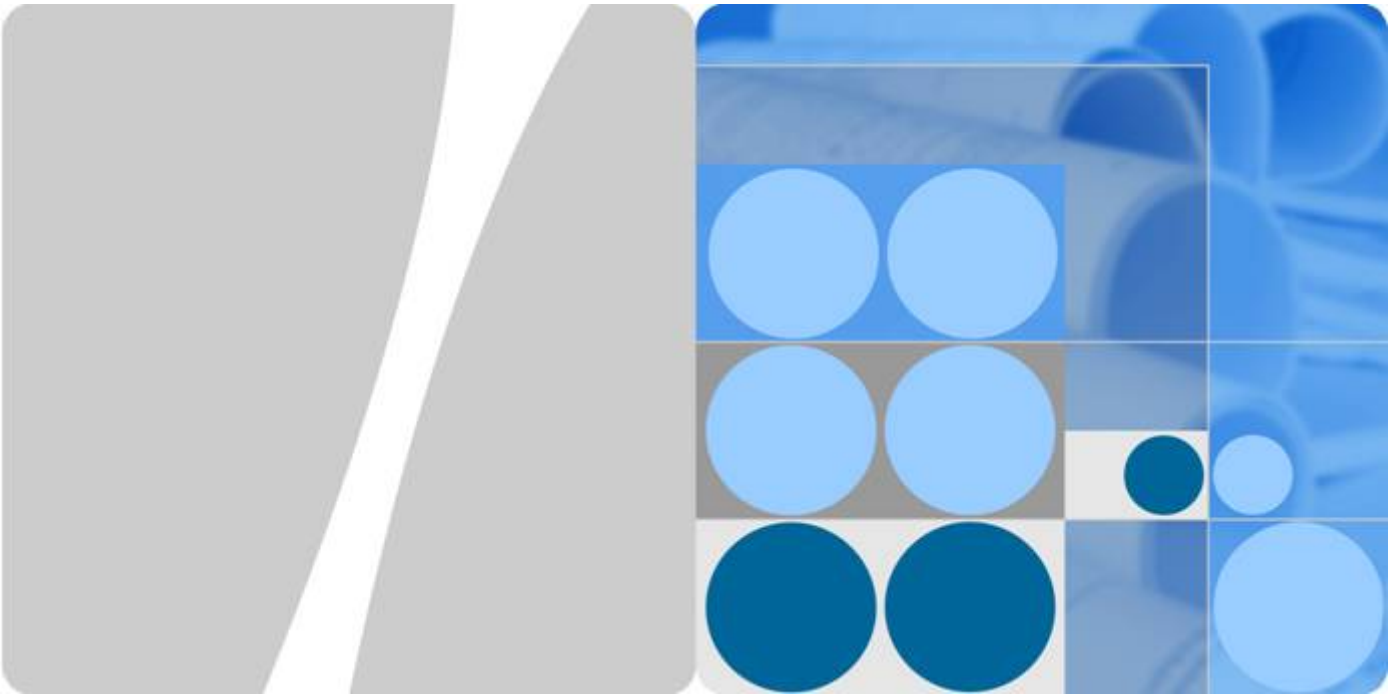

OceanStor UltraPath for Windows

21.3.0

User Guide

Issue 01

Date 2018-11-30

HUAWEI TECHNOLOGIES CO., LTD.

HUAWEI

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About This Document

Purpose

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.

Intended Audience

This document is intended for:

- Technical support engineers
- Maintenance engineers

Symbol Conventions

The symbols that may be found in this document are defined as follows.

Symbol	Description
	Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.
	Indicates a potentially hazardous situation which, if not avoided, could result in equipment damage, data loss, performance deterioration, or unanticipated results. NOTICE is used to address practices not related to personal injury.

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Symbol	Description
NOTE	Calls attention to important information, best practices and tips. NOTE is used to address information not related to personal injury, equipment damage, and environment deterioration.

Conventions

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

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Change History

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

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1 Overview

About This Chapter

OceanStor UltraPath is the multipathing software developed by Huawei. Its functions include masking of redundant LUNs, optimum path selection, I/O load balancing, and failover and failback. These functions enable your storage network to be intelligent, stable, and fast.

1.1 Overview
UltraPath can meet the requirements on high reliability and superb performance of storage networks. This section introduces the background, purpose, and benefits of UltraPath.

1.2 Principles and Functions
UltraPath provides powerful functions and features, ensuring secure, stable, and fast service operation. This section introduces the basic principles and functions of UltraPath.

1.3 Typical UltraPath Applications
Installed on an application server, UltraPath supports different networks and helps ensure fast and smooth data transfer.

1.4 UltraPath Security Feature
This chapter describes UltraPath security feature.

1.1 Overview

UltraPath can meet the requirements on high reliability and superb performance of storage networks. This section introduces the background, purpose, and benefits of UltraPath.

As modern technology develops, the requirements laid upon the security and stability of storage networks increase during the implementation of IT infrastructure. A fault in the storage network may cause the entire network to break down. Such a fault is called a single point of failure in the storage network. To avoid this, a highly reliable storage network not only includes redundant devices and components, but also adopts the interconnection of redundant links, as shown in **Figure 1-1**. The redundancy design can improve the reliability as well as the performance of the entire storage network. The multipathing technology helps achieve this goal.

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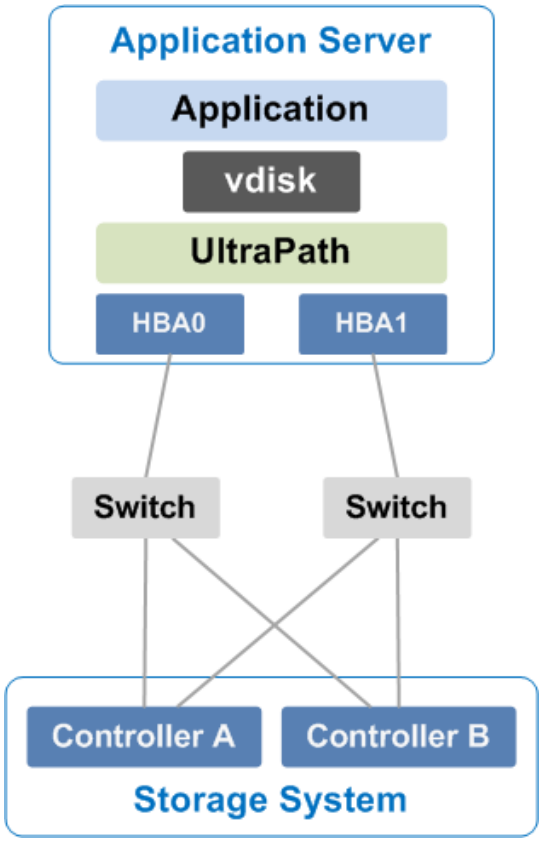
Figure 1-1 Multi-path networking



The multipathing technology is realized through multipathing software. If a path fails or cannot meet the performance requirement, multipathing software automatically and transparently transfers I/Os to other available paths to ensure that I/Os are transmitted effectively and reliably. As shown in **Figure 1-2**, multipathing software can handle many faults such as HBA faults, link faults, and controller faults.

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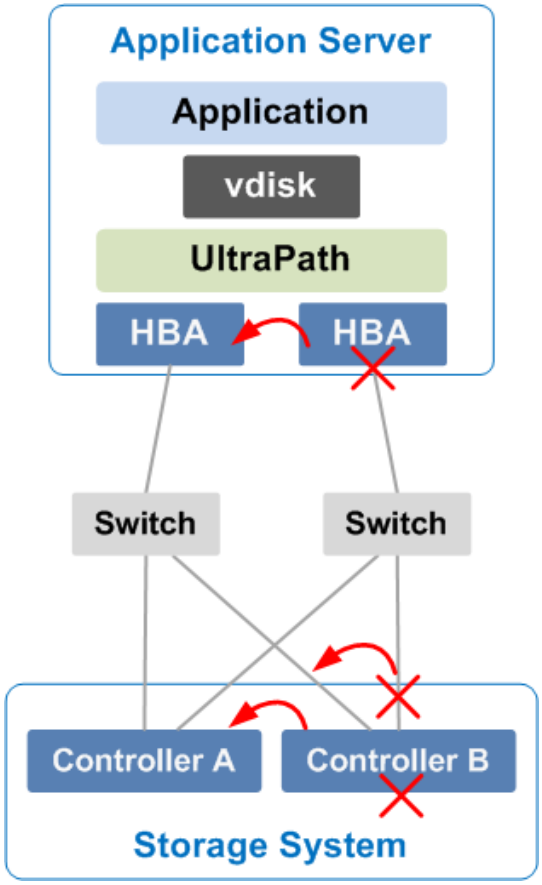
Figure 1-2 UltraPath handling path faults



The multipathing software (normally called Multi-Path I/O, MPIO) built-in host operating systems only provides basic failover and load balancing functions, failing to meet the high reliability requirements. Huawei UltraPath cannot only provide these basic functions, but also meet the systems' demands on reliability, performance, maintainability, and adaptation with many advanced functions such as path test, all paths down protection, path isolation, path alarm pushing, and path performance monitoring. Furthermore, UltraPath has better compatibility with Huawei storage. You are advised to use UltraPath for Huawei storage if you do not have any special requirements.

UltraPath is compatible with different host operating systems. For details,click **OceanStor Interoperability Navigator**.

1.2 Principles and Functions

UltraPath provides powerful functions and features, ensuring secure, stable, and fast service operation. This section introduces the basic principles and functions of UltraPath.

Integrating UltraPath with Operating Systems

UltraPath is a type of filter driver software running in host kernels. It can manage and process disk creation/deletion and I/O delivery of operating systems.

- **Figure 1-3** shows the layer where the UltraPath driver resides in Windows, Linux, and Solaris.

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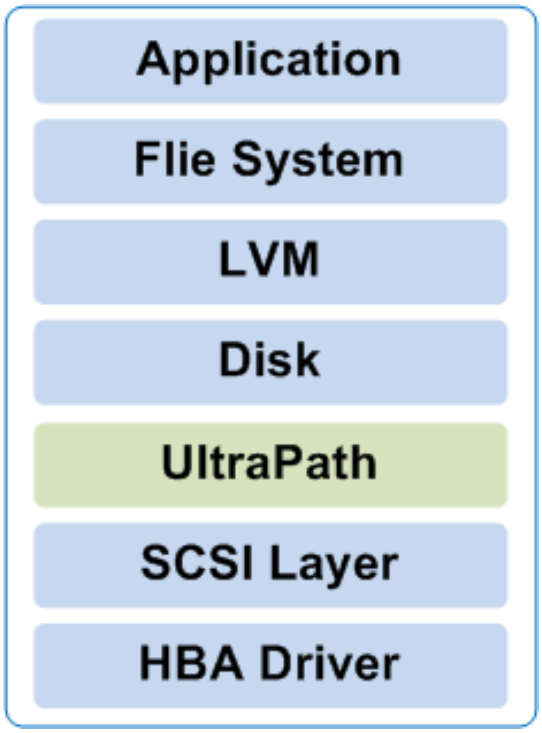
Figure 1-3 Layers where UltraPath resides in different operating systems



- On the AIX and VMware ESXi platform, UltraPath is implemented based on the multipath framework of operating systems.
  - UltraPath for AIX is a kernel driver developed based on the MPIO of AIX operating systems.

    MPIO is introduced to AIX 5.2 TL04 and 5.3, as well as later versions. With MPIO, a storage system can connect to a host through multiple paths and is present as one device on the host. MPIO employs Path-Control Modules (PCMs) to implement multipath management, such as path adding or deleting, I/O path selection, path detection, and failover.
  - UltraPath for vSphere is a Multipath Plug-in adaptable to the pluggable storage architecture (PSA) of VMware vShpere/ESXi platforms.

UltraPath Functions

- **Masking of Redundant LUNs**

  In a redundant storage network, an application server with no multipathing software detects a LUN on each path. Therefore, a LUN mapped through multiple paths is mistaken for two or more different LUNs. Redundant LUNs exist because each path reports a LUN directly to the application server.

  The dual-link direct-connection network shown in the left side of **Figure 1-4** is an example. As shown in the figure, the storage system maps one LUN to the application server. Since two paths exist between the application server and the storage system and no multipathing software is installed, the application server simultaneously detects two LUNs, LUN0 and LUN1, indicating that a redundant LUN exists. The two detected LUNs actually are the same LUN from the storage system. Due to the identification errors of the application server, different applications on the application server repeatedly write different data to the same location of the LUN, resulting in data corruption. To

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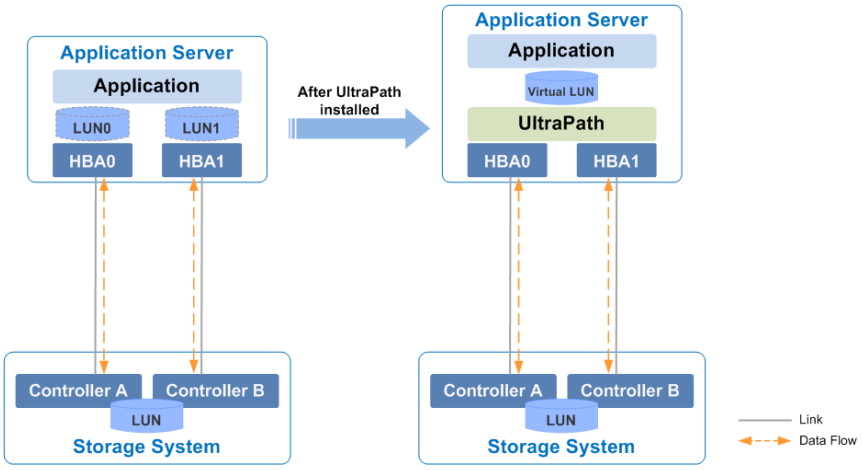
resolve this problem, the application server must identify which is the real and available LUN.

Figure 1-4 Masking the redundant LUN



As UltraPath is able to acquire configuration information of the storage system, it clearly knows which LUN has been mapped to the application server. As shown in the right side of **Figure 1-4**, UltraPath installed on the application server masks redundant LUNs on the operating system driver layer to provide the application server with only one available LUN, the virtual LUN. In this case, the application server only needs to deliver data read and write operations to UltraPath that masks the redundant LUNs, and properly writes data into LUNs without damaging other data.

- **Optimum Path Selection**

  To ensure service continuity and stability, a storage system is generally equipped with two or more controllers to implement redundancy parts. Each LUN in a storage system has its owning controller, and no other controllers can operate on the LUN, preventing data corruption due to possible controller conflicts. If an application server wants to access a LUN through non-owning controllers, this access request is still redirected to the owning controller. Therefore, the highest I/O speed occurs when application servers access the target LUN directly through the owning controller.

  In a multipath environment, the owning controller of a LUN on the application server that corresponds to the LUN on the storage array is called the prior controller of the LUN on the application server. Therefore, the highest I/O speed occurs when an application server with UltraPath inside accesses the LUN on the storage system through the prior controller (owning controller). The path to the prior controller is the optimum path.

  As UltraPath is able to acquire owning controller information, it can automatically select one or more optimum paths for data streams to achieve the highest I/O speed.

  As shown in **Figure 1-5**, the owning controller (prior controller) is controller A, and UltraPath selects the path to controller A as the optimum path.

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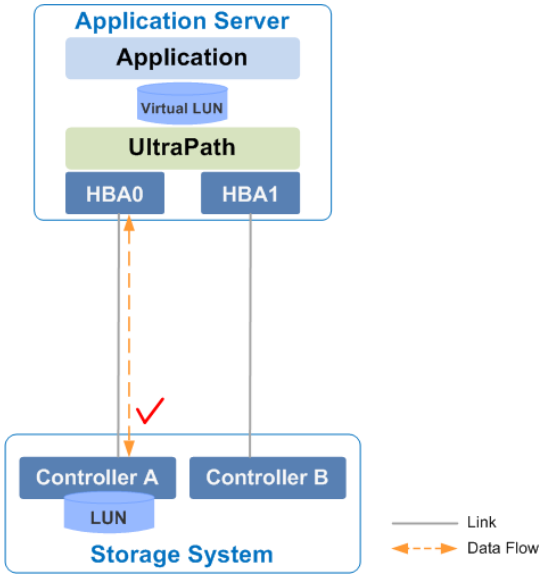
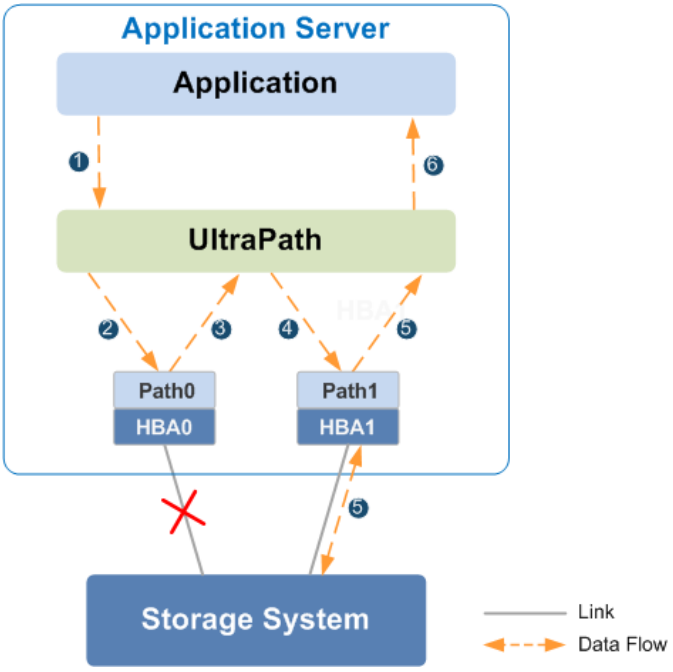
Figure 1-5 Optimum path selection by UltraPath



- **Failover and Failback**
  - Failover

    When a path fails, UltraPath fails over its services to another functional path. **Figure 1-6** shows the failover process.

