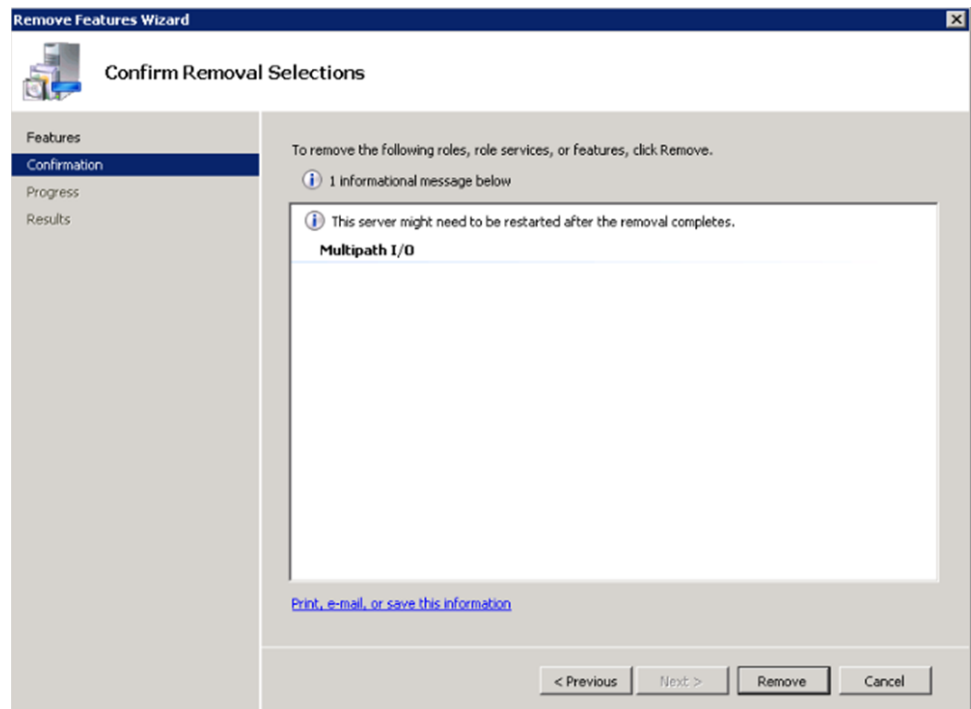
d.   After confirming the information, click **Remove** to start removing **Multipath I/O**.
The restart instruction page is displayed, as shown in **Figure 5-4**.

Figure 5-4 Removal Results restart instruction page
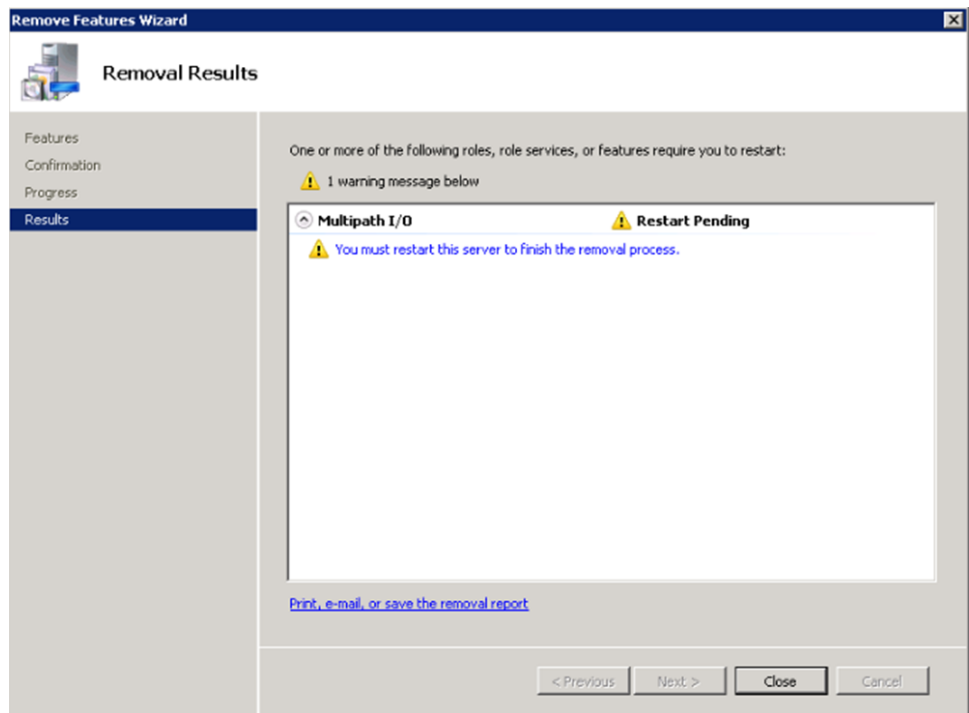
e. Click **Close**.

The restart instruction dialog box is displayed, as shown in **Figure 5-5**.

Figure 5-5 Remove Features Wizard restart instruction dialog box
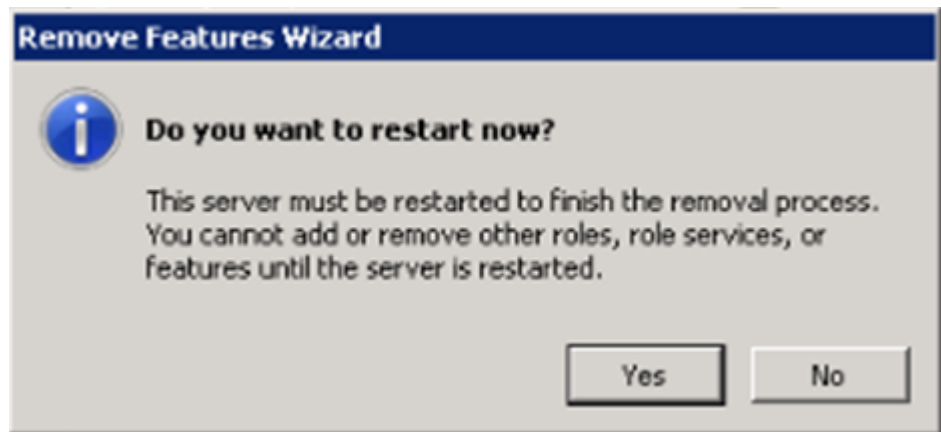
f. Click **Yes** to restart the operating system.

After the operating system is restarted, **Multipath I/O** is removed, as shown in **Figure 5-6**.

Figure 5-6 Removal Results page
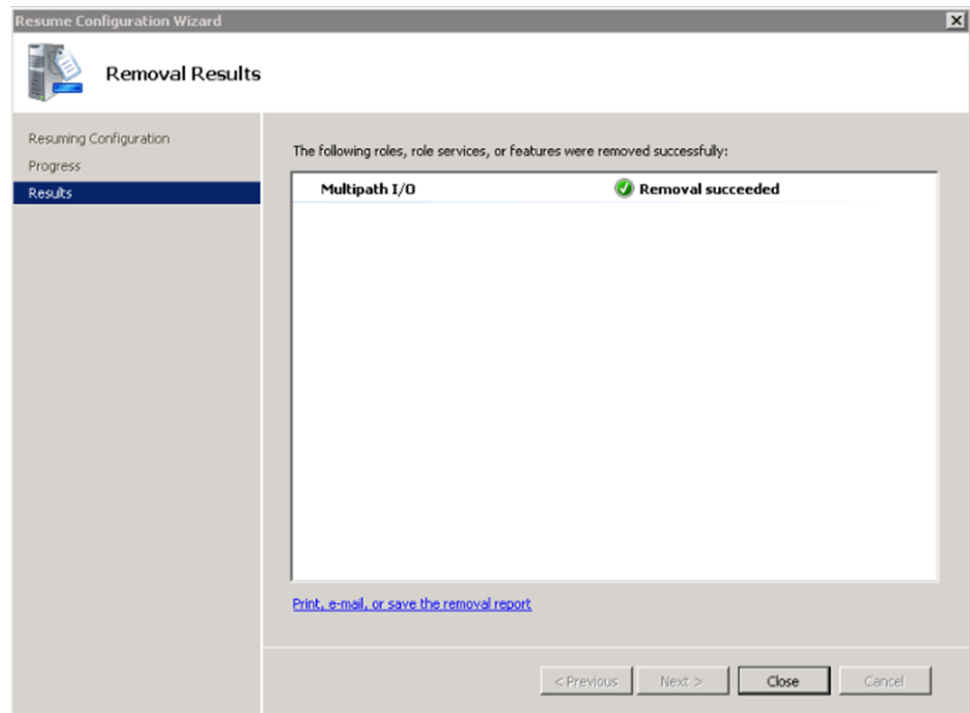
- Windows Server 2012:

    a. On the **Server Manager** menu bar, choose **ManageRemove Roles and Features**.

        The **Remove Roles and Features Wizard** dialog box is displayed, as shown in **Figure 5-7**.

    Figure 5-7 Remove Roles and Features Wizard dialog box
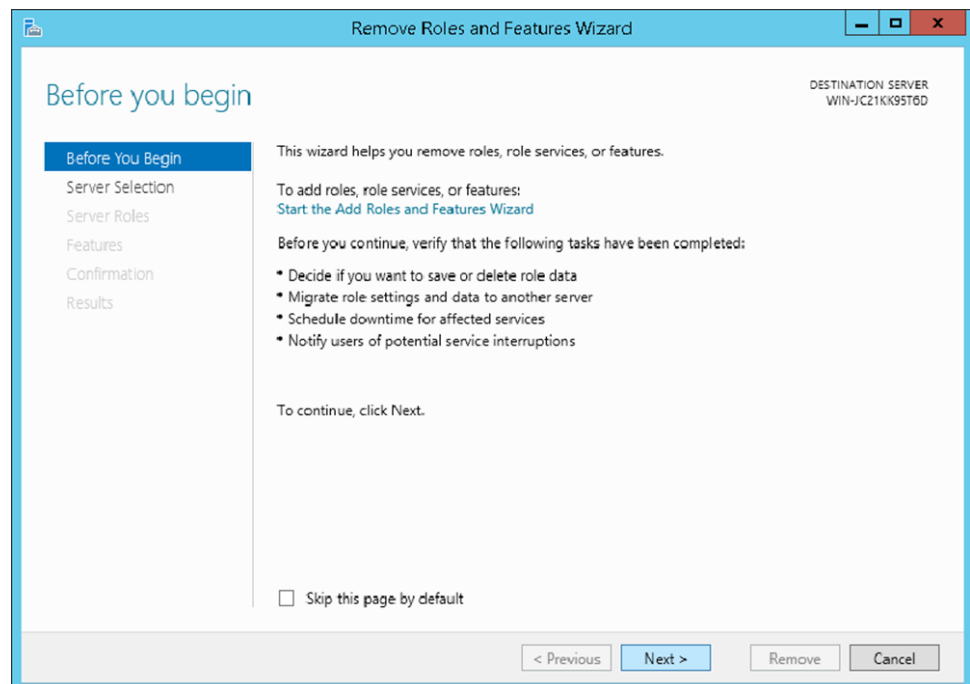
    b. Click **Next**.

        The **Remove features** page is displayed, as shown in **Figure 5-8**.

Figure 5-8 Remove features page
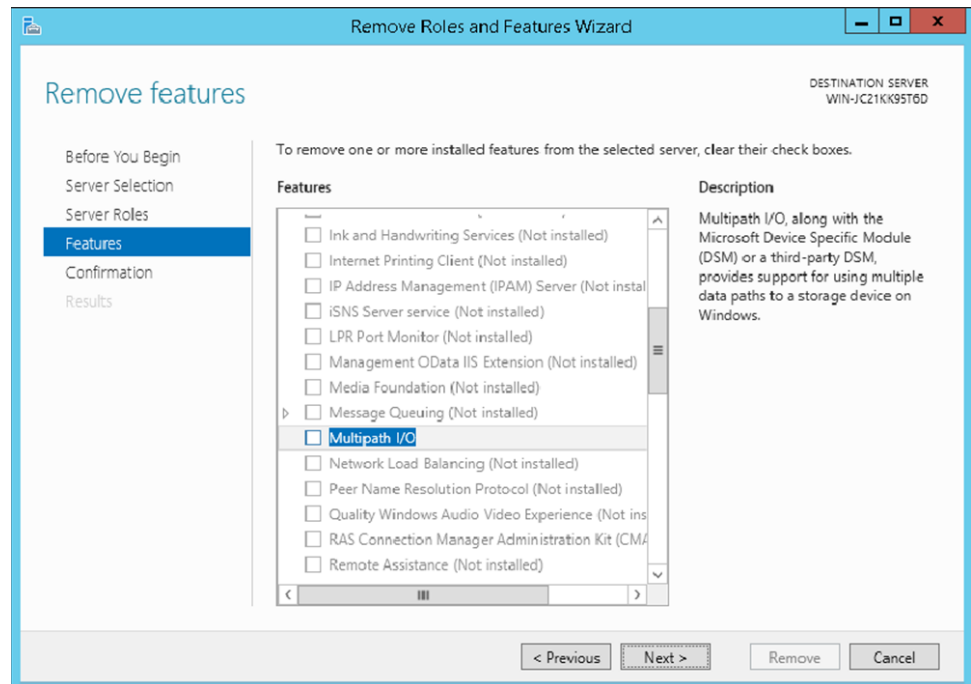
c. Deselect **Multipath I/O** and click **Next**.

The **Confirm Removal Selections** page is displayed, as shown in **Figure 5-9**.

Figure 5-9 Confirm Removal Selections page
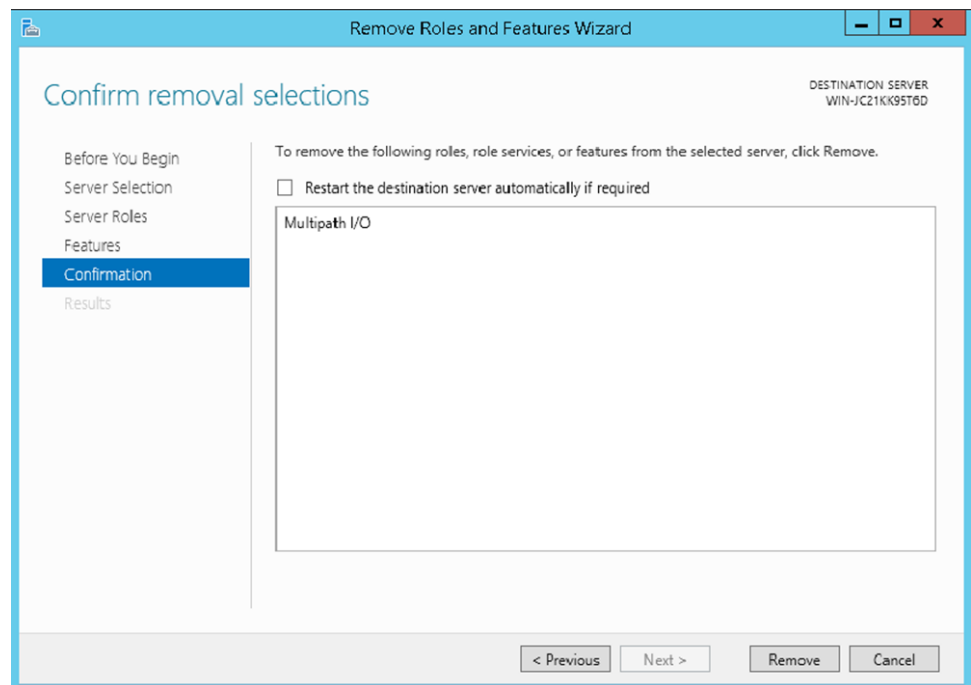
d. After confirming the information, click **Remove** to start removing **Multipath I/O**.
The restart instruction page is displayed, as shown in **Figure 5-10**.

Figure 5-10 Start page of SUSE operating system
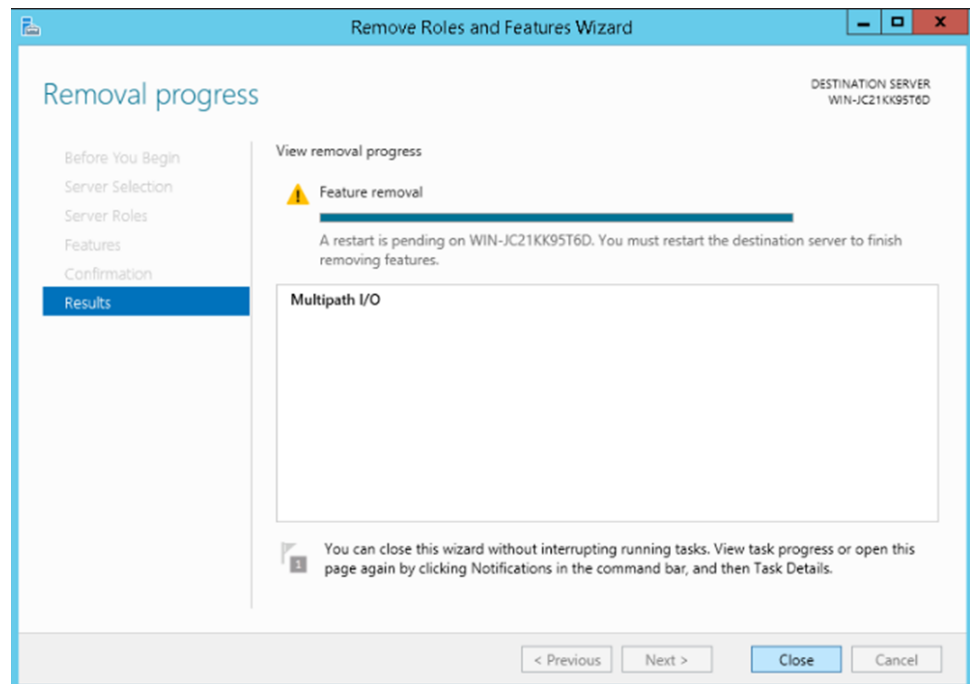
e.　Click **Close**.

The MPIO component is cleared after the operating system restarts.

5.2 How to Correctly Change a LUN Mapping View on a Storage Array?

Question

How to correctly change a LUN mapping view on a storage array?

Answer

If you remove a LUN mapping on an array and add the LUN to the host again in a different mapping sequence, the corresponding **Host LUN ID** will change and a series of exceptions will be caused.

To rectify this fault, you must comply with the following steps to change the LUN mapping view.

Solution

1.　Before removing the LUN mappings on the array, ask the administrator to stop the services running on the disk, namely, the LUN.

2.　Delete the LUN mapping view on the GUI management page (ISM or DeviceManager) of the array.

3.　Rescan Disks.

a.　Open the **cmd** CLI and enter **diskmgmt.msc** to open the **Disk Management**

    b.   On the menu bar, choose **Action** > **Rescan Disks**.

4.   Add the LUN mapping view on the GUI management page (ISM or DeviceManager) of the array.

5.   Repeat step **3** to scan and detect disks.

6.   Contact the administrator to start services.

5.3 What Can I Do If I Want to Configure the Path Where Files Pagefile and Dump Are Saved to a Path on Local Disks?

Question

What can I do If I want to configure the path where files **Pagefile** and **Dump** are saved to a path on local disks?

Answer

To ensure that the system can generate file **Dump** normally when bluescreen is displayed, you are advised to configure the path where files **Pagefile** and **Dump** are saved to a path on local disks. The configuration method is as follows (the following uses Windows Server 2008 as an example):

1.   Right-click the **Computer** icon on the desktop and choose **Properties** from the shortcut menu.

    The **System** page is displayed.

2.   Click **Advanced system settings**.

    The **System Properties** dialog box is displayed.

3.   Configure the path that saves file **Pagefile**.

    a.   Click the **Advanced** tab. In the **Performance** area of the tab page, click **Settings**.

        The **Performance Options** dialog box is displayed.

    b.   Click **Advanced**.

    c.   In the **Virtual memory** area, click **Change**.

