



**OceanStor UltraPath for Linux**  
**21.0.2**

**User Guide**

**Issue**     **02**  
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# About This Document

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## Intended Audience

This document explains how to install and configure the UltraPath software on a Linux operating system and describes commonly used commands, alarm handling, and troubleshooting.

This document is intended for:

- Technical support engineers
- Maintenance engineers

## Conventions

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

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## Change History

Changes between document issues are cumulative. The latest document issue contains all the changes made in earlier issues.

### Issue 02 (2018-01-05)

This issue is the second official release.

Optimized the document structure and the description of software functions.

### Issue 01 (2017-12-14)

The first official release.

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# 1 Overview

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## 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.

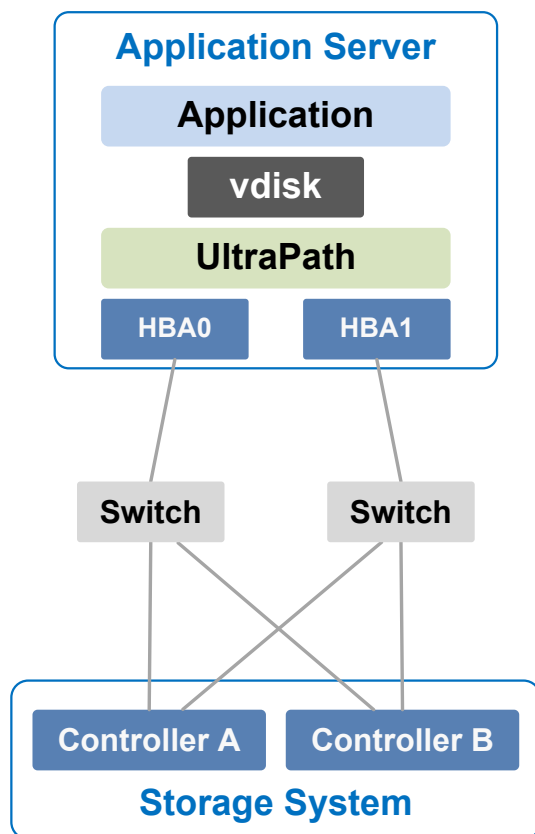
## 1.1 Overview

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.

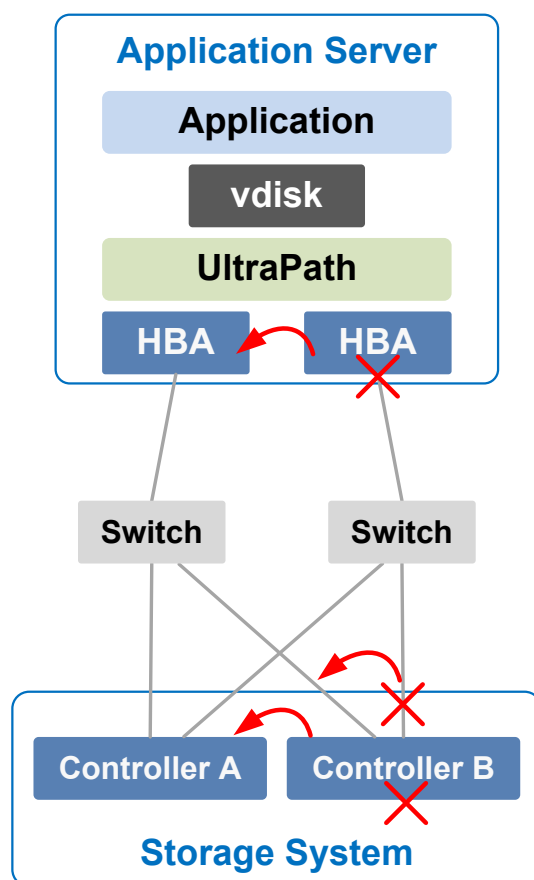


Figure 1-1 Multi-path networking



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.

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

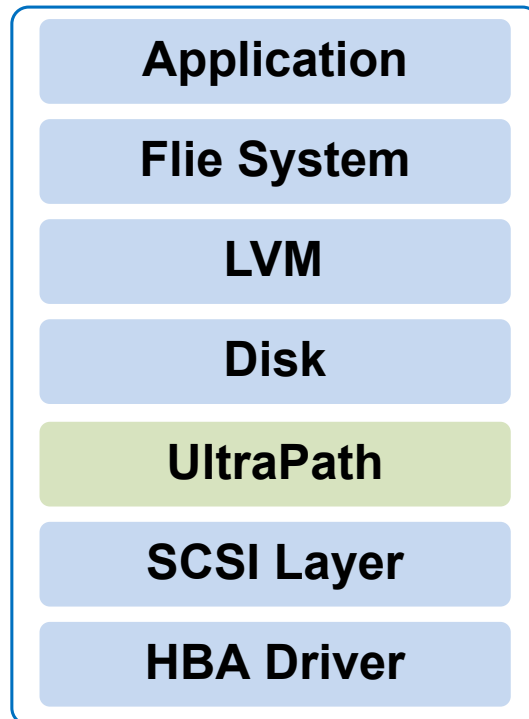
UltraPath provides powerful functions and features, ensuring secure, stable, and fast service operation. This section introduces the basic principles and functions of UltraPath.

### 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.

**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 vSphere/ESXi platforms.

## UltraPath Functions

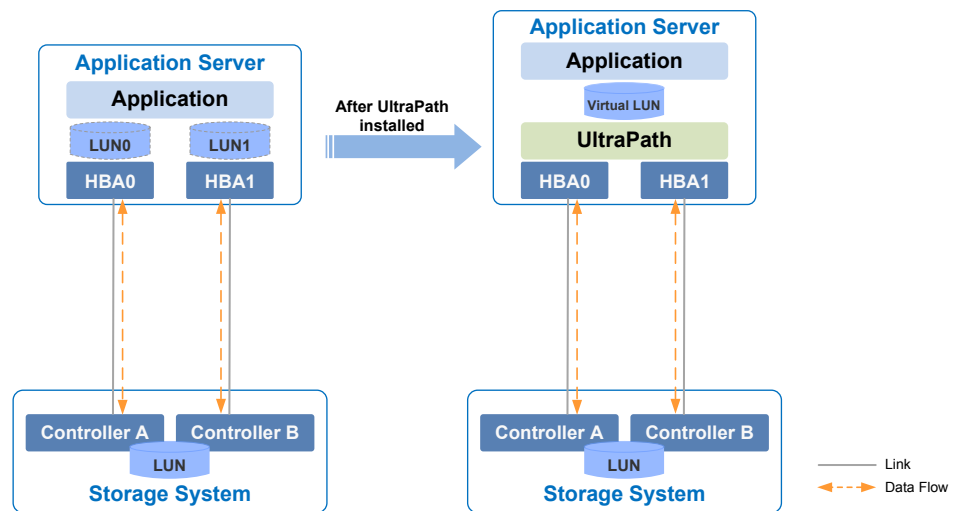
- **Masking of Redundant LUNs**

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 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**

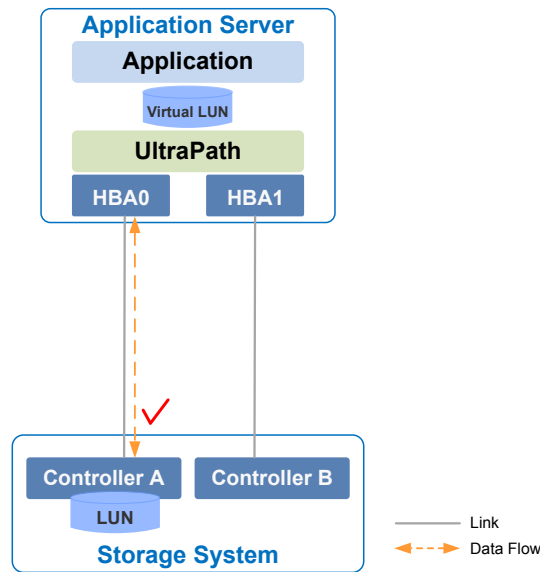
To ensure service continuity and stability, a storage system is generally equipped with two or more controllers to implement redundancy parts. Each LUN in a storage system has its owning controller, and no other controllers can operate on the LUN, preventing data corruption due to possible controller 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.

**Figure 1-5** Optimum path selection by UltraPath

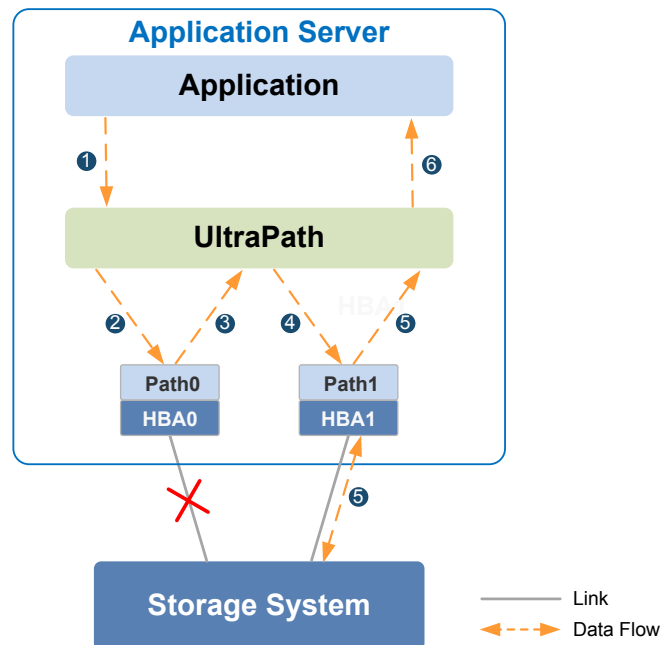


- **Failover and Failback**

- 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.
- 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**

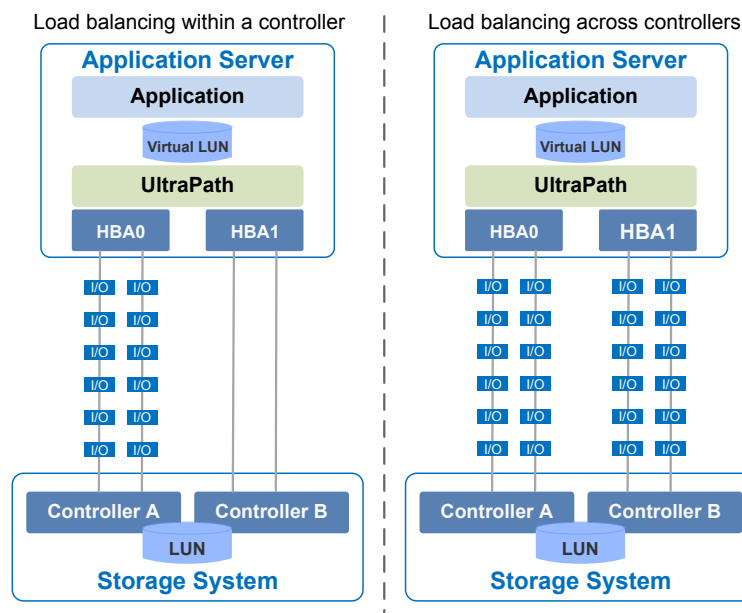
UltraPath automatically delivers I/Os to the first path again after the path recovers from the fault. There are two methods to recover a path:

- 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



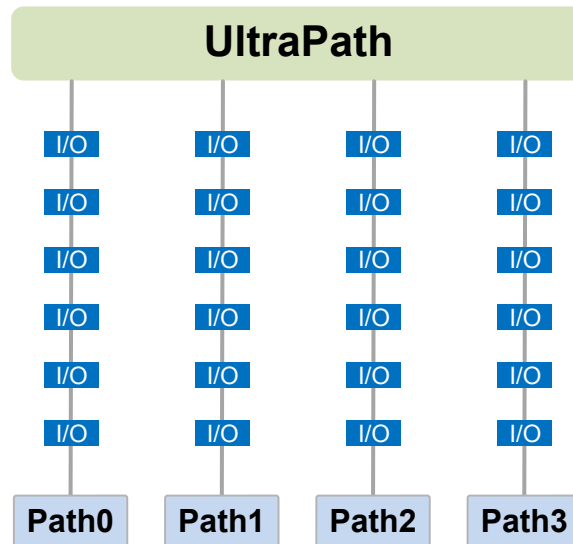
- For load balancing within a controller, I/Os poll among all the paths of the controller.

- 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:

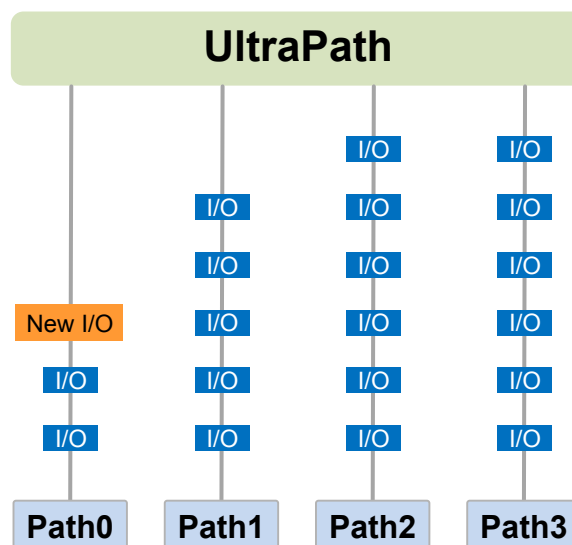
- **Round robin:** As is shown in **Figure 1-8**, when an application server delivers I/Os to a storage system, UltraPath sends the first set of I/Os through **path0** and the second set of I/Os through **path1**, and so on. Paths are used in turn to ensure that each path is fully utilized.

**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.

- **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 retries. 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

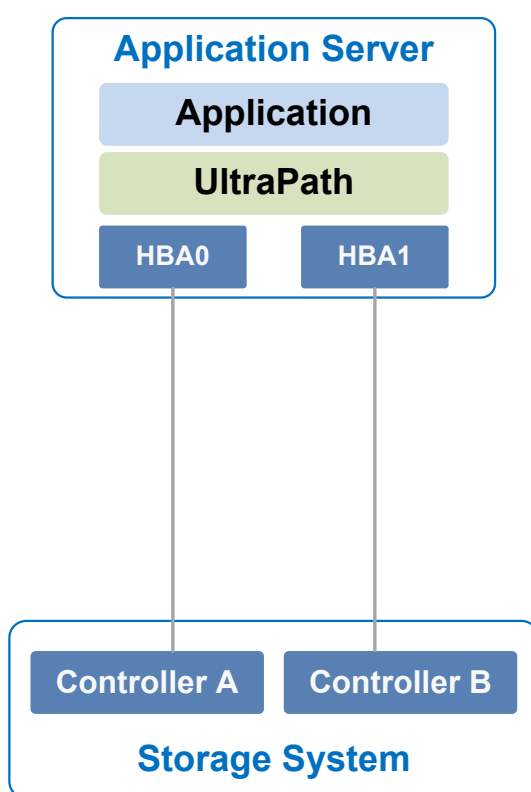


- Dual-link single-switch interconnection
- Dual-link dual-switch interconnection
- Dual-link dual-switch interconnection in a cluster environment
- Dual-link dual-switch interconnection in a HyperMetro cluster environment

## 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



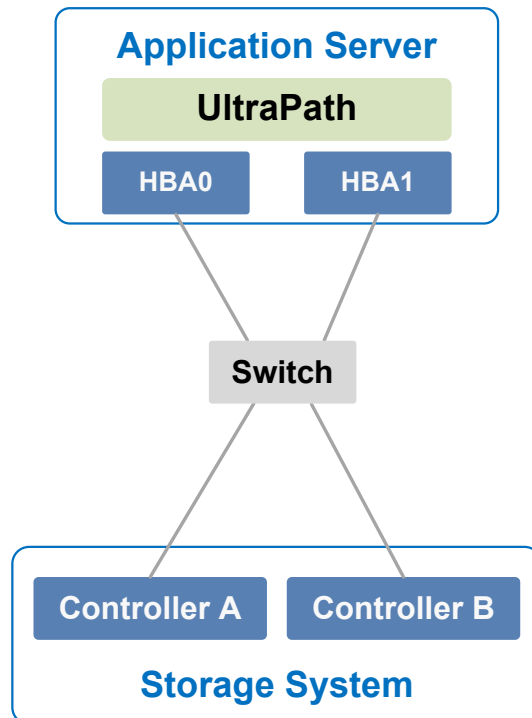
The application server uses optical fibers to connect different storage controllers for redundancy. In this networking mode, the path between the application server and the LUN's owning controller is the optimum one while other paths stand by.

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](#).

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



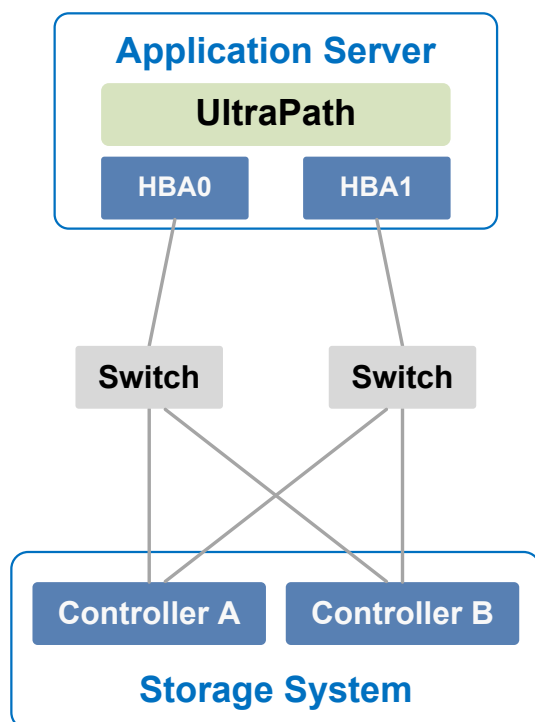
In **Figure 1-11**, there are four paths between the application server and the storage system. In this networking mode, the two paths between the application server and the LUN's owning controller are optimum while other two paths stand by.