    Figure 1-6 UltraPath failover

    i. An application on the the application server sends an I/O request to the virtual LUNs displayed on UltraPath.

    ii. UltraPath designate **Path0** to transfer this I/O request.

    iii. A fault on **Path0** prevents this I/O from being sent to the storage system. The I/O is returned to UltraPath.

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iv. UltraPath designate **Path1** to transfer this I/O request.

v. **Path1** is normal. The I/O request is sent to the storage system successfully. A message indicating the I/O request is sent successfully is sent to UltraPath.

vi. UltraPath sends the message to the application server.

NOTE

In the process displayed in **iii**, the HBA tries reconnection for a period of time after a path is faulty. During the period of time, I/Os remain in the HBA instead of returning back to UltraPath. For this reason, I/Os are blocked for a period of time during the failover.

- Failback

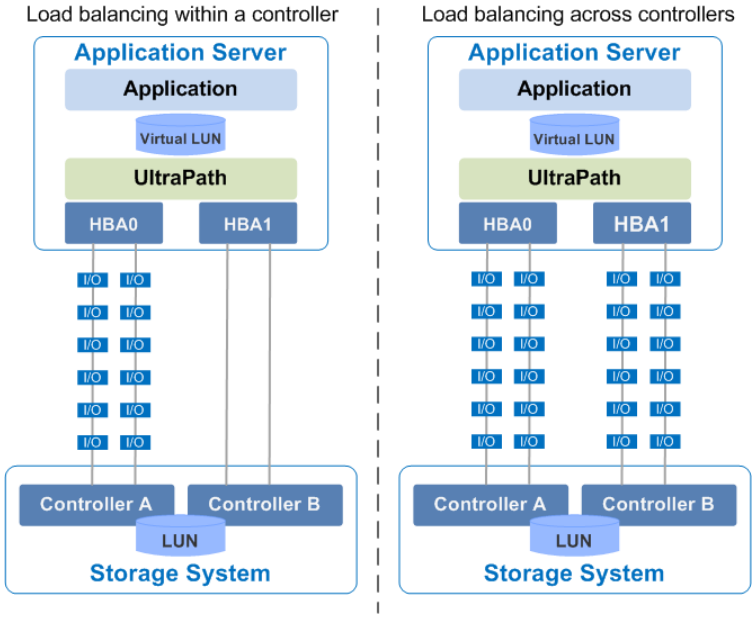
  UltraPath automatically delivers I/Os to the first path again after the path recovers from the fault. There are two methods to recover a path:

  - For a hot-swappable system (for example, Windows), the SCSI device will be deleted if the link between an application and a storage array is down. After the link is recovered, a SCSI device will be created. UltraPath can immediately sense the path recovery.
  - For a non-hot-swappable system (for example, AIX or earlier versions of Linux), UltraPath periodically tests and detects the path recovery.

- **I/O Load Balancing**

  UltraPath provides load balancing within a controller and across controllers, as shown in **Figure 1-7**.

Figure 1-7 Two I/O load balance modes



- For load balancing within a controller, I/Os poll among all the paths of the controller.
- For load balancing across controllers, I/Os poll among the paths of all these controllers.

  The path selection algorithm provided by UltraPath is as follows:

  - **Round robin**: As is shown in **Figure 1-8**, when an application server delivers I/Os to a storage system, UltraPath sends the first set of I/Os through **path0**

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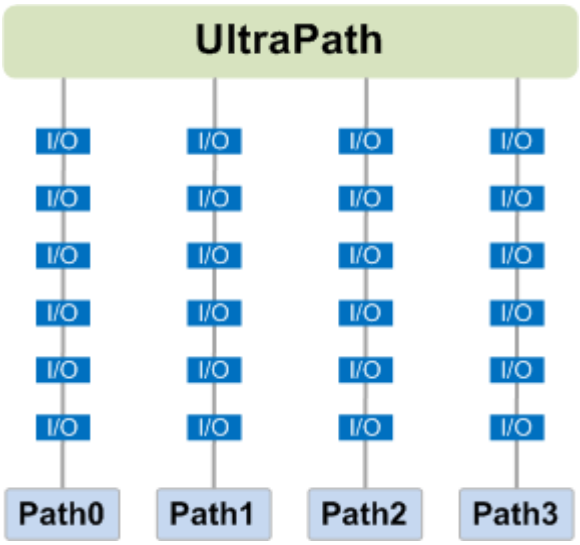
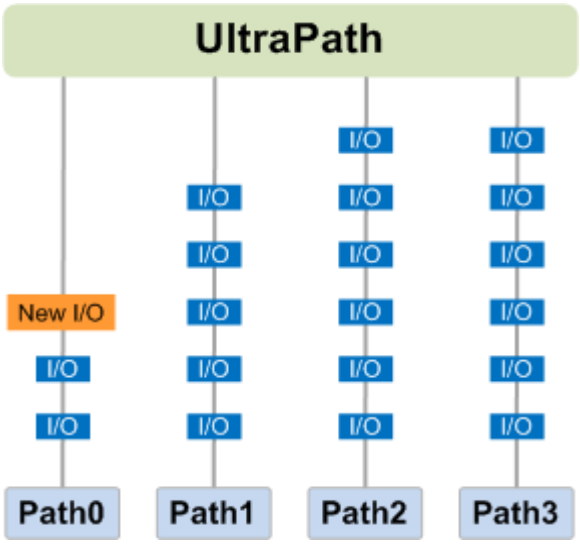
and the second set of I/Os through **path1**, and so on. Paths are used in turn to ensure that each path is fully utilized.

Figure 1-8 Round robin algorithm



- **Minimum queue depth**: As shown in **Figure 1-9**, UltraPath calculates the number of I/Os queuing in each path and delivers new I/Os to the path with minimum number of I/Os. The path with shortest I/O queue has the priority to send new I/Os.

Figure 1-9 Minimum queue depth algorithm



- **Minimum task**: On the basis of minimum queue depth algorithm, UltraPath uses the block size to calculate the overall load of each path and delivers new I/Os to the path with the minimum data load. The path with minimum I/O load has the priority to send new I/Os.

  According to the test, the minimum queue depth algorithm is superior than other algorithms in both performance and reliability. You are advised to use the minimum queue depth algorithm.

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- **Path test**

  UltraPath tests the following paths:

  - Faulty paths.

    UltraPath tests faulty paths with a high frequency to detect the path recover as soon as possible.

  - Idle, available paths.

    UltraPath tests idle paths to identify faulty paths in advance, preventing unnecessary I/O retires. The test frequency is kept low to minimize impact on service I/Os.

SAN Boot Functions

SANBOOT is a network storage management system that stores data (including servers' operating systems) totally on storage systems. Specifically, operating systems are installed on and booted from SAN storage devices. Therefore, SANBOOT is also called REMOTE BOOT or boot from SAN.

SAN Boot is beneficial to system integration and central management. Its advantages are as follows:

- Server integration: Blade servers are used to integrate a large number of servers within a small space. There is no need to configure local disks.
- Centralized management: Boot disks of servers are centrally managed on a storage device. All advanced management functions of the storage device can be fully utilized. For example, the volume replication function can be used for backup. Devices of the same model can be quickly deployed using the volume replication function. In addition, the remote mirroring function can be used for disaster recovery.
- Quick recovery: Once a server that is booted from SAN fails, its boot volume can be quickly mapped to another server, achieving quick recovery.

Boot modes supported by UltraPath:

- Boot from Local: Install the operating systems on the local disks of an application server and start the application server from local disks.
- Boot from SAN: Install the operating systems on the SAN storage devices and start the application server from the SAN storage devices.

1.3 Typical UltraPath Applications

Installed on an application server, UltraPath supports different networks and helps ensure fast and smooth data transfer.

UltraPath is applicable to the following scenarios:

- Dual-link direct connection
- Dual-link single-switch interconnection
- Dual-link dual-switch interconnection
- Dual-link dual-switch interconnection in a cluster environment
- Dual-link dual-switch interconnection in a HyperMetro cluster environment

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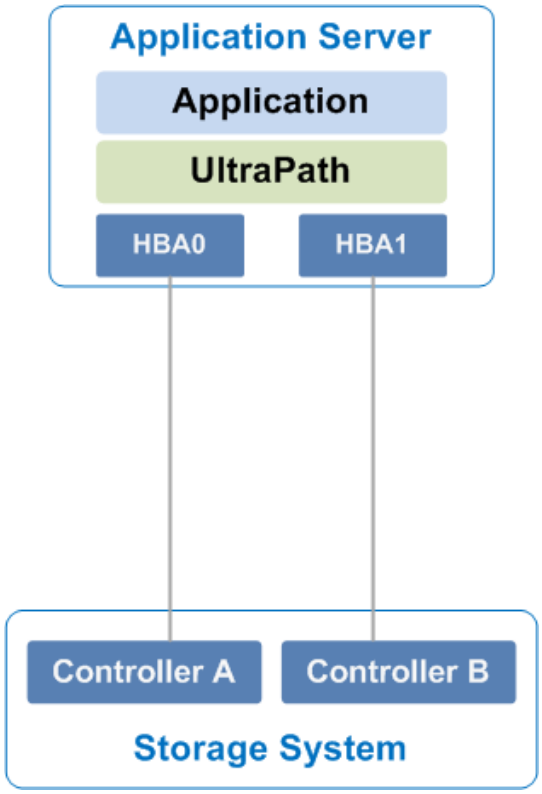
Dual-Link Direct Connection

Dual-link direct connection is the simplest and most inexpensive storage network connection, as shown in **Figure 1-10**.

Figure 1-10 UltraPath in dual-link direct connection



The application server uses optical fibers to connect different storage controllers for redundancy. In this networking mode, the path between the application server and the LUN's owning controller is the optimum one while other paths stand by.

In normal cases, UltraPath selects the optimum path for data transfer. If the optimum path is down, another standby path is used. After the optimum path recovers, it takes over data transfer again.

Dual-Link Single-Switch Interconnection

The dual-link single-switch interconnection adds one switch on the basis of dual-link direct connection, improving data access and forwarding capabilities, as shown in **Figure 1-11**.

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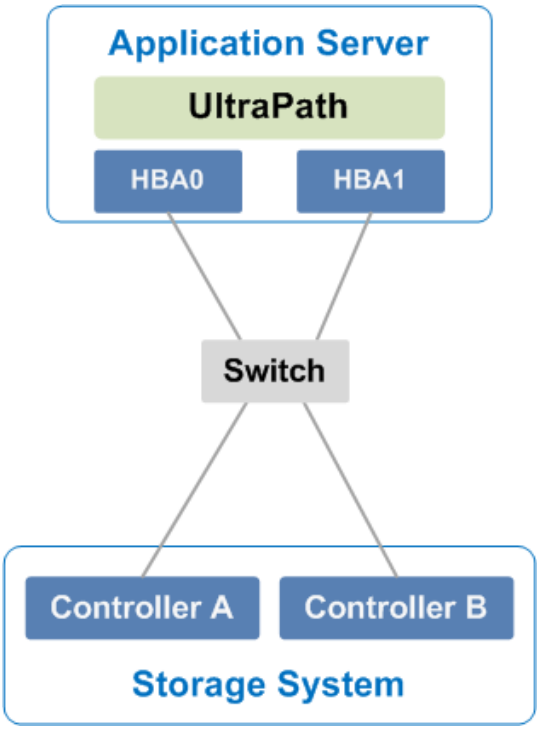
Figure 1-11 UltraPath in dual-link single-switch interconnection



In **Figure 1-11**, there are four paths between the application server and the storage system. In this networking mode, the two paths between the application server and the LUN's owning controller are optimum while other two paths stand by.

A switch expands host ports to improve access capability of the storage system. Besides, a switch extends the supported distance of transfer so that a remote application server can connect to the storage system through the switch. As only one switch is available in this networking mode, it may encounter a single point of failure. To prevent the failure, you can adopt **Dual-Link Dual-Switch Interconnection**, as shown in **Figure 1-12**.

Dual-Link Dual-Switch Interconnection

Dual-link dual-switch interconnection adds one switch on the basis of dual-link single-switch interconnection to provide dual-switch forwarding, as shown in **Figure 1-12**.

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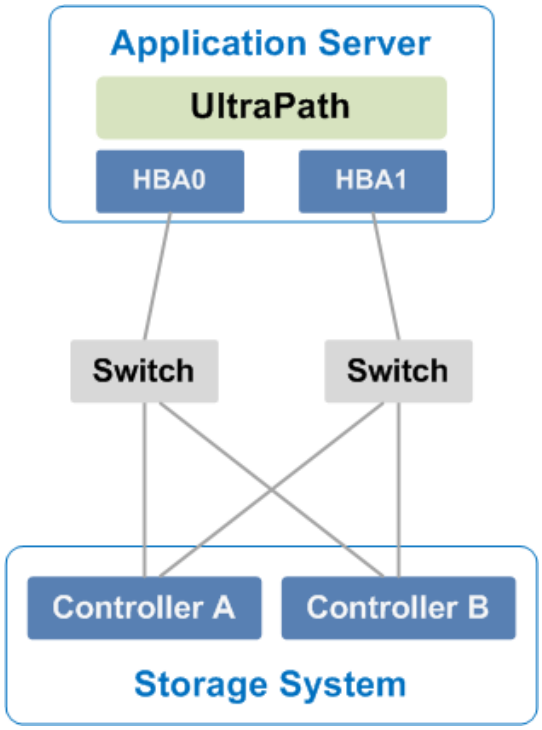
Figure 1-12 UltraPath in dual-link dual-switch interconnection



With two switches, the network prevents switch single points of failure to boost the network stabilization.

Dual-Link Dual-Switch Interconnection in a Cluster Environment

On the basis of dual-link dual-switch interconnection, one or more application servers are added to form a cluster environment, which enhances the reliability and processing capability of the application services, as shown in **Figure 1-13**.

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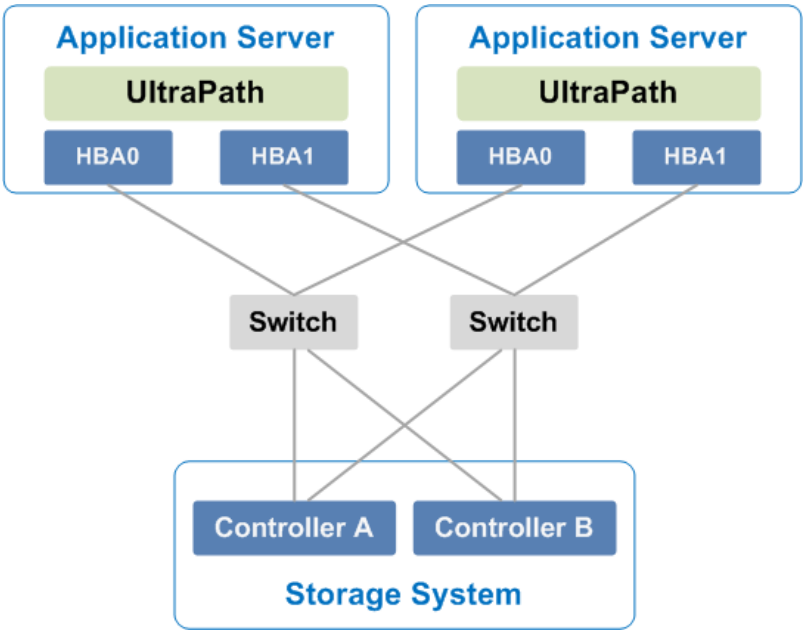
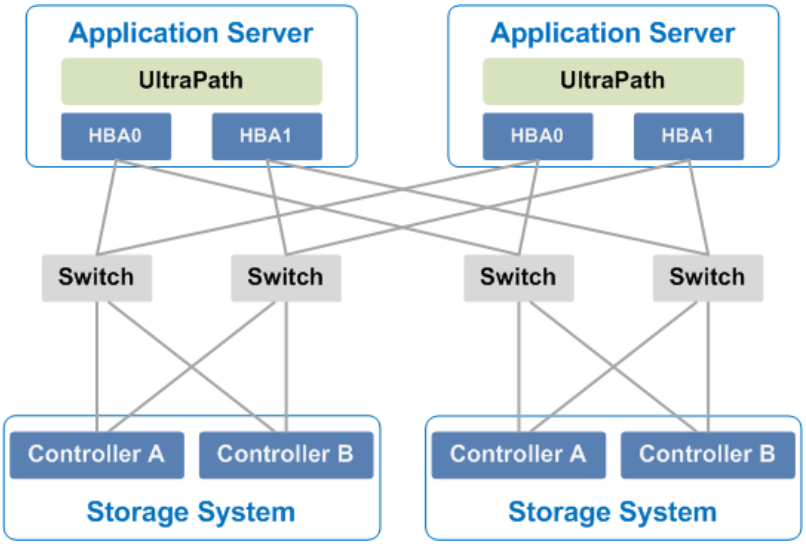
Figure 1-13 Dual-link dual-switch interconnection in a cluster environment



Dual-Link Dual-Switch Interconnection in a HyperMetro Cluster Environment

The dual-link dual-switch interconnection in a HyperMetro cluster environment improves the reliability and processing capability of the application servers. However, a single storage system is a hidden danger to cause a single point of failure in the entire storage network. Two storage systems back up each other in this scenario, greatly improving system reliability, as shown in **Figure 1-14**.

Figure 1-14 Dual-link dual-switch interconnection in a HyperMetro cluster environment



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1.4 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.