        The **Virtual Memory** dialog box is displayed.
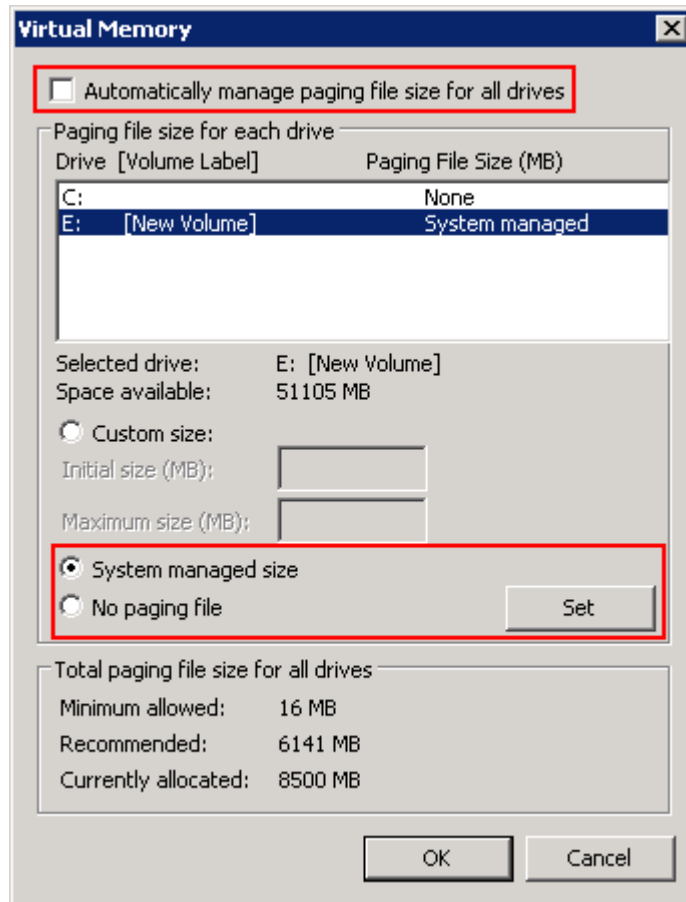
d. Deselect **Automatically manage paging file size for all drives**.

e. In the **Paging file size for each drive** area, select the disk on which file **Pagefile** will be saved, select **System managed size**, and click **Set**.

f. Select the disk that used to save file **Pagefile** and **No paging file**, and click **Set**.

The **System Properties** dialog box is displayed.

g. Click **Yes**.

h. Click **OK**. The path for saving file **Pagefile** is configured.

📖**NOTE**

After the configuration, the system prompts that the configuration takes effect only after you restart the operating system. You are advised to restart the operating system after all operations are finished.

4. Configure the path that saves file **Dump**.

a. In the **System Properties** dialog box, click the **Advanced** tab.

b. In **Startup and Recovery**, click **Settings**.

The **Startup and Recovery** dialog box is displayed.
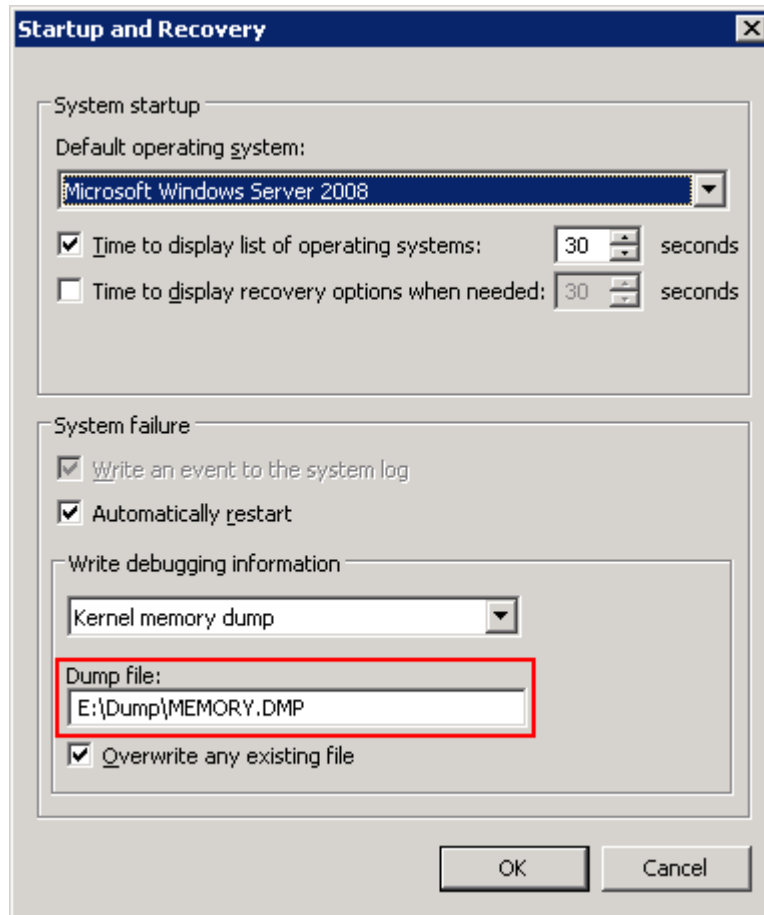
c. In **Write debugging information**, configure the path that saves file **Dump**.

d. Click **OK**.

The **System Properties** dialog box is displayed.

e. Click **Yes** to complete the configuration.

5. **Optional:** For a Windows Server 2008 system, you must configure the registry after the previous operations.

a. Click **Start** and enter **Regedit** in the search box to open the registry.

The **Regedit Editor** page is displayed.

b. Choose **HKEY_LOCAL_MACHINE** > **SYSTEM** > **CurrentControlSet** > **Control** > **CrashControl**.

c. Right-click in the blank area on the right and choose **New** > **String Value** to create a registry file. Name the file **DedicatedDumpFile**.

d. Double-click **DedicatedDumpFile**. Enter the **dedicateddumpfile.sys** path in **Value data**. For example, if file **Pagefile** is saved in disk E, enter **E:\dedicateddumpfile.sys** in **Value data**.

e. Click **OK** to complete the configuration.

6. Restart the operating system.

6 Troubleshooting Common Faults

About This Chapter

Faults may occur during the installation, configuration, and use of the UltraPath for windows. This chapter helps you troubleshoot common faults.

6.1 Disk Paths Managed by The UltraPath is Deleted or High Response Times or No Response Due to Removing and Reinserting Cables
On an iSCSI storage network, removing and reinserting cables when there is a certain amount of workload results in disk paths managed by The UltraPath is deleted or high response times or no response due to removing and reinserting cables.

6.2 Preventing Ping-Pong Effect
Ping-Pong Effect indicates that in the cluster networking the trespass of LUN working controller goes ceaseless.

6.3 A Yellow Exclamatory Mark Is Displayed Beside a LUN Name
A yellow exclamatory mark is displayed beside a physical LUN, MPIO virtual LUN, or UltraPath virtual LUN.

6.1 Disk Paths Managed by The UltraPath is Deleted or High Response Times or No Response Due to Removing and Reinserting Cables

On an iSCSI storage network, removing and reinserting cables when there is a certain amount of workload results in disk paths managed by The UltraPath is deleted or high response times or no response due to removing and reinserting cables.

Symptom

The server and storage devices are connected by iSCSI network. There is a certain amount of workload, removing and reinserting cables may cause disk paths managed by The UltraPath is deleted or high response times or no response.

Possible Causes

The possible reason is the immanent bug of iSCSI initiator.

Procedure

- method 1: Rescan hardware.
    a.   Open the **cmd** CLI and enter **devmgmt.msc** to open the **Device Manager**.
    b.   Please find **Disk drivers**, run**Action** > **Scan for hardware changes**.
    c.   Check whether the status become normal.
        - If yes, the procedure is complete.
        - If no, go to **method 2**.
- method 2: Reduce the amount of workload.

    Check whether the status become normal.
    - If yes, the procedure is complete.
    - If no, go to **method 3**.
- method 3: Restart server.

    Check whether the status become normal.
    - If yes, the procedure is complete.
    - If no, keep the fault environment intact and contact technical support engineers.

    ----End

6.2 Preventing Ping-Pong Effect

Ping-Pong Effect indicates that in the cluster networking the trespass of LUN working controller goes ceaseless.

Symptom

For S5000 series and S2600 series Storage System, in the double switch cluster networking, after disconnecting a node to array controller's cable. The trespass of LUN working controller goes ceaseless, thus causes to performance influence.

Possible Causes

By default, the UltraPath opens the trespass between operating and owning controllers of the LUN. That is, when all the paths of the prior controller are faulty, the UltraPath sends the I/O to the owning controller, and use the owning controller of the LUN to replace the working controller. But in some cluster networking. For example, the cluster networking that uses load balancing: Two application severs are connected to two controllers of a storage system respectively and can access the same LUN, as shown in **Figure 6-1**.

Figure 6-1 Cluster networking that uses load balancing
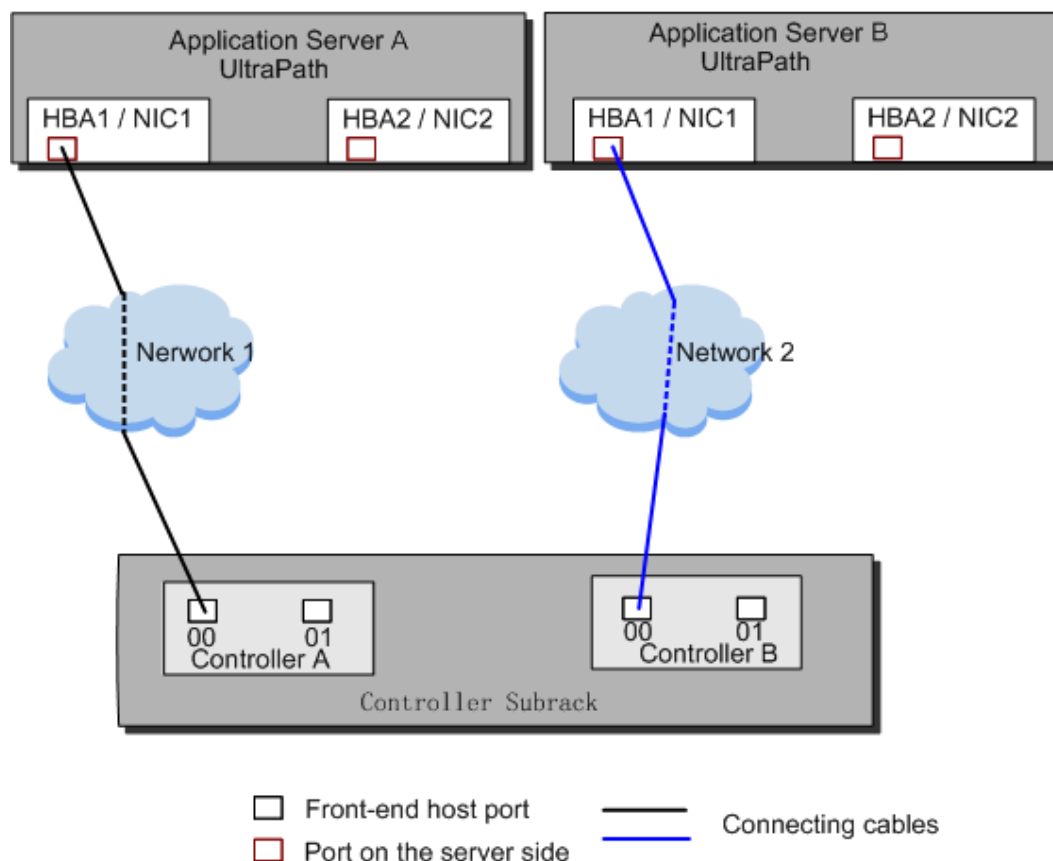
In this cluster networking, the UltraPath on AS A tries to use controller A as the working controller of the LUN, whereas the UltraPath on AS B tries to use controller B as the working controller of the LUN. As a result, the trespass of working controller goes ceaseless between controller A and controller B.

Procedure

- Method One: Restore the disconnecting cables as soon as possible and ensure that there is cable each node to each controller of array.

● Method Two: Disable the trespass between operating and owning controllers of the LUN. Please see **A.3.9 Setting the Working Controller Trespass Policy for a LUN**.

----End

6.3 A Yellow Exclamatory Mark Is Displayed Beside a LUN Name

A yellow exclamatory mark is displayed beside a physical LUN, MPIO virtual LUN, or UltraPath virtual LUN.

Symptom

● Symptom 1: When cables are rapidly and frequently inserted and removed, a yellow exclamatory mark is displayed beside a physical LUN name, but UltraPath for Windows still works properly.

● Symptom 2: After a host is restarted due to the installation or upgrade of UltraPath for Windows, a yellow exclamatory mark is displayed beside an MPIO virtual LUN on the **Device Manager** page.

● Symptom 3: When a LUN is being added or deleted, a yellow exclamatory mark is displayed beside a physical LUN, MPIO LUN, or UltraPath LUN on the **Device Manager** page.

Possible Causes

Fault diagnosis

● Symptom 1: Physical devices have historical records on their operating systems. After a storage array is connected to a host, its operating system loads a disk-type driver for the storage array. However, UltraPath for Windows masks physical devices, so the disk-type driver fails to be loaded and a yellow exclamatory mark is displayed.

● Symptoms 2 and 3: There is a low probability that driver loading encounters an anomaly after a LUN is added or deleted or a host is restarted.

Procedure

● Solution 1: Choose **Start** > **All Programs** > **UltraPath** > **Driver Update**. The driver is automatically updated.

● Solution 2: If the yellow exclamatory mark is not cleared after you perform solution 1, right-click the device on the **Device Manager** page and choose **Disable**. Then click **Enable**.

📖**NOTE**

Do not use this tool when services are running. Otherwise, the services may be interrupted.

● Perform the two solutions and observe if the yellow exclamatory mark is still displayed beside the MPIO virtual LUN. If the mark is not displayed, the fault has been rectified.

----End

A Commonly Used CLI Management Commands

The commonly used CLI management commands of UltraPath include basic operation commands, UltraPath management commands, and LUN management commands. General CLI commands used in operating systems are provided in this document as well.

This document describes commands used by customers when they use Huawei products to deploy and maintain a network.

Some advanced commands are used to implement a project or locate faults. Improper use of those commands may cause device exceptions or service interruptions. This document does not provide the advanced commands. If you need such commands, contact Huawei for help.

Some arrays do not support query of some information. Such information is displayed as **--** in UltraPath.

A.1 Command Conventions
You are required to follow the format conventions when you use the CLI commands.

A.2 Basic Operation Commands
Basic operation commands are used to query details about commands, and about how to log in to or log out of the UltraPath management module.

A.3 System Management Commands
The UltraPath system management commands include common management commands and commands for advanced parameter settings.

A.4 LUN Management Commands
LUN management commands include commands for viewing storage system information and virtual disk information.

A.5 UltraPath Other Commands
Introduce UltraPath other commands that are excluded in above.

A.1 Command Conventions

You are required to follow the format conventions when you use the CLI commands.

Table A-1 lists the format conventions.

Table A-1 Command conventions

Convention	Description
Boldface	The keywords of a command line are in **boldface**. This part should stay unchanged and need to be entered as it is.
Italic	Command arguments are in *italics*. This part needs to be replaced with an actual value.
[ ]	Items (keywords or arguments) in brackets [ ] are optional.
{ x | y | ... }	Optional items are grouped in braces and separated by vertical bars. One item is selected.
[x | y | ...]	Optional items are grouped in brackets and separated by vertical bars. One item is selected or no item is selected.
{ x | y | ... }*	Optional items are grouped in braces and separated by vertical bars. A minimum of one item or a maximum of all items can be selected.
[x | y | ...]*	Optional items are grouped in brackets and separated by vertical bars. Several items or no item can be selected.

□ NOTE

If the name of the disk array or LUN is in Chinese and the encoding format of the login tool is incorrect, garbled characters are displayed after the multipathing command is executed. Set the encoding format of the login tool.

A.2 Basic Operation Commands

Basic operation commands are used to query details about commands, and about how to log in to or log out of the UltraPath management module.

A.2.1 Logging in to the CLI

Function

If you need to manage the UltraPath or query its status, run the **upadm** command to log in to the CLI.

Format

upadm

Parameters

None

Level

User with **administrator** permissions

Usage Guidelines

The following uses **show version** as an example to show how to use **upadm** commands.

- Log in to the CLI and show the version of UltraPath.
  ```
  # upadm
  UltraPath CLI #0 >show version
  Software Version : 8.06.010
  Driver   Version : 8.06.010
  ```

- Run the **upadm show version** command to view the version of UltraPath.
  ```
  # upadm show version
  Software Version : 8.06.010
  Driver   Version : 8.06.010
  ```

  □NOTE

  If you directly use the command line in PowerShell to query the information about multiple objects, run the following command: **upadm show path id**=*0,1*. Keep the **id**=*0,1* parameter in a quotation mark. For example, run the following command: **upadm show path "id**=*0,1*".

Example

Log in to the UltraPath CLI.

```
# upadm
UltraPath CLI #0 >
```

System Response

None

A.2.2 Exiting the CLI

Function

The **quit** command is used to exit the UltraPath CLI.

Format

quit

Parameters

None

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Run the **quit** command to exit the CLI.

```
UltraPath CLI #3 >quit

~ #
```

System Response

None

A.2.3 Help

Function

The **help** command is used to query all UltraPath commands and their formats and details.

Format

help

?

Parameters

None

Level

User with **administrator** permissions

Usage Guidelines

After logging in to the UltraPath CLI, you can run the **help** command to query UltraPath CLI commands.

Example

Run **help** to query all UltraPath commands. The following figure shows some commands.

```
UltraPath CLI #0 >help
Usage: [OPTION]
help [command] [subcommand]        -- Print help message.
? [command] [subcommand]           -- Print help message.
quit                               -- Quit UltraPath command line.
show version                       -- Print version.
... ...
```

System Response

None

A.3 System Management Commands

The UltraPath system management commands include common management commands and commands for advanced parameter settings.

A.3.1 Querying the Version of UltraPath

Function

The **show version** command is used to query the version of UltraPath.

Format

show version [**verbose**]

Parameters

Parameter	Description	Default Value
verbose	Used to query the UltraPath version information.	None

Level

User with **administrator** permissions

Usage Guidelines

The version of UltraPath can be queried only after the software is installed successfully.

- Run the **show version** command to query the information about UltraPath version and driver version.
- Run the **show version verbose** command to query the information about UltraPath version, driver version, and product version.

Example

- Run the **show version** command to query the information about UltraPath version and driver version.
  ```
  UltraPath CLI #0 >show version
  Software Version : 8.06.010
  Driver   Version : 8.06.010
  ```
- Run the **show version verbose** command to query the information about UltraPath version, driver version, and product version.
  ```
  UltraPath CLI #0 >show version verbose
  Software Version  : 8.06.010
  ```

```
Driver    Version  : 8.06.010
Product   Version  : V100R008C50
```

System Response

None

A.3.2 Querying Configuration File Information

Function

The **show upconfig** command is used to query the configuration of UltraPath, including the working mode, load balancing policy, and LUN trespass function.

Format

show upconfig [**array_id**=*ID* | **vlun_id**=*ID*]

Parameters

Keyword and Parameter	Description	Default Value
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None
vlun_id=*ID*	ID of a virtual LUN. You can run **show vlun type**=*all* to display all virtual LUN IDs.	None

Level

User with **administrator** permissions

Usage Guidelines

- Run **show upconfig** to display all configuration information about UltraPath.
- Run **show upconfig array_id**=*ID* to check UltraPath configuration information about a specified storage system.
- Run the **show upconfig vlun_id**=*ID* command to check UltraPath configuration information about a specified virtual LUN.

Example

- Query all configuration information about UltraPath.

```
UltraPath CLI #2 >show upconfig
=======================================================
UltraPath Configuration
```

```
=======================================================
Basic Configuration
    Working Mode : load balancing within controller
    LoadBalance Mode : min-queue-depth
    Loadbanlance io threshold : 1
    LUN Trespass : on

Advanced Configuration
    Io Retry Times : 10
    Io Retry Delay : 0
    Faulty path check interval : 10
    Idle path check interval : 60
    Failback Delay Time : 600
    Io Suspension Time : 60
    Max io retry timeout : 1800

Path reliability configuration
    Timeout degraded statistical time : 600
    Timeout degraded threshold : 1
    Timeout degraded path recovery time : 1800
    Intermittent I/O error degraded statistical time : 300
    Min. I/Os for intermittent I/O error degraded statistical : 5000
    Intermittent I/O error degraded threshold : 20
    Intermittent I/O error degraded path recovery time : 1800
    Intermittent fault degraded statistical time : 1800
    Intermittent fault degraded threshold : 3
    Intermittent fault degraded path recovery time : 3600
    High latency degraded statistical time : 300
    High latency degraded threshold : 1000
    High latency degraded path recovery time : 3600
    Sensitive delayed degraded threshold : 30000
    Sensitive delayed degraded recovery time : 120

HyperMetro configuration
    HyperMetro Primary Array SN : Not configured
    HyperMetro WorkingMode : read write within primary array
    HyperMetro Split Size : 128MB
```

- Query UltraPath configuration information about a specified storage system.

```
UltraPath CLI #0 >show upconfig array_id=0
=======================================================
UltraPath Configuration
=======================================================
Working Mode : load balancing within controller
LoadBalance Mode : round-robin
Loadbanlance io threshold : 1
LUN Trespass : on
Io Suspension Time : 60
Max io retry timeout : 1800
```

- Query UltraPath configuration information about a specified virtual LUN.