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**.

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

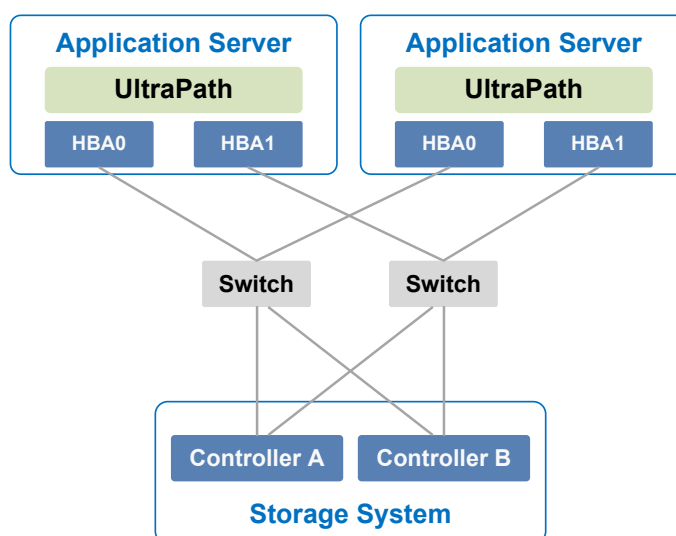


With two switches, the network prevents switch single points of failure to boost the network stabilization.

## 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](#).

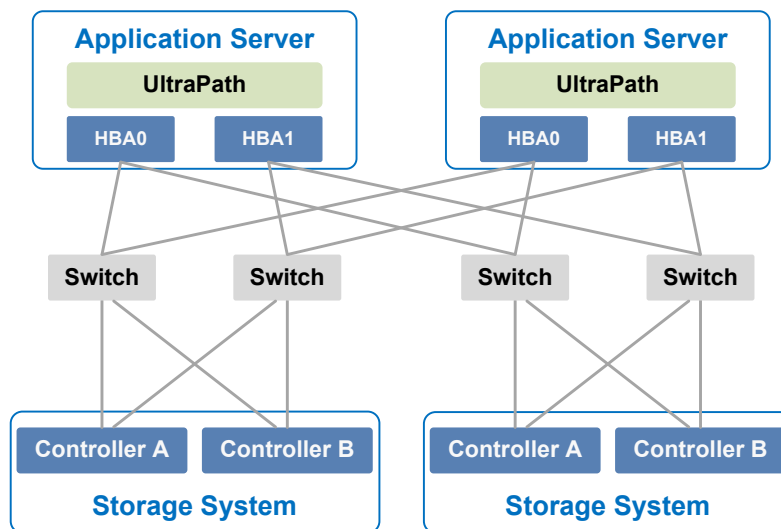
Figure 1-13 Dual-link dual-switch interconnection in a cluster environment



## 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



## 1.4 UltraPath Security Feature

This chapter describes UltraPath security feature.

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

# 2 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](#)

UltraPath supports two boot modes: boot from Local and boot from SAN. You can select a desired mode when using **install.sh** for installation.

### [2.3 Deploying UltraPath in Batch in a FusionSphere OpenStack Environment](#)

This section describes how to deploy UltraPath in batch in a FusionSphere OpenStack environment.

## 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

Select an UltraPath software package according to the system information. [Table 2-1](#) lists the operating systems for UltraPath software packages (21.0.1 as an example).

**Table 2-1** Operating systems for UltraPath software packages (21.0.1 as an example)

UltraPath Software Package	Operating System
OceanStor UltraPath XX.X.X_RHEL.zip	Red Hat, CentOS, and Oracle Linux
OceanStor UltraPath XX.X.X_SLES.zip	SUSE
OceanStor UltraPath XX.X.X_LinuxOther.zip	Red Flag Linux, LINX-TECH, Kylin, NeoShine, and Deepin
OceanStor UltraPath XX.X.X_FusionSphere.zip	UVP for FusionSphere

 **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.	Example: 192.168.100.100
User name	User name for the application server <b>NOTE</b> To install UltraPath, you must log in as user <b>root</b> .	<b>root</b>

Parameter	Description	Example
Password	<p>Password of the application server.</p> <p><b>NOTE</b></p> <p>The password must:</p> <ul style="list-style-type: none"> <li>● Contain at least one upper-case letter, one lower-case letter, one digit, and one special character among spaces or ~!@#%&amp;*()-_+=\ {};:“,&lt;&gt;/?</li> <li>● Contain 8 to 32 characters.</li> <li>● Not contain the user name or the reverse spelling of the user name.</li> </ul>	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

- **Operating System**

Check whether the Linux version installed on the application server meets the requirements for installing UltraPath for Linux.

 **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.

- **Remaining Space**

The recommended available memory of an application server is equal to or larger than 600 MB.

 **NOTE**

For a 32-bit operating system, run the `cat /proc/meminfo` command. If the value of the **LowFree** parameter is smaller than 600 MB and the value of the **MemFree** parameter is larger than 16 GB, you are advised to replace the 32-bit operating system with a 64-bit operating system.

### HBAs

UltraPath supports FCoE/Fibre Channel HBAs, IB HCAs, and iSCSI initiators. 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 the UltraPath, make sure that the HBA or the HCA, and its driver program have been correctly installed. If the HBA driver program supports failover, you must set its mode to **Non-Failover**.

 **NOTE**

- For details about how to install HBAs or the HCAs, and their drivers on application servers, contact your HBA or HCA suppliers.
- InfiniBand HCAs support 64-bit Red Hat Enterprise Linux 6.1, Red Hat Enterprise Linux 6.3, and SUSE 11 SP3.
- In an IB networking scenario, hosts running UltraPath can impelment automatic file system mouting. To impelment this fucntion, a host must run 64-bit Red Hat Enterprise Linux 6.1 or Red Hat Enterprise Linux 6.3, and the host must be directly connected to the storage system.

## Precautions for deploying the UltraPath on VMs

When you deploy 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.

## 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.

### 2.1.3 (Optional) SAN Boot Environment Requirements

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

UltraPath supports the preceding two boot modes, and provides the two modes for you to select during the UltraPath installation.

- **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 SAN storage devices and start the application server from the SAN storage devices.



#### **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.
  - In SAN Boot active-active scenarios, you can only configure HyperMetro after SAN Boot is configured, the host starts normally, and UltraPath takes effect after installation.
- 

## 2.2 Installing UltraPath

UltraPath supports two boot modes: boot from Local and boot from SAN. You can select a desired mode when using **install.sh** for installation.

- **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 SAN storage devices and start the application server from the SAN storage devices.



## 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.
  - Virtual disks (such as sda, sdb) generated by UltraPath are disk drives assigned by the operating system and may change. You are advised to use UUID (such as file mounting scenarios) or disk drives bound by udev to avoid change of disk drive letters (such as raw disk mounting in Oracle databases).
  - When the number of LUNs mapped to host exceeds 512, you are advised to use boot from SAN to install UltraPath.
- 

## 2.2.1 Installing the UltraPath (Boot from Local)

When the operating systems are installed on the local disks of the application server, install UltraPath in Boot from Local mode.

### 2.2.1.1 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.

### Procedure

- Step 1** Use a digital signature verification tool to verify integrity of the software package.

 **NOTE**

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

- Step 2** Upload the UltraPath software package to the application server.

Decompress the UltraPath software package on a Windows-based server and upload the package to a directory (such as /home) of the application server.

 **NOTE**

The software package path cannot contain a space.

- Step 3** Log in to the application server as user **root**, go to the software package directory (SUSE as an example), and check whether the configuration file **unattend\_install.conf** for silent installation exists.

```
suse11-67:/home/SLES # ls unattend_install.conf
unattend_install.conf
suse11-67:/home/SLES #
```

- Step 4** Set the configuration item of the configuration file **unattend\_install.conf**. Set the value of **boot\_type** to **1** and set the value of **restart** based on onsite requirements. [Table 2-3](#) describes the related parameters.

**Table 2-3** Parameters of the configuration item

Parameter	Description	Value
boot_type	Startup mode of UltraPath.	[Value range] <ul style="list-style-type: none"> <li>● 1: Boot from local</li> <li>● 2: Boot from SAN</li> </ul> [Default value] 1
restart	This parameter is used to determine whether the host is restarted after UltraPath is installed.	[Value range] <ul style="list-style-type: none"> <li>● y: The host is restarted after the installation.</li> <li>● n: The host is not restarted after the installation.</li> </ul> <b>NOTE</b> If IB cards such as HCA, QLogic, or Emulex HBA cards are used to connect to the storage array, you are advised to set the value to n. [Default value] n

**Step 5** Run the `install.sh -f /any-directory/unattend_install.conf` command to start silent installation.

```
suse11-67:/home/SLES # chmod +x install.sh
suse11-67:/home/SLES # ./install.sh -f unattend_install.conf
```

- The installation tool automatically checks the environment.

```
complete iscsi checking.
complete FC checking.
Verify the UltraPath existence.
The UltraPath is not installed.
```

- Modify adapters' configuration parameters.

```
Modify system configuration.[file:/etc/iscsi/
iscsid.conf,item:node.startup,value: automatic]
Modify system configuration.[file:/etc/iscsi/
iscsid.conf,item:node.session.timeo.replacement_timeout,value: 1]
Modify system configuration.[file:/etc/
modprobe.conf.local,module:qla2xxx,item:qlport_down_retry,value:5]
Modify system configuration.[file:/etc/
modprobe.conf.local,module:lpfc,item:lpfc_nodev_tmo,value:5]
```

**Table 2-4** describes the configuration parameters of adapters.

 **NOTE**

The following adapter parameters will be automatically modified when UltraPath is installed. You do not need to manually configure them.

**Table 2-4** Adapter parameters

Adapter Type	Configuration File	Parameter
Linux-iscsi	/etc/iscsi.conf	Multipath=portal ConnFailTimeout=1
open-iscsi	/etc/iscsi/iscsid.conf	node.startup = automatic node.session.timeo.replacement_timeout=1
Qlogic	SUSE: /etc/ modprobe.conf.local Red Hat 4/Red Hat 5: /etc/modprobe.conf Red Hat 6/Red Hat 7: /etc/modprobe.d/ nxupmodules.conf	options qla2xxx qlport_down_retry=5 options qla2xxx ql2xfailover=0
Emulex	SUSE: /etc/ modprobe.conf.local Red Hat 4/Red Hat 5: /etc/modprobe.conf Red Hat 6/Red Hat 7: /etc/modprobe.d/ nxupmodules.conf	Options lpfc lpfc_nodev_tmo=5

When you perform the preceding operations, the following cases lead to alarms:

- The operating system version and the kernel version do not match. As a result, the installed UltraPath software may fail to take effect.
- The version of the host adapter driver has defects. As a result, it is incompatible with the UltraPath software.

Alarm Scenario	Information Description	Information Description
The operating system version and the kernel version do not match.	The OS version XXX does not match the kernel version. If the kernel has been updated or patched, please confirm the compatibility.	Check whether the <b>release</b> file in the <b>/etc/</b> directory has been modified. If the file is modified, restore it and install the UltraPath software again. If the file is not modified, check whether the system is upgraded.

Alarm Scenario	Information Description	Information Description
The version of the host adapter driver has defects.	There are some defects of the iSCSI Initiator provided by SLES9 SP3. Therefore, you need to update the iSCSI Initiator.	Update the iSCSI initiator.
	The open-iscsi version is too low, Please update the iSCSI driver to the version 2.0-870.3.	Upgrade <b>open-iscsi</b> to 2.0-870.3.
	The default Qlogic driver in Red Hat AS4 and Asianux2 has a defect (Using upRescan command provided by the UltraPath.Please update it to qla2xxx-v8.02.23).	Download qla2xxx-v8.02.23 from <a href="http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/default.aspx">http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/default.aspx</a> (QLogic official website) and upgrade it.

- The default timeout parameter is modified using **Systemd**.

```
Modify system configuration.[file:/etc/systemd/system.conf,item:
DefaultTimeoutStartSec ,value: 600s]
```

**Table 2-5 Systemd default timeout parameter**

Systemd default timeout parameter	Configuration File	Parameter
Systemd	/etc/systemd/system.conf	DefaultTimeoutStartSec=600s <b>NOTE</b> This parameter is used to set the default timeout of starting a <b>systemd</b> service unit. If the unit startup period exceeds the timeout, the system startup will be affected. The number of LUNs mapped to hosts will affect the period of starting the service unit. The value of this parameter is modifiable based on actual conditions.

- Select the desired system boot mode <1>. 1 is automatically typed and the installation continues.

```
If the operating system is installed on a local drive of the server, you are
advised
to choose boot from local; if the operating system is installed on a SAN
storage
system, you must choose boot from san. Please choose the boot type of your
system:
<1>--boot-from-Local
<2>--boot-from-SAN
please input your select:1
Unattend install configuration item 'boot_type' set to '1'. Unattend
installation will continue.
```

```

Preparing... #####
UltraPath #####
User configuration is saved successfully.
The boot service is installed successfully.
The running service is installed successfully.
*****Attention*****
***
* UltraPath would modify some parameters of HBA cards for better performace.
If *
* UltraPath is installed for the first time, you may need to update the
initrd *
* image before system reboot to make the modification take
effect. *
*****
***
***
* UltraPath will use the system hostname for alarm generation and automatic
host*
* registration. Make sure that the system hostname is correctly
configured. *
*****
***
The installation is complete. Whether to restart the system now?
<Y|N>:n
Unattend install configuration item 'restart' set to 'n'. The system will not
be restarted after the unattend installation.
susell-67:/home/SLES #

```

- If HCA cards of the IB type are used to connect to the storage array, run the **upLinux config ib** command to configure the IB driver service. In this way, the disks of the storage array will be reported to the host for a takeover.
- If the QLogic or Emulex HBAs are used to connect the storage system, you are advised to run the **upLinux updateImage** command to update mirrors. In this way, modifications to the configuration of the QLogic or Emulex driver during the installation can take effect.

 **NOTE**

The modifications to the configuration parameters of the drive can take effect only after the host is restarted.

**Step 6 Optional:** If the **restart** item in the `unattend_install.conf` configuration file is set to `n`, you can use the following two methods to enable UltraPath to take effect after the installation.

- Restart the host. (This is the typical practice.)
- Start the `nxup` service.

Before starting the `nxup` service, the system asks you whether to process the existing disks that the UltraPath software can take over. To enable the `nxup` service to successfully start, you must delete these disks. Before deleting these disks, ensure that they do not have services, volume management software, clusters, file systems, and other applications.

The operation procedure is as follows:

Run the **service nxup start** or **/etc/init.d/nxup start** command.

 **NOTE**

For UltraPath in SUSE 12 series and Deepin operating systems, run the **/etc/init.d/nxup start** command.

The **service nxup start** command is used as an example.

```

#service nxup start
this kernel is 2.6.39-200.24.1.el16uek.x86_64
begin load nxup
begin scan host0

```

```
begin scan host1
begin scan host2
begin scan host3
begin scan host4
begin scan host5
begin scan host6
The device scanning is complete.
start upservice
The UltraPath starts successfully.
```

## NOTICE

- After a kernel mode switchover, for example, a switchover from the default mode to xen mode, perform the following operations:
  1. Run the **upLinux updateImage** command to update images.
  2. Restart the host.
- If you cannot log in to the operating system after UltraPath is installed in boot from local mode, see [5.2 Failed to Restart the SANBOOT System After the UltraPath Is Installed by Using the boot from local Mode](#) to solve the problem.

----End

### 2.2.1.2 Non-Silent Installation

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

#### Procedure

**Step 1** Use a digital signature verification tool to verify integrity of the software package.

##### NOTE

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

**Step 2** Upload the UltraPath software package to an application server.

Decompress the UltraPath software package on a Windows-based server and upload the package to a directory (such as /home) of the application server.

##### NOTE

The software package path cannot contain a space.

**Step 3** Log in to the application server as user **root**, go to the software package directory (SUSE as an example), and run installation tool `install.sh` to install the software.

```
linux-8beo:/home/SLES # chmod +x install.sh
linux-8beo:/home/SLES # ./install.sh
```

- The installation tool automatically checks the environment.

```
complete iscsi checking.
complete FC checking.
Verify the UltraPath existence.
The UltraPath is not installed.
```

- Modify all adapter configuration parameters.

```
Modify system configuration.[file:/etc/iscsi/
iscsid.conf,item:node.startup ,value: automatic]
```

```
Modify system configuration.[file:/etc/iscsi/iscsid.conf,item:node.session.timeo.replacement_timeout ,value: 1]
Modify system configuration.[file:/etc/modprobe.conf.local,module:qla2xxx,item:qlport_down_retry,value:5]
Modify system configuration.[file:/etc/modprobe.conf.local,module:lpfc,item:lpfc_nodev_tmo,value:5]
```

**Table 2-6** describes the adapter parameters.

 **NOTE**

The following adapter parameters will be automatically modified during UltraPath installation. No manual configuration is required.

**Table 2-6** Adapter parameters

Adapter Type	Configuration File	Parameter
Linux-iscsi	/etc/iscsi.conf	Multipath=portal ConnFailTimeout=1
open-iscsi	/etc/iscsi/iscsid.conf	node.startup = automatic node.session.timeo.replacement_timeout=1
QLogic	SUSE: /etc/modprobe.conf.local Red Hat 4/Red Hat 5: /etc/modprobe.conf Red Hat 6/Red Hat 7: /etc/modprobe.d/nxupmodules.conf	options qla2xxx qlport_down_retry=5 options qla2xxx ql2xfailover=0
Emulex	SUSE: /etc/modprobe.conf.local Red Hat 4/Red Hat 5: /etc/modprobe.conf Red Hat 6/Red Hat 7: /etc/modprobe.d/nxupmodules.conf	Options lpfc lpfc_nodev_tmo = 5

When you perform the preceding operations, the following cases generate alarms:

- The operating system version and the kernel version do not match. As a result, the installed UltraPath may fail to take effect.
- The version of the host adapter driver has defects. As a result, it is incompatible with the UltraPath.