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2 Installation

About This Chapter

Selecting and managing paths between an application server and the storage system can be realized after the UltraPath is installed.

2.1 Environment Requirements
This section describes the data, hardware, and software that are required ready before installing UltraPath.

2.2 Installing UltraPath for Windows
You can install UltraPath for Windows after the preceding preparations are made. This chapter introduces the two installation modes: silent installation and non-silent installation.

2.1 Environment Requirements

This section describes the data, hardware, and software that are required ready before installing UltraPath.

2.1.1 Preparing Software Packages and Data

To smoothly install UltraPath, prepare required software packages or data in advance or based on actual conditions.

Software Package

Check whether you have prepared the required software packages. **Table 2-1** lists the software packages.

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Table 2-1 Required software packages

Software Name	Software Package Content	Description
UltraPath for Windows installation package	**Docs** and **Packages**	Software package directory: **/Windows**
UltraPath for Windows installation files	**UltraPath-X.XX.XXX.exe**, **Config** and **Upgrade** (update package)	Software package directory: **/Windows/Packages**

NOTE

Due to constant software upgrades, the actual version and file name of the UltraPath software may differ from that in the document. In this case, use the actual name.

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 software package.

Application Server Data

Table 2-2 describes the data that you need prepare for installing UltraPath.

Table 2-2 Data preparations

Parameter	Description	Example
Management IP address	Used to manage application servers. Log in to the application server using this IP address to make necessary configurations for UltraPath for Windows.	Example: 192.168.100.100
User name	User name for the application server **NOTE** To install UltraPath for Windows, you must log in as user **administrator**.	**administrator**

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Parameter	Description	Example
Password	Password of the application server. **NOTE** The password must: ● Contain at least one upper-case letter, one lower-case letter, one digit, and one special character among spaces or ~!@#$%^&*()-_=+|{};:'",<.>/? ● Contain 8 to 32 characters. ● Not contain the user name or the reverse spelling of the user name.	Huawei@123

2.1.2 Preparing the Installation Environment

Check the application server and hardware and software of the storage system to ensure that UltraPath can be smoothly installed.

Application Servers

- 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. For details about operating systems supported by UltraPath, log in to Huawei technical support website (**http://support.huawei.com/enterprise/**). In the search field, enter **UltraPath**, and select a path from the paths that are automatically displayed to go to the document page of the UltraPath. Search, browse, and download the *Release Notes* of the corresponding 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 **3.3 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 **2.1.2 Preparing the Installation Environment**.
- After installing UltraPath, you need to reboot the application server. Therefore, stop services running on the application server before installing UltraPath.

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HBAs

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

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

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.

Storage System

For details about storage systems supported by UltraPath, log in to Huawei technical support website (**http://support.huawei.com/enterprise/**). In the search field, enter **UltraPath**, and select a path from the paths that are automatically displayed to go to the document page of the UltraPath. Search, browse, and download the *Release Notes* of the corresponding version.

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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. Besides, the virtual LUN running the host operating system must be a common virtual LUN.
- 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 **4.3 What Can I Do If I Want to Configure the Path Where Files Pagefile and Dump Are Saved to a Path on Local Disks?**.

The procedure for configuring HyperMetro in the SAN Boot scenario is as follows:

Step 1 Install the operating system on the SAN storage device.

Step 2 Install UltraPath on the operating system. For details, see **2.2 Installing UltraPath for Windows**.

Step 3 Configure the HyperMetro feature by referring to related product documentation.

NOTE

- Log in to Huawei technical support website (**http://support.huawei.com/enterprise/**) and enter **BC&DR Solution Product Documentation (Active-Active DCs)** in the search box to search for, browse, and download corresponding product documents.
- For UltraPath V100R008C50 and later versions, use the product documentation of V200R001C20.

----End

2.2 Installing UltraPath for Windows

You can install UltraPath for Windows after the preceding preparations are made. This chapter introduces the two installation modes: silent installation and non-silent installation.

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2.2.1 Silent Installation

Install UltraPath in silent installation mode. Before installing UltraPath, you must configure the parameters of the configuration file used for silent installation. The UltraPath installation process does not involve user interactions, enabling one-click installation.

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

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 Enter the **UnattendInstall** directory and open configuration file **unattend_install.conf** to set configuration items of silent installation. Table 2-3 describes related parameters.

Table 2-3 Parameter description

Keyword and Parameter	Description	Default Value
restart	This parameter is used to determine whether the host will be restarted immediately after UltraPath is installed. The value is **y** or **n**. ● y: The host will be restarted immediately after the installation. ● n: The host will not be restarted after the installation. You need to restart the host manually.	n

Step 3 Log in to the host running Windows, run **cmd** to open the CLI.

Step 4 Run **pushd** to enter the **OceanStor UltraPath XX.X.X_Windows\Windows\Packages\UnattendInstall** directory. The following takes copying the installation package of UltraPath for Windows to the **Test** file package on drive C as an example:

```
C:\User\Administrator>pushd C:\test\OceanStor UltraPath XX.X.X_Windows\Windows
\Packages\UnattendInstall
```

NOTE

Keep files in installation package directory **OceanStor UltraPath XX.X.X_Windows\Windows\Packages\UnattendInstall** and **Packages** unchanged; otherwise, the installation will fail.

Step 5 Run **unattend_install.bat** to start the installation. In this document, **restart** is set to **n**.

```
C:\Test\OceanStor UltraPath XX.X.X_Windows\Windows\Packages
\UnattendInstall>unattend_install.bat
```


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The installation takes about 3 minutes. The following information will be displayed after the installation succeeds:

```
Install UltraPath successfully. Unattend installation configuration item
'restart' s
et to 'N/n'. You must restart your system for the configuration changes made to
UltraPath to take effect.
```

Step 6 Log in to the host running Windows, check whether the installation succeeds. If **Install UltraPath successfully** is displayed, UltraPath for Windows has been installed successfully.

----End

Follow-up Procedure

- To check whether UltraPath for Windows has been successfully installed, perform the following steps:
  a. Double-click the **UltraPath Console** shortcut on the desktop to verify that **UltraPath Console** can start properly.
  b. Perform the following steps to check whether the up_service.exe service is running properly:
     i. Open the **cmd** CLI and enter **taskmgr** to open the **Task Manager**. Check whether the up_service.exe process is in the running state.
     ii. If the process does not exist, open the **cmd** CLI and enter **services.msc** in the CLI to open the service manager. Set **Startup type** of the UltraPath service to **Automatic**, as shown in **Figure 2-1** and **Figure 2-2**. If the service is still not running properly after the setting, contact technical support engineers.

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Figure 2-1 Setting the service startup type

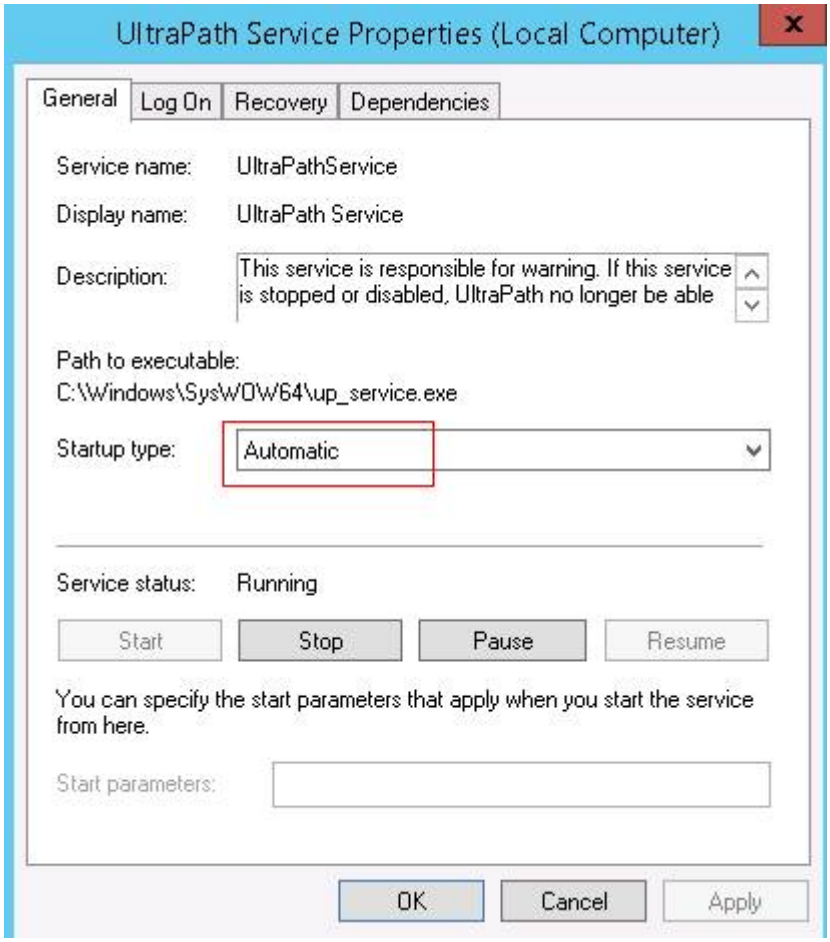
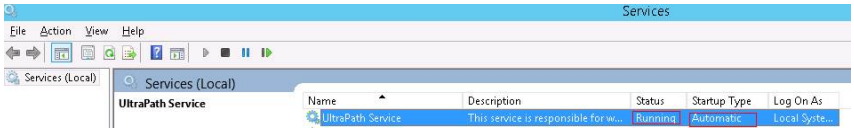


Figure 2-2 Checking the service startup type



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

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

   ii. 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 2-3**, the installation succeeded.

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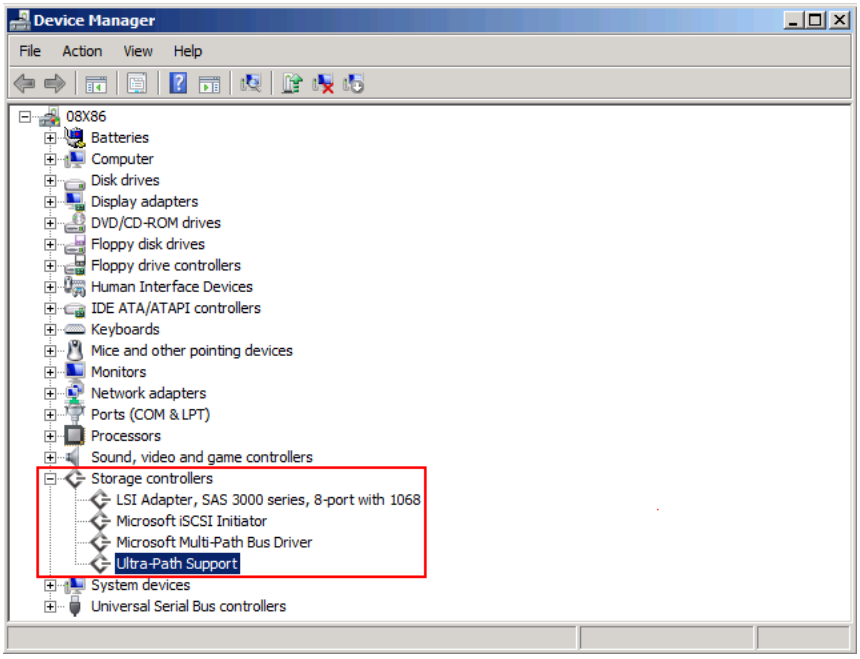
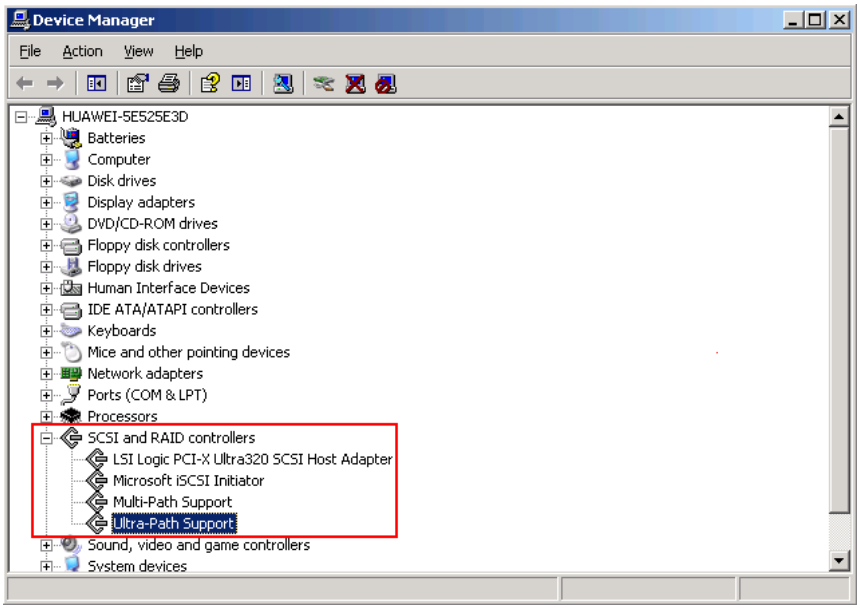
Figure 2-3 Device Manager window



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 2-4**, the installation succeeded.

Figure 2-4 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.

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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.

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.

2.2.2 Non-Silent Installation

Install UltraPath in non-silent installation mode. In the UltraPath installation process, you must perform operations according to the prompt information.

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

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 Run UltraPath for Windows installer. The UltraPath for Windows welcome page is displayed, as shown in **Figure 2-5**.

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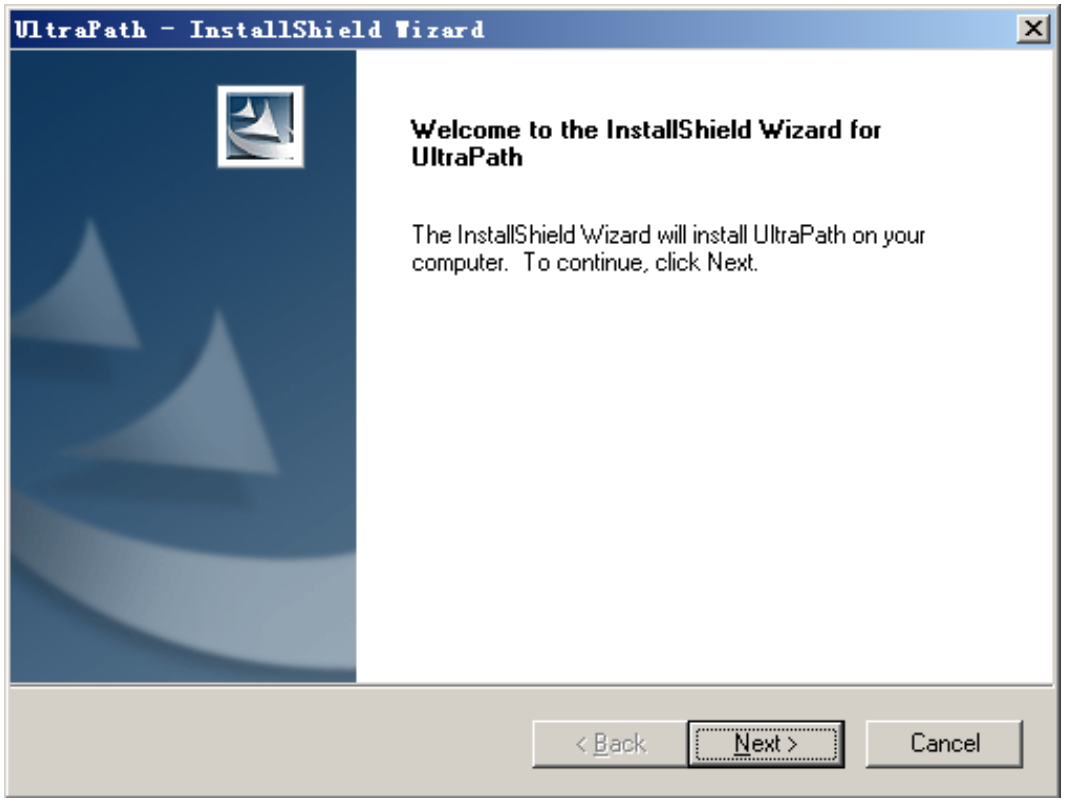
Figure 2-5 Installation welcome page



Step 3 Click **Next**. The **Customer Information** page is displayed, as shown in **Figure 2-6**.