  The virtual LUN whose ID is **1** is a common virtual LUN. The virtual LUN whose ID is **2** is a virtual HyperMetro LUN.

```
UltraPath CLI #0 >show upconfig vlun_id=1
=======================================================
UltraPath Configuration
=======================================================
Working Mode : load balancing within controller
LoadBalance Mode : round-robin
Loadbanlance io threshold : 1
LUN Trespass : on
Io Suspension Time : 60
Max io retry timeout : 1800
UltraPath CLI #3 >show upconfig vlun_id=2
=======================================================
UltraPath Configuration
=======================================================
Working Mode : load balancing within controller
LoadBalance Mode : min-task
```

```
Loadbanlance io threshold : 1
LUN Trespass : on
Io Suspension Time : 0
Max io retry timeout : 1800
HyperMetro Primary Array SN : 210235980510E8000015
HyperMetro WorkingMode : read write between both arrays
HyperMetro Split Size : 4KB
```

System Response

None

A.3.3 Querying Physical Path Information

Function

The **show path** command is used to query information about a specified or all physical paths, including the working status, owning storage system, owning controller, and owning HBA.

Format

show path [**id**=*ID1,ID2,...* | **array_id**=*ID*]

Parameters

Keyword and Parameter	Description	Default Value
id=*ID1,ID2,...*	ID of a physical path. You can run **show path** without an ID to display all physical path IDs. **NOTE** You can query a maximum of eight physical paths' performance statistics at a time. Use comas (,) to separate physical path IDs.	None
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None

Level

User with **administrator** permissions

Usage Guidelines

● Run the **show path** command to check the working status of all physical paths.

☷**NOTE**

When the **show path** command is executed, you can only view the information about a maximum of eight paths on one controller.

- Run the **show path array_id**=*ID* command to check the working status of a specified storage system's physical paths.

- Run the **show path id**=*ID1,ID2,...* command to check the working status of a specified physical path.

Example

- Check the working status and path IDs of all physical paths.

```
UltraPath CLI #0 >show path
------------------------------------------------------------------------
------------------------------------------------
 Path ID   Initiator Port       Array Name      Controller    Target Port
Path State   Check State   Port Type   Port ID
    0     2100001b32053e20   Huawei.Storage48     0B      20184846fb8ca15f
Normal        --          FC       --
    1     2100001b32053e20   Huawei.Storage48     0A      200b4846fb8ca15f
Normal        --          FC       --
    4     2100001b32055f20   Huawei.Storage48     0B      20194846fb8ca15f
Normal        --          FC       --
    5     2100001b32055f20   Huawei.Storage48     0A      20084846fb8ca15f
Normal        --          FC       --
------------------------------------------------------------------------
------------------------------------------------
------------------------------------------------------------------------
------------------------------------------------
 Path ID   Initiator Port       Array Name      Controller    Target Port
Path State   Check State   Port Type   Port ID
    2     2100001b32053e20   Huawei.Storage46     0B      24103400a30d9c5f
Normal        --          FC       --
    3     2100001b32053e20   Huawei.Storage46     0A      24003400a30d9c5f
Normal        --          FC       --
    6     2100001b32055f20   Huawei.Storage46     0B      24113400a30d9c5f
Normal        --          FC       --
    7     2100001b32055f20   Huawei.Storage46     0A      24013400a30d9c5f
Normal        --          FC       --
------------------------------------------------------------------------
------------------------------------------------
```

- Check the physical paths of the storage system whose ID is **0**.

```
UltraPath CLI #0 >show path array_id=0
------------------------------------------------------------------------
------------------------------------------------
 Path ID   Initiator Port       Array Name      Controller    Target Port
Path State   Check State   Port Type   Port ID
    0     2100001b32053e20   Huawei.Storage48     0B      20184846fb8ca15f
Normal        --          FC       --
    1     2100001b32053e20   Huawei.Storage48     0A      200b4846fb8ca15f
Normal        --          FC       --
    4     2100001b32055f20   Huawei.Storage48     0B      20194846fb8ca15f
Normal        --          FC       --
    5     2100001b32055f20   Huawei.Storage48     0A      20084846fb8ca15f
Normal        --          FC       --
------------------------------------------------------------------------
------------------------------------------------
```

- Check the working status of the physical path whose ID is **0**.

```
UltraPath CLI #0 >show path id=0
=====================================
          Path#0 Information
=====================================
Initiator Port  :  2100001b32053e20
Array Name      :  Huawei.Storage48
```

```
Controller      :  0B
Target Port     :  20184846fb8ca15f
Path State      :  Normal
Check State     :  --
Port Type       :  FC
I/O Retry count :  0
Path Fault count:  0
Latency-Low(ms) :  0
Latency-High(ms):  2
Latency-avg(ms) :  0
Port ID         :  --
=======================================
```

System Response

The following table explains some parameters in the command output:

Parameter	Description	Default Value
Path ID	ID of the physical path.	None
Initiator Port	Port of the initiator. **NOTE** For some arrays such as the S2600 and S5500, the initiator ports are displayed as the initiator port IDs in the SCSI address.	None
Target Port	Port of the target. **NOTE** For some arrays such as the S2600 and S5500, the initiator ports are displayed as the initiator port IDs in the SCSI address.	None
Controller	Name of a controller. **NOTE** If the controller name is followed by **Remote** information, the controller is a remote controller.	None

Parameter	Description	Default Value
Path State	State of the physical path. Possible values are as follows: ● Normal: The path is normal. ● Fault: The path is faulty. ● I/O discrete error degradation: The path is degraded due to discrete I/O errors. ● Intermittent failure degradation: The path is degraded due to intermittent failures. ● I/O timeout degradation: The path is degraded due to I/O timeout. ● High latency degradation: The path is degraded due to high latency. ● Disable: The path is disabled.	None
Check State	State check of a path. Possible values are as follows: ● Checking: The path is being checked. ● Waiting: The path is waiting to be checked. ● Succeed: The path status check succeeded. ● Fail: The path status check failed. ● Ignore: The path status check is ignored. ● --: The path is not checked.	None
I/O Retry Count	Number of I/O retry attempts.	None
Path Fault Count	Number of times for which a path becomes faulty.	None
Port ID	Location of the port.	None

A.3.4 Resetting the Status of a Physical Path

Function

The **set phypathnormal** command is used to restore the working status of a degraded path to normal.

Format

set phypathnormal path_id=*ID*

Parameters

Keyword and Parameter	Description	Default Value
path_id=*ID*	ID of the physical path. You can run **show phypath** without an ID to display all physical path IDs.	None

Level

User with **administrator** permissions

Usage Guidelines

📖**NOTE**

You can perform the following operations to recover an unstable path degraded and isolated by UltraPath if the maintenance personnel have replaced the fault components and eliminated link faults. After the path is recovered, UltraPath will deliver I/Os to it. If you are not sure whether all link faults have been cleared, run the **start pathcheck** command to check the health status of the path. If the path passes the check, reset the path to normal.

Run the **set phypathnormal path_id**=*ID* command to restore specified degraded physical paths.

Example

Restore the working status of the path whose ID is **1** to normal.

```
UltraPath CLI #2 >set phypathnormal path_id=1

Please check whether the fault has been rectified. If the fault persists and you
forcibly recover the path, the performance may be decreased.
Are you sure you want to continue? [y,n]: y

Succeeded in executing the command.
```

System Response

None

A.3.5 Setting a Controller's Paths

Function

The **set tpgstate** command is used to enable or disable the paths of a specified controller.

Format

set tpgstate={ *enable | disable* } **array_id**=*ID* **tpg_id**=*ID*

Parameters

Keyword and Parameter	Description	Default Value
*enable	disable*	Enabling or disabling a controller's path. Possible values are enable or disable. ● enable: enables a controller's paths. ● disable: disables a controller's paths.	enable
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None
tpg_id=*ID*	ID of a controller.	None

Level

User with **administrator** permissions

Usage Guidelines

⚠ **NOTICE**

● Once the command is run, UltraPath will not choose this path to deliver I/O.
● After the replacement or maintenance, you can run the command again to enable the paths of the controller, increasing redundance and balancing controller workload.

When changing the controller of a storage system or before powering off the controller for maintenance, you can run this command to disable paths of the controller. After the paths are disabled, UltraPath smoothly switches I/Os over to other controller's paths, preventing I/O latency caused by failback.

Example

Enable the paths of controller **0A** of the storage system whose ID is **0**.

```
UltraPath CLI #12 >set tpgstate=enable array_id=0 tpg_id=0A
Succeeded in executing the command.
```

System Response

None

A.3.6 Setting the Status of a Physical Path

Function

The **set pathstate** command is used to enable or disable a specified physical path.

Format

set pathstate={ *enable* | *disable* } **path_id**=*ID*

Parameters

Keyword and Parameter	Description	Default Value
{ *enable* | *disable* }	Enabling or disabling a physical path. The value is either enable or disable. ● enable: enables a physical path. ● disable: disables a physical path.	enable
path_id=*ID*	ID of a physical path. You can run **show path** without an ID to display all physical path IDs.	None

Level

User with **administrator** permissions

Usage Guidelines

⚠ NOTICE

- Once the command is run, UltraPath will not choose this path to deliver I/O.
- Only OceanStor T series V100R005 or later storage systems using Fibre Channel networks support this command.
- If a controller module is disabled by running the **set tpgstate** command, you cannot run the **set pathstate** command to change the status of the controller's path.

- When you replace an HBA, run the **set pathstate**=*disable* **path_id**=*ID* command to disable the designated physical path. UltraPath will switch I/Os smoothly to other physical paths.
- When the HBA is replaced, run the **set pathstate**=*enable* **path_id**=*ID* command to enable the physical path mentioned earlier.

Example

Enable the physical path whose ID is **0**.

```
UltraPath CLI #3 >set pathstate=enable path_id=0
Succeeded in executing the command.
```

System Response

None

A.3.7 Setting Working Mode for UltraPath

Function

The **set workingmode** is used to set cross-controller or intra-controller load balancing of UltraPath.

Format

set workingmode=*{0|1}* [**array_id**=*ID* | **vlun_id**={ *ID* | *ID1,ID2... * | *ID1-ID2* }]

Parameters

Keyword and Parameter	Description	Default Value
workingmode={*0*|*1*}	Load balancing mode of UltraPath. The value can be **0** or **1**. ● 0: indicates that I/Os are delivered through paths of the current working controller. ● 1: load balancing within a controller indicates that I/Os are delivered through paths of the current working controller.	1
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None
vlun_id={ *ID* | *ID1,ID2...* | *ID1-ID2* }	ID of a virtual LUN. You can run **show vlun type**=*all* to display all virtual LUN IDs.	None

Level

User with **administrator** permissions

Usage Guidelines

NOTE

If cross-controller load balancing mode is used, UltraPath does not distinguish between preferred and non-preferred working controllers of a LUN and uses all paths to deliver I/Os. For an OceanStor storage system with asymmetric active-active controllers, I/Os are forwarded between controllers, increasing I/O processing latency. Therefore, cross-controller load balancing is recommended only when the performance bottleneck lies in the transfer paths between a host and the storage system.

● Run **set workingmode**={*0*\|*1*} to set working mode for all storage systems.

● Run **set workingmode**={*0*\|*1*} **array_id**=*ID* to set a working mode for a specified storage system.

● **set workingmode**={*0*\|*1*} **vlun_id**={ *ID* \| *ID1,ID2...* \| *ID1-ID2* } to set a working mode for a specified virtual LUN.

⚟**NOTE**

- **vlun_id**=*ID*: ID of a single virtual LUN.
- **vlun_id**=*ID1,ID2...*: IDs of multiple virtual LUNs which are not necessarily related.
- **vlun_id**=*ID1–ID2*: IDs of all the virtual LUNs from ID1 to ID2.

Example

- Set the working mode of the storage system whose ID is **0** to **Cross-controller load balancing**.
  ```
  UltraPath CLI #2 >set workingmode=0 array_id=0

  The current configuration will overwrite the configuration of all VLUNs in
  this array.
  Are you sure you want to continue? [y,n]: y

  Succeeded in executing the command.
  ```
- Set the working mode of the LUN whose ID is **0** to **Cross-controller load balancing**.
  ```
  UltraPath CLI #3 >set workingmode=0 vlun_id=0
  Succeeded in executing the command.
  ```

System Response

None

A.3.8 Setting a Load Balancing Mode

Function

The **set loadbalancemode** command is used to set a load balancing mode for UltraPath.

Format

set loadbalancemode={ *round-robin* | *min-queue-depth* | *min-task* } [**array_id**=*ID* | **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* }]

Parameters

Keyword and Parameter	Description	Default Value
round-robin | *min-queue-depth* | *min-task* }	Load balancing mode. ● round-robin: round-robin load balancing ● min-queuedepth: minimum queue depth load balancing ● min-task: minimum task load balancing	min-queue-depth

Keyword and Parameter	Description	Default Value
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None
vlun_id={ *ID* | *ID1,ID2...* | *ID1-ID2* }	ID of a virtual LUN. You can run **show vlun type**=*all* to display all virtual LUN IDs.	None

Level

User with **administrator** permissions

Usage Guidelines

- Before resetting the load balancing mode, you are advised to run the **show upconfig** command to query the current load balancing mode. The load balancing modes are described as follows:
  - To set the load balancing mode to minimum task, run the **set loadbalancemode** *round-robin* command to set the load balancing mode to **round-robin**. When an application server delivers I/Os to a storage system, UltraPath sends the first set of I/Os through path 1 and second set of I/Os through path 2, and so on. Paths are used in turn to ensure that each path is fully utilized. When an application server delivers I/Os to a storage system, the minimum I/O queue takes precedence over other queues in I/O sending.
  - To set the load balancing mode to minimum task, run the **set loadbalancemode** *min-queue-depth* command to set the load balancing policy to **min-queuedepth**. In this mode, UltraPath for Linux calculates the number of waiting I/Os on each path in real time, and then delivers new I/Os to the path with the minimum waiting I/Os.
  - To set the load balancing mode to minimum task, run the **set loadbalancemode** *min-task* command to set the load balancing policy to **min-task**. In this mode, UltraPath for Linux calculates the number of waiting I/Os on each path and the data block size of each I/O in real time. Then UltraPath for Linux delivers new I/Os to the path with the lightest load. Before resetting the load balancing mode, you are advised to run the **show upconfig** command to query the current load balancing mode.

- Run **set loadbalancemode**={ *round-robin* \| *min-queue-depth* \| *min-task* } **array_id**=*ID* to set a load balancing mode for a specified storage system.

- Run **set loadbalancemode**={ *round-robin* \| *min-queue-depth* \| *min-task* } **vlun_id**={ *ID* \| *ID1,ID2...* \| *ID1-ID2* } to set a load balancing mode for a specified virtual LUN.

  □**NOTE**

  - **vlun_id**=*ID*: ID of a single virtual LUN.

  - **vlun_id**=*ID1,ID2...*: IDs of multiple virtual LUNs which are not necessarily related.

  - **vlun_id**=*ID1–ID2*: IDs of all the virtual LUNs from ID1 to ID2.

Example

Set the load balancing mode of the storage system whose ID is **0** to **round-robin**.

```
UltraPath CLI #3 >set loadbalancemode=round-robin array_id=0

The current configuration will overwrite the configuration of all VLUNs in this
array.
Are you sure you want to continue? [y,n]: y

Succeeded in executing the command.
```

System Response

None

A.3.9 Setting the Working Controller Trespass Policy for a LUN

Function

The **set luntrespass** command is used to set the working controller trespass policy for a LUN.

Format

set luntrespass={ *on* | *off* } [**array_id**=*ID* | **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* }]

Parameters

Keyword and Parameter	Description	Default Value
on | *off*	Working controller trespass policy of a LUN. The value is either **on** or **off**. ● on: Enables working controller trespass for a LUN. ● off: Disables working controller trespass for a LUN.	on
array_id= *ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None
vlun_id={ *ID* | *ID1,ID2...* | *ID1-ID2* }	ID of a virtual LUN. You can run **show vlun type**=*all* to display all virtual LUN IDs.	None

Level

User with **administrator** permissions

Usage Guidelines

> **NOTE**
>
> For an OceanStor storage system with asymmetric active-active controllers, UltraPath for Linux switches the working controller of a LUN when switching links, ensuring that I/Os are directly delivered to the working controller. However, when multiple hosts (for example, an active-active host cluster) access the same LUN of an OceanStor S5000 series storage system, the hosts may contend for the working controller and result in frequent working controller trespass (or "ping pong" trespass). Ping-pong trespass severely decreases performance. To prevent this problem, you are advised to disable the working controller trespass function in this case.

- Run the **set luntrespass**={ *on | off* } command to set all storage system LUN switches.

- Run **set luntrespass**={ *on | off* } **array_id**=*ID* to set the LUN switches of a specified storage system.

- Run **set luntrespass**={ *on | off* } **vlun_id**={ *ID | ID1,ID2... | ID1-ID2* } to set the LUN switches of a specified virtual LUN.

  > **NOTE**
  >
  > - **vlun_id**=*ID*: ID of a single virtual LUN.
  >
  > - **vlun_id**=*ID1,ID2...*: IDs of multiple virtual LUNs which are not necessarily related.
  >
  > - **vlun_id**=*ID1–ID2*: IDs of all the virtual LUNs from ID1 to ID2.

Example

Set the LUN working controller trespass of the storage system whose ID is **0** to **on**.

```
UltraPath CLI #3 >set luntrespass=on array_id=0

The current configuration will overwrite the configuration of all VLUNs in this
array.
Are you sure you want to continue? [y,n]: y

Succeeded in executing the command.
```

System Response

None

A.3.10 Setting Failback Delay

Function

The **set failbackdelaytime** command is used to set failback delay.

Format

set failbackdelaytime=*time*

Parameters

Keyword and Parameter	Description	Default Value
time	Failback delay. The value ranges from 0 to 3600, expressed in seconds.	600

Level

User with **administrator** permissions

Usage Guidelines

NOTE

To prevent intermittent communication interruption between links and service instability, UltraPath does not immediately implement failback upon detecting the recovery of a faulty path. Instead, UltraPath continues to monitor the path and implements failback if the path remains normal to improve system reliability. The failback delay may cause slight performance drop, but it is for the balance between reliability and performance.

Example

Set failback delay to 600 seconds.

```
UltraPath CLI #2 >set failbackdelaytime=600
Succeeded in executing the command.
```

System Response

None

A.3.11 Querying I/O Count Information

Function

The **show io_count** command is used to query the I/O count of all virtual LUNs or on logical paths of the specified virtual LUNs. The I/O count information includes the error I/O count, queue I/O count, error command count, and queue command count.

Format

show io_count [**vlun_id**=*ID1,ID2,...*]

Parameters

Parameter	Description	Default Value
vlun_id=*ID1,ID2,...*	ID of a virtual LUN If you run **show vlun** without specifying any parameters, all virtual LUN IDs can be obtained. Then you can run **show io_count** with this parameter to query the I/O count on the logical paths of these virtual LUNs. **NOTE** 　You can query a maximum of eight virtual LUNs at a time. Use commas (,) to separate IDs of the virtual LUNs.	None

Level

User with **administrator** permissions

Usage Guidelines

- Run **show io_count** to obtain the I/O count information of all virtual LUNs.

- Run **show io_count vlun_id**=*ID1,ID2,...* to query the I/O count information on logical paths of the specified virtual LUNs.

Example

- Query the I/O count information of all virtual LUNs.

```
UltraPath CLI #3 >show io_count
--------------------------------------------------------------------------------
--------------------
 Vlun ID     Disk Name     Error I/O Count   Queue I/O Count   Error Command
Count   Queue Command Count
    2       AIX198Lun_001          2                 0
4                 0
    3       AIX198Lun_002          0                 0
0                 0
--------------------------------------------------------------------------------
--------------------
```

- Query the I/O count information on logical paths of the specified virtual LUNs.

```
UltraPath CLI #3 >show io_count vlun_id=2
--------------------------------------------------------------------------------
--------------------------
 Vlun ID     Disk Name     Path ID   Error I/O Count   Queue I/O Count   Error
Command Count   Queue Command Count
    2       AIX198Lun_001      0              1                 0
2                 0
    2       AIX198Lun_001      1              1                 0
2                 0
--------------------------------------------------------------------------------
--------------------------
```

System Response

None

A.3.12 Clearing I/O Count Information

Function

The **clear io_count** command is used to clear I/O count information.