Alarm Scenario	Information Description	Suggestion
The operating system version and the kernel version do not match.	The OS version XXX does not match the kernel version. If the kernel has been updated or patched, please confirm the compatibility.	Check whether the release file in the <code>/etc/</code> directory has been modified. If yes, restore it before installing the UltraPath. If no, confirm whether a system upgrade is needed.
The version of the host adapter driver has defects.	There are some defects of the iSCSI Initiator provided by SLES9 SP3. Therefore, you need to update the iSCSI Initiator.	Update the iSCSI initiator.
	The open-iscsi version is too low, Please update the iSCSI driver to the version 2.0-870.3.	The open-iscsi version is outdated. You need to upgrade it to 2.0-870.3.
	The default QLogic driver in Red Hat AS4 and Asianux2 has a defect for using <code>upRescan</code> command provided by the UltraPath. Please update it to <code>qla2xxx-v8.02.23</code> .	Download <code>qla2xxx-v8.02.23</code> from the official QLogic website: <a href="http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/default.aspx">http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/default.aspx</a> .

- Modify the default timeout parameter in the system that uses **Systemd**.

```
Modify system configuration.[file:/etc/systemd/system.conf,item:
DefaultTimeoutStartSec ,value: 600s]
```

**Table 2-7** Default **Systemd** Timeout Parameter

Default Systemd Timeout Parameter	Configuration File	Parameter
Systemd	<code>/etc/systemd/system.conf</code>	<p>DefaultTimeoutStartSec=600s</p> <p><b>NOTE</b></p> <p>This parameter is used to set the default timeout of starting a <b>systemd</b> service unit. If the unit startup period exceeds the timeout, the system startup will be affected. The number of LUNs mapped to hosts will affect the period of starting the service unit. The value of this parameter is modifiable based on actual conditions.</p>

- Select the desired system boot mode. Select <1> to install the software.

If the operating system is installed on a local drive of the server, you are advised to choose boot from local; if the operating system is installed on a



```

SAN storage system, you must choose boot from san. Please choose the boot
type of your system:
<1>--boot-from-Local
<2>--boot-from-SAN
please input your select:1
Preparing... #####
UltraPath #####
User configuration is saved successfully.
The boot service is installed successfull.
The running service is installed successfully.
*****Attention*****
***
* UltraPath would modify some parameters of HBA cards for better performace.
If *
* UltraPath is installed for the first time, you may need to update the
initrd *
* image before system reboot to make the modification take
effect. *
*****
***
***
* UltraPath will use the system hostname for alarm generation and automatic
host*
* registration. Make sure that the system hostname is correctly
configured.. *
*****
***
The installation is complete. Whether to restart the system now?
<Y|N>:

```

- If the InfiniBand HCAs are used to connect the storage system, you are advised to type **N** and run the **upLinux config ib** command to configure the InfiniBand service. In this way, disk arrays connected to InfiniBand interface modules are reported to the host for takeover automatically.
- If the QLogic or Emulex HBAs are used to connect the storage system, you are advised to type **N** and run the **upLinux updateImage** command to update mirrors. In this way, modifications to the configuration of the QLogic or Emulex driver during the installation can take effect.

 **NOTE**

The modifications to the configuration parameters of the drive can take effect only after the host is restarted.

**Step 4** Enable the UltraPath to take effect in either of the following ways:

- Restart the host. (This is the typical practice.)
- Start the **nxup** service to start UltraPath.

Before you start the **nxup** service, the system asks you whether to process the existing disks that the UltraPath can take over. To enable the **nxup** service to successfully start, you must delete these disks. Before deleting these disks, ensure that they do not have services, volume management software, clusters, file systems, and other applications.

The operations are as follows:

Run **service nxup start** or **/etc/init.d/nxup start**.

 **NOTE**

For UltraPath in SUSE 12 series and Deepin operating systems, run the **/etc/init.d/nxup start** command.

The following uses **service nxup start** as an example.

```

#service nxup start
this kernel is 2.6.39-200.24.1.el6uek.x86_64
begin load nxup

```

```
begin scan host0
begin scan host1
begin scan host2
begin scan host3
begin scan host4
begin scan host5
begin scan host6
The device scanning is complete.
start upservice
The UltraPath starts successfully.
```

---

 **NOTICE**

- After switching the kernel mode, for example from **default** mode to **xen** mode, perform the following operations:
  1. Run the **upLinux updateImage** command to update the mirror.
  2. Restart the host.
- If you have incorrectly selected the boot from local mode on a SANBOOT system, the operating system cannot be loaded after you install the UltraPath. In this case, see [5.2 Failed to Restart the SANBOOT System After the UltraPath Is Installed by Using the boot from local Mode](#) to rectify the fault.

---

---End

## 2.2.2 Installing UltraPath (Boot from SAN)

When the operating systems are installed on SAN storage devices, install UltraPath in Boot from SAN mode.

### 2.2.2.1 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

The rocky system does not support silent installation if the SAN Boot mode is used.

### Procedure

- Step 1** Use a digital signature verification tool to verify integrity of the software package.

 **NOTE**

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

- Step 2** Upload the UltraPath software package to the application server.

Decompress the UltraPath software package on a Windows-based server and upload the package to a directory (such as /home) of the application server.

 **NOTE**

The software package path cannot contain a space.

**Step 3** Log in to the application server as user **root**, go to the software package directory (SUSE as an example), and check whether the configuration file **unattend\_install.conf** for silent installation exists.

```
suse11-67:/home/SLES # ls unattend_install.conf
unattend_install.conf
suse11-67:/home/SLES #
```

**Step 4** Set the configuration item of the configuration file **unattend\_install.conf**. Set the value of **boot\_type** to **2** and set the value of **restart** based on onsite requirements. [Table 2-8](#) describes the related parameters.

**Table 2-8** Parameters of the configuration item

Parameter	Description	Value
boot_type	Startup mode of UltraPath.	[Value range] <ul style="list-style-type: none"> <li>● 1: Boot from local</li> <li>● 2: Boot from SAN</li> </ul> [Default value] 1
restart	This parameter is used to determine whether the host is restarted after UltraPath is installed.	[Value range] <ul style="list-style-type: none"> <li>● y: The host is restarted after the installation.</li> <li>● n: The host is not restarted after the installation.</li> </ul> <b>NOTE</b> If IB cards such as HCA cards are used to connect to the storage array, you are advised to set the value to n. [Default value] n

**Step 5** Run the **install.sh -f /any-directory/unattend\_install.conf** command to start silent installation.

```
linux-8beo:/home/SLES # chmod +x install.sh
linux-8beo:/home/SLES # ./install.sh -f unattend_install.conf
```

- **The installation tool automatically checks the environment.**  
 complete iscsi checking.  
 complete FC checking.  
 Verify the UltraPath existence.  
 The UltraPath is not installed.
- **Modify adapters' configuration parameters.**  
 Modify system configuration.[file:/etc/iscsi/iscsid.conf,item:node.startup,value: automatic]  
 Modify system configuration.[file:/etc/iscsi/iscsid.conf,item:node.session.timeo.replacement\_timeout,value: 1]  
 Modify system configuration.[file:/etc/modprobe.conf.local,module:qla2xxx,item:qlport\_down\_retry,value:5]  
 Modify system configuration.[file:/etc/modprobe.conf.local,module:lpfc,item:lpfc\_nodev\_tmo,value:5]

**Table 2-9** describes the configuration parameters of adapters.

 **NOTE**

The following adapter parameters will be automatically modified when UltraPath is installed. You do not need to manually configure them.

**Table 2-9** Adapter parameters

Adapter Type	Configuration File	Parameter
Linux-iscsi	/etc/iscsi.conf	Multipath=portal ConnFailTimeout=1
open-iscsi	/etc/iscsi/iscsid.conf	node.startup = automatic node.session.timeo.replacement_timeout=1
Qlogic	SUSE: /etc/ modprobe.conf.local Red Hat 4/Red Hat 5: /etc/modprobe.conf Red Hat 6/Red Hat 7: /etc/modprobe.d/ nxupmodules.conf	options qla2xxx qlport_down_retry=5 options qla2xxx ql2xfailover=0
Emulex	SUSE: /etc/ modprobe.conf.local Red Hat 4/Red Hat 5: /etc/modprobe.conf Red Hat 6/Red Hat 7: /etc/modprobe.d/ nxupmodules.conf	Options lpfc lpfc_nodev_tmo=5

When you perform the preceding operations, the following cases lead to alarms:

- The operating system version and the kernel version do not match. As a result, the installed UltraPath software may fail to take effect.
- The version of the host adapter driver has defects. As a result, it is incompatible with the UltraPath software.

Alarm Scenario	Information Description	Information Description
The operating system version and the kernel version do not match.	The OS version XXX does not match the kernel version. If the kernel has been updated or patched, please confirm the compatibility.	Check whether the <b>release</b> file in the <b>/etc/</b> directory has been modified. If the file is modified, restore it and install the UltraPath software again. If the file is not modified, check whether the system is upgraded.
The version of the host adapter driver has defects.	There are some defects of the iSCSI Initiator provided by SLES9 SP3. Therefore, you need to update the iSCSI Initiator.	Update the iSCSI initiator.
	The open-iscsi version is too low, Please update the iSCSI driver to the version 2.0-870.3.	Upgrade <b>open-iscsi</b> to 2.0-870.3.
	The default Qlogic driver in Red Hat AS4 and Asianux2 has a defect (Using upRescan command provided by the UltraPath.Please update it to qla2xxx-v8.02.23).	Download qla2xxx-v8.02.23 from <a href="http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/default.aspx">http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/default.aspx</a> (QLogic official website) and upgrade it.

- The default timeout parameter is modified using **Systemd**.

```
Modify system configuration.[file:/etc/systemd/system.conf,item:
DefaultTimeoutStartSec ,value: 600s]
```

**Table 2-10 Systemd default timeout parameter**

Systemd default timeout parameter	Configuration File	Parameter
Systemd	/etc/systemd/system.conf	DefaultTimeoutStartSec=600s <b>NOTE</b> This parameter is used to set the default timeout of starting a <b>systemd</b> service unit. If the unit startup period exceeds the timeout, the system startup will be affected. The number of LUNs mapped to hosts will affect the period of starting the service unit. The value of this parameter is modifiable based on actual conditions.

- Select the desired system boot mode <2>. 2 is automatically typed and the installation continues.

```
If the operating system is installed on a local drive of the server, you are
advised
to choose boot from local; if the operating system is installed on a SAN
storage
system, you must choose boot from san. Please choose the boot type of your
system:
<1>--boot-from-Local
<2>--boot-from-SAN
please input your select:2
Unattend install configuration item 'boot_type' set to '2'. Unattend
installation will continue.
Preparing... #####
UltraPath #####
User configuration is saved successfully.
The UltraPath start items are added successfully.
The mirror is updated successfully.
append UltraPath title to bootloader successfully.[/boot/grub/menu.lst]
The running service is installed successfully.
*****
***
* UltraPath will use the system hostname for alarm generation and automatic
host*
* registration. Make sure that the system hostname is correctly
configured.. *
*****
***
The installation is complete. Whether to restart the system now?
<Y|N>:n
Unattend install configuration item 'restart' set to 'n'. The system will not
be restarted after the unattend installation.
susell-67:/home/SLES #
```

If HCA cards of the IB type are used to connect to the storage array, run the **upLinux config ib** command to configure the IB driver service. In this way, the disks of the storage array will be reported to the host for a takeover.

- After the UltraPath software is installed in this mode, a multipath image and a link that points to the image are generated in the **/boot** directory.

```
# cd /boot
# ls
System.map-X.X.XX.XX-X.XX.X-smp      message
backup_mbr                          nxup-X.X.XX.XX-X.XX.X-smp.img      ultrapath-
X.X.XX.XX-X.XX.X-smp.img
```

- If your operating system supports multiple boot modes, select a mode that takes effect as instructed by the UltraPath software. Modify the **/boot/grub/menu.lst**, **/etc/elilo.conf**, or **/etc/lilo.conf** configuration file. Add the UltraPath option and configure it as a default item. For example:

```
# cat /boot/grub/menu.lst
default 2
timeout 8
...
title Linux with ultrapath
    root (hd0,2)
    kernel /boot/vmlinuz-X.X.XX.XX-X.XX.X-smp root=/dev/sda2..
    initrd /boot/ultrapath-X.X.XX.XX-X.XX.X-smp.img.
```

**Step 6 Optional:** If the **restart** item in the **unattend\_install.conf** configuration file is set to n, restrat the host to enable UltraPath to take effect after the installation.

---



## NOTICE

If you cannot log in to the operating system after UltraPath is installed in boot from local mode, see [5.2 Failed to Restart the SANBOOT System After the UltraPath Is Installed by Using the boot from local Mode](#) to solve the problem.

---

----End

### 2.2.2.2 Non-Silent Installation

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

#### Procedure

**Step 1** Use a digital signature verification tool to verify integrity of the software package.

 **NOTE**

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

**Step 2** Upload the UltraPath software package to an application server.

Decompress the UltraPath software package on a Windows-based server and upload the package to a directory (such as /home) of the application server.

 **NOTE**

The software package path cannot contain a space.

**Step 3** Log in to the application server as user **root**, go to the software package directory (SUSE as an example), and run installation tool `install.sh` to install the software.

```
linux-8beo:/home/SLES # chmod +x install.sh
linux-8beo:/home/SLES # ./install.sh
```

- The installation tool automatically checks the environment.

```
complete iscsi checking.
complete FC checking.
Verify the UltraPath existence.
The UltraPath is not installed.
```

- Modify all adapter configuration parameters.

```
Modify system configuration.[file:/etc/iscsi/
iscsid.conf,item:node.startup ,value: automatic]
Modify system configuration.[file:/etc/iscsi/
iscsid.conf,item:node.session.timeo.replacement_timeout ,value: 1]
Modify system configuration.[file:/etc/
modprobe.conf.local,module:qla2xxx,item:qlport_down_retry,value:5]
Modify system configuration.[file:/etc/
modprobe.conf.local,module:lpfc,item:lpfc_nodev_tmo,value:5]
```

**Table 2-11** describes the adapter parameters.

 **NOTE**

The following adapter parameters will be automatically modified during UltraPath installation. No manual configuration is required.

**Table 2-11** Adapter parameters

Adapter Type	Configuration File	Suggestion
Linux-iscsi	/etc/iscsi.conf	Multipath=portal ConnFailTimeout=1
open-iscsi	/etc/iscsi/iscsid.conf	node.startup = automatic node.session.timeo.replacement_timeout=1
Qlogic	SUSE: /etc/ modprobe.conf.local Red Hat 4/Red Hat 5: /etc/modprobe.conf Red Hat 6/Red Hat 7: /etc/modprobe.d/ nxupmodules.conf	options qla2xxx qlport_down_retry=5 options qla2xxx ql2xfailover=0
Emulex	SUSE: /etc/ modprobe.conf.local Red Hat 4/Red Hat 5: /etc/modprobe.conf Red Hat 6/Red Hat 7: /etc/modprobe.d/ nxupmodules.conf	Options lpfc lpfc_nodev_tmo = 5

When you perform the preceding operations, the following cases generate alarms:

- The operating system version and the kernel version do not match. As a result, the installed UltraPath may fail to take effect.
- The version of the host adapter driver has defects. As a result, it is incompatible with the UltraPath.

Alarm Scenario	Information Description	Information Description
The operating system version and the kernel version do not match.	The OS version XXX does not match the kernel version. If the kernel has been updated or patched, please confirm the compatibility.	Check whether the release file in the <b>/etc/</b> directory has been modified. If yes, restore it before installing the UltraPath. If no, confirm whether a system upgrade is needed.
The version of the host adapter driver has defects.	There are some defects of the iSCSI Initiator provided by SLES9 SP3. Therefore, you need to update the iSCSI Initiator.	Update the iSCSI initiator.



Alarm Scenario	Information Description	Information Description
	The open-iscsi version is too low. Please update the iSCSI driver to the version 2.0-870.3.	The open-iscsi version is outdated. You need to upgrade it to 2.0-870.3.
	The default QLogic driver in Red Hat AS4 and Asianux2 has a defect for using upRescan command provided by the UltraPath. Please update it to qla2xxx-v8.02.23.	Download qla2xxx-v8.02.23 from the official QLogic website: <a href="http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/default.aspx">http://driverdownloads.qlogic.com/QLogicDriverDownloads_UI/default.aspx</a> .

- Modify the default timeout parameter in the system that uses **Systemd**.

```
Modify system configuration.[file:/etc/systemd/system.conf,item:
DefaultTimeoutStartSec ,value: 600s]
```

**Table 2-12** Default **Systemd** Timeout Parameter

Default Systemd Timeout Parameter	Configuration File	Parameter
Systemd	/etc/systemd/system.conf	DefaultTimeoutStartSec=600s <b>NOTE</b> This parameter is used to set the default timeout of starting a <b>systemd</b> service unit. If the unit startup period exceeds the timeout, the system startup will be affected. The number of LUNs mapped to hosts will affect the period of starting the service unit. The value of this parameter is modifiable based on actual conditions.

- Select the desired operating system boot mode. In this scenario, select <2> to perform a SANBOOT installation.

```
If the operating system is installed on a local drive of the server, you are
advised to choose boot from local; if the operating system is installed on a
SAN storage system, you must choose boot from san. Please choose the boot
type of your system:
<1>--boot-from-Local
<2>--boot-from-SAN
please input your select:2
Preparing... #####
UltraPath #####
User configuration is saved successfully.
The boot service is installed successfull.
The running service is installed successfully.
*****Attention*****
***
* UltraPath would modify some parameters of HBA cards for better performace.
If *
* UltraPath is installed for the first time, you may need to update the
initrd *
* image before system reboot to make the modification take
```

```

effect.                *
*****
***
*****
***
* UltraPath will use the system hostname for alarm generation and automatic
host*
* registration. Make sure that the system hostname is correctly
configured..          *
*****
***
The installation is complete. Whether to restart the system now?
<Y|N>:
    
```

If the InfiniBand HCAs are used to connect the storage system, you are advised to type **N** and run the **upLinux config ib** command to configure the InfiniBand service. In this way, disk arrays connected to InfiniBand interface modules are reported to the host for takeover automatically.