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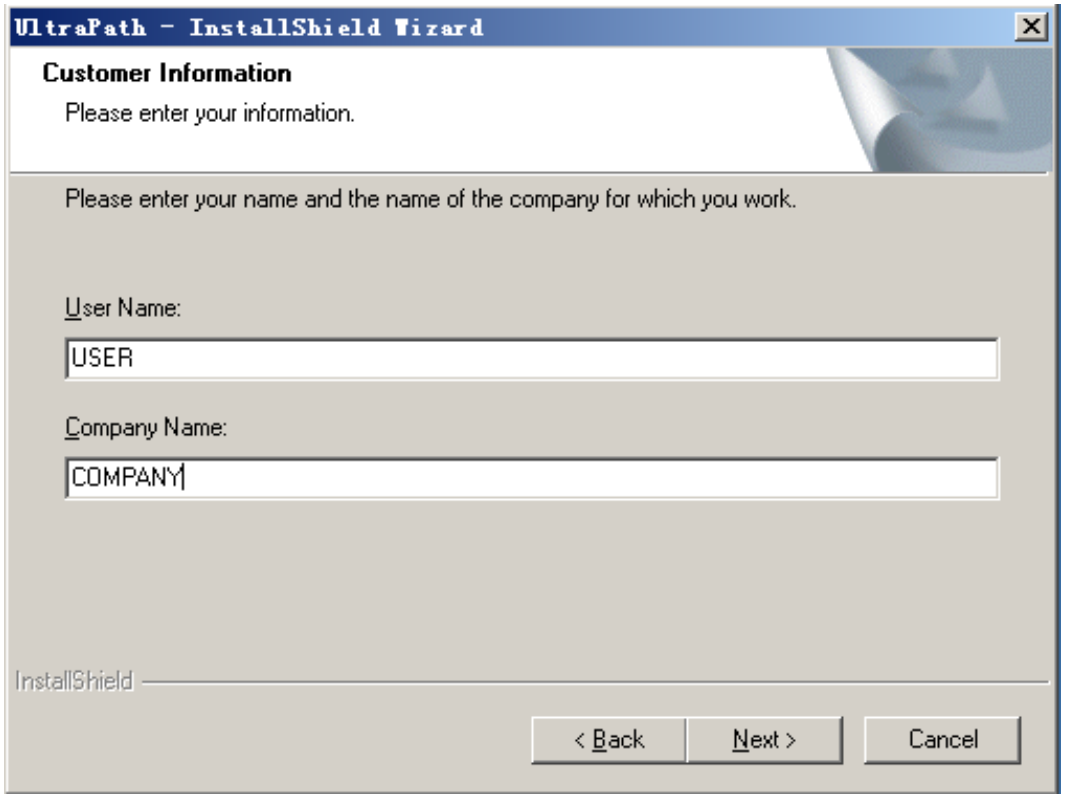
Figure 2-6 Customer Information page



Step 4 In the **User Name** and **Company Name** test boxes, enter a user name and company name.

Step 5 Click **Next**. The **Ready to Install the Program** page is displayed, as shown in **Figure 2-7**.

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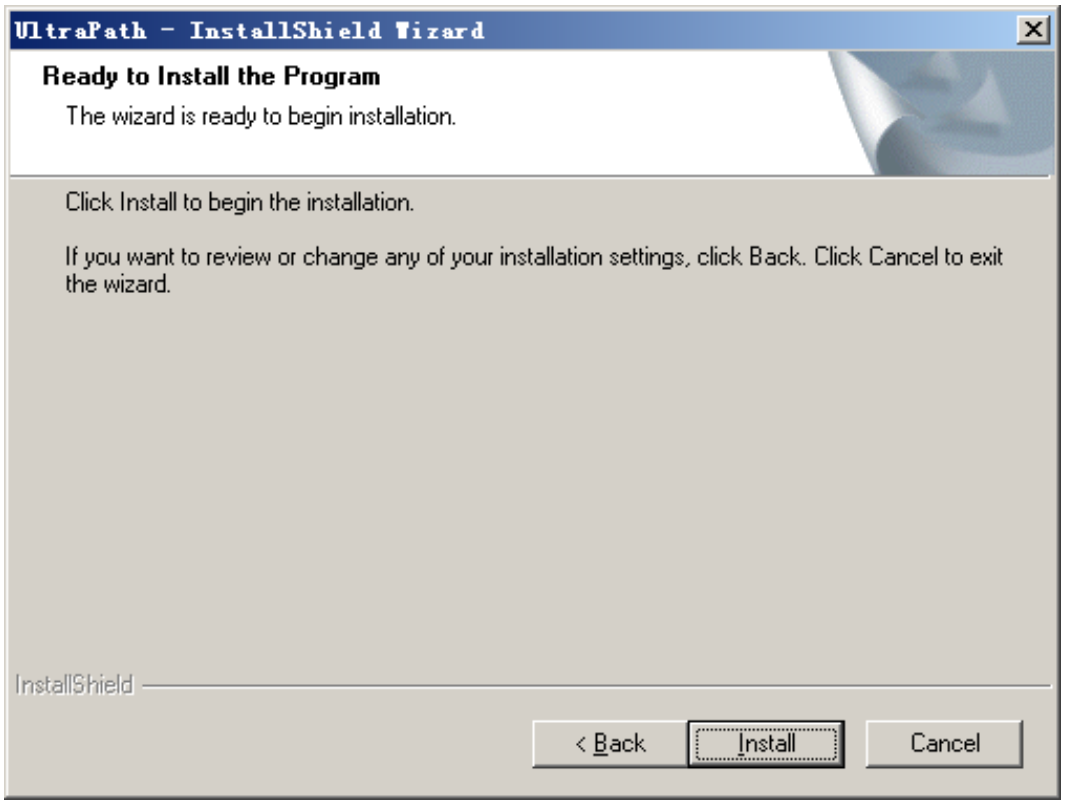
Figure 2-7 Ready to Install the Program page



Step 6 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 2-8** is displayed many times. Click **Continue** or **Yes** every time this dialog box is displayed until installation of UltraPath for Windows is complete.

Figure 2-8 Security Alert dialog box

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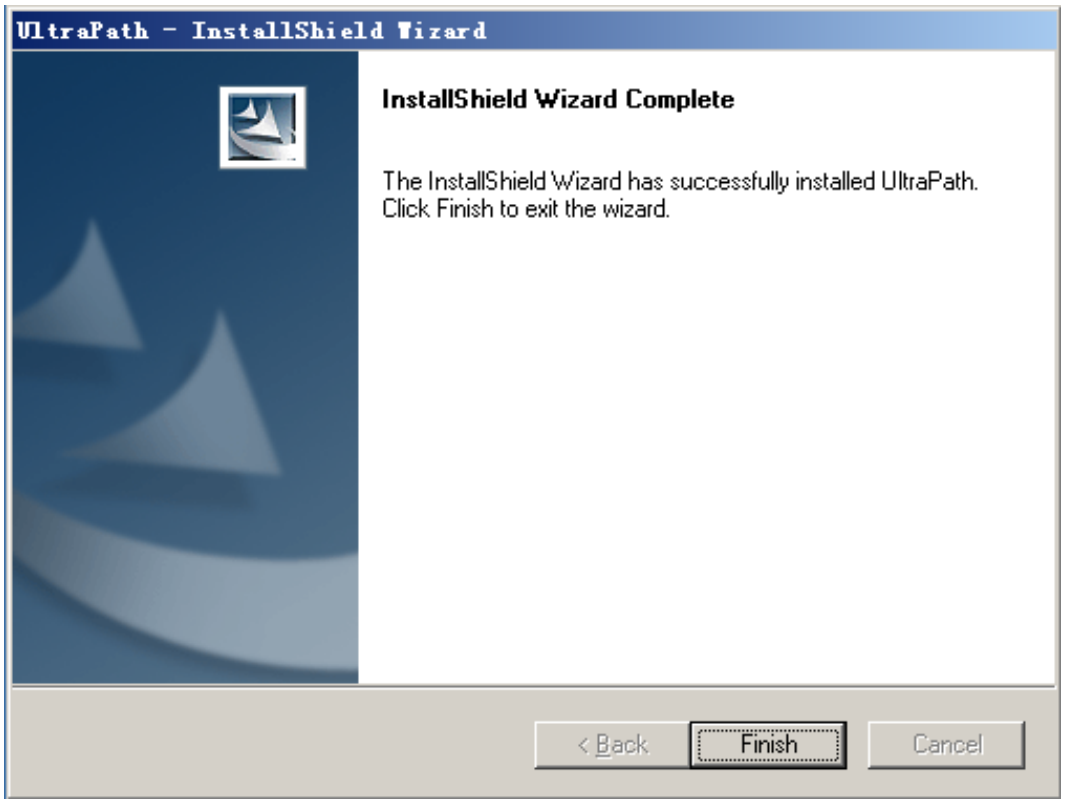
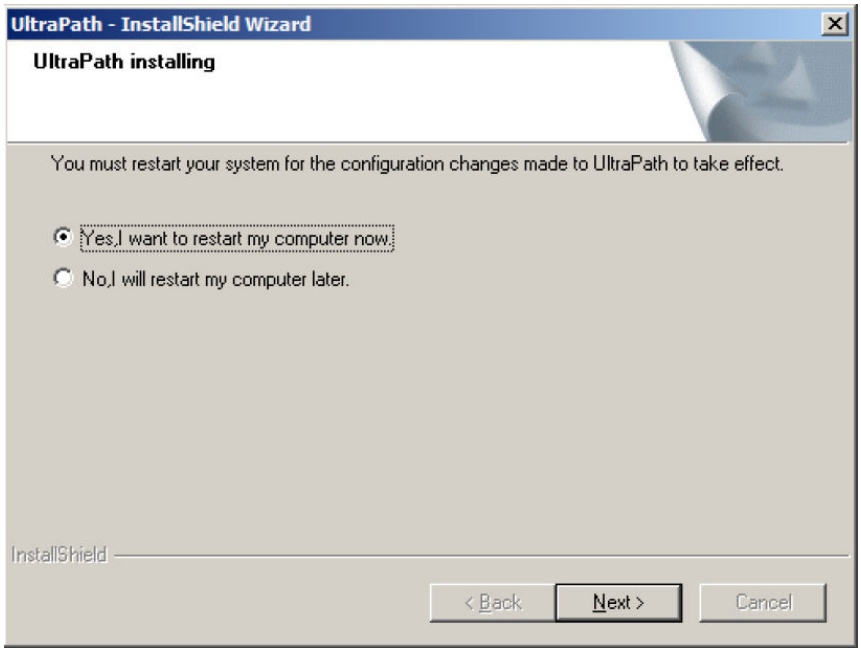
Step 7 Figure 2-9 is displayed, when installation of UltraPath for Windows is complete.

Figure 2-9 Finish page



Step 8 Click **Finish**. A dialog box shown in Figure 2-10 is displayed, asking you to restart your computer.

Figure 2-10 Restart page



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Step 9 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:
  a. Double-click the **UltraPath Console** shortcut on the desktop to verify that **UltraPath Console** can start properly.
  b. Perform the following steps to check whether the up_service.exe service is running properly:
     i. Open the **cmd** CLI and enter **taskmgr** to open the **Task Manager**. Check whether the up_service.exe process is in the running state.
     ii. If the process does not exist, open the **cmd** CLI and enter **services.msc** in the CLI to open the service manager. Set **Startup type** of the UltraPath service to **Automatic**, as shown in **Figure 2-11** and **Figure 2-12**. If the service is still not running properly after the setting, contact technical support engineers.

Figure 2-11 Setting the service startup type

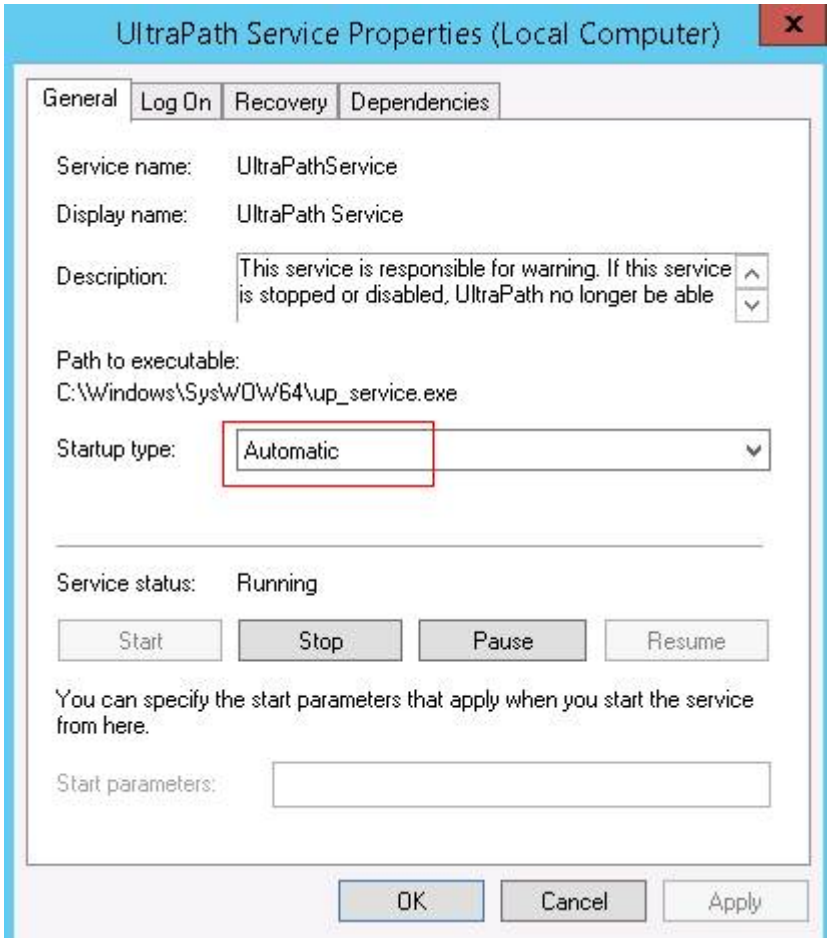

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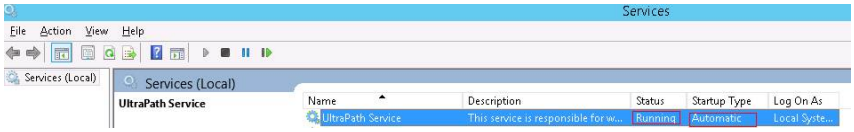
Figure 2-12 Checking the service startup type

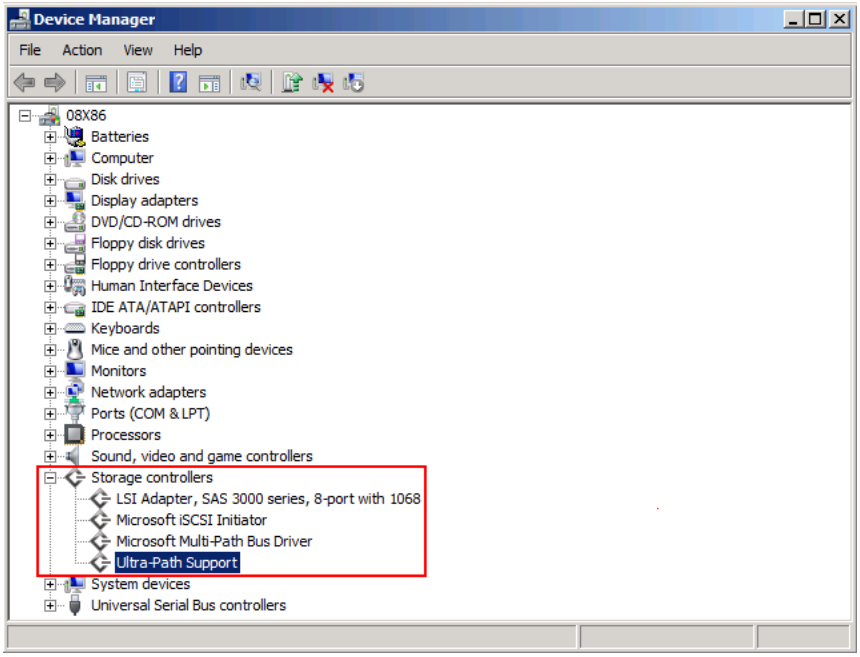


c. To check whether the UltraPath for Windows driver has been successfully installed, perform the following steps:

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

   ii. 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 2-13**, the installation succeeded.

Figure 2-13 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 2-14**, the installation succeeded.

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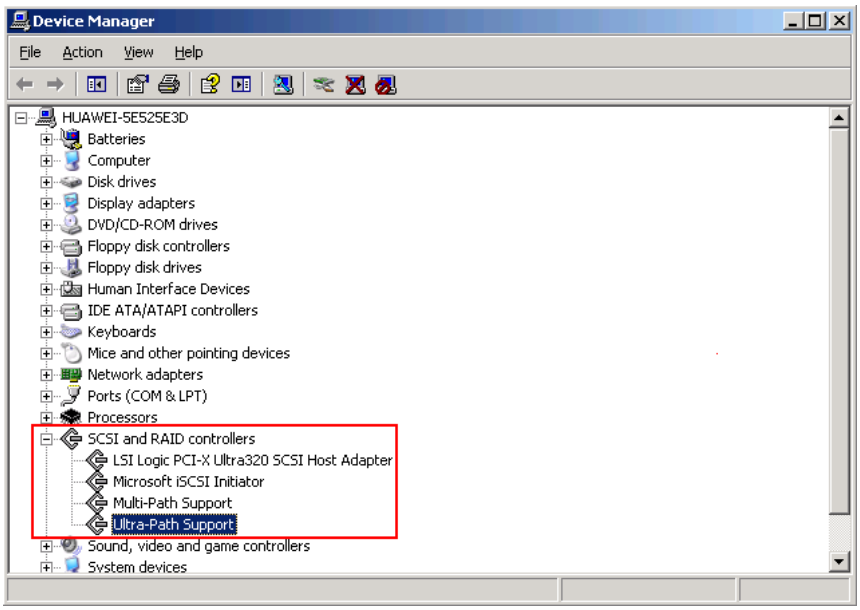
Figure 2-14 Windows Server 2003 **Device Manager** window



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.

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 Management

About This Chapter

When UltraPath is installed, you can maintain, upgrade, or uninstall it based on service running conditions.

3.1 Routine Maintenance
Routine maintenance can help UltraPath play a better role in storage networks.

3.2 Upgrading UltraPath
You can upgrade UltraPath to the latest version to obtain latest UltraPath functions.

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

3.1 Routine Maintenance

Routine maintenance can help UltraPath play a better role in storage networks.

3.1.1 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

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Parameter	Description	Value
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

3.1.2 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

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Parameter	Description	Value
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
Status	Working status of a physical path. The value can be **Normal**, **Fault**, **I/O discrete error degradation**, **Intermittent failure degradation**, **High latency degradation**, **Potential fault 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

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NOTE

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

----End

3.1.3 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

3.1.4 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.