Format

clear io_count

Parameters

None

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Clear I/O count information.

```
UltraPath CLI #3 >clear io_count
Succeeded in executing the command.
```

System Response

None

A.3.13 Querying I/O Latency Information

Function

The **show io_latency** command is used to query the latest I/O latency, max I/O latency, and average I/O latency of all virtual LUNs or on the logical paths of the specific virtual LUNs.

Format

show io_latency [**vlun_id**=*ID1,ID2,...*]

Parameters

Parameter	Description	Default Value
vlun_id=*ID1,ID2,...*	ID of a virtual LUN If you run **show vlun** without specifying any parameters, all virtual LUN IDs can be obtained. Then you can run **show io_latency** with this parameter to query the I/O latency on the logical paths of these virtual LUNs. NOTE You can query a maximum of eight virtual LUNs at a time. Use commas (,) to separate IDs of the virtual LUNs.	None

Level

User with **administrator** permissions

Usage Guidelines

- Run **show io_latency** to obtain the I/O latency information of all virtual LUNs.

- Run **show io_latency vlun_id**=*ID1,ID2,...* to query the I/O count information on the logical paths of the specified virtual LUNs.

Example

- Query the I/O latency information of all virtual LUNs.
  ```
  UltraPath CLI #3 >show io_latency
  --------------------------------------------------------------------------------
  ----
   Vlun ID     Disk Name     Latest I/O Latency   Max I/O Latency   Average I/O
  Latency
      2       AIX198Lun_001            0                  10
  0
      3       AIX198Lun_002            0                  100
  0
  --------------------------------------------------------------------------------
  ----
  ```

- Query the I/O latency information on the logical paths of the specific virtual LUNs.
  ```
  UltraPath CLI #3 >show io_latency vlun_id=2
  --------------------------------------------------------------------------------
  -----------
   Vlun ID     Disk Name     Path ID   Latest I/O Latency   Max I/O Latency
  Average I/O Latency
      2       AIX198Lun_001     0               0
  10               0
      2       AIX198Lun_001     1               0
  10               0
  --------------------------------------------------------------------------------
  -----------
  ```

System Response

None

A.3.14 Setting I/O Latency Threshold

Function

The **set io_latency_threshold** command is used to set the I/O latency threshold. If the average I/O latency in one minute exceeds this threshold, a critical event about long I/O latency will be recorded.

Format

set io_latency_threshold=*time*

Parameters

Parameter	Description	Default Value
time	I/O latency threshold The value ranges from 0 to 120000, expressed in milliseconds.	20

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Set the I/O latency threshold to 30 milliseconds.

```
UltraPath CLI #3 >set io_latency_threshold=30
Succeeded in executing the command.
```

System Response

None

A.3.15 Querying I/O Latency Threshold

Function

The **show io_latency_threshold** command is used to query the I/O latency threshold.

Format

show io_latency_threshold

Parameters

None

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Query the I/O latency threshold.

```
UltraPath CLI #3 >show io_latency_threshold
io_latency_threshold : 20
```

System Response

None

A.3.16 Setting I/O Retry Times and Interval

Function

The **set ioretry** command is used to set the number of I/O retries and an I/O retry interval.

Format

set ioretry=*number* **ioretrydelay**=*time*

Parameters

Keyword and Parameter	Description	Default Value
ioretry=*number*	Number of I/O retry times. The value ranges from 0 to 60.	10
ioretrydelay=*time*	Interval of I/O retry. The value ranges from 0 to 10, expressed in seconds.	0

Level

User with **administrator** permissions

Usage Guidelines

> ◫**NOTE**
>
> Increasing I/O retry times and retry interval can reduce the service interruption rate when intermittent path disconnection occurs, but it also prolongs service blockage. Therefore, set the two parameters based your service needs.

Example

Set the I/O retry times to 3 and retry interval to 10 seconds.

```
UltraPath CLI #8 >set ioretry=3 ioretrydelay=10
Succeeded in executing the command.
```

System Response

None

A.3.17 Setting the I/O Suspension Time

Function

The **set ioholdontime** command is used to set the I/O suspension time.

Format

set iosuspensiontime=*time* [**array_id**=*ID* | **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* }]

Parameters

Keyword and Parameter	Description	Default Value
iosuspensiontime=*time*	I/O suspension time. The value ranges from 0 to 2,592,000, expressed in seconds.	60
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None
vlun_id={ *ID* | *ID1,ID2...* | *ID1-ID2* }	ID of a virtual LUN. You can run **show vlun type**=*all* to display all virtual LUN IDs.	None

Level

User with **administrator** permissions

Usage Guidelines

- Run **set iosuspensiontime**=*time* to set the I/O suspension time for all storage systems.
- Run **set iosuspensiontime**=*time* **array_id**=*ID* to set the I/O suspension time for a specified storage system.
- Run **set iosuspensiontime**=*time* **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* } to set the I/O suspension time for a specified virtual LUN.

  NOTE

  - **vlun_id**=*ID*: ID of a single virtual LUN.
  - **vlun_id**=*ID1,ID2...*: IDs of multiple virtual LUNs which are not necessarily related.
  - **vlun_id**=*ID1–ID2*: IDs of all the virtual LUNs from ID1 to ID2.

Example

On the CLI, run **upadmin** to go to the command management page. Then set the I/O suspension time of all storage systems to 60 seconds.

```
UltraPath CLI #8 >set iosuspensiontime=60
Succeeded in executing the command.
```

System Response

None

A.3.18 Checking a Physical Path's Status

Function

The **start pathcheck** command is used to check the working status of a specified physical path.

Format

start pathcheck path_id=*ID1,ID2,...*

Parameters

Keyword and Parameter	Description	Default Value
path_id=*ID1,ID2,...*	ID of a physical path. You can run **show path** without an ID to display all physical path IDs.	None

Level

User with **administrator** permissions

Usage Guidelines

If you are not sure whether all link faults have been cleared, run the **start pathcheck** command to check the health status of the path. If the path passes the check, reset the path to normal.

Example

Check the working status of the physical path whose ID is **0**.

```
UltraPath CLI #1 >start pathcheck path_id=0

The path check will last about 3 minutes and will consume some bandwidth
resources.
Are you sure you want to continue? [y,n]: y

Check path command send on all pathes successfully, use "show path"command to
investigate the check result.
```

System Response

None

A.3.19 Setting a Time Window for I/O Timeout Isolation

Function

The **set tod_time** command is used to set a time window for path degradation and isolation upon an I/O timeout.

Format

set tod_time=*time*

Parameters

Keyword and Parameter	Description	Default Value
time	Time window for path degradation and isolation upon an I/O timeout. The value ranges from 60 to 2,592,000, expressed in seconds.	600

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Set the time window for path degradation and isolation upon an I/O timeout to 600 seconds.

```
UltraPath CLI #1 >set tod_time=600
Succeeded in executing the command.
```

System Response

None

A.3.20 Setting a Timeout Threshold for Path Degradation and Isolation

Function

The **set tod_threshold** command is used to set a timeout threshold for path degradation and isolation.

Format

set tod_threshold=*number*

Parameters

Keyword and Parameter	Description	Default Value
number	I/O timeout threshold for path degradation and isolation upon an I/O timeout. The value ranges from 0 to 65,535.	1

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Set the I/O timeout threshold for path degradation and isolation to 3.

```
UltraPath CLI #1 >set tod_threshold=3
Succeeded in executing the command.
```

System Response

None

A.3.21 Setting the Recovery Time of a Degraded Path

Function

The **set tod_recovery_time** command is used to set the recovery time of a degraded path.

Format

set tod_recovery_time=*time*

Parameters

Keyword and Parameter	Description	Default Value
time	Recovery timeout of a degraded path. The value ranges from 1,800 to 2,592,000, expressed in seconds.	1800

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Set the recovery time of a degraded path to 1800 seconds.

```
UltraPath CLI #1 >set tod_recovery_time=1800
Succeeded in executing the command.
```

System Response

None

A.3.22 Setting a Time Window for Calculating Discrete I/O Errors

Function

The **set ied_time** command is used to set a time window for calculating discrete I/O errors.

Format

set ied_time=*time*

Parameters

Keyword and Parameter	Description	Default Value
time	Time window for collecting discrete I/O errors. The value ranges from 60 to 2,592,000, expressed in seconds.	300

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Set the time window for calculating discrete I/O errors to 300 seconds.

```
UltraPath CLI #1 >set ied_time=300
Succeeded in executing the command.
```

System Response

None

A.3.23 Setting a Rate Threshold for Discrete I/O Error Isolation

Function

The **set ied_threshold** command is used to set a rate threshold for discrete I/O error isolation.

Format

set ied_threshold=*ratio*

Parameters

Keyword and Parameter	Description	Default Value
ratio	Rate threshold for discrete I/O error isolation. The value ranges from 0% to 100%.	20

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Set the rate threshold for discrete I/O error isolation to 20%.

```
UltraPath CLI #1 >set ied_threshold=20
Succeeded in executing the command.
```

System Response

None

A.3.24 Setting the minimum number of I/Os for the I/O discrete error isolation mechanism

Function

The **set iedminio** command is used to set the minimum number of I/Os for the I/O discrete error isolation mechanism.

Format

set ied_min_io=number

Parameters

Keyword and Parameter	Description	Default Value
number	The minimum number of I/Os for the I/O discrete error isolation mechanism. The value ranges from 5,000 to 65,535.	5000

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Set the minimum number of I/Os for the I/O discrete error isolation mechanism to 5000.

```
UltraPath CLI #1 >set ied_min_io=5000
Succeeded in executing the command.
```

System Response

None

A.3.25 Setting the Recovery Time of a Path with Discrete I/O Errors

Function

The **set ied_recovery_time** command is used to set the recovery time of a path with discrete I/O errors.

Format

set ied_recovery_time=*time*

Parameters

Keyword and Parameter	Description	Default Value
time	Recovery time of a path with discrete I/O errors. The value ranges from 1800 to 2,592,000, expressed in seconds.	1800

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Set the recovery time of a path with discrete I/O errors to 1800 seconds.

```
UltraPath CLI #1 >set ied_recovery_time=1800
Succeeded in executing the command.
```

System Response

None

A.3.26 Setting a Time Window for Collecting Intermittent Path Errors

Function

The **set ifd_time** command is used to set the recovery time of a path with intermittent I/O errors.

Format

set ifd_time=*time*

Parameters

Keyword and Parameter	Description	Default Value
time	Time window for collecting intermittent path errors. The value ranges from 60 to 2,592,000, expressed in seconds.	1800

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Set the time window for collecting intermittent path errors to 1800 seconds.

```
UltraPath CLI #1 >set ifd_time=1800
Succeeded in executing the command.
```

System Response

None

A.3.27 Setting an Intermittent Path Error Threshold for Path Isolation

Function

The **set ifd_threshold** command is used to set an intermittent path error threshold for path isolation.

Format

set ifd_threshold=*number*

Parameters

Keyword and Parameter	Description	Default Value
number	Intermittent path error threshold for path isolation. The value ranges from 0 to 65,535.	3

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Set the intermittent path error threshold for path isolation to 3.

```
UltraPath CLI #1 >set ifd_threshold=3
Succeeded in executing the command.
```

System Response

None

A.3.28 Setting the Recovery Time of a Path with Intermittent Errors

Function

The **set ifd_recovery_time** command is used to set the recovery time of a path with intermittent errors.

Format

set ifd_recovery_time=*time*

Parameters

Keyword and Parameter	Description	Default Value
time	Recovery time of a path with intermittent errors. The value ranges from 60 to 2,592,000, expressed in seconds.	3600

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Set the recovery time of a path with intermittent errors to 3600 seconds.

```
UltraPath CLI #1 >set ifd_recovery_time=3600
Succeeded in executing the command.
```

System Response

None

A.3.29 Setting a Time Window for Determining a High-latency Path

Function

The **set hld_time** command is used to set a time window for determining a high-latency path.

Format

set hld_time=*time*

Parameters

Keyword and Parameter	Description	Default Value
time	Time window for determining a high-latency path. The value ranges from 60 to 18,000, expressed in seconds.	300

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Set the time window for determining a high-latency path to 300 seconds.

```
UltraPath CLI #1 >set hld_time=300
Succeeded in executing the command.
```

System Response

None

A.3.30 Setting a Latency Threshold for High-latency Path Isolation

Function

The **set hld_threshold** command is used to set a latency threshold for high-latency path isolation.

Format

set hld_threshold=*time*

Parameters

Keyword and Parameter	Description	Default Value
time	Latency threshold for high-latency path isolation. The value ranges from 0 to 65,535, expressed in milliseconds.	1000

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Set the latency threshold for high-latency path isolation to 1000 ms.

```
UltraPath CLI #1 >set hld_threshold=100
Succeeded in executing the command.
```

System Response

None

A.3.31 Setting the Recover Time of a High-latency Path

Function

The **set hld_recovery_time** command is used to set the recovery time of a high-latency path.

Format

set hld_recovery_time=*time*

Parameters

Keyword and Parameter	Description	Default Value
time	Recover time of a high-latency path. The value ranges from 60 to 2,592,000, expressed in seconds.	3600

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Set the recovery time of a high-latency path to 3600 seconds.

```
UltraPath CLI #1 >set hld_recovery_time=3600
Succeeded in executing the command.
```

System Response

None

A.3.32 Setting the Threshold of Switching a Latency-sensitive Path

Function

set sdd_threshold is used to set the threshold of switching a latency-sensitive path.

Format

set sdd_threshold=*time*

Parameters

Parameter	Description	Default Value
time	Threshold of switching a latency-sensitive path The value ranges from 100 to 60,000, expressed in milliseconds.	30000

Level

User with **administrator** permissions

Usage Guidelines

None

Example

This example shows how to set the threshold of switching a latency-sensitive path to 1000 milliseconds.

```
UltraPath CLI #1 >set sdd_threshold=1000
Succeeded in executing the command.
```

System Response

None

A.3.33 Setting the Recovery Time of a Latency-sensitive Path

Function

set sdd_recovery_time is used to set the recovery time of a latency-sensitive path.

Format

set sdd_recovery_time=*time*

Parameters

Parameter	Description	Default Value
time	Recovery time of a latency-sensitive path The value ranges from 1 to 2,592,000, expressed in seconds.	120

Level

User with **administrator** permissions

Usage Guidelines

None

Example

This example shows how to set the recovery time of a latency-sensitive path to 600 seconds.

```
UltraPath CLI #1 >set sdd_recovery_time=600
Succeeded in executing the command.
```

System Response

None

A.3.34 Setting an Interval for Routine Detection of Faulty Paths

Function

The **set faulty_path_check_interval** command is used to set an interval for rountine detection of faulty paths.

Format

set faulty_path_check_interval=*time*

Parameters

Keyword and Parameter	Description	Default Value
time	Interval for routine inspection of faulty paths. The value ranges from 1 to 2,592,000, expressed in seconds.	10

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Set the interval for routine detection of faulty paths to 10 seconds.

```
UltraPath CLI #1 >set faulty_path_check_interval=10
Succeeded in executing the command.
```

System Response

None

A.3.35 Setting an Interval for Routine Inspection of Idle Paths

Function

The **set idle_path_check_interval** command is used to set an interval for rountine inspection of idle paths.

Format

set idle_path_check_interval=*time*

Parameters

Keyword and Parameter	Description	Default Value
time	Interval for routine inspection of idle paths. The value ranges from 1 to 2,592,000, expressed in seconds.	60

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Set the interval for routine detection of idle paths to 60 seconds.

```
UltraPath CLI #1 >set idle_path_check_interval=60
Succeeded in executing the command.
```

System Response

None

A.3.36 Setting I/O Retry Timeout

Function

The **set max_io_retry_timeout** command is used to set the timeout period for I/O retry on UltraPath.

Format

set max_io_retry_timeout=*time* [**array_id**=*ID* | **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* }]

Parameters

Keyword and Parameter	Description	Default Value
time	Timeout period for I/O retry on UltraPath. The value ranges from 1 to 2,592,000, expressed in seconds.	1800

Keyword and Parameter	Description	Default Value
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None
vlun_id={ *ID* | *ID1,ID2...* | *ID1-ID2* }	ID of a virtual LUN. You can run **show vlun type**=*all* to display all virtual LUN IDs.	None

Level

User with **administrator** permissions

Usage Guidelines

📖NOTE

In some cases, I/Os are not successfully processed (for example, due to fully-loaded HBAs) even if no clear faults occur on paths. UltraPath will retry to avoid I/O failure. However, if the I/Os are not returned for a long time, the impact on some upper-layer applications may be worse than an I/O failure. In this case, you can set the timeout period for I/O retry to prevent such an impact.

● Run **set max_io_retry_timeout**=*time* to set the I/O retry timeout of all storage systems.

● Run **set max_io_retry_timeout**=*time* **array_id**=*ID* to set the I/O retry timeout of a specified storage system.

● Run **set max_io_retry_timeout**=*time* **vlun_id**={ *ID* \| *ID1,ID2...* \| *ID1-ID2* } to set the I/O retry timeout of a specified virtual LUN.

📖NOTE

● **vlun_id**=*ID*: ID of a single virtual LUN.

● **vlun_id**=*ID1,ID2...*: IDs of multiple virtual LUNs which are not necessarily related.

● **vlun_id**=*ID1–ID2*: IDs of all the virtual LUNs from ID1 to ID2.

Example

Set the timeout period for I/O retry on UltraPath to 1800 seconds.

```
UltraPath CLI #1 >set max_io_retry_timeout=1800
Succeeded in executing the command.
```

System Response

None

A.3.37 Setting the Number of Consecutive I/Os on a Path

Function

The **set lb_io_threshold** command is used to set the number of consecutive I/Os on a path in load balancing mode.

Format

set lb_io_threshold= number [**array_id**=*ID* | **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* }]

Parameters

Keyword and Parameter	Description	Default Value
number	Number of consecutive I/Os on a path. The value ranges from 1 to 10,000.	1
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None
vlun_id={ *ID*	*ID1,ID2...*	*ID1-ID2* }	ID of a virtual LUN. You can run **show vlun type**=*all* to display all virtual LUN IDs.	None

Level

User with **administrator** permissions

Usage Guidelines

- Run **set lb_io_threshold**=*number* to set the number of consecutive I/Os on a path in load balancing mode for all storage systems.
- Run **set lb_io_threshold**=*number* **array_id**=*ID* to set the number of consecutive I/Os on a path in load balancing mode for a specified storage system.
- Run **set lb_io_threshold**=*number* **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* } to set the number of consecutive I/Os on a path in load balancing mode for a specified virtual LUN.

  NOTE

  - **vlun_id**=*ID*: ID of a single virtual LUN
  - **vlun_id**=*ID1,ID2...*: IDs of multiple virtual LUNs which are not necessarily related
  - **vlun_id**=*ID1–ID2*: IDs of all the virtual LUNs from ID1 to ID2

> **NOTE**
>
> Increasing the consecutive I/Os of a path can improve the efficiency of processing sequential I/Os. However, it does not apply to discrete I/Os, and an extra-large number of consecutive I/Os causes path blockage for short periods of time. Therefore, set an appropriate value based on the service I/O model to improve performance.

Example

Set the number of consecutive I/Os on a path in load balancing mode to 1.

```
UltraPath CLI #1 >set lb_io_threshold=1
Succeeded in executing the command.
```

System Response

None

A.3.38 Setting the Remote Controller of a VIS Storage System

Function

The **set remote_controller** command is used to set the remote controller of a VIS storage system so that host I/Os are delivered preferentially from the local VIS node, therefore shortening latency.

Format

set remote_controller array_id=*ID* **tpg_id**=*ID1,ID2*···[*remote* | *local*]

Parameters

Keyword and Parameter	Description	Default Value
array_id=*ID*	ID of a storage system allocated by UltraPath. You can run **show array** without an ID to display all storage system IDs.	None
tpg_id=*ID1,ID2*···	ID of a controller. **NOTE** 　You can specify multiple controllers at the same time.	None
remote | *local*	Status of a remote controller. The value can be **local** or **remote**. ● local: local controller ● remote: remote controller	remote

Level

User with **administrator** permissions

Usage Guidelines

📖 **NOTE**

UltraPath supports remote active-active VIS storage systems. In this mode, the I/O processing latency on the local VIS node is much smaller than that on the remote one. Therefore, UltraPath prefers the local VIS node for delivering I/Os. The remote VIS node is used only if the local node experiences a path fault.