- After the installation, a multipathing mirror and a link to the mirror are generated in the **/boot** directory.

```

# cd /boot
# ls
System.map-X.X.XX.XX-X.XX.X-smp      message
backup_mbr                          nxup-X.X.XX.XX-X.XX.X-smp.img      ultrapath-
X.X.XX.XX-X.XX.X-smp.img
    
```

- If the operating system has multiple loading modes, read the message of the UltraPath and select the currently effective loading mode to boot the system. An UltraPath-related option will be added to the boot configuration file (for example, **/boot/grub/menu.lst**, **etc/elilo.conf**, or **/etc/lilo.conf**). Keep the default value of the option. The following shows an example:

```

# cat /boot/grub/menu.lst
default 2
timeout 8
...
title Linux with ultrapath
    root (hd0,2)
    kernel /boot/vmlinuz-X.X.XX.XX-X.XX.X-smp root=/dev/sda2..
    initrd /boot/ultrapath-X.X.XX.XX-X.XX.X-smp.img.
    
```

**Step 4** After installing the UltraPath, restart the host.



## NOTICE

If you have incorrectly selected the boot from local mode on a SANBOOT system, the operating system cannot be loaded after you install the UltraPath. In this case, refer to [5.2 Failed to Restart the SANBOOT System After the UltraPath Is Installed by Using the boot from local Mode](#) to rectify the fault.

----End

## 2.3 Deploying UltraPath in Batch in a FusionSphere OpenStack Environment

This section describes how to deploy UltraPath in batch in a FusionSphere OpenStack environment.

## Procedure

- Step 1** Select an UltraPath software package applicable to FusionSphere products. **Table 2-13** lists the operating systems for UltraPath software packages (V100R008 as an example).

**Table 2-13** UltraPath software packages applicable to FusionSphere products (V100R008 as an example)

UltraPath Software Package	Operating System
OceanStor UltraPath V100R008CXXSPCXXX_FusionSphere.zip	UVP

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

 **NOTE**

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

- Step 3** Import the UltraPath installation package on the FusionSphere installation tool interface.

 **NOTE**

- The UltraPath installation package is saved in the FusionSphere OpenStack directory of the UltraPath software package.
- If you want to know details about how to install FusionSphere OpenStack, see the *FusionSphere Installation Guide (NFV)* specific to your software version.

For example, if FusionSphere OpenStack V100R006C00 is used, select and import ULTRAPATH\_V100R008C50\_FSO6U0.tar.gz on the installation tool interface (in the red square in the following figure).

**Install FusionSphere**

---

### Prepare

System Language :

中文     English

Select Package :

Install

Select the package of FusionSphere	Select the package of FusionManager (optional)
<input type="text"/>	<input type="text"/>
...	...
Select the file of Hostname (optional)	Select the package of UltraPath (optional)
<input type="text"/>	<input type="text"/>
...	...
Select the package of F8000 (optional)	Select the folder of Backup Data (optional)
<input type="text"/>	<input type="text"/>
...	...
Select the OpenStack package of Patch (optional)	
<input type="text"/>	
...	

Reinstall

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NextExit

----End

# 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 Upgrading the Operating System Kernel \(UltraPath Is Not Reinstalled\)](#)

After UltraPath is installed successfully, upgrade the operating system kernel. You do not need to reinstall UltraPath.

### [3.4 Uninstalling the UltraPath](#)

Due to service adjustment, UltraPath must be uninstalled. Perform the operations as instructed in this section. Correctly uninstalling UltraPath can effectively avoid the impact on service running.

## 3.1 Routine Maintenance

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

### 3.1.1 Querying Storage System Information

This section introduces how to query information about the storage system that connects to the application server.

#### Context

Run the **show array** command to query information about a specified or all storage systems connected to the application server.

## Procedure

- Step 1** Log in to the CLI as user **root**.
- Step 2** Run the **upadmin** command to go to the CLI of UltraPath.
- Step 3** Run the **show array [ id=ID1,ID2,... [ verbose ] ]** command to query information about all or specific storage systems connected to an application server. The parameters are describes as follows:

Keyword and Parameter	Description	Default Value
<b>id=ID1,ID2,...</b>	<p>ID of a storage system.</p> <p>You can run <b>show array</b> without an ID to display all storage system IDs.</p> <p><b>NOTE</b> You can query a maximum of eight storage systems' performance statistics at a time. Use comas (,) to separate storage systems.</p>	None
<b>verbose</b>	<p>Viewing details configuration information about a specified storage system.</p> <p><b>NOTE</b> Parameter <b>verbose</b> can display details configuration information about a specified storage system only when it is used with parameter <b>id</b>.</p>	None

The following example shows how to view information about a storage system whose ID is **1**.

```

UltraPath CLI #10 >show array id=1
=====
                        Array#1 Information
=====
Name                   : SN_210235G6EDZ0C2000001
Array SN               : 210235G6EDZ0C2000001
Vendor Name           : HUASY
Product Name          : S5600T
Controller 0A
  Status              : Enable
  LunCount            : 4
  PathInfo:
    Path1: Normal
Controller 0B
  Status              : Enable
  LunCount            : 4
  PathInfo:
    Path0: Normal
=====

```

For details about the **show array** command, see [A.4.1 Querying Storage System Information](#).

---End

### 3.1.2 Querying Physical Path Information

This section introduces how to query the working status of physical paths.

#### Context

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

#### Procedure

- Step 1** Log in to the CLI as user **root**.
- Step 2** Run the **upadmin** command to go to the CLI of UltraPath.
- Step 3** Run the **show path [ id=ID1,ID2,... | array\_id=ID ]** command to view the working status of all or specific physical paths. The parameters are describes as follows:

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

The following example shows how to query the working status of a 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          : --
=====
```

For details about the **show path** command, see [A.3.3 Querying Physical Path Information](#).

----End

### 3.1.3 Viewing Virtual LUN Information

This section introduces how to query the virtual LUNs mapped from the storage system to the application server.

#### Context

Run the **show vlun** command to query information about a specified LUN or all LUNs mapped from a storage system to an application server.

#### Procedure

- Step 1** Log in to the CLI as user **root**.
- Step 2** Run the **upadmin** command to go to the CLI of UltraPath.
- Step 3** Run the **show vlun [ id=ID1,ID2... | array\_id=ID1,ID2,... ] [ type={ all | hypermetro | migration } ] [ verbose ]** command to query information about the virtual LUNs mapped from the storage system to the application server. The parameters are describes as follows:

Keyword and Parameter	Description	Default Value
<b>array_id=ID1,ID2,...</b>	ID of a storage system. You can run <b>show array</b> without an ID to display all storage system IDs. <b>NOTE</b> You can query a maximum of eight storage systems' performance statistics at a time. Use comas (,) to separate storage systems.	None
<b>id=ID1,ID2...</b>	ID of a virtual LUN. You can run <b>show vlun type=all</b> to display all virtual LUN IDs. <b>NOTE</b> You can query a maximum of eight virtual LUNs' performance statistics at a time. Use comas (,) to separate virtual LUN IDs.	None



Keyword and Parameter	Description	Default Value
<b>verbose</b>	Viewing details configuration information about a virtual LUN. <b>NOTE</b> Parameter <b>verbose</b> views details configuration information about a virtual LUN only when it is used with parameter <b>id</b> .	None
<b>type</b> = { <i>all</i>   <i>hypermetro</i>   <i>migration</i> }	View the virtual LUN information of a specific type. If the <b>type</b> parameter is not specified, common virtual LUN information will be queried.  Possible values are all, hypermetro, and migration, where: <ul style="list-style-type: none"> <li>● all: all virtual LUNs</li> <li>● hypermetro: virtual HyperMetro LUNs</li> <li>● migration: virtual migration LUNs</li> </ul>	None

The following example shows how to query information about a virtual LUN whose ID is 1.

```
UltraPath CLI #2 >show vlun id=1
=====
                        VLUN#1 Information
=====
Disk                : sdc
Name                : hl_luntest_2
Status              : Normal
Capacity            : 1.00GB
Driver              : Vendor-specific (DEFAULT)
Product Name        : XSG1
Vendor Name         : HUAWEI
Owning Controller   : 0A
Working Controller  : 0B
Num of Paths        : 1
LUN WWN             : 630d17e100b33e3909eae968000000f2
Array Name          : Huawei.Storage
Controller 0B
Path 0 [1:0:0:2] (up-1) : Normal
Dev Lun ID          : 242
Manual IO Suspension : Off
=====
```

For details about the **show vlun** command, see [A.4.2 Viewing Virtual LUN Information](#).

----End

### 3.1.4 Querying Performance Statistics

UltraPath can obtain real-time performance data from the system. When performance decreases, the exported performance data can help you locate faults. This section introduces how to view and export performance data.

#### Context

Run the **show iostat** command to display and export the performance statistics (IOPS, bandwidth and response time) about storage systems and virtual LUNs.

#### Procedure

- Step 1** Log in to the CLI as user **root**.
- Step 2** Run the **upadmin** command to go to the CLI of UltraPath.
- Step 3** Run the **show iostat** command to query and export the IOPS and bandwidth statistics of a storage system or a virtual LUN. The parameters are describes as follows:

Parameter	Description	Default Value
<b>array_id</b> =ID1,ID2,...	Specifies IDs of storage systems.  You can run <b>show array</b> to obtain all storage system IDs.  <b>NOTE</b> You can query a maximum of eight storage systems' performance statistics at a time. Use comas (,) to separate storage systems.	None
<b>vlun_id</b> =ID1,ID2,...	Specifies IDs of virtual LUNs.  You can run <b>show vlun type=all</b> to obtain all virtual LUN IDs.  <b>NOTE</b> You can query a maximum of eight virtual LUNs' performance statistics at a time. Use comas (,) to separate virtual LUN IDs.	None

Parameter	Description	Default Value
<b>type</b> = <i>{ all   hypermetro   migration }</i>	View the virtual LUN information of a specific type. If the <b>type</b> parameter is not specified, common virtual LUN information will be queried.  Possible values are all, hypermetro, and migration, where: <ul style="list-style-type: none"> <li>● all: all the virtual LUNs</li> <li>● hypermetro: virtual HyperMetro LUNs</li> <li>● migration: virtual migration LUNs</li> </ul>	None
<b>interval</b> = <i>time</i>	Specifies an interval for performance statistics collection.  The value ranges from 1 to 60, expressed in seconds.	1
<b>file_name</b> = <i>file_name</i>	Specifies the saving path and name of the performance statistics report.  <b>NOTE</b> You are not required to specify the saving path but must specify the name of the performance report. The system automatically adds suffix <b>.CSV</b> to the name.  If a saving path is not specified, the report is saved in the <b>perf_log</b> file folder of the UltraPath log directory.	/opt/UltraPath/log/perf_log/
<b>archive_time</b> = <i>archive_time</i>	Specifies an interval for performance statistics collection.  The value can be 5, 60, 120, 300, 1800, and 3600, expressed in seconds.  <b>NOTE</b> This parameter is valid only when <b>file_name</b> is specified. The system writes performance data to the report at the specified time interval.	60

Parameter	Description	Default Value
<b>duration</b> = <i>duration</i>	<p>Statistics duration</p> <p>The value ranges from 60 to 259,200, expressed in seconds.</p> <p><b>NOTE</b></p> <p>This parameter is valid only when <b>file_name</b> is specified. The system stops performance statistics after the specified duration.</p>	900

The following example queries the performance data 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
=====
====
time (ms)                IOPS                                KB/S                                response
      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
=====
====
```

For details about the **show iostat** command, see [A.3.45 Querying and Exporting Performance Statistics](#).

----End

### 3.1.5 Viewing Critical Events

Critical events are logs that record the UltraPath running. When UltraPath becomes faulty, you can view critical events to locate and analyze the fault. This section introduces how to view critical events.

#### Context

Run the **show event** command to view critical events about UltraPath.

#### Procedure

- Step 1** Log in to the CLI as user **root**.
- Step 2** Run the **upadmin** command to go to the CLI of UltraPath.

**Step 3** Run the **show event [ count=number ]** command to view critical events that record UltraPath running. The parameters are describes as follows:

Keyword and Parameter	Description	Default Value
<b>count=number</b>	Printing number of critical events. The value ranges from 1 to 10,000.	1000

The following example shows how to view critical events about UltraPath.

```
UltraPath CLI #1 >show event
=====
-----
      SN          Array          Type          Time
Serverity      Description
  1    210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:47:902655 info Add
a path to disk: LUN name {fan0000}, Host Lun ID {1}.
.....
4793   210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:47:289423 info Add
a path to disk: LUN name {LUNV}, Host Lun ID {0}.
4794   210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:46:776981 info Add
a path to disk: LUN name {fan0003}, Host Lun ID {4}.
4795   210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:46:248418 info Add
a path to disk: LUN name {fan0002}, Host Lun ID {3}.
4796   210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:45:752700 info Add
a path to disk: LUN name {fan0001}, Host Lun ID {2}.
4797   210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:45:164166 info Add
a path to disk: LUN name {fan0000}, Host Lun ID {1}.
4798   210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:44:607698 info Add
a path to disk: LUN name {LUNV}, Host Lun ID {0}.
4799   210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:44:094826 info Add
a path to disk: LUN name {fan0003}, Host Lun ID {4}.
4800   210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:43:397182 info Add
a path to disk: LUN name {fan0002}, Host Lun ID {3}.
4801   210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:42:802060 info Add
a path to disk: LUN name {fan0001}, Host Lun ID {2}.
4802   210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:42:321424 info Add
a path to disk: LUN name {fan0000}, Host Lun ID {1}.
4803   210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:41:704031 info Add
a path to disk: LUN name {LUNV}, Host Lun ID {0}.
4804   210235G6ED10D8000006  Create virtual disk 2013-11-27 08:21:41:195517 info
Successfully create virtual disk: LUN name {fan0003}, Host Lun ID {4}.
-----
-----
-----
-----
```

For details about the **show event** command, see [A.3.43 Viewing Critical Events](#).

----End

## 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 Upgrading the Operating System Kernel (UltraPath Is Not Reinstalled)

After UltraPath is installed successfully, upgrade the operating system kernel. You do not need to reinstall UltraPath.

#### Prerequisites

- After the kernel is upgraded, you do not need to reinstall the following operating systems.

Operating System	Version
SUSE	SUSE 10 SPX series, SUSE 11 SPX series, and SUSE 12 SPX series
Oracle	Oracle 5.X series, Oracle 6.X series, and Oracle 7.X series
RHEL	RHEL 5.X series, RHEL 6.X series, and RHEL 7.X series
Centos	Centos 5.X series, Centos 6.X series, and Centos 7.X series

- The operating systems do not support cross-large version kernel upgrade (for example, SUSE 10 SP1 is upgraded to SUSE 10 SP2, SUSE 10 SP1 to SUSE 11 SP1, RHEL 5.X to RHEL 6.X, or Oracle 5.X to Oracle 6.X).
- Before upgrade the kernel or a kernel patch, ensure that the kernel or kernel path is compatible with UltraPath. For details about the compatibility, contact Huawei technical support.
- The kernel of the Oracle operating system must be a standard kernel version supported by UltraPath.

#### Procedure

**Step 1** Upgrade the kernel of the operating system. Do not restart the operating system.

**Step 2** Run the `cat /etc/UltraPath.packages.info` command to check the `t140s_solutionType` field.

```
[root@localhost RHEL]# cat /etc/UltraPath.packages.info
g10s_OSVersion=RHEL7
g10s_kernelType=normal
g30s_isSanBoot=0
t140s_solutionType=service
f20_solution=createSolution
g10s_sysbit=x86_64
t290s_runServType=redhatService
#####first install###end#####20160225033249#####
```

- If the value of the **t140s\_solutionType** parameter is **service**, UltraPath is installed in boot from local mode. go to **Step 6**.
- If the value of the **t140s\_solutionType** parameter is **mkinitrd**, UltraPath is installed in boot from SAN mode. go to **Step 3**.

**Step 3 Optional: Run the upLinux updateForNewKernel command.**

- If the following output is displayed, go to **Step 6**.

```
[root@localhost RHEL]# upLinux updateForNewKernel
The new kernel is 2.6.32-220.el6.x86_64.
The running service is deleted successfully.
The UltraPath startup guide items are deleted successfully.
remove nxup from dracut.
The UltraPath files are deleted successfully.
User configuration is saved successfully.
append nxup to dracut.
The mirror is updated successfully.
append UltraPath title to bootloader successfully. [/boot/grub/menu.lst]
The running service is installed successfully.
The system kernel is updated successfully in UltraPath. Please reboot.
```

- If the following output is displayed, go to **Step 4**.

```
[root@localhost RHEL]# upLinux updateForNewKernel
*****
*****
*
Notice
*****
*****
*UltraPath detects that the default startup item of BootLoader do not point
to the upgraded *
*new
kernel.
*
*The BootLoader type is grub.
*<Step> Edit /boot/grub/menu.lst and make the entry that contains the
initramfs image without *
*the ultraPath modules as the default
entry.
*For more information, see the UltraPath User
Guide.
*Chapter in [Upgrading Kernel Without Re-Installing
UltraPath]
*****
*****
Whether to go on?
<Y|N>:
```

**Step 4 Optional: Manually modify the BootLoader startup item of the operating system.**

 **NOTE**

Select the startup modification mode according to **The BootLoader type is grub** in the preceding command output. For example, **The BootLoader type is grub** indicates that the operating system is started in grub mode.

- Start the operating system in grub mode.
  - a. Run the **vi** command to open /boot/grub/menu.lst.