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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

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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:

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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**, **Potential fault degradation** or **Disable**.	[Example] Normal
Port Type	Type of a link port.	[Example] iSCSI

----End

3.1.5 Critical Event Management

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

3.1.5.1 Viewing Critical Events

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

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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

3.1.5.2 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.

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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

3.1.6 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.

3.1.6.1 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

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NOTE

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

----End

3.1.6.2 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

3.1.7 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.

3.1.7.1 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

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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.

3.1.7.2 Setting Timeout Parameters for an iSCSI Initiator

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

3.1.7.2.1 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
```

3.1.7.2.2 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

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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.
```

3.1.7.2.3 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.
```

3.1.7.3 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**.

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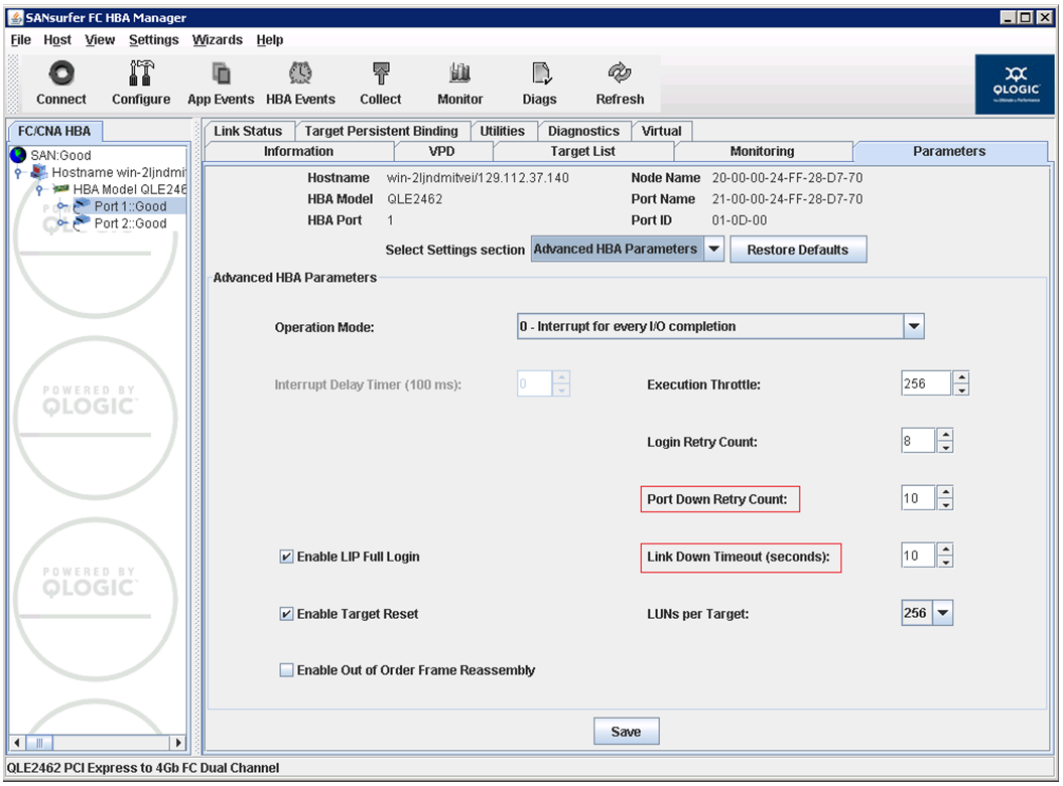
NOTICE

- 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



3.1.7.4 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.

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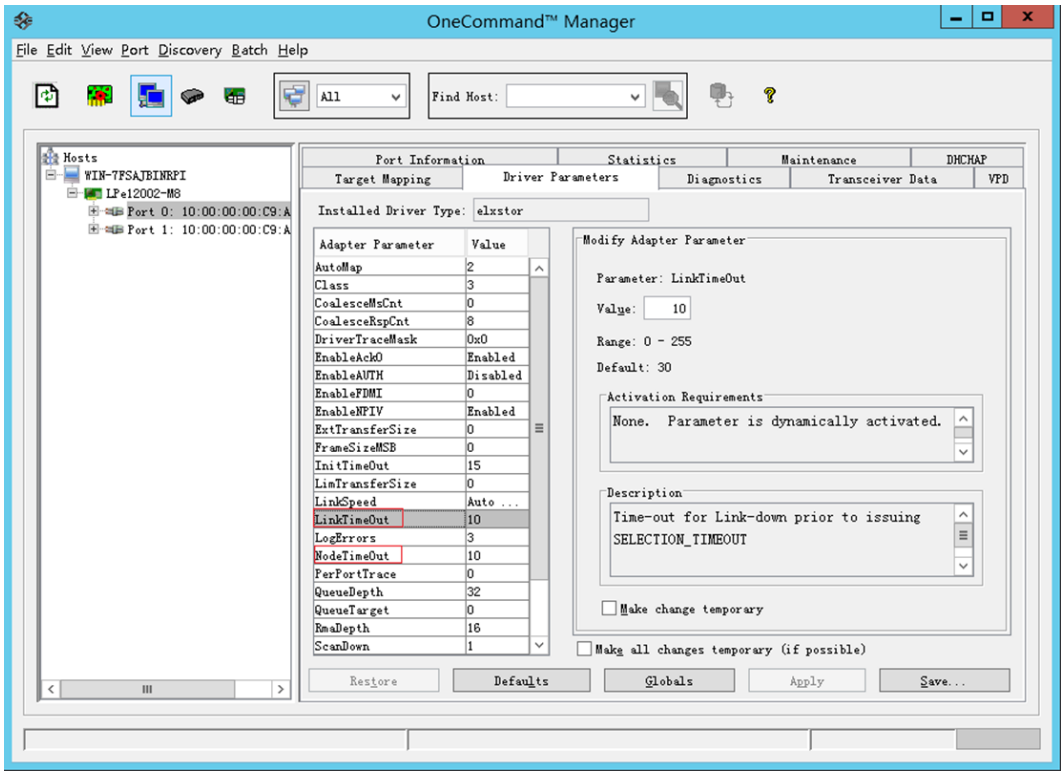
Figure 3-2 OneCommand Manager setting page



3.1.7.5 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
```

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```
    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)
```

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```
   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)
```

3.2 Upgrading UltraPath

You can upgrade UltraPath to the latest version to obtain latest UltraPath functions.

For details about how to upgrade, see Upgrade Guide of UltraPath. Obtaining method is as follows:

Log in to Huawei technical support website (**http://support.huawei.com/enterprise/**). In the search field, enter **UltraPath**, and select a path from the paths that are automatically displayed to go to the document page of the UltraPath. Search, browse, and download the *Upgrade Guide* of the corresponding version.

3.3 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.

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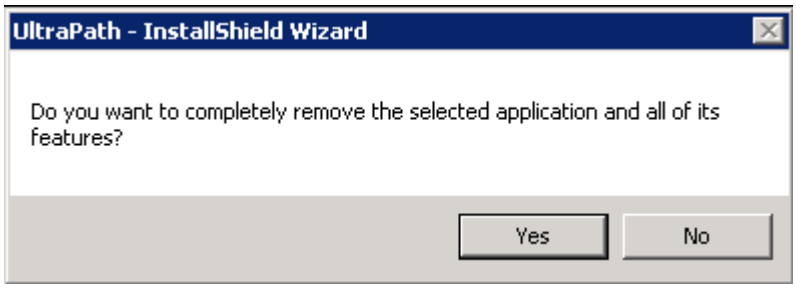
Procedure

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 3-3**.

Figure 3-3 Add or Remove Programs dialog box



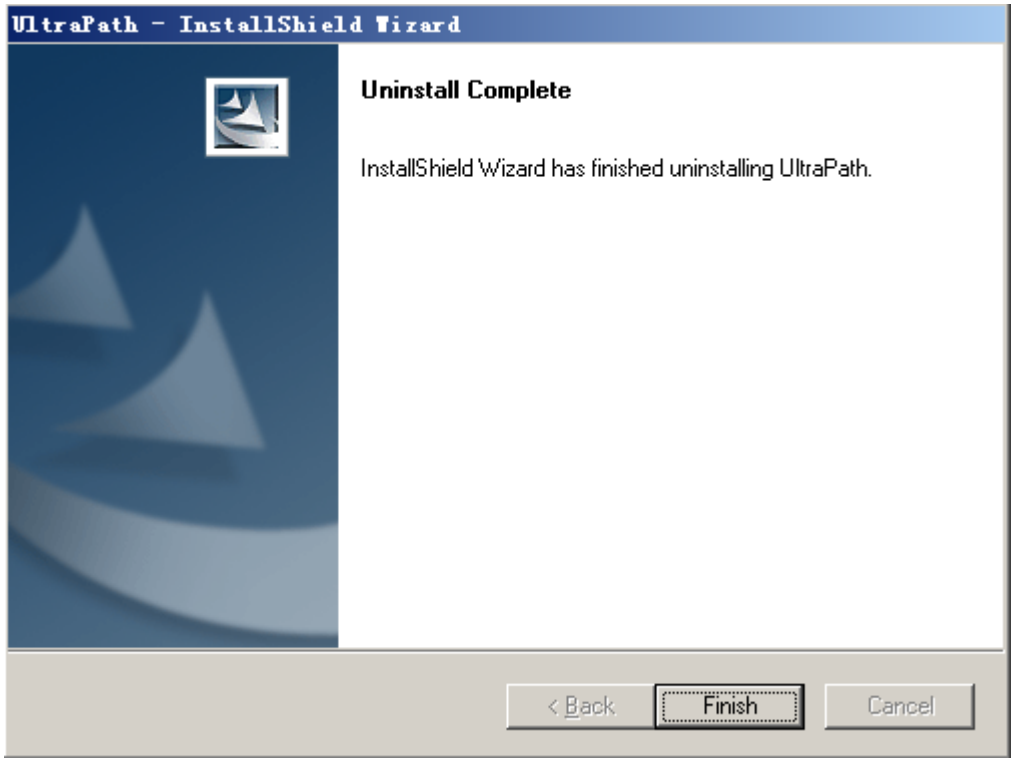
NOTE

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 3-4** is displayed. Click **Finish**. You are prompted to restart the computer.

Figure 3-4 Uninstall Complete dialog box



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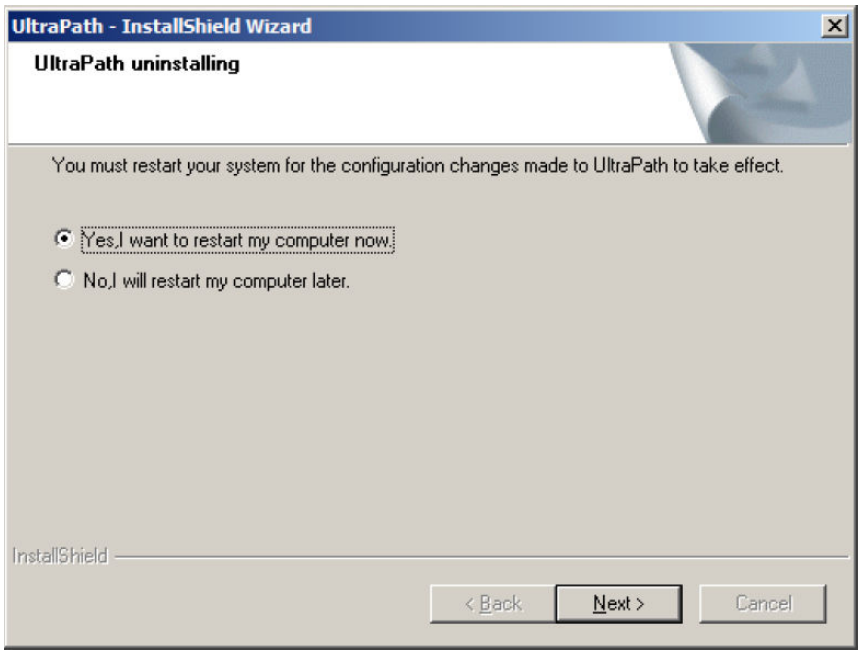
Step 5 Select **Yes, I want to restart my computer now** (recommended), as shown in **Figure 3-5**. Click **Next**. The application server restarts. You can also select **No, I will restart my computer later.** to defer the restart.

Figure 3-5 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**.

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4 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.

4.1 How can I Manually Remove the MPIO Component?

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

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

4.4 How Do I Determine Whether UltraPath Has Taken Effect By Using System Logs After a Host Restart?

4.5 How Do I Ensure Proper Running of UltraPath After the Windows Operating System Is Upgraded?

4.1 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 4-1**.

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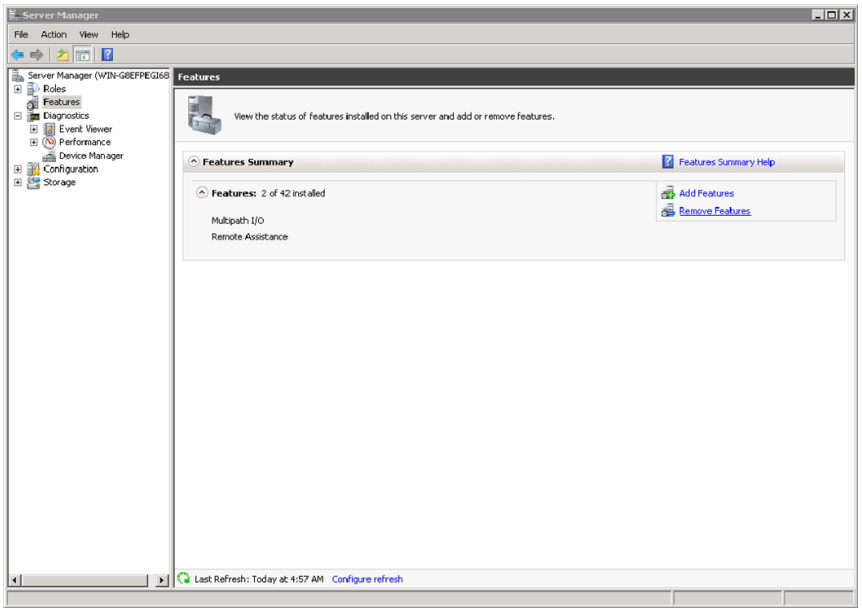
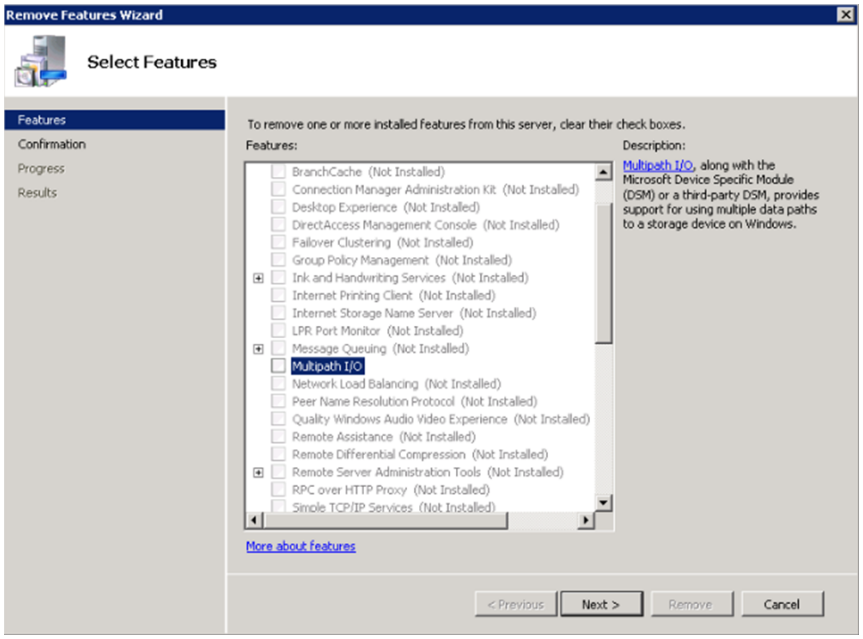
Figure 4-1 Server Manager page of Windows Server 2008 R2



b. Click **Remove Features**.

The **Remove Features Wizard** dialog box is displayed, as shown in **Figure 4-2**.

Figure 4-2 Remove Features Wizard dialog box



c. Deselect **Multipath I/O** and click **Next**.

The **Confirm Removal Selections** page is displayed, as shown in **Figure 4-3**.