Example

Set remote controller 0 of the storage system whose ID is **0** as a local node.

```
UltraPath CLI #1 >set remote_controller array_id=0 tpg_id=0 local
Succeeded in executing the command.
```

System Response

None

A.3.39 Clearing Configuration Information

Function

The **clear upconfig** command is used to clear the configuration information about a virtual LUN or storage system to recover them to default factory settings.

Format

clear upconfig={ **vlun_id**=*ID* | **array_id**=*ID* }

Parameters

Keyword and Parameter	Description	Default Value
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None
vlun_id=*ID*	ID of a virtual LUN. You can run **show vlun type**=*all* to display all virtual LUN IDs.	None

Level

User with **administrator** permissions

Usage Guidelines

- Run **clear upconfig array_id**=*ID* to clear the configuration information about a specified storage system.

- Run **clear upconfig vlun_id**=*ID* to clear the configuration information about a specified virtual LUN.

Example

- Clear the configuration information about the storage system whose ID is **0**.
  ```
  UltraPath CLI #1 >clear upconfig array_id=0
  Succeeded in executing the command.
  ```

- Clear the configuration information about the virtual LUN whose ID is **1**.
  ```
  UltraPath CLI #1 >clear upconfig vlun_id=0
  Succeeded in executing the command.
  ```

System Response

None

A.3.40 Deleting Obsolete Physical Path Information

Function

The **clear obsolete_path** command is used to delete obsolete physical path information.

Format

clear obsolete_path path_id=*ID*

Parameters

Keyword and Parameter	Description	Default Value
path_id=*ID*	ID of a physical path. You can run **show path** without an ID to display all physical path IDs.	None

Level

User with **administrator** permissions

Usage Guidelines

□ NOTE

- If a storage system administrator changes the path network (for example, changes the Fibre Channel port connected to the storage system), some paths managed by UltraPath may enter faulty state, interfering the administrator's detection of faulty paths. In this case, run the command to delete the paths from UltraPath.

- On an operating system that does not support hot swap or when an iSCSI software initiator is used, changing path ports does not trigger SCSI device deletion on the corresponding host. The path information cannot be deleted, either. In this case, you need run the command provided by the operating system to refresh devices.

Example

Delete the information about the obsolete physical path whose ID is **1**.

```
UltraPath CLI #1 >clear obsolete_path path_id=1
Succeeded in executing the command.
```

System Response

None

A.3.41 Checking the Status of UltraPath

Function

The **check status** command is used to check UltraPath, including the check of exceptions, software integrity, and environment configuration.

Format

check status

Parameters

None

Level

User with **administrator** permissions

Usage Guidelines

The configuration of the UltraPath can be queried only after it is successfully installed.

Example

Check the status of UltraPath.

```
UltraPath CLI #1 >check status
-------------------------------------------------------------
Checking path status:
Serverity Array Type description
Major 210000e0fccecc85 No redundant controllers No redundant controllers.
```

```
-------------------------------------------------------------
Checking envirment and config:
All Check Passed.
-------------------------------------------------------------
```

System Response

None

A.3.42 Viewing Critical Events

Function

The **show event** command is used to view critical events about UltraPath.

Format

show event [**count**=*number*]

Parameters

Keyword and Parameter	Description	Default Value
count=*number*	Printing number of critical events. The value ranges from 1 to 10,000.	1000

Level

User with **administrator** permissions

Usage Guidelines

None

Example

View critical events of UltraPath that occurred on the current day.

```
UltraPath CLI #3 >show event
----------------------------------------------------------------------------------------
----------------------------------------------------------------------------------------
-------------------------------------------
   SN          Array                        Type
Time          Serverity
description
   1     210235G7FL10D8000013     Delete path from disk     2014-12-16
07:51:08:350000  warn  Delete a path from disk: LUN name {jlc_lun_13}, Host Lun
ID {13}, Initiator WWN {2101001b32be3f2e}, Target WWN {2213200bc71fa9be}.

   2     210235G7FL10D8000013         Add path to disk         2014-12-16
07:51:08:363000  info  Add a path to disk {12}: Host Lun ID {13}, Initiator WWN
{2101001b32be3f2e}, Target WWN {2213200bc71fa9be}.
```

```
    3      210235G7FL10D8000013     Delete path from disk      2014-12-16
07:51:08:988000  warn  Delete a path from disk: LUN name {jlc_lun_14}, Host Lun
ID {14}, Initiator WWN {2101001b32be3f2e}, Target WWN {2213200bc71fa9be}.

    4      210235G7FL10D8000013       Add path to disk        2014-12-16
07:51:09:001000  info  Add a path to disk {13}: Host Lun ID {14}, Initiator WWN
{2101001b32be3f2e}, Target WWN {2213200bc71fa9be}.

    5      210235G7FL10D8000013     Delete path from disk      2014-12-16
07:51:09:893000  warn  Delete a path from disk: LUN name {jlc_lun_15}, Host Lun
ID {15}, Initiator WWN {2101001b32be3f2e}, Target WWN {2213200bc71fa9be}.

    6      210235G7FL10D8000013       Add path to disk        2014-12-16
07:51:09:919000  info  Add a path to disk {14}: Host Lun ID {15}, Initiator WWN
{2101001b32be3f2e}, Target WWN {2213200bc71fa9be}.

    7      210235G7FL10D8000013     Delete path from disk      2014-12-16
07:51:10:595000  warn  Delete a path from disk: LUN name {jlc_lun_16}, Host Lun
ID {16}, Initiator WWN {2101001b32be3f2e}, Target WWN {2213200bc71fa9be}.

    8      210235G7FL10D8000013       Add path to disk        2014-12-16
07:51:10:620000  info  Add a path to disk {15}: Host Lun ID {16}, Initiator WWN
{2101001b32be3f2e}, Target WWN {2213200bc71fa9be}.

    9      210235G7FL10D8000013     Delete path from disk      2014-12-16
07:51:11:220000  warn  Delete a path from disk: LUN name {jlc_lun_1}, Host Lun ID
{1}, Initiator WWN {2101001b32be3f2e}, Target WWN {2203333533383336}.

   10      210235G7FL10D8000013       Add path to disk        2014-12-16
07:51:11:232000  info  Add a path to disk {0}: Host Lun ID {1}, Initiator WWN
{2101001b32be3f2e}, Target WWN {2203333533383336}.

--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
----------------------------------------
```

System Response

None

A.3.43 Manually Updating a Controller

Function

The **start rebalancelun** command is used to check whether a LUN's working controller settings are optimum and implement a working controller trespass if necessary.

Format

start rebalancelun=[**array_id**=*ID* | **vlun_id**=*ID*]

Parameters

Keyword and Parameter	Description	Default Value
array_id=*ID*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None

Keyword and Parameter	Description	Default Value
vlun_id=*ID*	ID of a virtual LUN. You can run **show vlun type**=*all* to display all virtual LUN IDs.	None

Level

User with **administrator** permissions

Usage Guidelines

📖**NOTE**

If a LUN's working controller settings are not optimum (for example, the working controller differs from the initially configured owning controller, resulting load imbalance), you can use this command to manually check the working controller and update the settings.

Example

On the CLI, run **upadm** to go to the command management interface. Then manually update the working controller.

```
UltraPath CLI #1 >start rebalancelun
Succeeded in executing the command.
```

System Response

None

A.3.44 Querying and Exporting Performance Statistics

Function

The **show iostat** command is used to display and export the performance statistics (IOPS, bandwidth and response time) about storage systems and virtual LUNs.

Format

Run the following command to query and export performance statistics of specified arrays:

show iostat array_id=*ID1,ID2,...* [**interval**=*time*] [**file_name**=*file_name* [**archive_time**=*archive_time*] [**duration**=*duration*]]

Run the following command to query and export performance statistics of specified virtual LUNs:

show iostat vlun_id=*ID1,ID2,...* [**type**={ *all* | *hypermetro* | *migration* }] [**interval**=*time*] [**file_name**=*file_name* [**archive_time**=*archive_time*] [**duration**=*duration*]]

Parameters

Parameter	Description	Default Value
array_id=*ID1,ID2,...*	Specifies IDs of storage systems. You can run **show array** to obtain all storage system IDs. **NOTE** You can query a maximum of eight storage systems' performance statistics at a time. Use comas (,) to separate storage systems.	None
vlun_id=*ID1,ID2,...*	Specifies IDs of virtual LUNs. You can run **show vlun type**=*all* to obtain all virtual LUN IDs. **NOTE** You can query a maximum of eight virtual LUNs' performance statistics at a time. Use comas (,) to separate virtual LUN IDs.	None
type={ *all* | *hypermetro* | *migration* }	View the virtual LUN information of a specific type. If the **type** parameter is not specified, common virtual LUN information will be queried. Possible values are all, hypermetro, and migration, where: ● all: all the virtual LUNs ● hypermetro: virtual HyperMetro LUNs ● migration: virtual migration LUNs	None
interval=*time*	Specifies an interval for performance statistics collection. The value ranges from 1 to 60, expressed in seconds.	1

Parameter	Description	Default Value
file_name=*file_name*	Specifies the saving path and name of the performance statistics report. **NOTE** You are not required to specify the saving path but must specify the name of the performance report. The system automatically adds suffix **.CSV** to the name. If a saving path is not specified, the report is saved in the **perf_log** file folder of the UltraPath log directory.	C:\Program Files (x86)\UltraPath\log\perf_log or C:\Program Files \UltraPath\log\perf_log
archive_time=*archive_time*	Specifies an interval for performance statistics collection. The value can be 5, 60, 120, 300, 1800, and 3600, expressed in seconds. **NOTE** This parameter is valid only when **file_name** is specified. The system writes performance data to the report at the specified time interval.	60
duration=*duration*	Statistics duration The value ranges from 60 to 259,200, expressed in seconds. **NOTE** This parameter is valid only when **file_name** is specified. The system stops performance statistics after the specified duration.	900

Level

User with **administrator** permissions

Usage Guidelines

- When performance statistics is being collected, you can press **Ctrl+C** to end the collection.
- If a performance report with the specified name exists in the path, the function of performance statistics is not supported. Delete the existing report or enter a new name. Then export the report.

● If the remaining space of the directory to save the report is smaller than 180 MB, the performance report cannot be exported.

Example

● View performance statistics of the storage system whose ID is **0** at an interval of **30** seconds.

```
UltraPath CLI #3 >show iostat array_id=0 interval=30
==============================================================================
=======
                              IO Performance
Information
==============================================================================
=======
                   IOPS                    KB/S              response
time(ms)
            Total  |Read   |Write   Total  |Read   |Write   Total   |
Read     |Write
Array 0     0      |0      |0       0      |0      |0       0        |
0        |0
Controller 1
Phypath 0  :0      |0      |0       0      |0      |0       0        |
0        |0
Phypath 1  :0      |0      |0       0      |0      |0       0        |
0        |0


==============================================================================
=======
```

● View performance statistics of the virtual LUNs whose IDs are **0**, **1**, **2**, and **3** at an interval of **30** seconds.

```
UltraPath CLI #4 >show iostat vlun_id=0,1,2,3 interval=30
==============================================================================
=======
                              IO Performance
Information
==============================================================================
=======
                   IOPS                    KB/S              response
time(ms)
            Total  |Read   |Write   Total  |Read   |Write   Total   |
Read     |Write
VLUN 0      0      |0      |0       0      |0      |0       0        |
0        |0
Controller 0B
Path 0     :0      |0      |0       0      |0      |0       0        |
0        |0
Path 1     :0      |0      |0       0      |0      |0       0        |
0        |0
==============================================================================
=======
VLUN 1      0      |0      |0       0      |0      |0       0        |
0        |0
Controller 0B
Path 0     :0      |0      |0       0      |0      |0       0        |
0        |0
==============================================================================
=======
VLUN 2      0      |0      |0       0      |0      |0       0        |
0        |0
Controller 0B
Path 0     :0      |0      |0       0      |0      |0       0        |
0        |0
==============================================================================
=======
VLUN 3      0      |0      |0       0      |0      |0       0        |
0        |0
Controller 0B
```

```
Path 0     :0       |0      |0     0      |0      |0      0      |
0      |0
==============================================================================
=======
```

- Query performance statistics about HyperMetro virtual LUN **4**.

```
UltraPath CLI #4 >show iostat vlun_id=4 type=hypermetro
==============================================================================
=======
                              IO Performance
Information
==============================================================================
=======
                    IOPS                       KB/S              response
time(ms)
          Total   |Read   |Write  Total  |Read   |Write  Total  |
Read    |Write
VLUN 4    0       |0      |0      0      |0      |0      0      |
0       |0
Lun  Array 210235G6GSZ0C5000004
Controller 0A
Path 1     :0      |0      |0      0      |0      |0      0      |
0       |0
Controller 0B
Path 0     :0      |0      |0      0      |0      |0      0      |
0       |0
Lun  Array 210235G6GSZ0C2000008
Controller 0A
Path 2     :0      |0      |0      0      |0      |0      0      |
0       |0
Controller 0B
Path 3     :0      |0      |0      0      |0      |0      0      |
0       |0
==============================================================================
=======
```

- Query performance statistics about virtual LUN **0** and export the data to the default path.

```
UltraPath CLI #1 >show iostat vlun_id=0 file_name=perfLogFile
==============================================================================
=======
                          IO Performance Information
==============================================================================
=======
                    IOPS                       KB/S              response
time(ms)
          Total   |Read   |Write  Total  |Read   |Write  Total  |
Read    |Write
VLUN 0    9389    |9389   |0      38457  |38457  |0      0      |
0       |0
Controller 0A
Path 1     :9389   |9389   |0      38457  |38457  |0      0      |
0       |0
Controller 0B
Path 0     :0      |0      |0      0      |0      |0      0      |
0       |0
==============================================================================
=======
```

- Query performance statistics about virtual LUN **0** and export the data to the specified path. Specify the statistics interval to 5s and duration to 1000s.

```
UltraPath CLI #1 >show iostat vlun_id=0 file_name=D:\Ultrapath_PerfLog
\perfLogFile archive_time=5 duration=1000
==============================================================================
=======
                          IO Performance Information
==============================================================================
=======
                    IOPS                       KB/S              response
time(ms)
          Total   |Read   |Write  Total  |Read   |Write  Total  |
```

```
Read     |Write
VLUN 0      9559   |9559    |0       39153    |39153   |0       0        |
0        |0
Controller 0A
Path 1    :9559    |9559    |0       39153    |39153   |0       0        |
0        |0
Controller 0B
Path 0    :0       |0       |0       0        |0       |0       0        |
0        |0
============================================================================
=======
```

System Response

The system generates a performance report with suffix **.CSV** in the specified or default path.

A.3.45 Producing a Randow Number

Function

genprkey command is used to produce a randow number with nineteen bytes

Format

genprkey

Parameters

None

Level

User with **administrator** permissions

Usage Guidelines

This commond run once when UltraPath installing, the nineteen bytes randow number will be written to regedit file to make UltraPath work in SCSI-2 cluster.

Example

Run **genprkey** command. To produce an a randow number with nineteen bytes

```
UltraPath CLI #1 >genprkey
1688015227050849615
```

System Response

None

A.4 LUN Management Commands

LUN management commands include commands for viewing storage system information and virtual disk information.

📖**NOTE**

If the storage array name or LUN name on the storage array is Chinese and the encoding format of the login tool does not support Chinese characters, UltraPath will display marbled characters after command execution. If this occurs, change the encoding format of the login tool so that Chinese characters are supported.

A.4.1 Querying Storage System Information

Function

The **show array** command is used to query information about a specified or all storage systems connected to the application server.

Format

show array [**id**=*ID1,ID2,...* [**verbose**]]

Parameters

Keyword and Parameter	Description	Default Value
id=*ID1,ID2,...*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None
verbose	Viewing details configuration information about a specified storage system. **NOTE** 　Parameter **verbose** can display details configuration information about a specified storage system only when it is used with parameter **id**.	None

Level

User with **administrator** permissions

Usage Guidelines

- Run **show array** to view information about all storage systems connected to the application server.

- Run **show array id**=*ID1,ID2...* to view information about a specified storage system.

- Run **show array id**=*ID1,ID2...* **verbose** to view details configuration information about the storage system.

Example

- Run the following command to query information about all storage systems connected to the application server:

```
UltraPath CLI #9 >show array
--------------------------------------------------------------------------------
--------
 Array ID          Name                    Array SN         Vendor Name
Product Name
    0               S5300          2102315401Z083000004   HUAWEI
S5300
    1      SN_210235G6EDZ0C2000001  210235G6EDZ0C2000001   HUASY
S5600T
--------------------------------------------------------------------------------
--------
```

- Run the following command to view information about the storage system whose ID is **1**:

```
UltraPath CLI #10 >show array id=1
=======================================================
                 Array#1 Information
=======================================================
Name          : SN_210235G6EDZ0C2000001
Array SN      : 210235G6EDZ0C2000001
Vendor Name   : HUASY
Product Name  : S5600T
Controller 0A
       Status  : Enable
       LunCount: 4
       PathInfo:
                Path1: Normal
Controller 0B
       Status  : Enable
       LunCount: 4
       PathInfo:
                Path0: Normal
=======================================================
```

- Run the following command to view details configuration information about the storage system whose ID is **0**.

```
UltraPath CLI #2 >show array id=0 verbose
=======================================================
                 Array#0 Information
=======================================================
Name          : HUAWEIS5500T
Array SN      : 210235G6GRZ0C4000008
Vendor Name   : HUASY
Product Name  : S5500T
Controller 0A
       Status  : Enable
       LunCount: 2
       PathInfo:
                Path0: Normal
Working Mode  : load balancing within controller
LUN Trespass  : on
LoadBalance Mode        : min-queue-depth
Loadbanlance io threshold : 1
Io Suspension Time      : 60
Max io retry timeout    : 1800
=======================================================
```

System Response

The following table explains some parameters in the command output:

Parameter	Description	Default Value
Name	Name of the storage system.	None
Array SN	Serial No. of the storage system.	None
Vendor Name	Vendor of the storage system.	None
Product Name	Model of the storage system.	None
Controller	Name of the controller. **NOTE** ● If **Remote** information is displayed after the controller name, the controller is a remote controller. ● You can only view the information about a maximum of eight paths on one controller.	None

A.4.2 Viewing Virtual LUN Information

Function

The **show vlun** command is used to query information about a specified LUN or all LUNs mapped from a storage system to an application server.

Format

show vlun [**array_id**=*ID1,ID2,...*] [**type**={ *all* | *hypermetro* | *migration* }]

show vlun id=*ID1,ID2...* [**type**={ *all* | *hypermetro* | *migration* }] [**verbose**]

Parameters

Keyword and Parameter	Description	Default Value
array_id=*ID1,ID2,...*	ID of a storage system. You can run **show array** without an ID to display all storage system IDs. **NOTE** You can query a maximum of eight storage systems' performance statistics at a time. Use comas (,) to separate storage systems.	None
id=*ID1,ID2...*	ID of a virtual LUN. You can run **show vlun type**=*all* to display all virtual LUN IDs. **NOTE** You can query a maximum of eight virtual LUNs' performance statistics at a time. Use comas (,) to separate virtual LUN IDs.	None
verbose	Viewing details configuration information about a virtual LUN. **NOTE** Parameter **verbose** views details configuration information about a virtual LUN only when it is used with parameter **id**.	None
type={ *all* | *hypermetro* | *migration*	View the virtual LUN information of a specific type. If the **type** parameter is not specified, common virtual LUN information will be queried. Possible values are all, hypermetro, and migration, where: ● all: all virtual LUNs ● hypermetro: virtual HyperMetro LUNs ● migration: virtual migration LUNs	None

Level

User with **administrator** permissions

Usage Guidelines

- Run **show vlun** to query information about all common virtual LUNs mounted on the application server.

- Run **show vlun array_id**=*ID1,ID2,...* to view common virtual LUN information about a specified storage system.

- Run **show vlun id**=*ID1,ID2...* to view information about a specified common virtual LUN.

- Run **show vlun id**=*ID1,ID2...***verbose** to view details configuration information about a common virtual LUN.

- Run **show vlun type**=*all* to query information about all virtual LUNs mounted on the application server.

- Run **show vlun array_id**=*ID1,ID2,...* **type**=*all* to view all virtual LUN information about a specified storage system.

- Run **show vlun type**=*hypermetro* to query information about all virtual HyperMetro LUNs mounted on the application server.

- Run **show vlun id**=*ID1,ID2...* **type**=*all* to view information about a specified virtual LUN.

- Run **show vlun id**=*ID1,ID2...* **type**=*hypermetro* to view information about a specified virtual HyperMetro LUN.