 **NOTE**

In the command output, each **title** item corresponds to an operating system kernel and the location of each **title** item is related to the value of **default**. For example, the value of **default** that corresponds to the first **title** item is 0 and the value of **default** that corresponds to the second **title** item is 1.

```
Linux-coder:~ # vi /boot/grub/menu.lst
# Modified by YaST2. Last modification on Thu Mar 3 09:01:44 CST 2016
default 0
timeout 8
##YaST - generic_mbr
gfxmenu (hd0,1)/boot/message
##YaST - activate

###Don't change this comment - YaST2 identifier: Original name: linux###
title Xen -- SUSE Linux Enterprise Server 11 SP1 - 2.6.32.12-0.7
    root (hd0,1)
    kernel /boot/vmlinuz-2.6.32.12-0.7-xen root=/dev/disk/by-id/ata-
QEMU_HARDDISK_QM00001-part2 resume=/dev/disk/by-id/ata-QEMU_HARDDISK_QM00001-part1
splash=silent crashkernel=256M-:128M showopts vga=0x314
    initrd /boot/initrd-2.6.32.12-0.7-xen

###Don't change this comment - YaST2 identifier: Original name: linux###
title SUSE Linux Enterprise Server 11 SP1 - 2.6.32.12-0.7
    root (hd0,1)
    kernel /boot/vmlinuz-2.6.32.12-0.7-default root=/dev/disk/by-id/ata-
QEMU_HARDDISK_QM00001-part2 resume=/dev/disk/by-id/ata-QEMU_HARDDISK_QM00001-part1
splash=silent crashkernel=256M-:128M showopts vga=0x314 ide_core.noprobe=0.0
    initrd /boot/initrd-2.6.32.12-0.7-default

###Don't change this comment - YaST2 identifier: Original name: failsafe###
title Failsafe -- SUSE Linux Enterprise Server 11 SP1 - 2.6.32.12-0.7
    root (hd0,1)
    kernel /boot/vmlinuz-2.6.32.12-0.7-default root=/dev/disk/by-id/ata-
QEMU_HARDDISK_QM00001-part2 showopts ide=nodma apm=off noresume edd=off
powersaved=off nohz=off highres=off processor.max_cstate=1 nomodeset x11failsafe
vga=0x314
    initrd /boot/initrd-2.6.32.12-0.7-default
```

- b. Modify the value of **default**. The new kernel (**title SUSE Linux Enterprise Server 11 SP1 - 2.6.32.12-0.7**) is used as an example.

 **NOTE**

**title SUSE Linux Enterprise Server 11 SP1 - 2.6.32.12-0.7** is the second **title** item. The value of **default** is **1**.



```
Linux-coder:~ # vi /boot/grub/menu.lst
# Modified by YaST2. Last modification on Thu Mar 3 09:01:44 CST 2016
default 1
timeout 8
##YaST - generic_mbr
gfxmenu (hd0,1)/boot/message
##YaST - activate

###Don't change this comment - YaST2 identifier: Original name: linux###
title Xen -- SUSE Linux Enterprise Server 11 SP1 - 2.6.32.12-0.7
    root (hd0,1)
    kernel /boot/vmlinuz-2.6.32.12-0.7-xen root=/dev/disk/by-id/ata-
QEMU_HARDDISK_QM00001-part2 resume=/dev/disk/by-id/ata-QEMU_HARDDISK_QM00001-part1
splash=silent crashkernel=256M-:128M showopts vga=0x314
    initrd /boot/initrd-2.6.32.12-0.7-xen

###Don't change this comment - YaST2 identifier: Original name: linux###
title SUSE Linux Enterprise Server 11 SP1 - 2.6.32.12-0.7
    root (hd0,1)
    kernel /boot/vmlinuz-2.6.32.12-0.7-default root=/dev/disk/by-id/ata-
QEMU_HARDDISK_QM00001-part2 resume=/dev/disk/by-id/ata-QEMU_HARDDISK_QM00001-part1
splash=silent crashkernel=256M-:128M showopts vga=0x314 ide_core.noprobe=0.0
    initrd /boot/initrd-2.6.32.12-0.7-default

###Don't change this comment - YaST2 identifier: Original name: failsafe###
title Failsafe -- SUSE Linux Enterprise Server 11 SP1 - 2.6.32.12-0.7
    root (hd0,1)
    kernel /boot/vmlinuz-2.6.32.12-0.7-default root=/dev/disk/by-id/ata-
QEMU_HARDDISK_QM00001-part2 showopts ide=nodma apm=off noresume edd=off
powersaved=off nohz=off highres=off processor.max_cstate=1 nomodeset x11failsafe
vga=0x314
    initrd /boot/initrd-2.6.32.12-0.7-default
```

- c. Type **:wq** and press **Enter** to save the modification and exit.
- Start the operating system in grub2 mode.
  - a. Run the **vi** command to open **/boot/grub2/grub.cfg**.

 **NOTE**

Each **menuentry** item corresponds to an operating system kernel.

```
[root@localhost ~]# vi /boot/grub2/grub.cfg
...
menuentry 'Red Hat Enterprise Linux Server, with Linux 3.10.0-123.el7.x86_64' --
class red --class gnu-linux --class gnu --class os --unrestricted
$menuentry_id_option 'gnulinux-3.10.0-123.el7.x86_64-advanced-1670818d-dfab-4ab6-
8e62-4bd80d3f51fd' {
    load_video
    set gfxpayload=keep
    insmod gzio
    insmod part_msdos
    insmod xfs
    set root='hd0,msdos1'
    if [ x$feature_platform_search_hint = xy ]; then
        search --no-floppy --fs-uuid --set=root --hint-bios=hd0,msdos1 --hint-
efi=hd0,msdos1 --hint-baremetal=ahci0,msdos1 --hint='hd0,msdos1' 844afc06-cd4d-
48e8-bedd-40dcc4b75f77
    else
        search --no-floppy --fs-uuid --set=root 844afc06-cd4d-48e8-bedd-40dcc4b75f77
    fi
    linux16 /vmlinuz-3.10.0-123.el7.x86_64 root=UUID=1670818d-dfab-4ab6-8e62-
4bd80d3f51fd ro rd.lvm.lv=rhel/root crashkernel=auto rd.lvm.lv=rhel/swap
vconsole.font=latacyrheb-sun16 vconsole.keymap=us rhgb quiet
    initrd16 /initramfs-3.10.0-123.el7.x86_64.img
}
menuentry 'Red Hat Enterprise Linux Server, with Linux 0-rescue-
0a835e632e914232b163662a1afb387' --class red --class gnu-linux --class gnu --class
os --unrestricted $menuentry_id_option 'gnulinux-0-rescue-
0a835e632e914232b163662a1afb387-advanced-1670818d-dfab-4ab6-8e62-4bd80d3f51fd' {
    load_video
    insmod gzio
    insmod part_msdos
    insmod xfs
    set root='hd0,msdos1'
    if [ x$feature_platform_search_hint = xy ]; then
        search --no-floppy --fs-uuid --set=root --hint-bios=hd0,msdos1 --hint-
efi=hd0,msdos1 --hint-baremetal=ahci0,msdos1 --hint='hd0,msdos1' 844afc06-cd4d-
48e8-bedd-40dcc4b75f77
```

- b. Run the **grub2-set-default** *'new kernel version'* command. The new kernel (**Red Hat Enterprise Linux Server, with Linux 3.10.0-123.el7.x86\_64**) is used as an example.

```
[root@localhost ~]# grub2-set-default 'Red Hat Enterprise Linux Server,
with Linux 3.10.0-123.el7.x86_64'
```

- Start the operating system in lilo mode.
  - a. Run the **vi** command to open `/etc/lilo.conf`.

 **NOTE**

Each **label** item corresponds to an operating system kernel.

```
suse10sp3-85:~ # vi /etc/lilo.conf
# Modified by YaST2. Last modification on Tue Jul 14 01:24:14 CST 2015
menu-scheme = Wb:kw:Wb:Wb
timeout = 80
lba32
change-rules
reset
read-only
default= Failsafe_--
message = /boot/message
boot = /dev/sda2
image = /boot/vmlinuz-2.6.16.60-0.54.5-smp
###Don't change this comment - YaST2 identifier: Original name: linux###
    label = SUSE_Linux
    append = "resume=/dev/sda1 splash=silent showopts"
    initrd = /boot/initrd-2.6.16.60-0.54.5-smp
    root = /dev/sda2
image = /boot/vmlinuz-2.6.16.60-0.54.5-smp
###Don't change this comment - YaST2 identifier: Original name: failsafe###
    label = Failsafe_--
    append = "showopts ide=nodma apm=off acpi=off noresume nosmp noapic maxcpus=0
edd=off 3 crashkernel=128M@16M"
    initrd = /boot/initrd-2.6.16.60-0.54.5-smp
    root = /dev/sda2
```

- b. Modify the value of **default** to the default value of the new kernel. The new kernel (**SUSE\_Linux**) is used as an example.

```
# Modified by YaST2. Last modification on Tue Jul 14 01:24:14 CST 2015
menu-scheme = Wb:kw:Wb:Wb
timeout = 80
lba32
change-rules
reset
read-only
default=SUSE_Linux
message = /boot/message
boot = /dev/sda2
image = /boot/vmlinuz-2.6.16.60-0.54.5-smp
###Don't change this comment - YaST2 identifier: Original name: linux###
    label = SUSE_Linux
    append = "resume=/dev/sda1 splash=silent showopts"
    initrd = /boot/initrd-2.6.16.60-0.54.5-smp
    root = /dev/sda2
image = /boot/vmlinuz-2.6.16.60-0.54.5-smp
###Don't change this comment - YaST2 identifier: Original name: failsafe###
    label = Failsafe_--
    append = "showopts ide=nodma apm=off acpi=off noresume nosmp noapic maxcpus=0
edd=off 3 crashkernel=128M@16M"
    initrd = /boot/initrd-2.6.16.60-0.54.5-smp
    root = /dev/sda2
```

- c. Type **:wq** and press **Enter** to save the modification and exit.
- Start the operating system in elilo mode.
    - a. Run the **vi** command to open **/etc/elilo.conf**.

- b. For details about other operations, see step 2 and step 3 in "Start the operating system in lilo mode."
- Start the operating system in egrub mode.
  - a. Run the **vi** command to `/etc/grub.conf`.
  - b. For details about other operations, see step 2 and step 3 in "Start the operating system in grub mode."

**Step 5** In the command output, type **y**, as shown in the following:

```
[root@localhost RHEL]# upLinux updateForNewKernel
*****
*****
*
Notice
*****
*****
*UltraPath detects that the default startup item of BootLoader do not point to
the upgraded
*new
kernel.
*
*The BootLoader type is grub.
*<Step> Edit /boot/grub/menu.lst and make the entry that contains the initramfs
image without
*the ultraPath modules as the default
entry.
*For more information, see the UltraPath User
Guide.
*Chapter in [Upgrading Kernel Without Re-Installing
UltraPath]
*****
*****
Whether to go on?
<Y|N>:y
```

**Step 6** Restart the operating system.

----End

## 3.4 Uninstalling the UltraPath

Due to service adjustment, UltraPath must be uninstalled. Perform the operations as instructed in this section. Correctly uninstalling UltraPath can effectively avoid the impact on service running.

### Procedure

**Step 1** Run **rpm -e UltraPath** or **dpkg -r UltraPath** to uninstall the UltraPath software. The following uses **rpm -e UltraPath** as an example.

```
#rpm -e UltraPath
The running service is deleted successfully.
The boot service is removed successfully.
The UltraPath files are deleted successfully.
UltraPath driver package has been successfully removed from your system.
Restart the system.
```

**Step 2** Run the **reboot** command to reboot the system.

```
#reboot
```

----End

# 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 to Correctly Change a LUN Mapping View on a Storage Array?](#)

[4.2 How can I configure the fstab file in the deepin 15 operating system to enable file systems on a storage device to be automatically mounted to the operating system?](#)

## 4.1 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. Run **upRescan** command of UltraPath to rescan disks.
4. Add the LUN mapping view on the GUI management page (ISM or DeviceManager) of the array.
5. Run **upRescan** command of UltraPath to scan and detect disks.
6. Contact the administrator to start services.

## 4.2 How can I configure the fstab file in the deepin 15 operating system to enable file systems on a storage device to be automatically mounted to the operating system?

### Question

How can I configure the fstab file in the deepin 15 operating system to enable file systems on a storage device to be automatically mounted to the operating system?

### Answer

When configuring automatic file system mounting so that the file systems on a storage system can be automatically mounted to the operating system, use the `nofail` option in `/etc/fstab`. An example is as follows:

```
/dev/disk/by-uuid/15f80c92-4be8-4e4f-8d8c-bce1db64141c /mnt/sdx ext3 nofail  
0 2
```

# 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 Preventing Ping-Pong Effect](#)

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

### [5.2 Failed to Restart the SANBOOT System After the UltraPath Is Installed by Using the boot from local Mode](#)

### [5.3 Service I/Os Stop for a Long Time](#)

## 5.1 Preventing Ping-Pong Effect

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

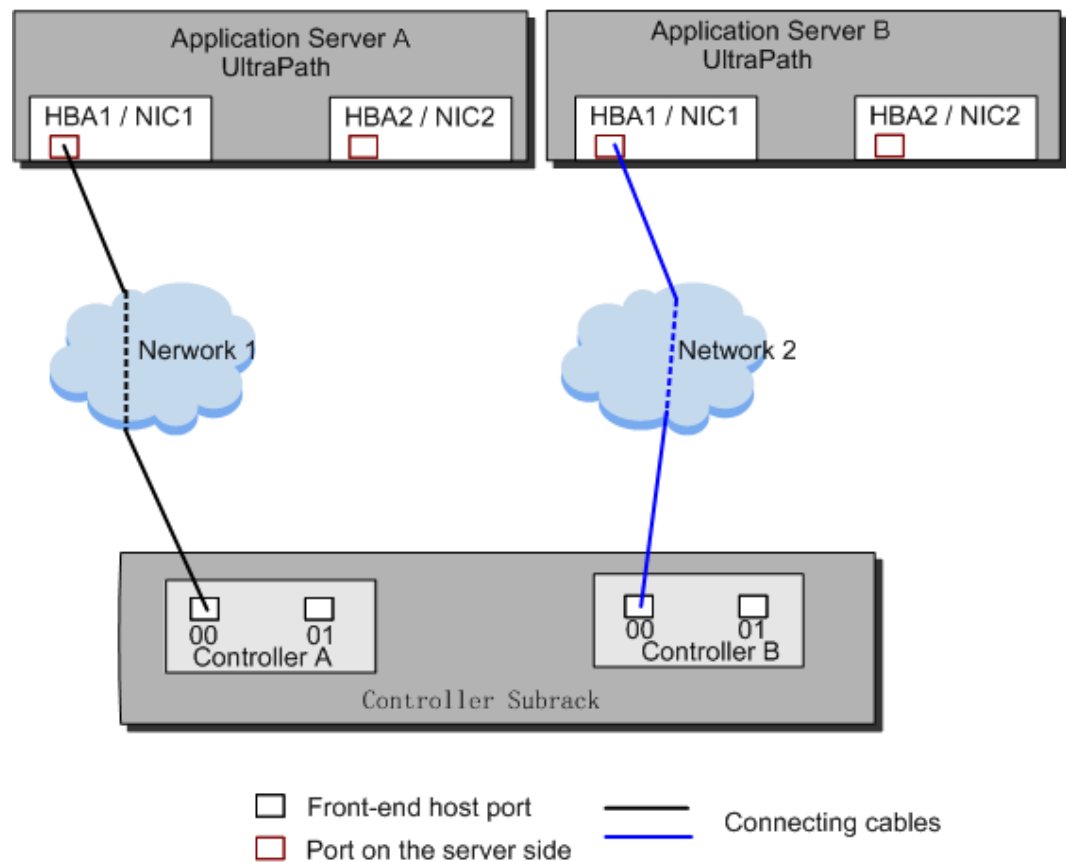
### Symptom

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 servers are connected to two controllers of a storage system respectively and can access the same LUN, as shown in [Figure 5-1](#).

**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](#).

----End

## 5.2 Failed to Restart the SANBOOT System After the UltraPath Is Installed by Using the boot from local Mode

### Symptom

After the **boot from local** command is executed to install the UltraPath, the operating system fails to be restarted.



## Possible Causes

The root file system is installed on a disk mapped by the storage array. The **boot from local** mode is used to install the UltraPath. During the startup of the operating system, the HBA is loaded prior to the UltraPath. When the UltraPath is loaded, the disk where the root file system is installed is deleted so that the UltraPath can take over the array disks. Therefore, the operating system fails to be restarted.

## Procedure

- Restart the operating system. When the startup menu is displayed, press **e** to edit the startup parameters and enter **NoUltraPath**. The UltraPath is not loaded during the startup, as shown in [Figure 5-2](#).

Figure 5-2 Startup Menu



- After the operating system is started successfully, uninstall the current UltraPath and install the UltraPath by **boot from SAN** mode.

---End

## 5.3 Service I/Os Stop for a Long Time

### Symptom

The **boot-from-local** mode is executed to install the UltraPath. During the service running process, a cable is removed. Upper-layer service I/Os stop for a long time, or the database is restarted.

### Possible Causes

When the **boot-from-local** mode is executed to install the UltraPath for the first time, and the Fibre Channel is used, the Qlogic or Emulex driver parameters are modified. If the modification does not take effect, the driver retries the failed I/Os in the path where a cable is removed. After a timeout, I/Os return. As for the upper-layer services, I/Os stop for a long time.

## Procedure

**Step 1** Run the **upLinux updateImage** command to update images.

**Step 2** Restart the host.

----End

---

# A Commonly Used CLI Management Commands

---

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

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

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

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

## [A.1 Command Conventions](#)

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

## [A.2 Basic Operation Commands](#)

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

## [A.3 System Management Commands](#)

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

## [A.4 LUN Management Commands](#)

LUN management commands include commands for viewing storage system information and virtual disk information.

## [A.5 Other UltraPath Commands](#)

This section describes UltraPath commands that are not included in the preceding command categories.