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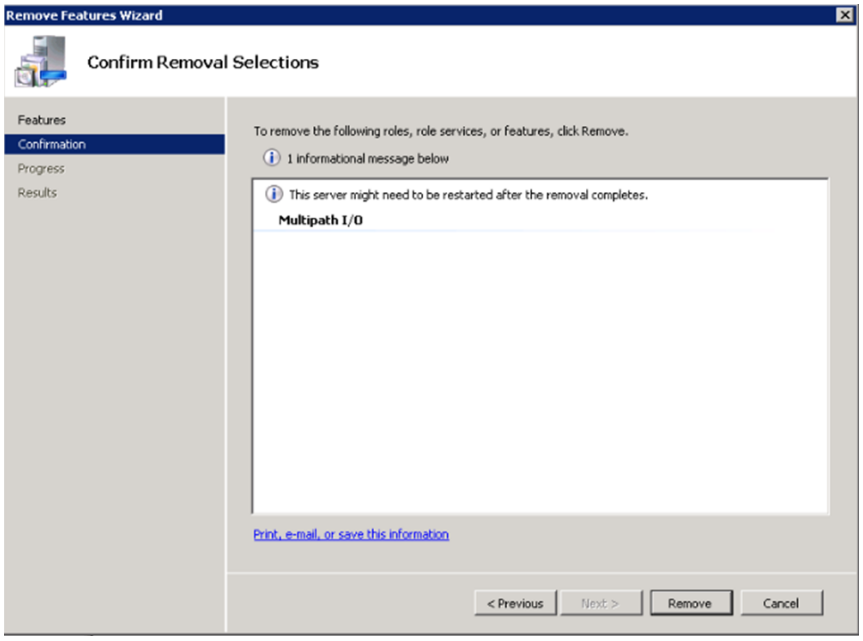
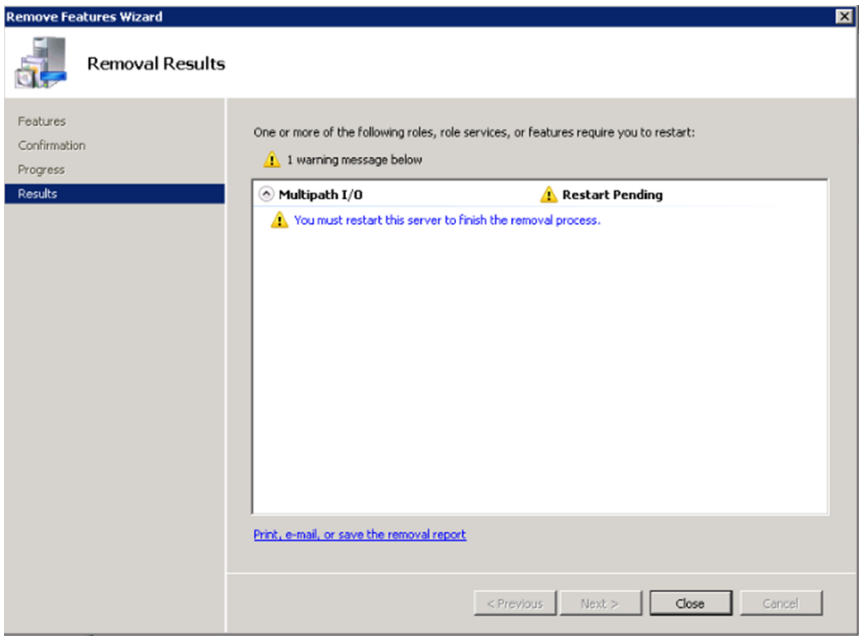
Figure 4-3 Confirm Removal Selections page



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

Figure 4-4 Removal Results restart instruction page



e. Click **Close**.

The restart instruction dialog box is displayed, as shown in **Figure 4-5**.

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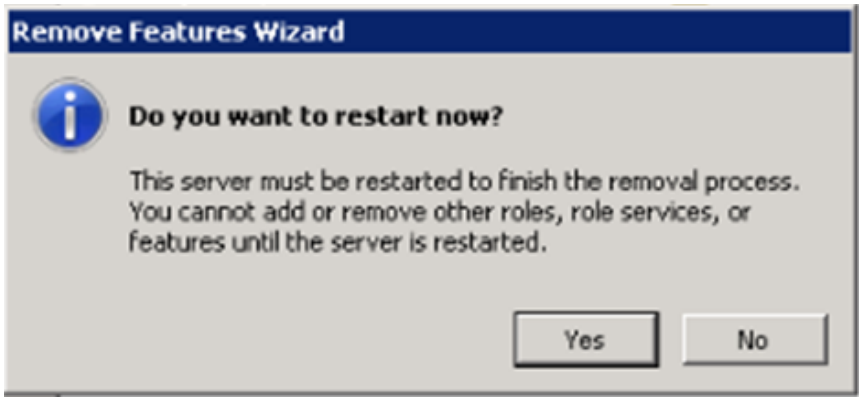
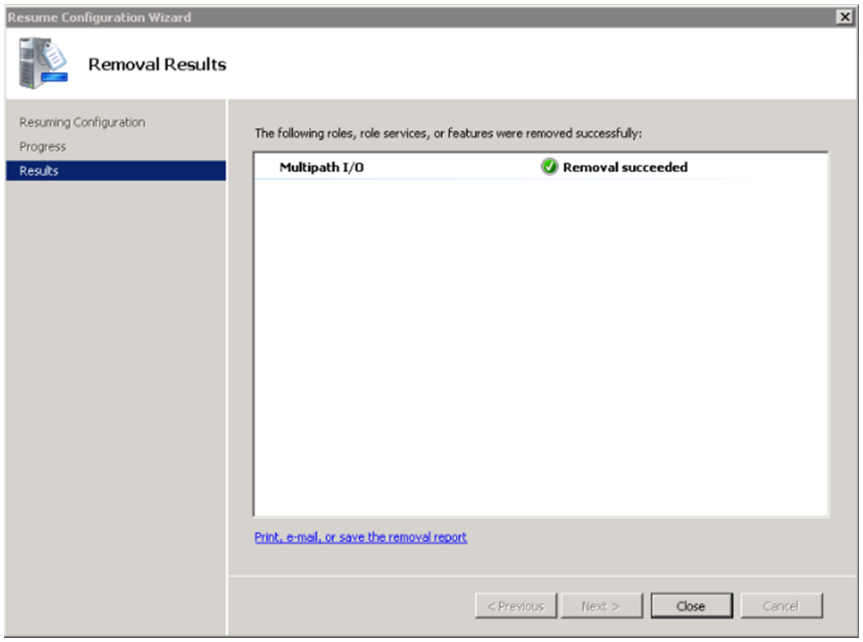
Figure 4-5 Remove Features Wizard restart instruction dialog box



f. Click **Yes** to restart the operating system.

After the operating system is restarted, **Multipath I/O** is removed, as shown in **Figure 4-6**.

Figure 4-6 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 4-7**.

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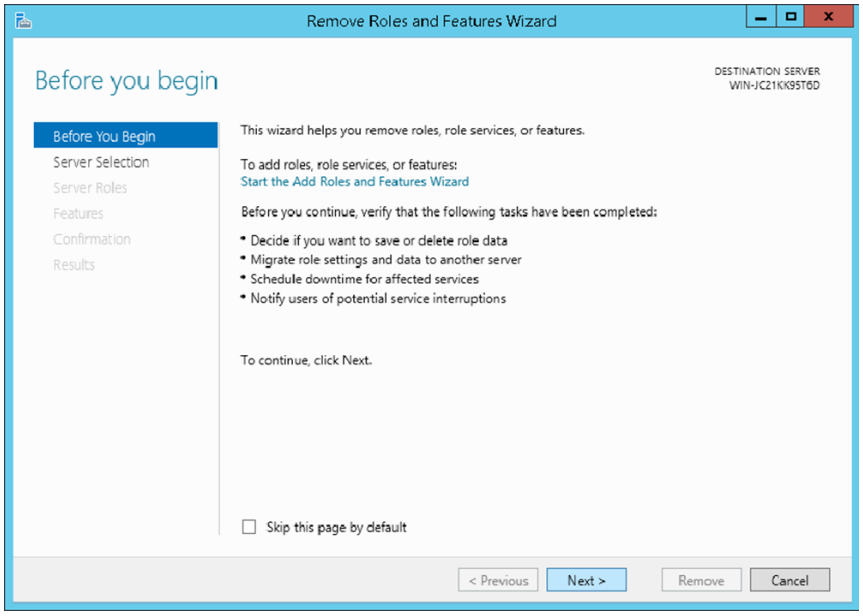
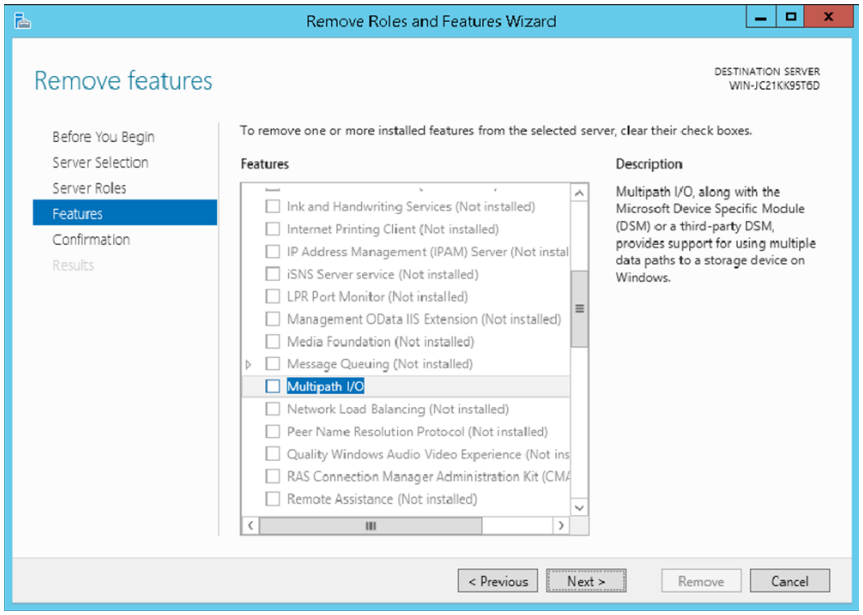
Figure 4-7 Remove Roles and Features Wizard dialog box



b. Click **Next**.

The **Remove features** page is displayed, as shown in **Figure 4-8**.

Figure 4-8 Remove features page



c. Deselect **Multipath I/O** and click **Next**.

The **Confirm Removal Selections** page is displayed, as shown in **Figure 4-9**.

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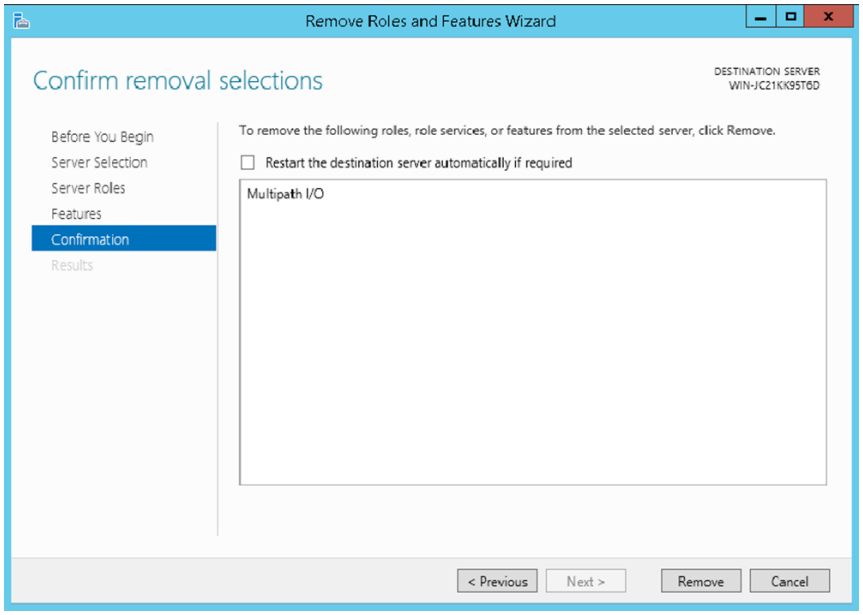
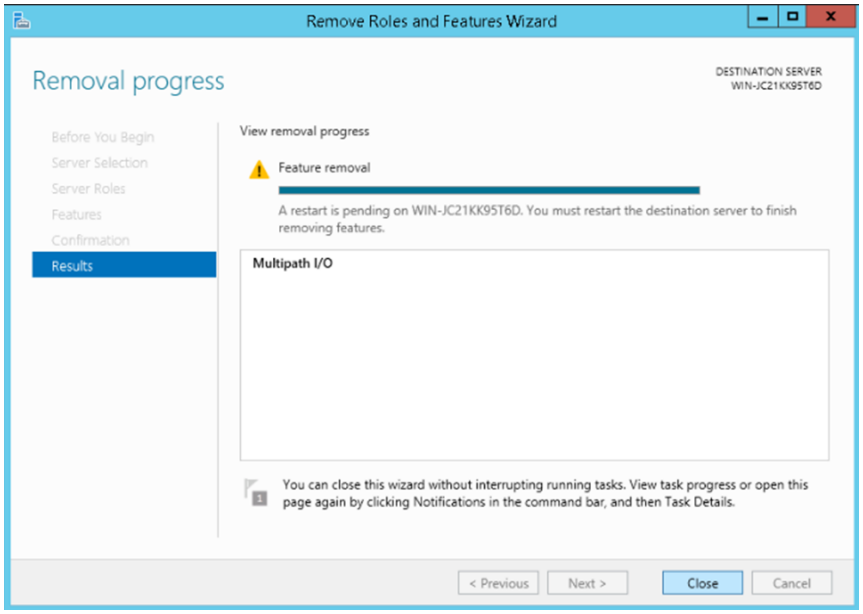
Figure 4-9 Confirm Removal Selections page



d. After confirming the information, click **Remove** to start removing **Multipath I/O**. The restart instruction page is displayed, as shown in **Figure 4-10**.

Figure 4-10 Start page of SUSE operating system



e. Click **Close**.

The MPIO component is cleared after the operating system restarts.

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4.2 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.

4.3 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):

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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**.

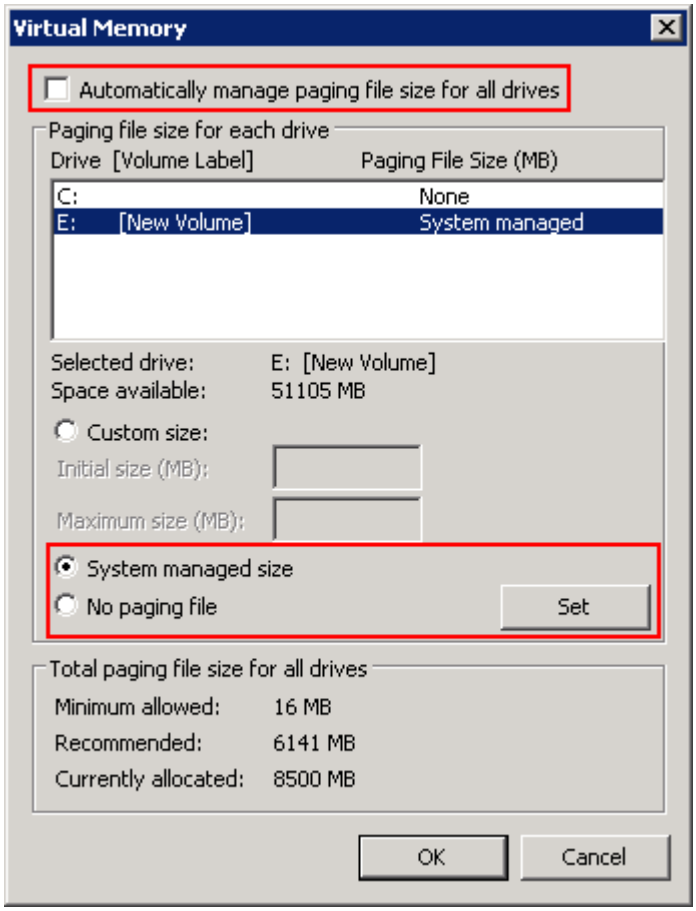
   a. Click the **Advanced** tab. In the **Performance** area of the tab page, click **Settings**.

      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.

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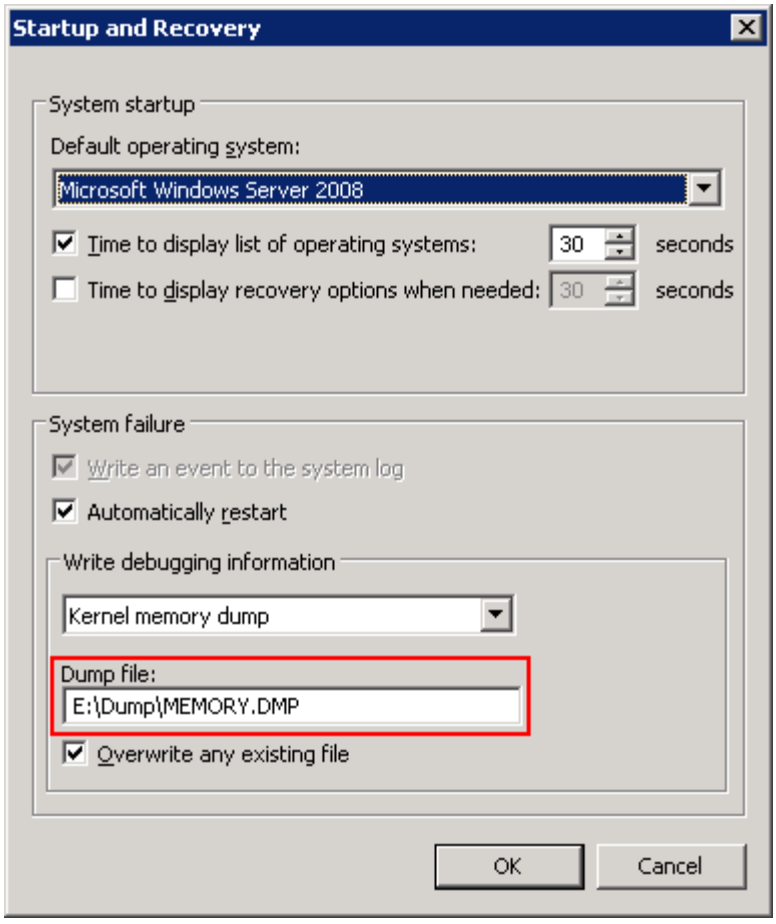
NOTE

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**.

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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.

4.4 How Do I Determine Whether UltraPath Has Taken Effect By Using System Logs After a Host Restart?

Question

How Do I Determine Whether UltraPath Has Taken Effect By Using System Logs After a Host Restart?