Example

- View information about all common virtual LUNs.

```
UltraPath CLI #0 >show vlun
--------------------------------------------------------------------------------
-----------------------------------------------------------------
 Vlun ID       Disk          Name                  Lun WWN
Status Capacity Ctrl(Own/Work)     Array Name      Dev Lun ID
    0          sdb          hl_luntest    630d17e100b33e3900135b9900000024
Normal  1.00GB         0A/0B      Huawei.Storage         36
    1          sdc          hl_luntest_2  630d17e100b33e3909eae968000000f2
Normal  1.00GB         0A/0B      Huawei.Storage         242
--------------------------------------------------------------------------------
-----------------------------------------------------------------
```

- View common virtual LUN information about the storage system whose ID is **0**.

```
UltraPath CLI #0 >show vlun array_id=0
--------------------------------------------------------------------------------
-----------------------------------------------------------------
 Vlun ID       Disk          Name                  Lun WWN
Status Capacity Ctrl(Own/Work)     Array Name      Dev Lun ID
    0          sdb          hl_luntest    630d17e100b33e3900135b9900000024
Normal  1.00GB         0A/0B      Huawei.Storage         36
    1          sdc          hl_luntest_2  630d17e100b33e3909eae968000000f2
Normal  1.00GB         0A/0B      Huawei.Storage         242
--------------------------------------------------------------------------------
-----------------------------------------------------------------
```

- View details about the common virtual LUN whose ID is **1**.

```
UltraPath CLI #2 >show vlun id=1
=====================================================
                 VLUN#1 Information
```

```
=======================================================
Disk             : sdc
Name             : hl_luntest_2
Status           : Normal
Capacity         : 1.00GB
Driver           : Vendor-specific(DEFAULT)
Product Name     : XSG1
Vendor Name      : HUAWEI
Owning Controller : 0A
Working Controller: 0B
Num of Paths     : 1
LUN WWN          : 630d17e100b33e3909eae968000000f2
Array Name       : Huawei.Storage
Controller 0B
Path 0 [1:0:0:2] (up-1)  : Normal
Dev Lun ID       : 242
Manual IO Suspension  : Off
-------------------------------------------------------
```

● View details configuration information about a common virtual LUN whose ID is **1**.

```
UltraPath CLI #2 >show vlun id=1 verbose
=======================================================
                VLUN#1 Information
=======================================================
Disk             : sdc
Name             : hl_luntest_2
Status           : Normal
Capacity         : 1.00GB
Driver           : Vendor-specific(DEFAULT)
Product Name     : XSG1
Vendor Name      : HUAWEI
Owning Controller : 0A
Working Controller: 0B
Num of Paths     : 1
LUN WWN          : 630d17e100b33e3909eae968000000f2
Array Name       : Huawei.Storage
Controller 0B
Path 0 [1:0:0:2] (up-1)  : Normal
Working Mode     : load balancing within controller
LUN Trespass     : on
LoadBalance Mode  : min-queue-depth
Loadbanlance io threshold : 1
Io Suspension Time      : 60
Max io retry timeout    : 1800
Dev Lun ID       : 242
Manual IO Suspension  : Off
-------------------------------------------------------
```

● View information about all virtual LUNs.

```
UltraPath CLI #0 >show vlun type=all
-----------------------------------------------------------------------------
-------------------------------------------------------------
Vlun ID   Disk Name            Lun WWN                          Status
Capacity   Ctrl(Own/Work)       Array Name     Dev Lun ID
0        sdb  hl_luntest   630d17e100b33e3900135b9900000024    Normal
1.00GB     0A/0B        Huawei.Storage    36
1        sdc  hl_luntest_2 630d17e100b33e3909eae968000000f2    Normal
1.00GB     0A/0B        Huawei.Storage    242
2        sdd  shuanghuo_A  630d17e100b33e3909912496800000031   Normal
1.00GB     0A/0B        Huawei.Storage    12
2        sdd  shuanghuo_B  630d17e100b33e3909912496800000031   Normal
1.00GB     0A/0B        Huawei.Storage    12
-----------------------------------------------------------------------------
-------------------------------------------------------------
```

● View all virtual LUN information about the storage system whose ID is **0**.

```
UltraPath CLI #7 >show vlun array_id=0 type=all
-----------------------------------------------------------------------------
----------------------------------------------------
 Vlun ID  Disk     Name                   Lun WWN          Status
```

```
Capacity  Ctrl(Own/Work)    Array Name    Dev Lun ID
    0     sdb   remote0000  63400a31000d9c5f01415fb500000008  Fault
0.00KB     0B/0B      Huawei.Storage48     --
    1     sdc   remote0001  63400a31000d9c5f01415fd700000009  Fault
0.00KB     0A/0A      Huawei.Storage48     --
    2     sdd   remote0002  63400a31000d9c5f0141600b0000000a  Fault
0.00KB     0B/0B      Huawei.Storage48     --
    3     sde   remote0003  63400a31000d9c5f014160330000000b  Fault
0.00KB     0A/0A      Huawei.Storage48     --
    4     sdf   test20002   64846fb1008ca15f08c0007000000042  Normal
1.00GB     0A/0A      Huawei.Storage48     --
    5     sdg   test20003   64846fb1008ca15f08c0009700000043  Normal
1.00GB     0B/0B      Huawei.Storage48     --
-------------------------------------------------------------------------------
-----------------------------------------------------
```

- View information about all virtual HyperMetro LUNs.

```
UltraPath CLI #0 >show vlun type=hypermetro
-------------------------------------------------------------------------------
-----------------------------------------------------
Vlun ID   Disk Name            Lun WWN                      Status
Capacity   Ctrl(Own/Work)    Array Name   Dev Lun ID
2         sdd  shuanghuo_A    630d17e100b33e3909124968000000031  Normal
1.00GB     0A/0B      Huawei.Storage      12
2         sdd  shuanghuo_B    630d17e100b33e3909124968000000031  Normal
1.00GB     0A/0B      Huawei.Storage      12
-------------------------------------------------------------------------------
-----------------------------------------------------
```

- View details about the virtual LUN whose ID is **0**.

```
UltraPath CLI #10 >show vlun id=0 type=all
=======================================================
                 VLUN#0 Information
=======================================================
Disk                 : sdb
Manual IO Suspension   : Off
Aggregation Type       : Hyper Metro
Aggregation Specific Attribution
    WorkingMode         : read write between both arrays
    Primary Array SN    : 210235980510E8000015
Aggregation Member#0 Infomation
    Name              : local0000
    Status            : Normal
    Capacity          : 2.00GB
    Aggregation Specific Attribution : N/A
    LUN WWN           : 63400a31000d9c5f01415fb500000008
    Array Name        : Huawei.Storage46
    Array SN          : 210235980510E8000015
    Driver            : Vendor-specific(DEFAULT)
    Product Name      : XSG1
    Vendor Name       : HUAWEI
    Owning Controller : 0A
    Working Controller: 0A
    Num of Paths      : 4
    Controller 0A
    Path 3 [3:0:3:1] (up-12)  : Normal
    Path 7 [4:0:3:1] (up-28)  : Normal
    Controller 0B
    Path 2 [3:0:2:1] (up-8)  : Normal
    Path 6 [4:0:2:1] (up-24)  : Normal
Aggregation Member#1 Infomation
    Name              : remote0000
    Status            : Fault
    Capacity          : 0.00KB
    Aggregation Specific Attribution : N/A
    LUN WWN           : 63400a31000d9c5f01415fb500000008
    Array Name        : Huawei.Storage48
    Array SN          : SN987654321076543210
    Driver            : Vendor-specific(DEFAULT)
    Product Name      : XSG1
```

```
       Vendor Name      : HUAWEI
       Owning Controller : 0B
       Working Controller: 0B
       Num of Paths     : 4
       Controller 0A
       Path 1 [3:0:1:1] (up-4)  : Fault
       Path 5 [4:0:1:1] (up-20)  : Fault
       Controller 0B
       Path 0 [3:0:0:1] (up-0)  : Fault
       Path 4 [4:0:0:1] (up-16)  : Fault
       ---------------------------------------------------------
```

● View details about the virtual HyperMetro LUN whose ID is **2**.

```
UltraPath CLI #0 >show vlun id=2 type=hypermetro
========================================================
                  VLUN#2 Information
========================================================
Disk                     : sdd
Manual IO Suspension     : Off
Aggregation Type         : Hyper Metro
Aggregation Specific Attribution
    WorkingMode             : read write between both arrays
    Primary Array SN        : 210235G6GSZ0C5000004
Aggregation Member#0 Infomation
    Name              : shuangh_A
    Status            : Normal
    Capacity          : 1.00GB
    Aggregation Specific Attribution : N/A
    LUN WWN           : 630d17e100b33e390912496800000031
    Array Name        : Array8.1
    Array SN          : 210235G6GSZ0C5000004
    Driver            : Vendor-specific(DEFAULT)
    Product Name      : S5500T
    Vendor Name       : HUASY
    Reservation       : 0
    Queued I/O        : 0
    Owning Controller : 0A
    Working Controller: 0A
    Num of Paths      : 2
    Controller 0A
    Path 1 [5:0:0:2] (up-5)  : Normal
    Controller 0B
    Path 0 [4:0:0:2] (up-2)  : Normal
Aggregation Member#1 Infomation
    Name              : shuangh_B
    Status            : Normal
    Capacity          : 1.00GB
    Aggregation Specific Attribution : N/A
    LUN WWN           : 630d17e100b33e390912496800000031
    Array Name        : SN_210235G6GSZ0C2000008
    Array SN          : 210235G6GSZ0C2000008
    Driver            : Vendor-specific(DEFAULT)
    Product Name      : S5500T
    Vendor Name       : HUASY
    Reservation       : 0
    Queued I/O        : 0
    Owning Controller : 0B
    Working Controller: 0A
    Num of Paths      : 2
    Controller 0A
    Path 2 [3:0:0:0] (up-6)  : Normal
    Controller 0B
    Path 3 [7:0:0:0] (up-7)  : Normal
    ---------------------------------------------------------
```

System Response

The following table explains some parameters in the command output:

Parameter	Description	Default Value
Disk	Name of the disk that corresponds to the virtual LUN on an host.	None
Name	Name of the virtual LUN **NOTE** The name is specified when the LUN is created on its storage array.	None
Status	Status of the virtual LUN. Possible values are as follows: ● Normal: The virtual LUN is normal. ● Fault: The virtual LUN is faulty. ● Degraded: The virtual LUN is degraded. ● Unavailable: The virtual LUN is unavailable. **NOTE** ● If the LUN on the array is in **Fault** state while the virtual LUN on the host is in **Available** state (viewed by using UltraPath), the virtual LUN can be accessed by the host. ● If you remap a LUN from the storage array to a host but do not rescan LUNs on the host, the mapping between the LUN on the storage array and the virtual LUN changes and the status of the virtual LUN is **Unavailable**.	None
Capacity	Capacity of the virtual LUN	None
Product Name	Model of the storage system	None
Vendor Name	Vendor of the storage system	None
Num of Paths	Number of logical paths **NOTE** You can only view the information about a maximum of eight paths on one controller.	None

Parameter	Description	Default Value
LUN WWN	WWN of the virtual LUN	None
Dev Lun ID	ID of the storage system LUN corresponding to the virtual LUN	None
Manual IO Suspension	Manual I/O suspension time of the virtual LUN.	None
Aggregation Type	Type of the aggregation LUN. Possible values are as follows: ● Hyper Metro: virtual HyperMetro LUNs ● Migration: virtual migration LUNs.	None
Aggregation Specific Attribution	Attribution of the aggregation LUN. For virtual HyperMetro LUNs: ● WorkingMode: working mode for virtual HyperMetro LUNs. ● Primary Array SN: SN of the primary array. For migration virtual LUNs: ● IO Direction: switch I/O to the target array or source array. ● Rollback: enable or disable automatic I/O switchback.	None

A.4.3 Update the disks' driver

Function

start diskdriverupdatecommand is used to manually update the disks' driver, associating with UltraPath to their most matched driver.

Format

start diskdriverupdate *[mode=[1|2|3]]*

This command without "mode" option is recommended.

Parameters

- 1: Execute the cmd in its subprocess with no window.
- 2: Execute the cmd in its subprocess with minimized window.
- 3: Execute the cmd silently without risk prompt.

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Run **start diskdriverupdate** command.

```
UltraPath CLI #1 >start diskdriverupdate

Execute this command may affect the stability of the application you're running
or even result in more serious consequences.
Are you sure still want to execute it [y,n]: y

Enumerate disks ...
Enumerate hba disks ...
No disk need to update driver.
Enumerate disks ...
Enumerate mpio disks ...
No disk need to update driver.
Enumerate disks ...
Enumerate upio disks ...
No disk need to update driver.
Command executed successfully.
```

System Response

None

A.4.4 Setting the Size of a HyperMetro Fragment

Function

The **set hypermetro split_size** command is used to set the fragment size when HyperMetro cross-array load balancing is applied.

Format

set hypermetro split_size=*size* [**vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* }]

Parameters

Parameter	Description	Default Value
split_size=*size*	Fragment size. The value ranges from 512 bytes to 1 GB. The unit is byte. **NOTE** The value must be an integer multiple of 512 and a power of 2.	128 MB
vlun_id={ *ID* | *ID1,ID2...* | *ID1-ID2* }	ID of an virtual HyperMetro LUN. Run the **show vlun type**=*hypermetro* command to obtain the IDs of the virtual HyperMetro LUNs.	None

Level

User with **administrator** permissions

Usage Guidelines

- Run the **set hypermetro split_size**=*size* command to set the HyperMetro fragment size for all storage systems.

- Run the **set hypermetro split_size**=*size* **vlun_id**={ *ID* \| *ID1,ID2...* \| *ID1-ID2* } command to set the HyperMetro fragment size of the virtual LUNs.

  NOTE

  - **vlun_id**=*ID*: ID of a single virtual LUN.

  - **vlun_id**=*ID1,ID2...*: IDs of multiple virtual LUNs which are not necessarily related.

  - **vlun_id**=*ID1–ID2*: IDs of all the virtual LUNs from ID1 to ID2.

Example

- Set the HyperMetro fragment size to 128 MB for all storage systems.

  ```
  UltraPath CLI #2 >set hypermetro split_size=128M
  Succeeded in executing the command.
  ```

- Set the HyperMetro fragment size of the virtual LUNs whose ID is **0** to 128 MB.

  ```
  UltraPath CLI #3 >set hypermetro split_size=128M vlun_id=0
  Succeeded in executing the command.
  ```

System Response

None

A.4.5 Setting the HyperMetro Working Mode

Function

The **set hypermetro workingmode** command is used to set the HyperMetro working mode.

Format

set hypermetro workingmode={ *priority | balance* } **primary_array_id**=*ID* [**vlun_id**={ *ID | ID1,ID2... | ID1-ID2* }]

Parameters

Parameter	Description	Default Value
workingmode={ *priority	balance* }	HyperMetro working mode. Possible values are priority and balance, where: ● priority: primary array mode ● balance: load balance mode	priority
primary_array_id=*ID*	ID of the primary array. You can run **show array** to display all array IDs. **NOTE** ● In priority mode, the primary array indicates the array that delivers I/O first. ● In balance mode, the primary array indicates the array where the first fragment range resides. ● If an array is connected to multiple hosts, the array ID varies on different hosts. Use the array SN to determine whether the arrays queried on different hosts are the same.	None
vlun_id={ *ID	ID1,ID2...	ID1-ID2* }	ID of an virtual HyperMetro LUN. Run the **show vlun type**=*hypermetro* command to obtain the IDs of the virtual HyperMetro LUNs.	None

Level

User with **administrator** permissions

Usage Guidelines

> 📖**NOTE**
>
> Setting the HyperMetro working mode of a specified virtual LUN with a higher priority than that of storage systems. If the HyperMetro working mode of a virtual LUN has been set, its working mode remains unchanged after the HyperMetro working mode of storage systems is set.

- When the working mode is set to primary array mode, UltraPath delivers I/Os to the priority array. UltraPath will deliver I/Os to non-priority arrays only when the primary array encounters a fault.

- When the working mode is set to load balance mode, UltraPath chooses to deliver a specific array based on the start address of I/Os, fragment size, and priority array.

  For example, if the fragment size is 128 MB, then the I/Os with start addresses from 0 MB to 128 MB are delivered to the priority array, and the I/Os with start addresses from 128 MB to 256 MB are delivered to non-priority arrays.

- Run the **set hypermetro workingmode**={ *priority* | *balance* } **primary_array_id** command to set the HyperMetro working mode for all storage systems.

- Run the **set hypermetro workingmode**={ *priority* | *balance* } **primary_array_id**=*ID* **vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* } command to set the HyperMetro working mode of a specific virtual LUN.

  > 📖**NOTE**
  >
  > - **vlun_id**=*ID*: ID of a single virtual LUN.
  > - **vlun_id**=*ID1,ID2...*: IDs of multiple virtual LUNs which are not necessarily related.
  > - **vlun_id**=*ID1–ID2*: IDs of all the virtual LUNs from ID1 to ID2.

Example

- Set the HyperMetro working mode to **primary array mode** for all storage systems, and set the storage systems whose ID is **0**, to the primary array.

  ```
  UltraPath CLI #2 >set hypermetro workingmode=priority primary_array_id=0
  Succeeded in executing the command.
  ```

- Set the HyperMetro working mode of the virtual LUNs whose ID is **0**, to **primary array mode**, and set the storage systems whose ID is **0**, to the primary array.

  ```
  UltraPath CLI #3 > set hypermetro workingmode=priority primary_array_id=0
  vlun_id=0
  Succeeded in executing the command.
  ```

System Response

None

A.4.6 Configuring I/O Switchover

Function

The **start migration** is used to switch over I/Os to the target array or the source array.

Format

start migration vlun_id=*ID* **direction**={ *source* | *target* } **rollback**={ *enable* | *disable* }

Parameters

Parameter	Description	Default Value
vlun_id=*ID*	ID of a virtual LUN. Run the **show vlun** command to obtain the ID of a virtual LUN.	None
direction={ *source* | *target* }	Switch I/O to the target array or source array. Possible values are source and target, where: ● source: switch I/O to the source array. ● target: switch I/O to the target array.	None
rollback={ *enable* | *disable* }	Enable or disable automatic I/O switchback. Possible values are enable or disable, where: ● enable: automatic I/O switchback is enabled. If an online migration fails, I/Os can be switched back to the source array. NOTE This value can be used only when **direction** equals *target*. ● disable: automatic I/O switchback is disabled. If an online migration fails, I/Os cannot be switched back to the source array.	None

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Switch over the I/Os of the LUN whose ID is **0** to the target array and enable automatic switchback.

```
UltraPath CLI #3 >start migration vlun_id=0 direction=target rollback=enable
Succeeded in executing the command.
```

System Response

None

A.4.7 Suspending I/Os of a Virtual LUN

Function

The **start iosuspension** command is used to suspend I/Os of a specific LUN.

Format

start iosuspension vlun_id=*ID* **timeout**=*value*

Parameters

Parameter	Description	Default Value
vlun_id=*ID*	ID of a virtual LUN. Run the **show vlun** command to obtain the ID of a virtual LUN.	None
timeout=*value*	I/O suspension timeout period. The value ranges from 1 to 2,592,000, expressed in seconds. You are advised to set the value to 20 seconds.	None

Level

User with **administrator** permissions

Usage Guidelines

start iosuspension is a blocking command. It runs only when all I/Os of a specific LUN return to UltraPath.

Example

Set the I/O suspension time of the LUN whose ID is **0** to 20 seconds.

```
UltraPath CLI #3 >start iosuspension vlun_id=0 timeout=20
Succeeded in executing the command.
```

System Response

None

A.4.8 Stopping I/O Suspension of a Virtual LUN

Function

The **start iosuspension** command is used to stop I/O suspension of the a specific LUN.

Format

stop iosuspension vlun_id=*ID*

Parameters

Parameter	Description	Default Value
vlun_id=*ID*	IDs of the virtual LUNs. Run the **show vlun** command to obtain the ID of a virtual LUN.	None

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Stop I/O suspension of the virtual LUN whose ID is **0**.

```
UltraPath CLI #3 >stop iosuspension vlun_id=0
Succeeded in executing the command.
```

System Response

None

A.5 UltraPath Other Commands

Introduce UltraPath other commands that are excluded in above.

A.5.1 Showing Array Models Supported by the UltraPath

Function

The **show supportarraylist** command is used to show all disk array models supported by the UltraPath.