## A.1 Command Conventions

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

**Table A-1** lists the format conventions.

**Table A-1** Command conventions

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

 **NOTE**

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

## A.2 Basic Operation Commands

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

### A.2.1 Logging in to the CLI

#### Function

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

#### Format

**upadmin**

#### Parameters

None

## Level

User **root**

## Usage Guidelines

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

- Log in to the CLI and show the version of UltraPath.

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

- Run the **upadmin show version** command to view the version of UltraPath.

```
# upadmin show version
Software Version : XX.XX.XXX
Driver Version : XX.XX.XXX
```

## Example

Log in to the UltraPath CLI.

```
# upadmin
UltraPath CLI #0 >
```

## System Response

None

## A.2.2 Exiting the CLI

### Function

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

### Format

**quit**

### Parameters

None

## Level

User **root**

## 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 **root**

### Usage Guidelines

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

### Example

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

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

## System Response

None

## A.3 System Management Commands

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

## A.3.1 Querying the Version of UltraPath

### Function

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

### Format

**show version** [verbose]

### Parameters

Parameter	Description	Default Value
<b>verbose</b>	Used to query the UltraPath version information.	None

### Level

User **root**

### Usage Guidelines

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

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

### Example

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

```
UltraPath CLI #0 >show version
Software Version : 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
<b>array_id=ID</b>	ID of a storage system. You can run <b>show array</b> without an ID to display all storage system IDs.	None
<b>vlun_id=ID</b>	ID of a virtual LUN. You can run <b>show vlun type=all</b> to display all virtual LUN IDs.	None

## Level

User **root**

## Usage Guidelines

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

## Example

- Query all configuration information about UltraPath.

```
UltraPath CLI #2 >show upconfig
=====
UltraPath Configuration
=====
Basic Configuration
  Working Mode : load balancing within controller
  LoadBalance Mode : min-queue-depth
  Loadbanlance io threshold : 1
  LUN Trespass : on

Advanced Configuration
  Io Retry Times : 10
  Io Retry Delay : 0
  Faulty path check interval : 10
  Idle path check interval : 60
  Failback Delay Time : 600
```



```

Io Suspension Time : 60
Max io retry timeout : 1800

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

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

```

- Query UltraPath configuration information about a specified storage system.

```

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

```

- Query UltraPath configuration information about a specified virtual LUN.

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

```

UltraPath CLI #0 >show upconfig vlun_id=1
=====
UltraPath Configuration
=====
Working Mode : load balancing within controller
LoadBalance Mode : round-robin
Loadbanlance io threshold : 1
LUN Trespass : on
Io Suspension Time : 60
Max io retry timeout : 1800
UltraPath CLI #3 >show upconfig vlun_id=2
=====
UltraPath Configuration
=====
Working Mode : load balancing within controller
LoadBalance Mode : min-task
Loadbanlance io threshold : 1
LUN Trespass : on
Io Suspension Time : 0
Max io retry timeout : 1800
HyperMetro Primary Array SN : 210235980510E8000015
HyperMetro WorkingMode : read write between both arrays
HyperMetro Split Size : 4KB

```

## System Response

None

## A.3.3 Querying Physical Path Information

### Function

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

### Format

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


### Parameters

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

### Level

User **root**

### Usage Guidelines

- Run the **show path** command to check the working status of all physical paths.  
 **NOTE**  
When the **show path** command is executed, you can only view the information about a maximum of eight paths on one controller.
- Run the **show path array\_id=ID** command to check the working status of a specified storage system's physical paths.
- Run the **show path id=ID1,ID2,...** command to check the working status of a specified physical path.

### Example

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

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

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

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

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

```
UltraPath CLI #0 >show path id=0
=====
Path#0 Information
=====
Initiator Port : 2100001b32053e20
Array Name    : Huawei.Storage48
Controller    : 0B
Target Port   : 20184846fb8ca15f
Path State    : Normal
Check State   : --
Port Type     : FC
I/O Retry count : 0
Path Fault count: 0
Latency-Low(ms) : 0
Latency-High(ms) : 2
Latency-avg(ms) : 0
Port ID      : --
=====
```

## System Response

The following table explains some parameters in the command output:

Parameter	Description	Default Value
Path ID	ID of the physical path.	None
Initiator Port	Port of the initiator. <b>NOTE</b> 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. <b>NOTE</b> 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. <b>NOTE</b> If the controller name is followed by <b>Remote</b> information, the controller is a remote controller.	None

Parameter	Description	Default Value
Path State	<p>State of the physical path. Possible values are as follows:</p> <ul style="list-style-type: none"> <li>● Normal: The path is normal.</li> <li>● Fault: The path is faulty.</li> <li>● I/O discrete error degradation: The path is degraded due to discrete I/O errors.</li> <li>● Intermittent failure degradation: The path is degraded due to intermittent failures.</li> <li>● High latency degradation: The path is degraded due to high latency.</li> <li>● I/O timeout degradation: The path is degraded due to I/O timeout.</li> <li>● Potential fault degradation: The path is degraded due to potential fault.</li> <li>● Disable: The path is disabled.</li> </ul>	None
Check State	<p>State check of a path. Possible values are as follows:</p> <ul style="list-style-type: none"> <li>● Checking: The path is being checked.</li> <li>● Waiting: The path is waiting to be checked.</li> <li>● Succeed: The path status check succeeded.</li> <li>● Fail: The path status check failed.</li> <li>● Ignore: The path status check is ignored.</li> <li>● --: The path is not checked.</li> </ul>	None
I/O Retry Count	Number of I/O retry attempts.	None

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 phyathnormal** command is used to restore the working status of a degraded path to normal.

### Format

```
set phyathnormal path_id=ID
```

### Parameters

Keyword and Parameter	Description	Default Value
<b>path_id</b> = <i>ID</i>	ID of the physical path. You can run <b>show path</b> without an ID to display all physical path IDs.	None

### Level

User **root**

### 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 phyathnormal 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 phyathnormal path_id=1
```

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

Succeeded in executing the command.
```

## System Response

None

## A.3.5 Setting 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. <ul style="list-style-type: none"> <li>● enable: enables a physical path.</li> <li>● disable: disables a physical path.</li> </ul>	enable
path_id=ID	ID of a physical path. You can run <b>show path</b> without an ID to display all physical path IDs.	None

### Level

User **root**

## Usage Guidelines



### NOTICE

- Once the command is run, UltraPath will not choose this path to deliver I/O.
  - Only OceanStor T series V100R005 or later storage systems using Fibre Channel networks support this command.
  - If a controller module is disabled by running the **set tpgstate** command, you cannot run the **set pathstate** command to change the status of the controller's path.
- 
- When you replace an HBA, run the **set pathstate=disable path\_id=ID** command to disable the designated physical path. UltraPath will switch I/Os smoothly to other physical paths.
  - When the HBA is replaced, run the **set pathstate=enable path\_id=ID** command to enable the physical path mentioned earlier.

## Example

Enable the physical path whose ID is 0.

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

## System Response

None

## A.3.6 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
<b>path_id=ID1,ID2,...</b>	<p>ID of a physical path.</p> <p>You can run <b>show path</b> without parameters to obtain all physical path IDs.</p> <p><b>NOTE</b></p> <p>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.</p>	None
<b>array_id=ID1,ID2,...</b>	<p>Storage array ID.</p> <p>You can run the <b>show array</b> command without parameters to obtain IDs of storage arrays.</p> <p><b>NOTE</b></p> <p>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.</p>	None

## Level

User **root**

## 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=ID
```

### Parameters

| Keyword and Parameter   | Description                                                                                                                                                                                                                          | Default Value |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <i>enable   disable</i> | Enabling or disabling a controller's path.<br>Possible values are enable or disable.<br><ul style="list-style-type: none"> <li>● enable: enables a controller's paths.</li> <li>● disable: disables a controller's paths.</li> </ul> | enable        |
| <b>array_id=ID</b>      | ID of a storage system.<br>You can run <b>show array</b> without an ID to display all storage system IDs.                                                                                                                            | None          |
| <b>tpg_id=ID</b>        | ID of a controller.                                                                                                                                                                                                                  | None          |

### Level

User **root**

### 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 redundancy and balancing controller workload.

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

## Example

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

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

## System Response

None

## A.3.8 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 |
|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>workingmode</b> ={0 1} | <p>Load balancing mode of UltraPath.</p> <p>The value can be <b>0</b> or <b>1</b>.</p> <ul style="list-style-type: none"> <li>● <b>0</b>: cross-controller load balancing mode. That is, I/Os are delivered through paths of all controllers.</li> <li>● <b>1</b>: intra-controller load balancing mode. That is, I/Os are delivered through paths of the current working controller.</li> </ul> | 1             |
| <b>array_id</b> =ID       | <p>ID of a storage system.</p> <p>You can run <b>show array</b> without an ID to display all storage system IDs.</p>                                                                                                                                                                                                                                                                             | None          |

| Keyword and Parameter                                                        | Description                                                                                   | Default Value |
|------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|---------------|
| <b>vlun_id</b> ={ <i>ID</i>   <i>ID1</i> , <i>ID2</i> ...   <i>ID1-ID2</i> } | ID of a virtual LUN.<br>You can run <b>show vlun type=all</b> to display all virtual LUN IDs. | None          |

## Level

User **root**

## 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* } ]

## Parameters

| Keyword and Parameter                                              | Description                                                                                                                                                                                                                                              | Default Value   |
|--------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------|
| <i>round-robin</i>   <i>min-queue-depth</i>   <i>min-task</i> }    | Load balancing mode.<br><ul style="list-style-type: none"> <li>● <i>round-robin</i>: round-robin load balancing</li> <li>● <i>min-queue-depth</i>: minimum queue depth load balancing</li> <li>● <i>min-task</i>: minimum task load balancing</li> </ul> | min-queue-depth |
| <b>array_id</b> = <i>ID</i>                                        | ID of a storage system.<br>You can run <b>show array</b> without an ID to display all storage system IDs.                                                                                                                                                | None            |
| <b>vlun_id</b> ={ <i>ID</i>   <i>ID1,ID2...</i>   <i>ID1-ID2</i> } | ID of a virtual LUN.<br>You can run <b>show vlun type=all</b> to display all virtual LUN IDs.                                                                                                                                                            | None            |

## Level

User **root**

## 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-queue-depth**. 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.
- 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 |
|--------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <i>on</i>   <i>off</i>                                             | Working controller trespass policy of a LUN.<br>The value is either <b>on</b> or <b>off</b> .<br><ul style="list-style-type: none"> <li>● <b>on</b>: Enables working controller trespass for a LUN.</li> <li>● <b>off</b>: Disables working controller trespass for a LUN.</li> </ul> | on            |
| <i>array_id= ID</i>                                                | ID of a storage system.<br>You can run <b>show array</b> without an ID to display all storage system IDs.                                                                                                                                                                             | None          |
| <b>vlun_id</b> ={ <i>ID</i>   <i>ID1,ID2...</i>   <i>ID1-ID2</i> } | ID of a virtual LUN.<br>You can run <b>show vlun type=all</b> to display all virtual LUN IDs.                                                                                                                                                                                         | None          |

## Level

User **root**

## Usage Guidelines

### NOTE

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

- Run the **set luntrespass**={ *on* | *off* } command to set all storage system LUN switches.
- Run **set luntrespass**={ *on* | *off* } **array\_id**=*ID* to set the LUN switches of a specified storage system.
- Run **set luntrespass**={ *on* | *off* } **vlun\_id**={ *ID* | *ID1,ID2...* | *ID1-ID2* } to set the LUN switches of a specified virtual LUN.

### NOTE

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

## Example

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

```
UltraPath CLI #3 >set luntrespass=on array_id=0
The current configuration will overwrite the configuration of all VLUNs in this array.
Are you sure you want to continue? [y,n]: y
Succeeded in executing the command.
```

## System Response

None

## A.3.11 Setting Failback Delay

### Function

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

### Format

**set failbackdelaytime**=*time*

### Parameters

| Keyword and Parameter | Description                                                               | Default Value |
|-----------------------|---------------------------------------------------------------------------|---------------|
| <i>time</i>           | Failback delay.<br>The value ranges from 0 to 3600, expressed in seconds. | 600           |

### Level

User **root**

### 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,...]
```

### Parameters

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

### Level

User **root**

### 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
-----
-----

```

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

```

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

```

### System Response

None

## A.3.13 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 **root**

### 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,...]
```

## Parameters

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

## Level

User **root**

## Usage Guidelines

- Run **show io\_latency** to obtain the I/O latency information of all virtual LUNs.
- Run **show io\_latency vlun\_id=ID1,ID2,...** to query the I/O count information on the logical paths of the specified virtual LUNs.

## Example

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

```
UltraPath CLI #3 >show io_latency
-----
Vlun ID      Disk Name      Latest I/O Latency  Max I/O Latency  Average I/O
Latency
    2        AIX198Lun_001         0                10
0
    3        AIX198Lun_002         0               100
0
-----
-----
```

- Query the I/O latency information on the logical paths of the specific virtual LUNs.

```
UltraPath CLI #3 >show io_latency vlun_id=2
-----
Vlun ID      Disk Name      Path ID  Latest I/O Latency  Max I/O Latency
Average I/O Latency
  2          AIX198Lun_001    0          0
10           0
  2          AIX198Lun_001    1          0
10           0
-----
```

## System Response

None

## A.3.15 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 |
|-------------|----------------------------------------------------------------------------------------|---------------|
| <i>time</i> | I/O latency threshold<br>The value ranges from 0 to 120000, expressed in milliseconds. | 20            |

### Level

User **root**

### 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.

### Format

```
show io_latency_threshold
```

### Parameters

None

### Level

User **root**

### 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 |
|--------------------------|--------------------------------------------------------------------------------|---------------|
| <b>ioretry=number</b>    | Number of I/O retry times.<br>The value ranges from 0 to 60.                   | 10            |
| <b>ioretrydelay=time</b> | Interval of I/O retry.<br>The value ranges from 0 to 10, expressed in seconds. | 0             |

## Level

User **root**

## 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 |
|--------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------|
| <b>iosuspensiontime</b> = <i>time</i>                              | I/O suspension time.<br>The value ranges from 0 to 2,592,000, expressed in seconds.                       | 60            |
| <b>array_id</b> = <i>ID</i>                                        | ID of a storage system.<br>You can run <b>show array</b> without an ID to display all storage system IDs. | None          |
| <b>vlun_id</b> ={ <i>ID</i>   <i>ID1,ID2...</i>   <i>ID1-ID2</i> } | ID of a virtual LUN.<br>You can run <b>show vlun type=all</b> to display all virtual LUN IDs.             | None          |

## Level

User **root**

## Usage Guidelines

- Runset **iosuspensiontime=time** to set the I/O suspension time for all storage systems.
- Runset **iosuspensiontime=time array\_id=ID** to set the I/O suspension time for a specified storage system.
- Runset **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 |
|----------------------------|--------------------------------------------------------------------------------------------------------|---------------|
| <b>path_id=ID1,ID2,...</b> | ID of a physical path.<br>You can run <b>show path</b> without an ID to display all physical path IDs. | None          |

## Level

User **root**

## 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 |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <i>time</i>           | Time window for path degradation and isolation upon an I/O timeout.<br>The value ranges from 60 to 2,592,000, expressed in seconds. | 600           |

## Level

User **root**

## Usage Guidelines

None

## Example

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

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

## System Response

None

## A.3.21 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 |
|-----------------------|-------------------------------------------------------------------------------------------------------------------------|---------------|
| <i>number</i>         | I/O timeout threshold for path degradation and isolation upon an I/O timeout.<br><br>The value ranges from 0 to 65,535. | 1             |

## Level

User **root**

## Usage Guidelines

None

## Example

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

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

## System Response

None

## A.3.22 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 |
|-----------------------|-------------------------------------------------------------------------------------------------------------|---------------|
| <i>time</i>           | Recovery timeout of a degraded path.<br><br>The value ranges from 1,800 to 2,592,000, expressed in seconds. | 1800          |

## Level

User **root**

## 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*

### Parameters

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

## Level

User **root**

## 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 |
|-----------------------|---------------------------------------------------------------------------------------|---------------|
| <i>ratio</i>          | Rate threshold for discrete I/O error isolation.<br>The value ranges from 0% to 100%. | 20            |

### Level

User **root**

### 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 |
|-----------------------|----------------------------------------------------------------------------------------------------------------------|---------------|
| <b>number</b>         | The minimum number of I/Os for the I/O discrete error isolation mechanism.<br>The value ranges from 5,000 to 65,535. | 5000          |

## Level

User **root**

## Usage Guidelines

None

## Example

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

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

## System Response

None

## A.3.26 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 |
|-----------------------|----------------------------------------------------------------------------------------------------------------------|---------------|
| <i>time</i>           | Recovery time of a path with discrete I/O errors.<br>The value ranges from 1,800 to 2,592,000, expressed in seconds. | 1800          |

## Level

User **root**

## Usage Guidelines

None

## Example

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

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

## System Response

None

## 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 |
|-----------------------|----------------------------------------------------------------------------------------------------------------------|---------------|
| <i>time</i>           | Time window for collecting intermittent path errors.<br>The value ranges from 60 to 2,592,000, expressed in seconds. | 1800          |

## Level

User **root**

## 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.

### Format

**set ifd\_threshold=number**

### Parameters

| Keyword and Parameter | Description                                                                                 | Default Value |
|-----------------------|---------------------------------------------------------------------------------------------|---------------|
| <i>number</i>         | Intermittent path error threshold for path isolation.<br>The value ranges from 0 to 65,535. | 3             |

## Level

User **root**

## 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
```

### Parameters

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

## Level

User **root**

## 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 |
|-----------------------|---------------------------------------------------------------------------------------------------------------|---------------|
| <i>time</i>           | Time window for determining a high-latency path.<br>The value ranges from 60 to 18,000, expressed in seconds. | 300           |

### Level

User **root**

### 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 |
|-----------------------|---------------------------------------------------------------------------------------------------------------------|---------------|
| <i>time</i>           | Latency threshold for high-latency path isolation.<br>The value ranges from 0 to 65,535, expressed in milliseconds. | 1000          |

### Level

User **root**

### Usage Guidelines

None

### Example

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

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

### System Response

None

## A.3.32 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 |
|-----------------------|------------------------------------------------------------------------------------------------------|---------------|
| <i>time</i>           | Recover time of a high-latency path.<br>The value ranges from 60 to 2,592,000, expressed in seconds. | 3600          |

## Level

User **root**

## Usage Guidelines

None

## Example

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

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

## System Response

None

## A.3.33 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 |
|-------------|--------------------------------------------------------------------------------------------------------------------|---------------|
| <i>time</i> | Threshold of switching a latency-sensitive path<br>The value ranges from 100 to 60,000, expressed in milliseconds. | 30000         |

## Level

User **root**

## 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*

### Parameters

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

## Level

User **root**

## 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 routine detection of faulty paths.

## Format

**set faulty\_path\_check\_interval**=*time*

## Parameters

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

## Level

User **root**

## 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 routine inspection of idle paths.

### Format

```
set idle_path_check_interval=time
```

### Parameters

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

### Level

User **root**

### Usage Guidelines

None

### Example

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

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

## System Response

None

## A.3.37 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 |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------|
| <i>time</i>                                  | Timeout period for I/O retry on UltraPath.<br>The value ranges from 1 to 2,592,000, expressed in seconds. | 1800          |
| <b>array_id=ID</b>                           | ID of a storage system.<br>You can run <b>show array</b> without an ID to display all storage system IDs. | None          |
| <b>vlun_id={ ID   ID1,ID2...   ID1-ID2 }</b> | ID of a virtual LUN.<br>You can run <b>show vlun type=all</b> to display all virtual LUN IDs.             | None          |

## Level

User **root**

## Usage Guidelines

### NOTE

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

- Run **set max\_io\_retry\_timeout=time** to set the I/O retry timeout of all storage systems.
- Run **set max\_io\_retry\_timeout=time array\_id=ID** to set the I/O retry timeout of a specified storage system.
- Run **set max\_io\_retry\_timeout=time vlun\_id={ ID | ID1,ID2... | ID1-ID2 }** to set the I/O retry timeout of a specified virtual LUN.