Answer

Check the UltraPath log **C:\Program Files (x86)\UltraPath\log\xmp_log*.txt** or **C:\Program Files\UltraPath\log\xmp_log*.txt**. If **UltraPath started successfully.** is recorded in the log after the host is started, UltraPath has taken effect.

NOTICE

xmp_log*.txt may be dumped. If **UltraPath started successfully.** is not recorded in the log after the host is started and the start time of log recording in **xmp_log*.txt** is later than host startup, you can check the UltraPath log that has been dumped **C:\Program Files (x86)\UltraPath\log\kernel_log***xmp_log*** or **C:\Program Files\UltraPath\log\kernel_log***xmp_log*** in the UltraPath log dump directory (*** in ***xmp_log*** indicates the time when a file is created, for example, 20180406115145792xmp_log0).

4.5 How Do I Ensure Proper Running of UltraPath After the Windows Operating System Is Upgraded?

Question

After UltraPath is installed, how do I ensure that UltraPath works properly after the Windows operating system is upgraded?

Answer

After the Windows operating system is upgraded, the registry information of UltraPath is lost and some drivers become invalid. Therefore, before upgrading the Windows operating system, you need to perform the following operations to ensure proper running of UltraPath:

1. Uninstall UltraPath. For details, see **3.3 UltraPath for Windows Uninstallation**.
2. Upgrade the Windows operating system.

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3. Reinstall UltraPath. For details, see **2.2 Installing UltraPath for Windows**.

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5 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.

5.1 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.

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

5.3 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.

5.4 After UltraPath Is Installed and the System Is Restarted, a Message Is Displayed Asking You to Restart Again When You First Add LUN Mapping
After UltraPath is installed and the system is restarted, a message is displayed asking you to restart again when you add LUN mapping for the first time. In Device Manager, yellow exclamation marks appear in the MPIO virtual LUNs.

5.1 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.

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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.

5.2 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 5-1**.

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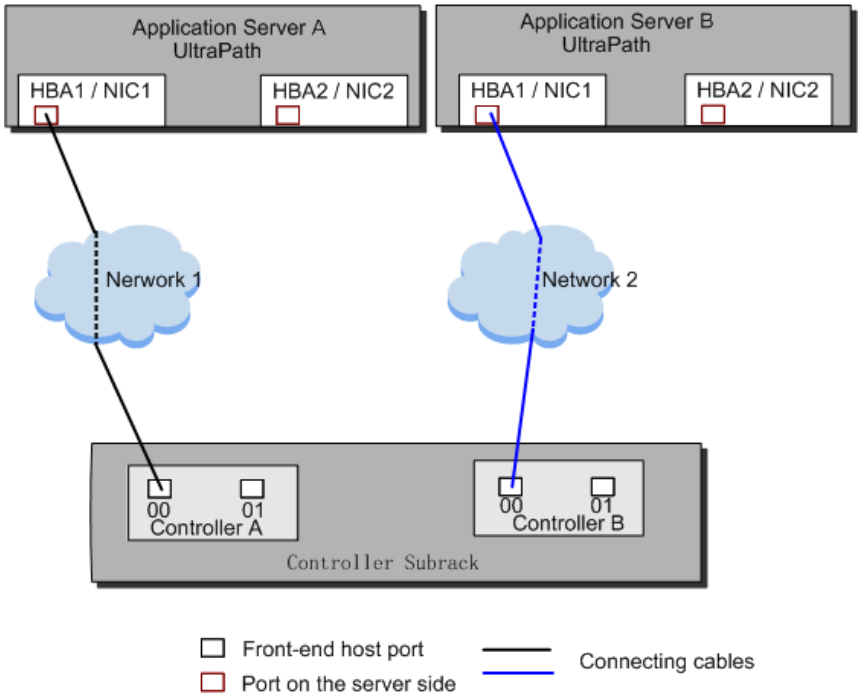
Figure 5-1 Cluster networking that uses load balancing



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.3.10 Setting the Working Controller Trespass Policy for a LUN**.

5.3 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.

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- 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.

5.4 After UltraPath Is Installed and the System Is Restarted, a Message Is Displayed Asking You to Restart Again When You First Add LUN Mapping

After UltraPath is installed and the system is restarted, a message is displayed asking you to restart again when you add LUN mapping for the first time. In Device Manager, yellow exclamation marks appear in the MPIO virtual LUNs.

Symptom

After UltraPath is installed and the system is restarted, a message is displayed asking you to restart again when you add LUN mapping for the first time, as shown in **Figure 5-2**. Open Device Manager and select **Disk drives**. You can see that yellow exclamation marks appear on the virtual LUNs of MPIO.

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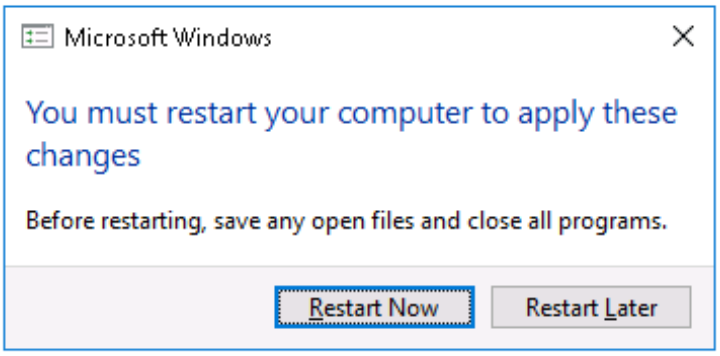
Figure 5-2 A message asking you to restart the computer



Possible Causes

The system occasionally fails to load the driver. In this case, the system will prompt you to restart the computer.

Procedure

- 1. In the dialog box that is displayed, select **Restart Later**.
- 2. When no service is running, click **Start** > **All Programs** > **UltraPath** > **Driver Update**, and then the tool automatically updates the driver.

NOTE

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

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A Commonly Used CLI Management Commands

About This Chapter

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 CLI Use Guidance

This chapter explains how to use the CLI and provides some useful tips.

A.1.1 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.

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Convention	Description
[ ]	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.1.2 Shortcut Keys

Use UltraPath command line interface (CLI) shortcut keys for improved operation efficiency.

UltraPath CLI provides many shortcut keys. **Table 6-2** lists functions of shortcut keys.

Table A-2 Function of Shortcut Keys

Shortcut Keys	Description
Up arrow key (↑)	Inserts a previously executed command line.
Down arrow key (↓)	Inserts a subsequently executed command line.
Left arrow key (←)	Moves the cursor one character to the left.
Right arrow key (→)	Moves the cursor one character to the right.
Back space (←)	Deletes one character on the left of the cursor.
Delete	Deletes one character on the right of the cursor.
Insert	Switch over between the insertion and overwrite modes. ● Insertion mode (default): inserts one character to the right of the cursor. ● Overwrite mode: overwrites one character to the right of the cursor.
Tab	Associating Command Lines
Enter	Triggers command execution.

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Shortcut Keys	Description
Ctrl+C	● If a command is being executed, stop the current command. ● If no command is being executed, stop and exit from UltraPath CLI.

A.1.3 Command Line Completion

In the UltraPath command line interface (CLI), you can press the **Tab** to complete a command line in stages.

NOTE

Run **upadm** to log in to UltraPath CLI. You can only use UltraPath commands to supplement functions after login.

- Press **Tab** once to display the available starting segments of a command line.

```
UltraPath CLI #1 >//Press Tab.
add                             check
clear                           del
genprkey                        set
show                            start
stop                            upRescan
```

- After the starting segment is determined and completed, press **Tab** once to display the available adjacent segments of the starting segment.

```
UltraPath CLI #2 >show//Press Tab.
alarmenable                     array
event                           io_count
io_latency                      io_latency_threshold
iostat                          path
path_reliability_enable         supportarraylist
upconfig                        version
vlun                            workerstate
```

- When part of a segment has been typed and its intact form can be determined by the CLI, pressing **Tab** once completes the segment while displaying available adjacent segments.

```
UltraPath CLI #3 >show vl//Press Tab.
UltraPath CLI #3 >show vlun
```

- When an executable command is input, you can press **Tab** to query all executable parameters of the command. The system also prompts you that this command can be executed.

```
UltraPath CLI #1 >show vlun//Press Tab.
[array_id=?]                    [id=?]                          [type=?]
Command is executable now.
```

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.

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

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.

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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.

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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.

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Example

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

```
UltraPath CLI #0 >show version
Software Version : XX.XX.XXX
Driver Version : XX.XX.XXX
```

- 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 : XX.XX.XXX
Driver Version : XX.XX.XXX
Product  Version : XX.X.X
```

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.

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- 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 between controllers
    LoadBalance Mode : round-robin
    Loadbanlance io threshold : 100
    LUN Trespass : off

Advanced Configuration
    Io Retry Times : 10
    Io Retry Delay : 0
    Faulty path check interval : 10
    Idle path check interval : 60
    Failback Delay Time : 60
    Io Suspension Time : 60
    Max io retry timeout : 1800
    Performance Record : off
    NPIV Strategy : check

Path reliability configuration
    Timeout degraded statistical time : 600
    Timeout degraded threshold : 1
    Timeout degraded path recovery time : 1800
    Intermittent IO error degraded statistical time : 300
    Min. I/Os for intermittent IO error degraded statistical : 5000
    Intermittent IO error degraded threshold : 20
    Intermittent IO 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 : 2102350RMG10H2000006
    HyperMetro WorkingMode : read write between both arrays
    HyperMetro Split Size : 128MB
    HyperMetro Load Balance Mode : split-size
```

- 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
```

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```
=====================================================
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
HyperMetro Load Balance Mode : split-size
```

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

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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         --
------------------------------------------------------------------------------
------------------------------------------
```

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- 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

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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. ● High latency degradation: The path is degraded due to high latency. ● I/O timeout degradation: The path is degraded due to I/O timeout. ● Potential fault degradation: The path is degraded due to potential fault. ● 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

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Parameter	Description	Default Value
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 path** 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
```

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```
Succeeded in executing the command.
```

System Response

None

A.3.5 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.

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- 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.3.6 Clearing Statistics About Physical Paths

Function

The **clear path_statistic** command can be used to clear statistics about all or specific physical paths, including I/O Retry count, Path Fault count, Latency-Low, Latency-High, and Latency-avg.

Format

clear path_statistic [**path_id**=*ID1,ID2,...* | **array_id**=*ID1,ID2,...*]

Parameters

Parameter	Description	Default Value
path_id=*ID1,ID2,...*	ID of a physical path. You can run **show path** without parameters to obtain all physical path IDs. **NOTE** You can clear statistics about eight physical paths at most at a time. To clear statistics about multiple physical paths, use comma (,) to separate the path IDs.	None

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Parameter	Description	Default Value
array_id=*ID1,ID2,...*	Storage array ID. You can run the **show array** command without parameters to obtain IDs of storage arrays. **NOTE** You can clear statistics about physical paths of eight storage arrays at most at a time. To clear statistics about physical paths of multiple storage arrays, use comma (,) to separate the storage array IDs.	None

Level

User with **administrator** permissions

Usage Guidelines

- Run **clear path_statistic** to clear statistics about all physical paths.

NOTE

When **clear path_statistic** is used, statistics about at most eight paths of a controller can be cleared.

- Run **clear path_statistic path_id**=*ID1,ID2,...* to clear statistics about specific physical paths.
- Run **clear path_statistic array_id**=*ID1,ID2,...* to clear statistics about physical paths of specific storage arrays.

Example

- Clear statistics about all physical paths.
```
UltraPath CLI #0 >clear path_statistic
Statistics of all paths cleared successfully.
```
- Clear statistics about the physical path whose ID is **0**.
```
UltraPath CLI #0 >clear path_statistic path_id=0
Statistics of all specified paths cleared successfully.
```
- Clear statistics about physical paths of storage array whose ID is **0**
```
UltraPath CLI #0 >clear path_statistic array_id=0
Statistics of all specified arrays cleared successfully.
```

A.3.7 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**=< *A* | *B* | *ID* >

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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=< *A* | *B* | *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

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A.3.8 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: cross-controller load balancing mode. That is, I/Os are delivered through paths of all controllers. ● 1: intra-controller load balancing mode. That is, 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

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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.3.9 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 }*]

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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
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 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 calculates the number of waiting I/Os on each path and the data block size of each I/O in real time. Then UltraPath delivers new I/Os to the path with the lightest load.
- Run **set loadbalancemode**={ *round-robin* \| *min-queue-depth* \| *min-task* } **array_id**=*ID* to set a load balancing mode for a specified storage system.

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- 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.3.10 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.	off
array_id= ID	ID of a storage system. You can run **show array** without an ID to display all storage system IDs.	None

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Keyword and Parameter	Description	Default Value
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 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.3.11 Setting Failback Delay

Function

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

Format

set failbackdelaytime=*time*

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Parameters

Keyword and Parameter	Description	Default Value
time	Failback delay. The value ranges from 0 to 3600, expressed in seconds.	60

Level

User with **administrator** permissions

Usage Guidelines

None

Example

Set failback delay to 600 seconds.

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

System Response

None

A.3.12 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*,...]

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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. 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
-------------------------------------------------------------------------------
---------------------------
```

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System Response

None

A.3.13 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.3.14 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*,...]

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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. 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
-------------------------------------------------------------------------------
-----------
```

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System Response

None

A.3.15 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, 0 indicates disabled.	0

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.3.16 Querying I/O Latency Threshold

Function

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

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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.3.17 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

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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.3.18 Setting the I/O Suspension Time

Function

The **set iosuspensiontime** 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

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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.3.19 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

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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.3.20 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

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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.3.21 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

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A.3.22 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.3.23 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*

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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.3.24 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

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

Function

The **set ied_min_io** 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

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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.3.26 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 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 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

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A.3.27 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.3.28 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.

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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.3.29 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*

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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.3.30 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

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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.3.31 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

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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.3.32 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

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A.3.33 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.3.34 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*

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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.3.35 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

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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.3.36 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.

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

System Response

None

A.3.37 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
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.

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- 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.3.38 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

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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.3.39 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*]

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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.3.40 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.

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Format

clear 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 **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=1
Succeeded in executing the command.
```

System Response

None

A.3.41 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*

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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.3.42 Setting the Pending Delete Period of Obsolete Path Information

Function

The **set obsolete_path_clear_delaytime** command is used to set the pending delete period of information about obsolete paths.

Format

set obsolete_path_clear_delaytime=*time*

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Parameters

Parameter	Description	Default Value
time	● The pending delete period of information about obsolete paths. ● The value ranges from 7,200 to 2,592,000, expressed in seconds.	28,800

Level

User with **administrator** permissions

Usage Guidelines

NOTE

- When the network is faulty (for example, the optical fiber link is interrupted), some paths managed by UltraPath will be set to faulty state automatically. If the storage system administrator has not adjusted the pending delete period, the system will delete information about the paths in faulty state automatically eight hours later.
- If the storage system administrator wants to reserve the path information for fault analysis or clear the path information earlier to reduce interference, the administrator can use this command to adjust the pending delete period.

Example

Setting the pending delete period of obsolete path information to 7200s.

```
UltraPath CLI #1 >set obsolete_path_clear_delaytime=7200
Succeeded in executing the command.
```

System Response

None

A.3.43 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

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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.3.44 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

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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.3.45 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*]

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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

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

Manually update the working controller.

```
UltraPath CLI #1 >start rebalancelun
Succeeded in executing the command.
```

System Response

None

A.3.46 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:

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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

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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.

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- 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
```

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```
================================================================================
=======
```

- 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       |
```

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```
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.3.47 Enabling and Disabling the Performance Data Record Function

Function

set performance_record is used to enable and disable the performance data record function.

Format

set performance_record={ *on* | *off* } [**duration**=*time*]

Parameters

Parameter	Description	Default Value
{ *on* | *off* }	Performance data record function The value can be **on** or **off**. ● on: Enable the performance data record function. ● off: Disable the performance data record function. The performance data file is saved in the UltraPath log directory and is named **perf_record.log**.	off
duration=*time*	Time during which the performance data record function works The value ranges from 0 to 8,760, expressed in hours. **0** indicates that the performance data record function works permanently.	0

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Level

User with **administrator** permissions

Usage Guidelines

- You are not required to specify **duration** when disabling the performance data record function.
- When the size of the performance data file reaches 30 MB, the system automatically dumps it to the **perf_record** directory which is under the UltraPath **log** directory.

Example

- Enable the performance data record function and set **duration** to 24 hours.
```
UltraPath CLI #0 >set performance_record=on duration=24
Succeeded in executing the command.
```
- Disable the performance data record function.
```
UltraPath CLI #0 >set performance_record=off
Succeeded in executing the command.
```

System Response

None

A.3.48 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
```


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System Response

None

A.3.49 Setting an NPIV Scenario Detection Method

Function

set npiv_strategy is used to set an NPIV scenario detection method.

Format

set npiv_strategy={ *off* | *check* | *force-check* | *update*}

Parameters

Parameter	Description	Default Value
npiv_strategy={ *off* | *check* | *force-check* | *update*}	NPIV scenario detection method The value can be **off**, **check**, **force-check**, or **update**. ● off: UltraPath does not check whether it is the NPIV scenario. ● check: UltraPath checks whether it is the NPIV scenario. ● force-check: UltraPath is forced to believe that the current environment is NPIV. ● update: UltraPath checks whether it is the NPIV scenario. When changes of the path WWN information are detected, UltraPath updates the path information.	update

Level

User with **administrator** permissions

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Usage Guidelines

NOTE

When Hyper-V VMs using the NPIV are used in a Windows cluster, if Hyper-V VMs are migrated (online or fast) among the Windows hosts in the cluster, the defect of the Windows system will cause a disorder of NPIV paths managed by UltraPath. To prevent service interruption in the Hyper-V VMs, **update** is recommended.