Format

show supportarraylist

Parameters

None

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Show all disk array models supported by the UltraPath.

```
UltraPath CLI #0 >show supportarraylist

Vendor    Product
------------------------------
HUAWEI    S6800E
HUAWEI    V1500
HUAWEI    V1500N
HUAWEI    V1800
HUAWEI    S2100
HUAWEI    S2300
HUAWEI    S2300E
HUAWEI    S2600
HUAWEI    S2900
HUAWEI    S5300
HUAWEI    S5100
HUAWEI    S5500
HUAWEI    S5600
HUAWEI    S8000-I
HUAWEI    V1600N
HUAWEI    S3900
HUAWEI    S6900
HUAWEI    S2200T
HUAWEI    S2600T
HUAWEI    S5500T
HUAWEI    S5600T
HUAWEI    S5800T
HUAWEI    S6800T
HUAWEI    S3900-M200
HUAWEI    S3900-M300
HUAWEI    S5900-M100
HUAWEI    S5900-M200
HUAWEI    S6900-M100
HUAWEI    Dorado2100
HUAWEI    Dorado5100
HUASY     S2600T
HUASY     S3900
HUASY     S5300
```

```
HUASY     S2200T
HUASY     S6900
HUASY     S5500T
HUASY     S5600T
HUASY     S5800T
HUASY     S6800T
HUASY     S3900-M200
HUASY     S3900-M300
HUASY     S5900-M100
HUASY     S5900-M200
HUASY     S6900-M100
HUASY     S8000-I
HUASY     Dorado2100
HUASY     Dorado5100
HUAWEI    VIS6000
HS        VIS6000
HUAWEI    VIS6000T
HS        VIS6000T
HS        V1500
HS        V1500N
HS        V1800
HS        S2100
HS        S2300
HS        S2300E
HS        S2600
HS        S2600T
HS        S5100
HS        S5300
HS        S5500
HS        S5600
HS        S6800E
HS        V1600N
HS        S8000-I
HS        S8000
HUAWEI    S8000
HUAWEI    Dorado2100 G2
HUAWEI    HVS85T
HUAWEI    HVS88T
HUAWEI    XSG1
Marstor   XSG1
UDsafe    XSG1
SanM      XSG1
AnyStor   XSG1
SUGON     XSG1
NETPOSA   XSG1
------------------------------
```

System Response

None

A.5.2 Adding a Disk Array Model Supported by the UltraPath

Function

The **add supportarraylist** command is used to add a disk array model supported by the UltraPath.

Format

add supportarraylist vendor=*<vendor_id>* **product**=*<product_id>*
[**driver**=*<driver_type>*]

Parameters

Keyword and Parameter	Description	Default Value
vendor=*\<vendor_id\>*	Vendor ID of a disk array. **NOTE** The ID contains a maximum of 8 characters. The space at the beginning and end of the ID are omitted. It is recommended that double quotation marks ("") are used to mark a vendor ID. If a vendor ID contains spaces, it must be marked with double quotation marks. The number of characters is a value ranging from 32 to 126 (32 ≤ ASCII code ≤ 126). The following characters are not supported: #^&=|\;><,"_	None
product=*\<product_id\>*	Product ID of a disk array. **NOTE** The ID contains a maximum of 16 characters. The space at the beginning and end of the ID are omitted. It is recommended that double quotation marks ("") are used to mark a vendor ID. If a vendor ID contains spaces, it must be marked with double quotation marks. The number of characters is a value ranging from 32 to 126 (32 ≤ ASCII code ≤ 126). The following characters are not supported: #^&=|\;><,"_	None
driver=*\<driver_type\>*	Driver type of a disk array. The value is **default**. **NOTE** It is recommended that double quotation marks ("") are used to mark the driver type of a disk array.	None

Level

User with **administrator** permissions

Usage Guidelines

In Windows, after a disk array model is added, the system must be restarted for the settings to take effect.

Example

Add a disk array model supported by the UltraPath.

```
UltraPath CLI #0 >add supportarraylist vendor="HUAWEI" product="S2600T"
driver="default"

Execute this command may affect the stability of the application you're running
or even result in more serious consequences.
You will add the array's information: vendor="HUAWEI" product="S2600T"
driver="default".

Are you sure still want to execute it [y,n]: y

Command executed successfully. You need to restart the computer to enable the
configuration.
```

System Response

None

A.5.3 Deleting a Disk Array Model Supported by the UltraPath

Function

The **del supportarraylist** command is used to delete a disk array model supported by the UltraPath.

Format

del supportarraylist vendor=<*vendor_id*> **product**=<*product_id*>

Parameters

Keyword and Parameter	Description	Default Value
vendor=<*vendor_id*>	Vendor ID of a disk array. **NOTE** The ID contains a maximum of 8 characters. The space at the beginning and end of the ID are omitted. It is recommended that double quotation marks ("") are used to mark a vendor ID. If a vendor ID contains spaces, it must be marked with double quotation marks. The number of characters is a value ranging from 32 to 126 (32 ≤ ASCII code ≤ 126). The following characters are not supported: #^&=|\;><,"_	None

Keyword and Parameter	Description	Default Value
product=<*product_id*>	Product ID of a disk array. **NOTE** The ID contains a maximum of 16 characters. The space at the beginning and end of the ID are omitted. It is recommended that double quotation marks ("") are used to mark a vendor ID. If a vendor ID contains spaces, it must be marked with double quotation marks. The number of characters is a value ranging from 32 to 126 (32 ≤ ASCII code ≤ 126). The following characters are not supported: #^&=|\;><,"_	None

Level

User with **administrator** permissions

Usage Guidelines

- In Windows, a mapped disk array model can be deleted.
- In Windows, after a disk array model is deleted, the system must be restarted for the settings to take effect.

Example

Delete a disk array model supported by the UltraPath.

```
UltraPath CLI #0 >del supportarraylist vendor="HUAWEI" product="S2600T"

Execute this command may affect the stability of the application you're running
or even result in more serious consequences.
You will delete the array's information: vendor="HUAWEI" product="S2600T".

Are you sure still want to execute it [y,n]: y

Command executed successfully. You need to restart the computer to enable the
configuration.
```

System Response

None

A.5.4 Executing a Non-disruptive Upgrade of UltraPath

Function

The **UltraPath-x.xx.xxx.exe** command is used to execute a non-disruptive upgrade of UltraPath.

Format

UltraPath-x.xx.xxx.exe /z"UPMODE:NDU [CPU:cpuvalue [MEMORY:memoryvalue [SPACE:spacevalue]]]"

📖**NOTE**

The installation package corresponding to the **UltraPath-x.xx.xxx.exe** command is UltraPath-8.06.007.exe that serves as an example.

Parameters

Keyword and Parameter	Description	Default Value
/z	The installation package is executed with parameters.	None
/z" "	The content within the double quotation marks is an non-disruptive upgrade control parameter.	None
UPMODE:NDU	Enables the non-disruptive upgrade mode.	None
CPU:cpuvalue	Set the maximum CPU usage for an non-disruptive upgrade. The value ranges from 0 to 100.	80
MEMORY:memoryvalue	Set the minimum system physical memory for an non-disruptive upgrade. The unit is MB. The value ranges from 0 to 2,147,483,647.	200
SPACE:spacevalue	Set the minimum system disk capacity for an non-disruptive upgrade. The unit is MB. The value ranges from 600 to 2,147,483,647.	1024

Level

User with **administrator** permissions

Usage Guidelines

Run the command to upgrade the UltraPath online.

Example

- Enable the non-disruptive upgrade mode.
  ```
  C:\> UltraPath-8.06.007.exe /z"UPMODE:NDU"
  ```

- Set the maximum CPU usage for an non-disruptive upgrade to 85% and enable the non-disruptive upgrade mode.
  ```
  C:\> UltraPath-8.06.007.exe /z"UPMODE:NDU CPU:85"
  ```

- Set the maximum CPU usage, minimum system physical memory, and minimum system disk capacity for an non-disruptive upgrade to 85%, 100 MB, and 1000 MB respectively and enable the non-disruptive upgrade mode.
  ```
  C:\> UltraPath-8.06.007.exe /z"UPMODE:NDU CPU:85 MEMORY:100 SPACE:1000"
  ```

System Response

After running the command, upgrade the UltraPath on the GUI.

A.5.5 Viewing the Status of the Host Alarm Push Switch

Function

show alarmenable is used to view the status of the host alarm push switch.

Format

show alarmenable

Parameters

None

Level

User with **administrator** permissions

Usage Guidelines

None

Example

View the alarm push switch for UltraPath:

```
UltraPath CLI #0 >show alarmenable
alarmenable: on
```

System Response

None

A.5.6 Setting the Switch of Host Alarm Push

Function

set alarmenable is used to set the switch of host alarm push.

Format

set alarmenable={ *on* | *off* }

Parameters

Parameter	Description	Default Value
alarmenable={ *on*	*off* }	Alarm push switch for UltraPath. The value can be **on** or **off**, where: ● **on**: Enables the alarm push switch. ● **off**: Disables the alarm push switch.	on

Level

User with **administrator** permissions

Usage Guidelines

● When the alarm push switch is enabled, UltraPath will detect the single-controller connectivity, link down, and link degrade, and send the link status to the storage system through alarms.

● When the alarm push switch is disabled, the alarms reported by UltraPath to arrays cannot be cleared on the arrays. Therefore, disable the switch cautiously.

Example

Disable the alarm push switch for UltraPath:

```
UltraPath CLI #0 >set alarmenable=off
If you close alarm enable, the host would not push alarm to the array, and the
alarm in array will not be cleared.
Are you sure you want to continue? [y,n]: y

Succeeded in executing the command.
Please clear the alarm in the array manually, thanks.
```

System Response

None

A.5.7 Viewing the Status of the UltraPath Link Degrade Switch

Function

show path_reliability_enable is used to view the status of the UltraPath link degrade switch.

Format

show path_reliability_enable

Parameters

None

Level

User with **administrator** permissions

Usage Guidelines

None

Example

View the status of the UltraPath link degrade switch:

```
UltraPath CLI #0 >show  path_reliability_enable
path reliabilityenable: on
```

System Response

None

A.5.8 Setting the Switch for UltraPath Link Degrade

Function

set path_reliability_enable is used to set the switch for UltraPath link degrade.

Format

set path_reliability_enable={ *on* | *off* }

Parameters

Parameter	Description	Default Value
path_reliability_enable={ *on* | *off* }	Link degrade switch for UltraPath. The value can be **on** or **off**, where: ● **on**: Enables the link degrade switch. ● **off**: Disables the link degrade switch.	on

Level

User with **administrator** permissions

Usage Guidelines

● When the link degrade switch is enabled, UltraPath will detect and isolate degraded links.

● When the link degrade switch is disabled, some faults cannot be isolated by UltraPath, which results in the deterioration of the host performance. Therefore, disable the switch cautiously.

Example

Disable the link degrade switch for UltraPath:

```
UltraPath CLI #0 >set path_reliability_enable=off

If you close reliability enable, this would abandon the path reliability check
and may infect the performance.
Are you sure you want to continue? [y,n]: y

Succeeded in executing the command.
```

System Response

None

A.5.9 Clearing Inactive Drivers in Online Upgrade Process

Function

The **UpgradeTool.exe** command is used to clear drivers that do not take effect during an online upgrade.

Format

UpgradeTool.exe -r

Parameters

Parameter	Description	Default Value
-r	Clear drivers that do not take effect during an online upgrade.	None

Level

User with **administrator** permissions

Usage Guidelines

Copy the **UpgradeTool.exe** file in the **\Windows\Packages\Upgrade** directory where the UltraPath for Windows software installation package is saved to any directory (directory A) of the Windows host. Use CLI to switch to directory A and run the **UpgradeTool.exe -r** command.

Run **UpgradeTool.exe -r** to clear drivers that do not take effect during an online upgrade.

Example

Clear drivers that do not take effect during the online upgrade.

```
UpgradeTool.exe –r
Clear invalid nxup driver success
```

System Response

None

A.5.10 Viewing the Running Status of the UltraPath Working Thread

Function

The **show workerstate** command is used to view the running status of the UltraPath working thread.

Format

show workerstate

Parameters

None

Level

User with **administrator** permissions

Usage Guidelines

This command is used to show the status of the UltraPath working thread. Administrators can view last refresh time and present time to determine whether the working thread is blocked and calculated the block duration.

Example

View the status of the UltraPath working thread.

```
UltraPath CLI #0 > show workerstate
worker name: USIImmediateWkq_1        last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: USIDefererdWkq_1         last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: KLSWriteLogWorkQueue_1   last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: VLMVLunNotifyWkq_1       last refresh time: 2016-07-26 08:13:06
present time: 2016-07-26 08:13:07
worker name: CodeStreamWorkQueue_1    last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: LPMSyncCmdPost_1         last refresh time: 2016-07-26 08:13:06
present time: 2016-07-26 08:13:07
worker name: LPMPathMgrWkq_1          last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PingSpecialWorkQueue_1   last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PingWorkQueue_1          last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PcmCmdWorkQueue_0_1      last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PcmCmdWorkQueue_1_1      last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PcmCmdWorkQueue_2_1      last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PcmCmdWorkQueue_3_1      last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PcmCmdWorkQueue_4_1      last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PCM_AttachCmdWkQueue_1   last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
```

System Response

Parameter	Description	Default Value
worker name	Working thread name.	None
last refresh time	Last refresh time of the working thread.	None
present time	Current system time, that is, execution time of the command.	None

B Files Related to the UltraPath

After the UltraPath is correctly installed on a Windows operating system, the UltraPath adds and modifies certain files that ensure its proper running. Do not modify or delete these files unnecessarily.

Files Added to the UltraPath

Name	File path	Description
cmd.ico deiverbloom.ico UltraPath Console.ico	C:\Program Files (x86)\UltraPath\bin	Shortcut icon.
configuration.properties	C:\Program Files (x86)\UltraPath\bin	Configuration file that controls the GUI language.
cfg_upgrade.exe	C:\Program Files (x86)\UltraPath\bin	UltraPath configuration tool.
installpost.exe	C:\Program Files (x86)\UltraPath\bin	UltraPath driver installation, upgrade, and uninstallation tool.
iscsiConfig.exe	C:\Program Files (x86)\UltraPath\bin; C:\Windows\System32	iSCSI initiator timeout parameter configuration tool.
kcfreg.exe	C:\Program Files (x86)\UltraPath\bin	UltraPath parameter configuration tool.
UltraPathConsole.exe	C:\Program Files (x86)\UltraPath\bin	GUI startup program.
upadm.exe	C:\Program Files (x86)\UltraPath\bin; C:\Windows\System32	UltraPath CLI execution program.

Name	File path	Description
uptool.exe	C:\Program Files (x86)\UltraPath\bin; C:\Windows\System32	Recovery tool that recovers disk drives to common disks after UltraPath is uninstalled.
libxml2_amd64.dll	C:\Program Files (x86)\UltraPath\bin; C:\Windows\System32	**libxml** library file used by 64-bit operating systems.
libxml2_i386.dll	C:\Program Files (x86)\UltraPath\bin; C:\Windows\System32	**libxml** library file used by 32-bit operating systems.
nxup.cat	C:\Program Files (x86)\UltraPath\bin; C:\Windows\System32\DriverStore\FileRepository	Security authentication file of the UltraPath nxup driver.
nxup.inf	C:\Program Files (x86)\UltraPath\bin; C:\Windows\System32\DriverStore\FileRepository	INF file of the UltraPath nxup driver.
nxup.sys	C:\Program Files (x86)\UltraPath\bin; C:\Windows\System32\drivers	Binary file of the UltraPath nxup driver.
nxupdsm.cat	C:\Program Files (x86)\UltraPath\bin; C:\Windows\System32\DriverStore\FileRepository	Security authentication file of the UltraPath nxupdsm driver.
nxupdsm.inf	C:\Program Files (x86)\UltraPath\bin; C:\Windows\System32\DriverStore\FileRepository	INF file of the UltraPath nxupdsm driver.
nxupdsm.sys	C:\Program Files (x86)\UltraPath\bin; C:\Windows\System32\drivers	Binary file of the UltraPath nxupdsm driver.
nxup_ext_a.cat	C:\Program Files (x86)\UltraPath\bin; C:\Windows\System32\DriverStore\FileRepository	Security authentication file of the UltraPath nxup_ext_a driver.

Name	File path	Description
nxup_ext_a.inf	C:\Program Files (x86)\UltraPath\bin; C:\Windows \System32\DriverStore \FileRepository	INF file of the UltraPath nxup_ext_a driver.
nxup_ext_a.sys	C:\Program Files (x86)\UltraPath\bin; C:\Windows \System32\drivers	Binary file of the UltraPath nxup_ext_a driver.
nxup_ext_b.cat	C:\Program Files (x86)\UltraPath\bin; C:\Windows \System32\DriverStore \FileRepository	Security authentication file of the UltraPath nxup_ext_b driver.
nxup_ext_b.inf	C:\Program Files (x86)\UltraPath\bin; C:\Windows \System32\DriverStore \FileRepository	INF file of the UltraPath nxup_ext_b driver.
nxup_ext_b.sys	C:\Program Files (x86)\UltraPath\bin; C:\Windows \System32\drivers	Binary file of the UltraPath nxup_ext_b driver.
updisk.cat	C:\Program Files (x86)\UltraPath\bin; C:\Windows \System32\DriverStore \FileRepository	Security authentication file of the UltraPath updisk driver.
updisk.inf	C:\Program Files (x86)\UltraPath\bin; C:\Windows \System32\DriverStore \FileRepository	INF file of the UltraPath updisk driver.
updisk.sys	C:\Program Files (x86)\UltraPath\bin; C:\Windows \System32\drivers	Binary file of the UltraPath updisk driver.
RestartComputer.cmd	C:\Program Files (x86)\UltraPath\bin	Command for restarting a computer.
up.conf user_cfg.xml user_cfg.xml.bak	C:\Program Files (x86)\UltraPath\bin	UltraPath configuration file.

Name	File path	Description
NxupService.dll	C:\Program Files (x86)\UltraPath\bin	Interface library for UltraPath GUI kernel interaction.
up_service.exe	C:\Windows\System32 C:\Windows\SysWOW64	UltraPath background service. ● System32 is applicable to 32-bit systems. ● SysWOW64 is applicable to 64-bit systems.
WatchRestart.vbs	C:\Program Files (x86)\UltraPath\bin	Script for scheduled computer restart reminding.
jre6u45*	C:\Program Files (x86)\UltraPath\bin	File related to JDK 6.45.
framework\lib*	C:\Program Files (x86)\UltraPath\bin	External JAR package on which GUI depends.
framework\framework.jar	C:\Program Files (x86)\UltraPath\bin	Framework file of GUI.

File Modified by the UltraPath

None.

C How to Obtain Help

If a problem persists in routine maintenance or troubleshooting, contact Huawei for technical support.

C.1 Preparations for Contacting Huawei

To better solve the problem, you need to collect troubleshooting information and make debugging preparations before contacting Huawei.

C.2 How to Use the Document

Huawei provides guide documents shipped with the device. The guide documents can be used to handle the common problems occurring in daily maintenance or troubleshooting.

C.3 How to Obtain Help from Website

Huawei provides users with timely and efficient technical support through the regional offices, secondary technical support system, telephone technical support, remote technical support, and on-site technical support.

C.4 Ways to Contact Huawei

Huawei Technologies Co., Ltd. provides customers with comprehensive technical support and service. For any assistance, contact our local office or company headquarters.

C.1 Preparations for Contacting Huawei

To better solve the problem, you need to collect troubleshooting information and make debugging preparations before contacting Huawei.

C.1.1 Collecting Troubleshooting Information

You need to collect troubleshooting information before troubleshoot.

You need to collect the following information:

- Name and address of the customer
- Contact person and telephone number
- Time when the fault occurred
- Description of the fault phenomena
- Device type and software version
- Measures taken after the fault occurs and the relevant results
- Troubleshooting level and required solution deadline

C.1.2 Making Debugging Preparations

When you contact Huawei for help, the technical support engineer of Huawei might help you do certain operations to collect information about the fault or rectify the fault directly.

Before contacting Huawei for help, you need to prepare the boards, port modules, screwdrivers, screws, cables for serial ports, network cables, and other required materials.

C.2 How to Use the Document

Huawei provides guide documents shipped with the device. The guide documents can be used to handle the common problems occurring in daily maintenance or troubleshooting.

To better solve the problems, use the documents before you contact Huawei for technical support.

C.3 How to Obtain Help from Website

Huawei provides users with timely and efficient technical support through the regional offices, secondary technical support system, telephone technical support, remote technical support, and on-site technical support.