### NOTE

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

## Example

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

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

## System Response

None

## A.3.38 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 |
|----------------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------|
| <i>number</i>                                | Number of consecutive I/Os on a path.<br>The value ranges from 1 to 10,000.                               | 100           |
| <b>array_id=ID</b>                           | ID of a storage system.<br>You can run <b>show array</b> without an ID to display all storage system IDs. | None          |
| <b>vlun_id={ ID   ID1,ID2...   ID1-ID2 }</b> | ID of a virtual LUN.<br>You can run <b>show vlun type=all</b> to display all virtual LUN IDs.             | None          |

### Level

User **root**

### 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 ]**

### Parameters

| Keyword and Parameter    | Description                                                                                                                      | Default Value |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>array_id=ID</b>       | ID of a storage system allocated by UltraPath.<br>You can run <b>show array</b> without an ID to display all storage system IDs. | None          |
| <b>tpg_id=ID1,ID2...</b> | ID of a controller.<br><b>NOTE</b><br>You can specify multiple controllers at the same time.                                     | None          |

| Keyword and Parameter        | Description                                                                                                                                                                                            | Default Value |
|------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <i>remote</i>   <i>local</i> | Status of a remote controller.<br>The value can be <b>local</b> or <b>remote</b> .<br><ul style="list-style-type: none"> <li>● local: local controller</li> <li>● remote: remote controller</li> </ul> | remote        |

## Level

User **root**

## 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.

### Format

```
clear upconfig={ vlun_id=ID | array_id=ID }
```

## Parameters

| Keyword and Parameter | Description                                                                                               | Default Value |
|-----------------------|-----------------------------------------------------------------------------------------------------------|---------------|
| <b>array_id=ID</b>    | ID of a storage system.<br>You can run <b>show array</b> without an ID to display all storage system IDs. | None          |
| <b>vlun_id=ID</b>     | ID of a virtual LUN.<br>You can run <b>show vlun type=all</b> to display all virtual LUN IDs.             | None          |

## Level

User **root**

## 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**

## Parameters

| Keyword and Parameter | Description                                                                                            | Default Value |
|-----------------------|--------------------------------------------------------------------------------------------------------|---------------|
| <b>path_id=ID</b>     | ID of a physical path.<br>You can run <b>show path</b> without an ID to display all physical path IDs. | None          |

## Level

User **root**

## 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 Checking the Status of UltraPath

### Function

The **check status** command is used to check UltraPath, including the check of exceptions, software integrity, and environment configuration.

### Format

**check status**

### Parameters

None

## Level

User **root**

## 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:
Pass
-----
Checking envirmnt and config:
Pass
-----
Checking HBA Information:
[WARNING] iscsi is not installed.
complete FC checking.
Host Adapters from different supported vendors co-exists on your system.
-----
```

## System Response

None

## A.3.43 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 |
|-----------------------|---------------------------------------------------------------------------|---------------|
| <b>count=number</b>   | Printing number of critical events.<br>The value ranges from 1 to 10,000. | 1000          |

## Level

User **root**

## Usage Guidelines

None

## Example

View critical events of UltraPath that occurred on the current day.

```
UltraPath CLI #1 >show event
=====
-----
      SN          Array          Type          Time
Serverity      Description
  1  210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:47:902655 info Add a
path to disk: LUN name {fan0000}, Host Lun ID {1}.
  ....
4793 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:47:289423 info Add a
path to disk: LUN name {LUNV}, Host Lun ID {0}.
4794 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:46:776981 info Add a
path to disk: LUN name {fan0003}, Host Lun ID {4}.
4795 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:46:248418 info Add a
path to disk: LUN name {fan0002}, Host Lun ID {3}.
4796 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:45:752700 info Add a
path to disk: LUN name {fan0001}, Host Lun ID {2}.
4797 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:45:164166 info Add a
path to disk: LUN name {fan0000}, Host Lun ID {1}.
4798 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:44:607698 info Add a
path to disk: LUN name {LUNV}, Host Lun ID {0}.
4799 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:44:094826 info Add a
path to disk: LUN name {fan0003}, Host Lun ID {4}.
4800 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:43:397182 info Add a
path to disk: LUN name {fan0002}, Host Lun ID {3}.
4801 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:42:802060 info Add a
path to disk: LUN name {fan0001}, Host Lun ID {2}.
4802 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:42:321424 info Add a
path to disk: LUN name {fan0000}, Host Lun ID {1}.
4803 210235G6ED10D8000006  Add path to disk 2013-11-27 08:21:41:704031 info Add a
path to disk: LUN name {LUNV}, Host Lun ID {0}.
4804 210235G6ED10D8000006  Create virtual disk 2013-11-27 08:21:41:195517 info
Successfully create virtual disk: LUN name {fan0003}, Host Lun ID {4}.
-----
-----
-----
```

## System Response

None

## A.3.44 Manually Updating a Controller

### Function

The **start rebalancelun** command is used to check whether a LUN's working controller settings are optimum and implement a working controller trespass if necessary.

### Format

**start rebalancelun**=[array\_id=*ID* | vlun\_id=*ID*]

## Parameters

| Keyword and Parameter | Description                                                                                               | Default Value |
|-----------------------|-----------------------------------------------------------------------------------------------------------|---------------|
| <b>array_id=ID</b>    | ID of a storage system.<br>You can run <b>show array</b> without an ID to display all storage system IDs. | None          |
| <b>vlun_id=ID</b>     | ID of a virtual LUN.<br>You can run <b>show vlun type=all</b> to display all virtual LUN IDs.             | None          |

## Level

User **root**

## 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.3.45 Querying and Exporting Performance Statistics

### Function

The **show iostat** command is used to display and export the performance statistics (IOPS, bandwidth and response time) about storage systems and virtual LUNs.

### Format

Run the following command to query and export performance statistics of specified arrays:

```
show iostat array_id=ID1,ID2,... [ interval=time ] [ file_name=file_name ]  
[ archive_time=archive_time ] [ duration=duration ] ]
```

Run the following command to query and export performance statistics of specified virtual LUNs:

```
show iostat vlun_id=ID1,ID2,... [ type={ all | hypermetro | migration } ] [ interval=time ]
[ file_name=file_name [ archive_time=archive_time] [ duration=duration ] ]
```

## Parameters

| Parameter                                                           | Description                                                                                                                                                                                                                                                                                                                                                                                    | Default Value |
|---------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>array_id</b> =ID1,ID2,...                                        | Specifies IDs of storage systems.<br>You can run <b>show array</b> to obtain all storage system IDs.<br><b>NOTE</b><br>You can query a maximum of eight storage systems' performance statistics at a time. Use comas (,) to separate storage systems.                                                                                                                                          | None          |
| <b>vlun_id</b> =ID1,ID2,...                                         | Specifies IDs of virtual LUNs.<br>You can run <b>show vlun type=all</b> to obtain all virtual LUN IDs.<br><b>NOTE</b><br>You can query a maximum of eight virtual LUNs' performance statistics at a time. Use comas (,) to separate virtual LUN IDs.                                                                                                                                           | None          |
| <b>type</b> = { <i>all</i>   <i>hypermetro</i>   <i>migration</i> } | View the virtual LUN information of a specific type. If the <b>type</b> parameter is not specified, common virtual LUN information will be queried.<br>Possible values are all, hypermetro, and migration, where:<br><ul style="list-style-type: none"> <li>● all: all the virtual LUNs</li> <li>● hypermetro: virtual HyperMetro LUNs</li> <li>● migration: virtual migration LUNs</li> </ul> | None          |
| <b>interval</b> =time                                               | Specifies an interval for performance statistics collection.<br>The value ranges from 1 to 60, expressed in seconds.                                                                                                                                                                                                                                                                           | 1             |



| Parameter                                 | Description                                                                                                                                                                                                                                                                                                                                                                                | Default Value                |
|-------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| <b>file_name</b> = <i>file_name</i>       | Specifies the saving path and name of the performance statistics report.<br><b>NOTE</b><br>You are not required to specify the saving path but must specify the name of the performance report. The system automatically adds suffix <b>.CSV</b> to the name.<br>If a saving path is not specified, the report is saved in the <b>perf_log</b> file folder of the UltraPath log directory. | /opt/UltraPath/log/perf_log/ |
| <b>archive_time</b> = <i>archive_time</i> | Specifies an interval for performance statistics collection.<br>The value can be 5, 60, 120, 300, 1800, and 3600, expressed in seconds.<br><b>NOTE</b><br>This parameter is valid only when <b>file_name</b> is specified. The system writes performance data to the report at the specified time interval.                                                                                | 60                           |
| <b>duration</b> = <i>duration</i>         | Statistics duration<br>The value ranges from 60 to 259,200, expressed in seconds.<br><b>NOTE</b><br>This parameter is valid only when <b>file_name</b> is specified. The system stops performance statistics after the specified duration.                                                                                                                                                 | 900                          |

## Level

User **root**

## Usage Guidelines

- When performance statistics is being collected, you can press **Ctrl+C** to end the collection.
- If a performance report with the specified name exists in the path, the function of performance statistics is not supported. Delete the existing report or enter a new name. Then export the report.

- If the remaining space of the directory to save the report is smaller than 180 MB, the performance report cannot be exported.

## Example

- View performance statistics of the storage system whose ID is **0** at an interval of **30** seconds.

```
UltraPath CLI #3 >show iostat array_id=0 interval=30
=====
Information
=====
IO Performance
=====
time (ms)          IOPS          KB/S          response
  Total  |Read  |Write  Total  |Read  |Write  Total  |
Read  |Write
Array 0    0    |0     |0     0     |0     |0     0     |
0         |0
Controller 1
Phyphat 0 :0    |0     |0     0     |0     |0     0     |
0         |0
Phyphat 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
=====
Information
=====
IO Performance
=====
time (ms)          IOPS          KB/S          response
  Total  |Read  |Write  Total  |Read  |Write  Total  |
Read  |Write
VLUN 0    0    |0     |0     0     |0     |0     0     |
0         |0
Controller 0B
Path 0    :0    |0     |0     0     |0     |0     0     |
0         |0
Path 1    :0    |0     |0     0     |0     |0     0     |
0         |0
=====
VLUN 1    0    |0     |0     0     |0     |0     0     |
0         |0
Controller 0B
Path 0    :0    |0     |0     0     |0     |0     0     |
0         |0
=====
VLUN 2    0    |0     |0     0     |0     |0     0     |
0         |0
Controller 0B
Path 0    :0    |0     |0     0     |0     |0     0     |
0         |0
=====
VLUN 3    0    |0     |0     0     |0     |0     0     |
0         |0
Controller 0B
=====
```

```
Path 0      :0      |0      |0      |0      |0      |0      |0      |
0          |0
=====
=====
```

- Query performance statistics about HyperMetro virtual LUN 4.

```
UltraPath CLI #4 >show iostat vlun_id=4 type=hypermetro
=====
=====
IO Performance
Information
=====
=====
IOPS                                KB/S                                response
time (ms)
  Total |Read |Write Total |Read |Write Total |
Read   |Write
VLUN 4  0   |0   |0   0   |0   |0   |0   |
0      |0
Lun Array 210235G6GSZ0C5000004
Controller 0A
Path 1   :0   |0   |0   0   |0   |0   |0   |
0      |0
Controller 0B
Path 0   :0   |0   |0   0   |0   |0   |0   |
0      |0
Lun Array 210235G6GSZ0C2000008
Controller 0A
Path 2   :0   |0   |0   0   |0   |0   |0   |
0      |0
Controller 0B
Path 3   :0   |0   |0   0   |0   |0   |0   |
0      |0
=====
=====
```

- Query performance statistics about virtual LUN 0 and export the data to the default path.

```
UltraPath CLI #1 >show iostat vlun_id=0 file_name=perfLogFile
=====
=====
IO Performance Information
=====
=====
IOPS                                KB/S                                response
time (ms)
  Total |Read |Write Total |Read |Write Total |
Read   |Write
VLUN 0 9389 |9389 |0   38457 |38457 |0   |0   |
0      |0
Controller 0A
Path 1  :9389 |9389 |0   38457 |38457 |0   |0   |
0      |0
Controller 0B
Path 0  :0   |0   |0   0   |0   |0   |0   |
0      |0
=====
=====
```

- Query performance statistics about virtual LUN 0 and export the data to the specified path. Specify the statistics interval to 5s and duration to 1000s.

```
UltraPath CLI #1 >show iostat vlun_id=0 file_name="/home/perfLog/perfLogFile"
archive_time=5 duration=1000
=====
=====
IO Performance Information
=====
=====
IOPS                                KB/S                                response
time (ms)
  Total |Read |Write Total |Read |Write Total |
```

```

Read      |Write
VLUN 0    | 9559 |9559 |0 | 39153 |39153 |0 | 0 | |
0         | |0
Controller 0A
Path 1    | :9559 |9559 |0 | 39153 |39153 |0 | 0 | |
0         | |0
Controller 0B
Path 0    | :0 |0 |0 | 0 |0 |0 | 0 | |
0         | |0
=====
=====

```

## System Response

The system generates a performance report with suffix `.CSV` in the specified or default path.

## A.3.46 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 } | <p>Performance data record function</p> <p>The value can be <b>on</b> or <b>off</b>.</p> <ul style="list-style-type: none"> <li>● on: Enable the performance data record function.</li> <li>● off: Disable the performance data record function.</li> </ul> <p>The performance data file is saved in the UltraPath log directory and is named <b>perf_record.log</b>.</p> | off           |

| Parameter                     | Description                                                                                                                                                                                               | Default Value |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>duration</b> = <i>time</i> | Time during which the performance data record function works<br><br>The value ranges from 0 to 8,760, expressed in hours. <b>0</b> indicates that the performance data record function works permanently. | 0             |

## Level

User **root**

## 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.
- If the performance data record function is enabled before UltraPath is uninstalled, configuration files are not deleted. The performance data record function is enabled automatically after UltraPath is re-installed.

## 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.4 LUN Management Commands

LUN management commands include commands for viewing storage system information and virtual disk information.

### NOTE

If the storage array name or LUN name on the storage array is Chinese and the encoding format of the login tool does not support Chinese characters, UltraPath will display marbled characters after command execution. If this occurs, change the encoding format of the login tool so that Chinese characters are supported.

## A.4.1 Querying Storage System Information

### Function

The **show array** command is used to query information about a specified or all storage systems connected to the application server.

### Format

```
show array [ id=ID1,ID2,... [ verbose ] ]
```

### Parameters

| Keyword and Parameter | Description                                                                                                                                                                                                                                                | Default Value |
|-----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>id=ID1,ID2,...</b> | ID of a storage system.<br>You can run <b>show array</b> without an ID to display all storage system IDs.<br><b>NOTE</b><br>You can query a maximum of eight storage systems' performance statistics at a time. Use comas (,) to separate storage systems. | None          |
| <b>verbose</b>        | Viewing details configuration information about a specified storage system.<br><b>NOTE</b><br>Parameter <b>verbose</b> can display details configuration information about a specified storage system only when it is used with parameter <b>id</b> .      | None          |

### Level

User **root**

### Usage Guidelines

- Run **show array** to view information about all storage systems connected to the application server.
- Run **show array id=ID1,ID2...** to view information about a specified storage system.
- Run **show array id=ID1,ID2... verbose** to view details configuration information about the storage system.

## Example

- Run the following command to query information about all storage systems connected to the application server:

```
UltraPath CLI #9 >show array
-----
Array ID          Name                Array SN          Vendor Name
Product Name
0                S5300              2102315401Z083000004  HUAWEI
S5300
1                SN_210235G6EDZ0C2000001  210235G6EDZ0C2000001  HUASY
S5600T
-----
```

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

```
UltraPath CLI #10 >show array id=1
=====
                        Array#1 Information
=====
Name          : SN_210235G6EDZ0C2000001
Array SN      : 210235G6EDZ0C2000001
Vendor Name   : HUASY
Product Name  : S5600T
Controller 0A
  Status      : Enable
  LunCount    : 4
  PathInfo:
    Path1: Normal
Controller 0B
  Status      : Enable
  LunCount    : 4
  PathInfo:
    Path0: Normal
=====
```

- Run the following command to view details configuration information about the storage system whose ID is **0**.