You can execute **npiv_strategy**={ *off* | *check* | *force-check* | *update*} to set an NPIV scenario detection method of UltraPath.

Example

Setting the NPIV scenario detection method of UltraPath to **update**.

```
UltraPath CLI #2 >set npiv_strategy=update
Succeeded in executing the command.
```

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 Commands for Configuring and Managing HyperMetro

This topic describes how to configure the HyperMetro working mode and manage HyperMetro.

A.4.1.1 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* }]

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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 **NOTE** In default configurations, namely manual configuration has not been performed, the system compares the array SNs and selects the largest numbered array as the preferred one.
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.

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- 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.4.1.2 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* }]

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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

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A.4.1.3 Setting Load Balance Mode for a HyperMetro System

Function

You can run the **set hypermetro loadbalancemode** command to set load balance mode for HyperMetro configured across arrays.

Format

set hypermetro loadbalancemode={ *split-size* | *round-robin* }

[**vlun_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* }]

Parameters

Parameter	Description	Default Value
loadbalancemode ={ *split-size* | *round-robin* }	Load balance mode for a HyperMetro system Its value can be **split-size** or **round-robin**. Parameter descriptions are as follows: ● split-size: splitting mode across arrays. ● round-robin: round-robin mode across arrays. **NOTE** ● Load balance mode of a HyperMetro storage system only takes effect when the HyperMetro working mode is set to balance.	split-size
vlun_id={ *ID* | *ID1,ID2 ...* | *ID1–ID2*}	Specifies the ID of a virtual HyperMetro LUN. Run the **show vlun type** =*hypermetro* command to obtain ID information about HyperMetro virtual LUNs.	None

Level

User with **administrator** permissions

Usage Guidelines

- Descriptions about load balance mode for a HyperMetro system are as follows:
  - If split-size mode is selected, UltraPath delivers I/Os to a specific storage array based on the start addresses of I/Os, the size of slices that are set, and the preferred storage array. If the fragment size is 128 MB, the I/Os with start addresses from 0

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MB to 128 MB are delivered to the preferred storage array, and the I/Os with start addresses from 128 MB to 256 MB are delivered to the non-preferred storage array.

- If round-robin mode is selected, UltraPath delivers I/Os to two storage systems in turn.

- Run the **set hypermetro loadbalancemode**={ *split-size* | *round-robin* } command to set the HyperMetro working mode for all storage systems.
- Run the **set hypermetro loadbalancemode**={ *split-size* | *round-robin* } **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 HyperMetro load balance mode of all storage systems to **split-size**.

```
UltraPath CLI #2 >set hypermetro loadbalancemode=split-size
Succeeded in executing the command
```

- Set HyperMetro load balance mode of virtual LUNs with an ID of **0** to **split-size**.

```
UltraPath CLI #3 > set hypermetro loadbalancemode=split-size vlun_id=0
Succeeded in executing the command.
```

System Response

None

A.4.2 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**]]

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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. **NOTE** You can query a maximum of eight storage systems' performance statistics at a time. Use comas (,) to separate storage systems.	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           210231540lZ083000004    HUAWEI
S5300
    1      SN_210235G6EDZ0C2000001  210235G6EDZ0C2000001    HUASY
S5600T
------------------------------------------------------------------------------
--------
```

- Run the following command to view information about the storage system whose ID is **1**:

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```
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

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Parameter	Description	Default Value
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.4.3 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 { **id**=*ID1,ID2,...* | **disk**=*diskname* } [**type**={ *all* | *hypermetro* | *migration* }] [**verbose**]

show vlun [**array_id**=*ID1,ID2...*] [**type**={ *all* | *hypermetro* | *migration* }]

Parameters

Keyword and Parameter	Description	Default Value
id=*ID1,ID2...*	ID of a virtual LUN. You can run **show vlun** without an ID 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

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Keyword and Parameter	Description	Default Value
array_id=*ID1,ID2,...*	ID of a storage system. You can run **show array** without an ID 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
disk=*diskname*	Drive letter name of a virtual LUN. **NOTE** You can run this command to view information about only one virtual LUN at a time.	None
verbose	Viewing details configuration information about a virtual LUN. **NOTE** Parameter **verbose** can be used to view detailed information about a specified virtual LUN only when it is used together with either parameter **id** or **disk**.	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 nodename, where: ● all: all the virtual LUNs ● hypermetro: virtual HyperMetro LUNs ● migration: virtual migration LUNs	None

Level

User with **administrator** permissions

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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 disk=***diskname* to view information about a specified virtual LUN.
- Run **show vlun id**=*ID1,ID2...***verbose** to view details configuration information about a common virtual LUN.
- Run **show vlun disk**=*diskname* **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 disk=***diskname* **type**=*all* to view information about a specified virtual LUN.
- 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.
- Run **show vlun disk=***diskname* **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  No. of Paths(Available/
Total)
    0     Disk2  test_74_0000  63400a31000d9c5f2003354500000484  Normal
1.00GB       0A/0A       Storage217_74     1156                  4/4
    1     Disk3  test_74_0001  63400a31000d9c5f200336aa00000485  Normal
1.00GB       0B/0B       Storage217_74     1157                  4/4
------------------------------------------------------------------------------
------------------------------------------------------------------------------
------
```

- View common virtual LUN information about the storage system whose ID is **0**.

```
UltraPath CLI #1 >show vlun array_id=0
------------------------------------------------------------------------------
------------------------------------------------------------------------------
------
 Vlun ID  Disk       Name                  Lun WWN               Status
Capacity  Ctrl(Own/Work) Array Name    Dev Lun ID  No. of Paths(Available/
Total)
    0     Disk2  test_74_0000  63400a31000d9c5f2003354500000484  Normal
1.00GB       0A/0A       Storage217_74     1156                  4/4
```

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```
    1     Disk3  test_74_0001  63400a31000d9c5f200336aa00000485  Normal
1.00GB       0B/0B       Storage217_74     1157                  4/4
------------------------------------------------------------------------------
------------------------------------------------------------------------------
------
```

- View details about the common virtual LUN whose ID is **1**.

```
UltraPath CLI #2 >show vlun id=1
=======================================================
                 VLUN#1 Information
=======================================================
Disk                  : Disk3
Name                  : test_74_0001
Status                : Normal
Capacity              : 1.00GB
Driver                : Vendor-specific(DEFAULT)
Product Name          : XSG1
Vendor Name           : HUAWEI
Owning Controller     : 0B
Working Controller    : 0B
Num of Paths          : 4
LUN WWN               : 63400a31000d9c5f200336aa00000485
Array Name            : Storage217_74
Controller 0A
     Path 3       : Normal
    Path 11       : Normal
Controller 0B
     Path 4       : Normal
     Path 5       : Normal
Dev Lun ID            : 1157
Manual IO Suspension  : Off
-------------------------------------------------------
```

- View information about the virtual LUN whose drive letter name is **Disk3**.

```
UltraPath CLI #2 >show vlun disk=Disk3
=======================================================
                 VLUN#1 Information
=======================================================
Disk                  : Disk3
Name                  : test_74_0001
Status                : Normal
Capacity              : 1.00GB
Driver                : Vendor-specific(DEFAULT)
Product Name          : XSG1
Vendor Name           : HUAWEI
Owning Controller     : 0B
Working Controller    : 0B
Num of Paths          : 4
LUN WWN               : 63400a31000d9c5f200336aa00000485
Array Name            : Storage217_74
Controller 0A
     Path 3       : Normal
    Path 11       : Normal
Controller 0B
     Path 4       : Normal
     Path 5       : Normal
Dev Lun ID            : 1157
Manual IO Suspension  : Off
-------------------------------------------------------
```

- View details configuration information about a common virtual LUN whose ID is **1**.

```
UltraPath CLI #3 >show vlun id=1 verbose
=======================================================
                 VLUN#1 Information
=======================================================
Disk                  : Disk3
Name                  : test_74_0001
Status                : Normal
Capacity              : 1.00GB
Driver                : Vendor-specific(DEFAULT)
Product Name          : XSG1
```

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```
Vendor Name           : HUAWEI
Owning Controller     : 0B
Working Controller    : 0B
Num of Paths          : 4
LUN WWN               : 63400a31000d9c5f200336aa00000485
Array Name            : Storage217_74
Controller 0A
     Path 3     : Normal
    Path 11       : Normal
Controller 0B
     Path 4       : Normal
     Path 5       : 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            : 1157
Manual IO Suspension  : Off
----------------------------------------------------
```

- View details configuration information about a common virtual LUN whose drive letter name is **Disk3**.

```
UltraPath CLI #3 >show vlun disk=Disk3 verbose
====================================================
                VLUN#1 Information
====================================================
Disk                  : Disk3
Name                  : test_74_0001
Status                : Normal
Capacity              : 1.00GB
Driver                : Vendor-specific(DEFAULT)
Product Name          : XSG1
Vendor Name           : HUAWEI
Owning Controller     : 0B
Working Controller    : 0B
Num of Paths          : 4
LUN WWN               : 63400a31000d9c5f200336aa00000485
Array Name            : Storage217_74
Controller 0A
     Path 3     : Normal
    Path 11       : Normal
Controller 0B
     Path 4       : Normal
     Path 5       : 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            : 1157
Manual IO Suspension  : Off
----------------------------------------------------
```

- View information about all virtual LUNs.

```
UltraPath CLI #4 >show vlun type=all
-------------------------------------------------------------------------------
-------------------------------------------------------------------------------
---------------
 Vlun ID  Disk       Name                    Lun WWN               Status
Capacity  Ctrl(Own/Work)       Array Name        Dev Lun ID  No. of
Paths(Available/Total)
    0     Disk2  test_74_0000 63400a31000d9c5f2003354500000484  Normal
1.00GB       0A/0A           Storage217_74         1156                  4/4
    1     Disk3  test_74_0001 63400a31000d9c5f200336aa00000485  Normal
1.00GB       0B/0B           Storage217_74         1157                  4/4
    2     Disk4  test_210_0002  63400a31000d9c5f200336fc00000486  Normal
1.00GB       0A/0A       Huawei.Storage217.210     144                   4/4
```

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```
    2     Disk4  test_74_0002 63400a31000d9c5f200336fc00000486  Normal
1.00GB       0A/0A           Storage217_74         1158                  4/4
------------------------------------------------------------------------------
------------------------------------------------------------------------------
---------------
```

- View all virtual LUN information about the storage system whose ID is **0**.

```
UltraPath CLI #5 >show vlun array_id=0 type=all
------------------------------------------------------------------------------
------------------------------------------------------------------------------
---------------
 Vlun ID  Disk       Name                   Lun WWN               Status
Capacity  Ctrl(Own/Work)       Array Name        Dev Lun ID  No. of
Paths(Available/Total)
    0     Disk2  test_74_0000 63400a31000d9c5f2003354500000484  Normal
1.00GB       0A/0A           Storage217_74         1156                  4/4
    1     Disk3  test_74_0001 63400a31000d9c5f200336aa00000485  Normal
1.00GB       0B/0B           Storage217_74         1157                  4/4
    2     Disk4  test_74_0002 63400a31000d9c5f200336fc00000486  Normal
1.00GB       0A/0A           Storage217_74         1158                  4/4
------------------------------------------------------------------------------
------------------------------------------------------------------------------
---------------
```

- View information about the virtual LUN whose drive letter name is **Disk2**.

```
UltraPath CLI #8 >show vlun disk=Disk2 type=all
======================================================
                  VLUN#0 Information
======================================================
Disk                  : Disk2
Name                  : test_74_0000
Status                : Normal
Capacity              : 1.00GB
Driver                : Vendor-specific(DEFAULT)
Product Name        : XSG1
Vendor Name           : HUAWEI
Owning Controller     : 0A
Working Controller    : 0A
Num of Paths          : 4
LUN WWN               : 63400a31000d9c5f2003354500000484
Array Name            : Storage217_74
Controller 0A
     Path 3       : Normal
    Path 11       : Normal
Controller 0B
     Path 4       : Normal
     Path 5       : Normal
Dev Lun ID            : 1156
Manual IO Suspension  : Off
------------------------------------------------------
```

- View information about all virtual HyperMetro LUNs.

```
UltraPath CLI #6 >show vlun type=hypermetro
------------------------------------------------------------------------------
------------------------------------------------------------------------------
---------------
 Vlun ID  Disk       Name                   Lun WWN               Status
Capacity  Ctrl(Own/Work)       Array Name        Dev Lun ID  No. of
Paths(Available/Total)
    2     Disk4  test_210_0002  63400a31000d9c5f200336fc00000486  Normal
1.00GB       0A/0A       Huawei.Storage217.210     144                   4/4
    2     Disk4  test_74_0002 63400a31000d9c5f200336fc00000486  Normal
1.00GB       0A/0A           Storage217_74         1158                  4/4
------------------------------------------------------------------------------
------------------------------------------------------------------------------
---------------
```

- View details about the virtual LUN whose ID is **0**.

```
UltraPath CLI #8 >show vlun id=0 type=all
======================================================
                  VLUN#0 Information
```

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```
=====================================================
Disk                  : Disk2
Name                  : test_74_0000
Status                : Normal
Capacity              : 1.00GB
Driver                : Vendor-specific(DEFAULT)
Product Name        : XSG1
Vendor Name           : HUAWEI
Owning Controller     : 0A
Working Controller    : 0A
Num of Paths          : 4
LUN WWN               : 63400a31000d9c5f2003354500000484
Array Name            : Storage217_74
Controller 0A
     Path 3       : Normal
    Path 11       : Normal
Controller 0B
     Path 4       : Normal
     Path 5       : Normal
Dev Lun ID            : 1156
Manual IO Suspension  : Off
-----------------------------------------------------
```

- View details about the virtual HyperMetro LUN whose ID is **2**.

```
UltraPath CLI #7 >show vlun id=2 type=hypermetro
=====================================================
                 VLUN#2 Information
=====================================================
Disk                      : Disk4
Manual IO Suspension      : Off
Aggregation Type          : Hyper Metro
Aggregation Specific Attribution
    WorkingMode             : read write within primary array
    Primary Array SN        : SN987654321076543210
Aggregation Member#0 Infomation
    Name              : test_210_0002
    Status            : Normal
    Capacity          : 1.00GB
    Aggregation Specific Attribution : N/A
    LUN WWN           : 63400a31000d9c5f200336fc00000486
    Array Name        : Huawei.Storage217.210
    Array SN          : SN987654321076543210
    Driver            : Vendor-specific(DEFAULT)
    Product Name      : XSG1
    Vendor Name       : HUAWEI
    Owning Controller : 0A
    Working Controller: 0A
    Num of Paths      : 4
    Controller 0A
         Path 6       : Normal
         Path 9       : Normal
    Controller 0B
         Path 7       : Normal
        Path 10       : Normal
Aggregation Member#1 Infomation
    Name              : test_74_0002
    Status            : Normal
    Capacity          : 1.00GB
    Aggregation Specific Attribution : N/A
    LUN WWN           : 63400a31000d9c5f200336fc00000486
    Array Name        : Storage217_74
    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       : Normal
```

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```
        Path 11       : Normal
    Controller 0B
         Path 4       : Normal
         Path 5       : Normal
-----------------------------------------------------
```

- View details about the virtual HyperMetro LUN whose drive letter name is **Disk4**.

```
UltraPath CLI #7 >show vlun disk=Disk4 type=hypermetro
=====================================================
                  VLUN#2 Information
=====================================================
Disk                     : Disk4
Manual IO Suspension     : Off
Aggregation Type         : Hyper Metro
Aggregation Specific Attribution
    WorkingMode            : read write within primary array
    Primary Array SN       : SN987654321076543210
Aggregation Member#0 Infomation
    Name              : test_210_0002
    Status            : Normal
    Capacity          : 1.00GB
    Aggregation Specific Attribution : N/A
    LUN WWN           : 63400a31000d9c5f200336fc00000486
    Array Name        : Huawei.Storage217.210
    Array SN          : SN987654321076543210
    Driver            : Vendor-specific(DEFAULT)
    Product Name      : XSG1
    Vendor Name       : HUAWEI
    Owning Controller : 0A
    Working Controller: 0A
    Num of Paths      : 4
    Controller 0A
         Path 6       : Normal
         Path 9       : Normal
    Controller 0B
         Path 7       : Normal
        Path 10       : Normal
Aggregation Member#1 Infomation
    Name              : test_74_0002
    Status            : Normal
    Capacity          : 1.00GB
    Aggregation Specific Attribution : N/A
    LUN WWN           : 63400a31000d9c5f200336fc00000486
    Array Name        : Storage217_74
    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       : Normal
        Path 11       : Normal
    Controller 0B
         Path 4       : Normal
         Path 5       : 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

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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
No. of Paths(Available/ Total)	Number of available logical paths of virtual LUNs/Total number of logical paths of virtual LUNs. **NOTE** ● **Available**: Indicates number of available logical paths of virtual LUNs. ● **Total**: Indicates total number of logical paths of virtual LUNs.	None

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A.4.4 Update the disks' driver

Function

start diskdriverupdate command 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.4.5 Configuring I/O Switchover

Function

The **start migration** is used to switch over I/Os to the target array or the source array.

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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

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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.4.6 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**=*time*

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=*time*	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
```


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```
Succeeded in executing the command.
```

System Response

None

A.4.7 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.

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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
```

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```
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*>]

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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.

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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

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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.

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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.

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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.

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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.

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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

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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)

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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
```

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```
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

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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.

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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.

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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.

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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.

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C How to Obtain Help

About This Chapter

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.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.

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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/**

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D Acronyms and Abbreviations

F	
FC	Fibre Channel
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

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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

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