Contents of the Huawei technical support system are as follows:

- Huawei headquarters technical support department
- Regional office technical support center
- Customer service center
- Technical support website: **http://enterprise.huawei.com**

You can query how to contact the regional offices at **http://enterprise.huawei.com**.

C.4 Ways to Contact Huawei

Huawei Technologies Co., Ltd. provides customers with comprehensive technical support and service. For any assistance, contact our local office or company headquarters.

Huawei Technologies Co., Ltd.

Address: Huawei Industrial Base Bantian, Longgang Shenzhen 518129 People's Republic of China

Website: **http://support.huawei.com/enterprise/**

D Glossary

A

AC power module	The module that transfers the external AC power supply into the power supply for internal use.
Application server	A service processing node (a computer device) in the network. Application programs of data services are run on the application server.
Asynchronous remote replication	A kind of remote replication. When the data on the primary site is updated, the data does not need to be updated on the mirroring site synchronously to finish the update. In this way, performance is not reduced due to data mirroring.

B

Backup	A periodic operation performed on the data stored in the database for the purposes of database recovery in case that the database is faulty. The backup also refers to data synchronization between active and standby boards.
Bandwidth	A range of transmission frequencies a transmission line or channel can carry in a network. In fact, the bandwidth is the difference between the highest and lowest frequencies in the transmission line or channel. The greater the bandwidth, the faster the data transfer rate.
Baud rate	The number of times per second the signal can change on a transmission line. Commonly, the transmission line uses only two signal states, making the baud rate equal to the number of bits per second that can be transferred. The underlying transmission technique may use some of the bandwidth, so it may not be the case that user data transfers at the line's specified bit rate.
Bit error	An incompatibility between a bit in a transmitted digital signal and the corresponding bit in the received digital signal.
Bit error rate	Ratio of received bits that contain errors. BER is an important index used to measure the communications quality of a network.

Bonding	Bonding can bind multiple independent physical network ports into a logical port, which ensures the high availability of server network connections and improving network performance.
Boundary scan	A test methodology that uses shift registers in the output connections of integrated circuits. One IC often is connected to the next. A data pattern is passed through the chain and the observed returned data stream affected by the circuit conditions gives an indication of any faults present. The system is defined under IEEE standard 1149.1 and is also often known as JTAG (Joint Test Action Group).
Browser/Server	An architecture that defines the roles of browser and server, where the browser is the service request party and the server is the service provider.

C

Cache hit ratio	The ratio of directly accessed I/O from Cache to all the I/O operation during the read operation.
Cache prefetch strategy	According to the operation in which data has been read or is being read, the required data is read from a disk into the cache in advance.
Captive Screw	After the screw is loosened, screw caps and bolts are not disconnected from the main body.
Cascading	Connect the storage system to more disk enclosures through connection cables, thus expanding the capacity of the storage system.
CHAP	A method to periodically verify the identity of the peer using a 3-way handshake. During the establishment of a link, the authenticator sends a "challenge" message to the peer. The peer responds with a value calculated using a "one-way hash" function. The authenticator checks the response against its own calculation of the expected hash value. If the values match, the authentication is acknowledged. CHAP provides protection against playback attack.
Clone	A snapshot technology. The source data is completely copied to generate a data duplicate; therefore the duplicate needs the storage space as the same size as the source data. It is also called clone. In the VIS system, it is also called third-mirror break-off snapshot.
Cluster	A mechanism adopted to improve the system performance. Several devices of the same type form a cluster. The exterior of a cluster is some like a kind of equipment. In the interior of a cluster, the nodes share the load.
Coffer	A technology for ensuring data security and integrity in a storage system. It is used to store the mission-critical data of the system.
Coffer disk	Disks that build up the coffer.
Command device	A special LUN through which the host can send inband commands to storage devices.

Constant prefetch	A cache prefetch strategy. The size of the data to be prefetched is the size as set. This strategy applies to the applications that require reading data of a fixed size in a certain order. An example is the streaming media demanded by multiple subscribers who use the same bit rate.
Controller	The core module that processes services in a storage system. It contains physical components such as system-level CPUs and memory.
Controller enclosure	An enclosure that accommodates controllers and provides storage services. It is the core component of a storage system, and generally consists of components such as controllers, power supplies, and fans.
Copyback	The process of copying the data from the hot spare disk back to the previous disk when the faulty member disk is restored or replaced by a new one.
Copying	A state of pair. The state indicates that the source LUN data is being synchronized to the target LUN.
Coordinator Point Server	A server can provide the arbitration service. The server can provide arbitration service for cluster system or HyperCluster, to avoid resource conflict access from different application servers.
Continued Mirror	After storage controller became fault, a method of data in the LUN to write mirror into other storage controller, while ensure data integrity and uninterrupted operation host services.

D

Data compression	Encoding data to take up less storage space and less bandwidth for transmission.
Data deduplication	A specialized data compression technique for eliminating coarse-grained redundant data, typically to improve storage utilization. In the deduplication process, duplicate data is deleted, leaving only one copy of the data to be stored, along with references to the unique copy of data. Deduplication is able to reduce the required storage capacity since only the unique data is stored.
Data flow	A process that involves processing the data extracted from the source system, such as filtering, integration, calculation, and summary, finding and solving data inconsistency, and deleting invalid data so that the processed data meets the requirements of the destination system for the input data.
Data migration	It is the process to cleanse and transform history data, and then load them to the new system.
Data source	A system, database, or file that can make BOs persistent. A data source can be a database instance or a database user.
Data switch	A data switch used for interconnections between controllers.

Dirty data	The data that is stored temporarily on cache and has not been written onto disks.
Disaster recovery	A system deployment solution aiming at reducing loss in disasters. A set of disaster recovery system that is the same as the production system is deployed as a backup to store the production data when a fault occurs in the production system. The applications are switched over to the disaster recovery system before the production system recovers. After the production system recovers, the applications are switched back to the production system.
Disk array	A set of disks from one or more commonly accessible disk subsystem. These disks are combined and controlled by the control software. The control software provides the storage capacity of these disks for hosts as one or more virtual disks.
Disk Domain	A combination of disks. A disk domain consists of the same type or different types of disks. Disk domains are isolated from each other. Therefore, services carried by different disk domains do not affect each other in terms of performance and faults (if any).
Disk location	The process of locating a hard disk, that is, determining the enclosure ID and slot ID of the hard disk in the storage system.
Disk enclosure	It consists of the following parts in redundancy: expansion module, hard disk, power module, and fan module. System capacity can be expanded by cascading multiple disk enclosures.
Disk utilization	The percentage of used capacity in the total available capacity.

E

eDevLUN (external device LUN)	Logic space created by third-party storage systems.
Engine	Two controllers in one enclosure are called Engine.
Expansion	Connecting a storage system to more disk enclosures through connection cables, thus expanding the capacity of the storage system.
Expander module	A component used for expanding.

F

Failover	The automatic substitution of a functionally equivalent system component for a failed one. The term failover is most often applied to intelligent controllers connected to the same storage devices and host computers. If one of the controllers fails, failover occurs, and the survivor takes over its I/O load.

Field replaceable unit	A unit that can function as a circuit board, part, or component of an electronic device. It can be quickly and easily removed from a personal computer or other electronic devices. If an FRU becomes faulty, users can replace it with a new one instead of sending the entire product or system for maintenance.
File Engine	The component in a unified storage systems that provides file-level service.
Firmware	The programmable software part in a hardware component. A firmware is a part of hardware, but is scalable as software.
Front-end host port	The port that connects the controller enclosure to the service side and transfers service data. There are three types of front-end host ports: SAS, FC, and iSCSI.

G

Gateway	A device that connects two network segments using different protocols. It is used to translate the data in the two network segments.
Global system for mobile communications	The second-generation mobile networking standard defined by European Telecommunications Standards Institute (ETSI). It is aimed at designing a standard for global mobile phone networks. The standard allows a subscriber to use a phone globally. GSM consists of three main parts: mobile switching subsystem (MSS), base station subsystem (BSS), and mobile station (MS).

H

Hard disk	A non-volatile storage device that stores digitally encoded data on rapidly rotating platters with magnetic surfaces. Hard disks generally offer more storage and quicker access to data than floppy disks do.
Hard disk tray	The tray that bears the hard disk.
Hard quota	The value to limit the space used in quota configuration. If the space used arrives hard quota, file operation is not allowed to continue.
Heartbeat	Heartbeats are the packets, requiring no acknowledgement, transmitted between two devices. The device can judge the validity status of the peer device. Heartbeat supports node communication, fault diagnosis, and event triggering.
Hit ratio	The ratio of directly accessed I/Os from cache to all I/Os.
Hot swap	A technology used to replace system components without shutting down the system, which improves the reliability and maintainability of a system.
HyperVault	A self-protective property of the data built in storage device.

HyperCluster	A value-added service of storage system. The HyperCluster refers to provide storage services with two datasets on two storage array as one dataset, to achieve the applications load balancing and transferring without interruption when there is a fault.	

I

I/O	Data movement process between memory and peripheral devices in the computer system. I/O is a collective name, indicating the operations reading data into the memory and writing data to other places from computer memory.
Inband management	Inband management means that the management control information of the network and the carrier service information of the user network are transferred through the same logical channel. Inband management enables users to manage storage arrays through commands. Management commands are sent through service channels, that is, I/O write and read channels. The advantages of inband management include high speed, stable transfer, and no additional management network ports required.
Initiator	A system component that can initiate an I/O operation on an I/O bus or on a network.
Intelligent prefetch	A cache prefetch strategy. The system software calculates a proper size of prefetched data. This strategy applies to a read application involving a single bit stream or to the situations where you do not know whether the data is read in a certain order. An example is reading or writing a file.
Interface module	A field replaceable module that accommodates the service or management ports.

L

Load balance	A method of adjusting the system, application components and data to averagely distribute the applied I/O or computing requests for physical resources of the system.
Load the file system in mini mode	A method of restoring the user data in an offline file system.
Logical unit	The entity is located inside the SCSI object, and can execute I/O commands. After a SCSI I/O command is sent to an object, the logic unit inside the object executes this command. Usually, each SCSI physical disk has one logic unit. A tape drive and array controller may have multiple logic units, which process different I/O commands. Each logic unit inside an array controller corresponds to a virtual disk.
Logical unit number	The number of a logical disk that the host can access.

LUN formating	The process of writing 0 bits in the data area on the logical drive and generating related parity bits so that the logical drive can be in the ready state.	
LUN mapping	The storage system maps LUNs to ASs so that the ASs can access the storage reorganization.	
LUN migration	A method for the data in the LUN to migrate between different physical storage space while ensuring data integrity and uninterrupted operation host services.	
LUN copy	The function of copying the original LUN data to one or multiple target LUNs.	

M

Maintenance terminal	The computer that is connected through a serial port or management network port and maintains the storage system.
Management network	An entity that provides a means to transmit and process the information related to network management.
Management network port	The network port on the controller enclosure that is connected to the maintenance terminal. It is provided for the remote maintenance terminal.

N

Node	A managed device in the network. For a device with a single frame, one node stands for one device. For a device with multiple frames, one node stands for one frame of the device.

O

Out-of-band management	A management mode used during out-of-band networking. In the out-of-band management mode, the management and control information of the network and the bearer service information of the user network are transmitted through different logical channels.
Owning controller	The controller that can prior access a certain LUN.

P

Power failure protection	When the external power failure occurs, the AC PEM depends on the battery for power supply, which ensures the integrity of the dirty data in cache.
Pre-copy	When the system monitors that a member disk in a RAID group is to fail, the system copies the data on the disk to a hot spare disk in advance. This technology is called pre-copy.

Primary backup	A kind of backup mode for file system, means that create a copy (snapshot) for filesystem.
Primary restore	A kind of restore mode for file system, means that restore a copy (snapshot) to filesystem.
Primary storage controller	The controller that plays a leading role in controlling the management is the primary storage controller. It can perform relevant management operations on the controller enclosure.
Primary/ Secondary switchover	A process for the conversion of the primary/secondary relationship.
Prior controller	For the application server LUN, prior controller means that the working controller is the owner controller of the corresponding array LUN.

Q

Quota tree	A first-level directory of file system that can be managed with quota.

R

RAID level	The application of different redundant types to a logical drive. A RAID level improves the fault tolerance or performance of the logical drive but reduces the available capacity of the logical drive. You must specify a RAID level for each logical drive.
Reconstruction	The process of restoring the data saved on a faulty member disk in a RAID group.
Redundancy	The scheme to add more than one channels, elements or parts that have the same functions with the counterparts in the system or device at a critical place. When a fault occurs, the system or device can work well, and the reliability is then improved.
Remote replication	A core technology for disaster recovery and a foundation that implements remote data synchronization and disaster recovery. This technology remotely maintains a set of data mirror through the remote data connection function of the storage devices that are separated in different places. Even when a disaster occurs, the data backup on the remote storage device is not affected. Remote replication can be divided into synchronous remote replication and asynchronous remote replication by whether the host that requires mirrors needs the confirmation information of the remote replication site.
Reverse synchronizing	The process of restoring data from the redundancy machine (RM) when the services of the production machine (PM) are recovering.
Route	The path that network traffic takes from its source to its destination. In a TCP/IP network, each IP packet is routed independently. Routes can change dynamically.

S

Script	A collection of data statements used to perform an operation.
Secondary backup	A kind of backup mode for file system, means that backup the data of the primary file system to the remote file system on the secondary array.
Secondary restore	A kind of restore mode for file system, means that restore the data of the secondary file system to the primary file system on the secondary array.
Secondary controller	(1) A controller that backs up service and management data of the primary controller in a clustered system. When the primary controller fails, the secondary controller is upgraded to the primary controller and takes over the management and services of the controller enclosure. (2) A controller that backs up the management data of the primary controller in a block-level array. When the primary controller fails, the secondary controller is upgraded to the primary controller and takes over the management of the system.
Serial port	An input/output location (channel) that sends and receives data to and from a computer's CPU or a communications device one bit at a time. Serial ports are used for serial data communication and as interfaces with some peripheral devices, such as mice and printers.
Service data	The user and/or network information required for the normal functioning of services.
Service network port	The network port that is used to store services.
SFP optical transceiver	A component that can make data conversion between optical signals and electrical signals and that can receive and transfer data.
Simple network management protocol	A network management protocol of TCP/IP. It enables remote users to view and modify the management information of a network element. This protocol ensures the transmission of management information between any two points. The polling mechanism is adopted to provide basic function sets. According to SNMP, agents, which can be hardware as well as software, can monitor the activities of various devices on the network and report these activities to the network console workstation. Control information about each device is maintained by a management information block.
Single point of failure	A type of failure. Data transmission over a network is stopped and cannot be recovered automatically if a single point failure occurs. The point can be an interface, a board, a device, or a link.
Small computer system interface	A set of standards for physically connecting and transferring data between computers and peripheral devices. SCSI is most commonly used for hard disks and tape drives, but it can connect a wide range of other devices, including scanners, and optical drive.

Smart tenancy	A feature of Huawei storage system. With Smart Tenancy, multiple virtual storage systems can be created in one physical storage system, which allows tenants to share the same storage system hardware resource without affecting data security and privacy of each other. This feature achieves more flexible, easy-to-manage and low-cost shared storage in a multi-protocol unified storage architecture.
Snapshot	A data backup technology through which a fully usable copy of a data object can be quickly generated. The duplicate contains the image of the data object at a point in time.
Snapshot copy	A copy of the snapshot LUN, which is also a snapshot LUN.
Soft quota	The value to alarm space usage in quota configuration. After used space arrives this value, an alarm triggered; if space used from above this value becomes lower than, the previous alarm eliminated.
Source LUN	The LUN where the original data is located.
Storage Pool Shrinking	A method of shrinking the total capacity of Storage Pool.
Storage system	An integrated system. It consists of the following parts: controller, storage array, host bus adapter, physical connection between storage units, and all control software.
Storage unit	An abstract definition of backup storage media for storing backup data. The storage unit is connected with actual storage media, used to back up data.
Streaming media	The media by which content is transmitted continuously with the streaming method in real time. Streaming media ensure high-quality playback effects at low bandwidth by integrating with the following technologies: data collection, data compression, encoding, storage, transmission, terminal playback, and network communication.
Stripe	The set of strips at corresponding locations of each member extent of a disk array which uses striped data mapping. The strips in a stripe are associated with each other in a way (e.g., relative extent block addresses) that allows membership in the stripe to be quickly and uniquely determined by a computational algorithm. Parity RAID uses stripes to map virtual disk block addresses to member extent block addresses.
Subnet	A type of smaller networks that form a larger network according to a rule, for example, according to different districts. This facilitates the management of the large network.
Subnet mask	The technique used by the IP protocol to determine which network segment packets are destined for. The subnet mask is a binary pattern that is stored in the device and is matched with the IP address.
Synchronous remote replication	A kind of remote replication. When the data on the primary site is updated, the data must be synchronously updated on the mirroring site before the update is complete. In this way, the data that is stored on both the primary and mirroring sites can be synchronized.

T

Target	A system component that can receive SCSI I/O operation commands.
Target LUN	The LUN on which target data resides.
Tenant	A property of SmartTenancy, which represents a virtual storage system in a physical one. The private and independent logical resource of a tenant mainly includes disk domain space, LUN, file system and ports. Tenants get complete storage services, but also remain resource and network isolation with other tenants, which avoids interference.
Thin provisioning	A mechanism that offers on-demand allocation of storage space.
Thin LUN	The thin LUN is a logic disk that can be accessed by hosts. The thin LUN dynamically allocates storage resources from the thin pool according to the actual capacity requirements of users.
Timing Snapshot	To create snapshots periodically to continuously protect data.
Topology	The configuration or layout of a network formed by the connections between devices on a local area network (LAN) or between two or more LANs.
Trap	A type of SNMP message that indicates the occurrence of an event. This type of message is transmitted to the received through UDP. The transmission process is not completely reliable.

U

User datagram protocol	A TCP/IP standard protocol that allows an application program on one device to send a datagram to an application program on another. User Datagram Protocol (UDP) uses IP to deliver datagram. UDP provides application programs with the unreliable connectionless packet delivery service. There is a possibility that UDP messages will be lost, duplicated, delayed, or delivered out of order. The destination device does not confirm whether a data packet is received.
User interface	The space in which users interact with a machine.

V

Variable prefetch	A cache prefetch strategy. The size of the data to be prefetched is the multiple for prefetching multiplied by the length of a read command.
	This strategy applies to the applications that require reading data of variable size in a certain order or to the situations where multiple subscribers read data concurrently but no fixed prefetch size can be set, because the amount of pre-read data cannot be judged. An example is the streaming media demanded by multiple subscribers who use different bit rates.

| vStore | A property of SmartTenancy. In Huawei SmartTenancy, a tenant is called a vStore, which represents a virtual storage system. |

W

Working controller	The controller that reads data from and writes data onto LUNs or file systems in a storage array.
Write back	A caching technology in which the completion of a write request is signaled as soon as the data is in cache, and actual writing to non-volatile media occurs at a later time. Write back includes an inherent risk that an application will take some action predicated on the write completion signal, and a system failure before the data is written to non-volatile media will cause media contents to be inconsistent with that subsequent action. For this reason, good write back implementations include mechanisms to preserve cache contents across system failures (including power failures) and to flush the cache at system restart time.
Write through	A caching technology in which the completion of a write request is not signaled until data is safely stored on non-volatile media. Write performance with the write through technology is approximately that of a non-cached system, but if the data written is also held in cache, subsequent read performance may be dramatically improved.

Z

| Zone | A Fibre Channel switch function that is similar to the VLAN function for Ethernet switches. It logically allocates the devices including hosts and storage systems on a SAN to different zones. In this way, the devices in different zones cannot directly access each other over a Fibre Channel network, implementing device isolation on the SAN. |

E Acronyms and Abbreviations

F

FCoE   Fibre Channel over Ethernet

G

GUI   Graphical User Interface

H

HBA   Host Bus Adapter

I

iSCSI   Internet Small Computer Systems
Interface

ISM   Integrated Storage Management

L

LUN   Logical Unit Number

M

MPIO   MultiPath Input Output

MSCS   Microsoft Cluster Service

N

NIC   Network Interface Card

P

PnP   Plug and Play

R

RAID   Redundant Array of Independent Disks

RDM   Raw Device Mapping

S

SAS   Serial Attached SCSI

SCSI   Small Computer System Interface

SN   Serial Number

T

TOE   TCP Offload Engine

V

VLUN   Virtual LUN

W

WWN   World-Wide Number