```
UltraPath CLI #2 >show array id=0 verbose
=====
                        Array#0 Information
=====
Name          : HUAWEIS5500T
Array SN      : 210235G6GRZ0C4000008
Vendor Name   : HUASY
Product Name  : S5500T
Controller 0A
  Status      : Enable
  LunCount    : 2
  PathInfo:
    Path0: Normal
Working Mode  : load balancing within controller
LUN Trespass : on
LoadBalance Mode      : min-queue-depth
Loadbanlance io threshold : 1
Io Suspension Time    : 60
Max io retry timeout  : 1800
=====
```

## System Response

The following table explains some parameters in the command output:

| Parameter    | Description                                                                                                                                                                                                                                                                                           | Default Value |
|--------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Name         | Name of the storage system.                                                                                                                                                                                                                                                                           | None          |
| Array SN     | Serial No. of the storage system.                                                                                                                                                                                                                                                                     | None          |
| Vendor Name  | Vendor of the storage system.                                                                                                                                                                                                                                                                         | None          |
| Product Name | Model of the storage system.                                                                                                                                                                                                                                                                          | None          |
| Controller   | Name of the controller.<br><b>NOTE</b> <ul style="list-style-type: none"> <li>● If <b>Remote</b> information is displayed after the controller name, the controller is a remote controller.</li> <li>● You can only view the information about a maximum of eight paths on one controller.</li> </ul> | None          |

## A.4.2 Viewing Virtual LUN Information

### Function

The **show vlun** command is used to query information about a specified LUN or all LUNs mapped from a storage system to an application server.

### Format

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

```
show vlun id=ID1,ID2... [ type={ all | hypermetro | migration } ] [ verbose ]
```



## Parameters

| Keyword and Parameter                               | Description                                                                                                                                                                                                                                                                                                                                                                                        | Default Value |
|-----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>array_id</b> = <i>ID1,ID2,...</i>                | <p>ID of a storage system.</p> <p>You can run <b>show array</b> without an ID to display all storage system IDs.</p> <p><b>NOTE</b></p> <p>You can query a maximum of eight storage systems' performance statistics at a time. Use comas (,) to separate storage systems.</p>                                                                                                                      | None          |
| <b>id</b> = <i>ID1,ID2...</i>                       | <p>ID of a virtual LUN.</p> <p>You can run <b>show vlun type=all</b> to display all virtual LUN IDs.</p> <p><b>NOTE</b></p> <p>You can query a maximum of eight virtual LUNs' performance statistics at a time. Use comas (,) to separate virtual LUN IDs.</p>                                                                                                                                     | None          |
| <b>verbose</b>                                      | <p>Viewing details configuration information about a virtual LUN.</p> <p><b>NOTE</b></p> <p>Parameter <b>verbose</b> views details configuration information about a virtual LUN only when it is used with parameter <b>id</b>.</p>                                                                                                                                                                | None          |
| <b>type</b> = <i>{ all   hypermetro   migration</i> | <p>View the virtual LUN information of a specific type. If the <b>type</b> parameter is not specified, common virtual LUN information will be queried.</p> <p>Possible values are all, hypermetro, and migration, where:</p> <ul style="list-style-type: none"> <li>● all: all virtual LUNs</li> <li>● hypermetro: virtual HyperMetro LUNs</li> <li>● migration: virtual migration LUNs</li> </ul> | None          |

## Level

User **root**

## Usage Guidelines

- Run **show vlun** to query information about all common virtual LUNs mounted on the application server.
- Run **show vlun array\_id=ID1,ID2,...** to view common virtual LUN information about a specified storage system.
- Run **show vlun id=ID1,ID2...** to view information about a specified common virtual LUN.
- Run **show vlun id=ID1,ID2...verbose** to view details configuration information about a common virtual LUN.
- Run **show vlun type=all** to query information about all virtual LUNs mounted on the application server.
- Run **show vlun array\_id=ID1,ID2,... type=all** to view all virtual LUN information about a specified storage system.
- Run **show vlun type=hypermetro** to query information about all virtual HyperMetro LUNs mounted on the application server.
- Run **show vlun id=ID1,ID2... type=all** to view information about a specified virtual LUN.
- Run **show vlun id=ID1,ID2... type=hypermetro** to view information about a specified virtual HyperMetro LUN.

## Example

- View information about all common virtual LUNs.

```
UltraPath CLI #0 >show vlun
-----
Vlun ID      Disk      Name      Lun WWN
Status Capacity Ctrl (Own/Work)  Array Name  Dev Lun ID
-----
0           sdb      hl_luntest  630d17e100b33e3900135b9900000024
Normal  1.00GB  0A/0B      Huawei.Storage  36
1           sdc      hl_luntest_2  630d17e100b33e3909eae968000000f2
Normal  1.00GB  0A/0B      Huawei.Storage  242
-----
```

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

```
UltraPath CLI #0 >show vlun array_id=0
-----
Vlun ID      Disk      Name      Lun WWN
Status Capacity Ctrl (Own/Work)  Array Name  Dev Lun ID
-----
0           sdb      hl_luntest  630d17e100b33e3900135b9900000024
Normal  1.00GB  0A/0B      Huawei.Storage  36
1           sdc      hl_luntest_2  630d17e100b33e3909eae968000000f2
Normal  1.00GB  0A/0B      Huawei.Storage  242
-----
```

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

```
UltraPath CLI #2 >show vlun id=1
=====
VLUN#1 Information
```

```

=====
Disk          : sdc
Name          : hl_luntest_2
Status       : Normal
Capacity     : 1.00GB
Driver       : Vendor-specific(DEFAULT)
Product Name : XSG1
Vendor Name  : HUAWEI
Owning Controller : 0A
Working Controller: 0B
Num of Paths : 1
LUN WWN     : 630d17e100b33e3909eae968000000f2
Array Name  : Huawei.Storage
Controller 0B
Path 0 [1:0:0:2] (up-1) : Normal
Dev Lun ID  : 242
Manual IO Suspension : Off
-----

```

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

```

UltraPath CLI #2 >show vlun id=1 verbose
=====
                        VLUN#1 Information
=====
Disk          : sdc
Name          : hl_luntest_2
Status       : Normal
Capacity     : 1.00GB
Driver       : Vendor-specific(DEFAULT)
Product Name : XSG1
Vendor Name  : HUAWEI
Owning Controller : 0A
Working Controller: 0B
Num of Paths : 1
LUN WWN     : 630d17e100b33e3909eae968000000f2
Array Name  : Huawei.Storage
Controller 0B
Path 0 [1:0:0:2] (up-1) : Normal
Working Mode : load balancing within controller
LUN Trespass : on
LoadBalance Mode : min-queue-depth
Loadbanlance io threshold : 1
Io Suspension Time : 60
Max io retry timeout : 1800
Dev Lun ID  : 242
Manual IO Suspension : Off
-----

```

- View information about all virtual LUNs.

```

UltraPath CLI #0 >show vlun type=all
-----
Vlun ID  Disk Name          Lun WWN          Status
Capacity Ctrl(Own/Work)      Array Name      Dev Lun ID
0        sdb hl_luntest         630d17e100b33e3900135b9900000024 Normal
1.00GB   0A/0B                Huawei.Storage  36
1        sdc hl_luntest_2     630d17e100b33e3909eae968000000f2 Normal
1.00GB   0A/0B                Huawei.Storage  242
2        sdd shuanghuo_A      630d17e100b33e390912496800000031 Normal
1.00GB   0A/0B                Huawei.Storage  12
2        sdd shuanghuo_B      630d17e100b33e390912496800000031 Normal
1.00GB   0A/0B                Huawei.Storage  12
-----

```

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

```

UltraPath CLI #7 >show vlun array_id=0 type=all
-----
Vlun ID  Disk  Name          Lun WWN          Status
-----

```

| Capacity | Ctrl (Own/Work) | Array Name                        | Dev Lun ID | Status |
|----------|-----------------|-----------------------------------|------------|--------|
| 0        | sdb remote0000  | 63400a31000d9c5f01415fb500000008  |            | Fault  |
| 0.00KB   | 0B/0B           | Huawei.Storage48                  | --         |        |
| 1        | sdh remote0001  | 63400a31000d9c5f01415fd700000009  |            | Fault  |
| 0.00KB   | 0A/0A           | Huawei.Storage48                  | --         |        |
| 2        | sdd remote0002  | 63400a31000d9c5f0141600b0000000a  |            | Fault  |
| 0.00KB   | 0B/0B           | Huawei.Storage48                  | --         |        |
| 3        | sde remote0003  | 63400a31000d9c5f014160330000000b  |            | Fault  |
| 0.00KB   | 0A/0A           | Huawei.Storage48                  | --         |        |
| 4        | sdf test20002   | 64846fb1008ca15f08c0007000000042  |            | Normal |
| 1.00GB   | 0A/0A           | Huawei.Storage48                  | --         |        |
| 5        | sdg test20003   | 64846fb1008ca15f08c00097000000043 |            | Normal |
| 1.00GB   | 0B/0B           | Huawei.Storage48                  | --         |        |

● View information about all virtual HyperMetro LUNs.

```
UltraPath CLI #0 >show vlun type=hypermetro
```

| Vlun ID  | Disk Name       | Lun WWN                          | Status     |
|----------|-----------------|----------------------------------|------------|
| Capacity | Ctrl (Own/Work) | Array Name                       | Dev Lun ID |
| 2        | sdd shuanghuo_A | 630d17e100b33e390912496800000031 | Normal     |
| 1.00GB   | 0A/0B           | Huawei.Storage                   | 12         |
| 2        | sdd shuanghuo_B | 630d17e100b33e390912496800000031 | Normal     |
| 1.00GB   | 0A/0B           | Huawei.Storage                   | 12         |

● View details about the virtual LUN whose ID is 0.

```
UltraPath CLI #10 >show vlun id=0 type=all
```

```
=====
                        VLUN#0 Information
=====
```

```
Disk                      : sdb
Manual IO Suspension      : Off
Aggregation Type          : Hyper Metro
Aggregation Specific Attribution
  WorkingMode              : read write between both arrays
  Primary Array SN         : 210235980510E8000015
Aggregation Member#0 Information
  Name                     : local0000
  Status                   : Normal
  Capacity                 : 2.00GB
  Aggregation Specific Attribution : N/A
  LUN WWN                  : 63400a31000d9c5f01415fb500000008
  Array Name               : Huawei.Storage46
  Array SN                 : 210235980510E8000015
  Driver                   : Vendor-specific(DEFAULT)
  Product Name             : XSG1
  Vendor Name              : HUAWEI
  Owning Controller        : 0A
  Working Controller       : 0A
  Num of Paths             : 4
  Controller 0A
  Path 3 [3:0:3:1] (up-12) : Normal
  Path 7 [4:0:3:1] (up-28) : Normal
  Controller 0B
  Path 2 [3:0:2:1] (up-8)  : Normal
  Path 6 [4:0:2:1] (up-24) : Normal
Aggregation Member#1 Information
  Name                     : remote0000
  Status                   : Fault
  Capacity                 : 0.00KB
  Aggregation Specific Attribution : N/A
  LUN WWN                  : 63400a31000d9c5f01415fb500000008
  Array Name               : Huawei.Storage48
  Array SN                 : SN987654321076543210
  Driver                   : Vendor-specific(DEFAULT)
  Product Name             : XSG1
```

```
Vendor Name      : HUAWEI
Owning Controller : 0B
Working Controller: 0B
Num of Paths     : 4
Controller 0A
Path 1 [3:0:1:1] (up-4) : Fault
Path 5 [4:0:1:1] (up-20) : Fault
Controller 0B
Path 0 [3:0:0:1] (up-0) : Fault
Path 4 [4:0:0:1] (up-16) : Fault
-----
```

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

```
UltraPath CLI #0 >show vlun id=2 type=hypermetro
=====
                        VLUN#2 Information
=====
Disk                    : sdd
Manual IO Suspension   : Off
Aggregation Type       : Hyper Metro
Aggregation Specific Attribution
    WorkingMode         : read write between both arrays
    Primary Array SN    : 210235G6GSZ0C5000004
Aggregation Member#0 Information
    Name                : shuangh_A
    Status               : Normal
    Capacity             : 1.00GB
    Aggregation Specific Attribution : N/A
    LUN WWN              : 630d17e100b33e390912496800000031
    Array Name           : Array8.1
    Array SN             : 210235G6GSZ0C5000004
    Driver               : Vendor-specific(DEFAULT)
    Product Name         : S5500T
    Vendor Name          : HUASY
    Reservation          : 0
    Queued I/O           : 0
    Owning Controller    : 0A
    Working Controller   : 0A
    Num of Paths         : 2
    Controller 0A
    Path 1 [5:0:0:2] (up-5) : Normal
    Controller 0B
    Path 0 [4:0:0:2] (up-2) : Normal
Aggregation Member#1 Information
    Name                : shuangh_B
    Status               : Normal
    Capacity             : 1.00GB
    Aggregation Specific Attribution : N/A
    LUN WWN              : 630d17e100b33e390912496800000031
    Array Name           : SN_210235G6GSZ0C2000008
    Array SN             : 210235G6GSZ0C2000008
    Driver               : Vendor-specific(DEFAULT)
    Product Name         : S5500T
    Vendor Name          : HUASY
    Reservation          : 0
    Queued I/O           : 0
    Owning Controller    : 0B
    Working Controller   : 0A
    Num of Paths         : 2
    Controller 0A
    Path 2 [3:0:0:0] (up-6) : Normal
    Controller 0B
    Path 3 [7:0:0:0] (up-7) : Normal
-----
```

## System Response

The following table explains some parameters in the command output:

| Parameter    | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Default Value |
|--------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| Disk         | Name of the disk that corresponds to the virtual LUN on an host.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | None          |
| Name         | Name of the virtual LUN<br><b>NOTE</b><br>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:<br><ul style="list-style-type: none"> <li>● Normal: The virtual LUN is normal.</li> <li>● Fault: The virtual LUN is faulty.</li> <li>● Degraded: The virtual LUN is degraded.</li> <li>● Unavailable: The virtual LUN is unavailable.</li> </ul> <b>NOTE</b> <ul style="list-style-type: none"> <li>● If the LUN on the array is in <b>Fault</b> state while the virtual LUN on the host is in <b>Available</b> state (viewed by using UltraPath), the virtual LUN can be accessed by the host.</li> <li>● 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 <b>Unavailable</b>.</li> </ul> | 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<br><b>NOTE</b><br>You can only view the information about a maximum of eight paths on one controller.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | None          |

| Parameter                        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                         | Default Value |
|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| LUN WWN                          | WWN of the virtual LUN                                                                                                                                                                                                                                                                                                                                                                                                                              | None          |
| Dev Lun ID                       | ID of the storage system LUN corresponding to the virtual LUN                                                                                                                                                                                                                                                                                                                                                                                       | None          |
| Manual IO Suspension             | Manual I/O suspension time of the virtual LUN.                                                                                                                                                                                                                                                                                                                                                                                                      | None          |
| Aggregation Type                 | Type of the aggregation LUN. Possible values are as follows: <ul style="list-style-type: none"> <li>● Hyper Metro: virtual HyperMetro LUNs</li> <li>● Migration: virtual migration LUNs.</li> </ul>                                                                                                                                                                                                                                                 | None          |
| Aggregation Specific Attribution | Attribution of the aggregation LUN.<br>For virtual HyperMetro LUNs: <ul style="list-style-type: none"> <li>● WorkingMode: working mode for virtual HyperMetro LUNs.</li> <li>● Primary Array SN: SN of the primary array.</li> </ul> For migration virtual LUNs: <ul style="list-style-type: none"> <li>● IO Direction: switch I/O to the target array or source array.</li> <li>● Rollback: enable or disable automatic I/O switchback.</li> </ul> | None          |

### A.4.3 Setting the Size of a HyperMetro Fragment

#### Function

The **set hypermetro split\_size** command is used to set the fragment size when HyperMetro cross-array load balancing is applied.

#### Format

```
set hypermetro split_size=size [ vlun_id={ ID | ID1,ID2... | ID1-ID2 } ]
```

## Parameters

| Parameter                                             | Description                                                                                                                                                   | Default Value |
|-------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>split_size</b> = <i>size</i>                       | Fragment size.<br>The value ranges from 512 bytes to 1 GB. The unit is byte.<br><b>NOTE</b><br>The value must be an integer multiple of 512 and a power of 2. | 128 MB        |
| <b>vlun_id</b> = <i>{ ID   ID1,ID2...   ID1-ID2 }</i> | ID of an virtual HyperMetro LUN.<br><br>Run the <b>show vlun type=hypermetro</b> command to obtain the IDs of the virtual HyperMetro LUNs.                    | None          |

## Level

User **root**

## Usage Guidelines

- Run the **set hypermetro split\_size=size** command to set the HyperMetro fragment size for all storage systems.
- Run the **set hypermetro split\_size=size vlun\_id={ ID | ID1,ID2... | ID1-ID2 }** command to set the HyperMetro fragment size of the virtual LUNs.

### NOTE

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

## Example

- Set the HyperMetro fragment size to 128 MB for all storage systems.

```
UltraPath CLI #2 >set hypermetro split_size=128M
Succeeded in executing the command.
```

- Set the HyperMetro fragment size of the virtual LUNs whose ID is 0 to 128 MB.

```
UltraPath CLI #3 >set hypermetro split_size=128M vlun_id=0
Succeeded in executing the command.
```

## System Response

None

## A.4.4 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* } ]

**set hypermetro workingmode**={ *priority* | *balance* } [ **primary\_array\_id**=*ID* | **primary\_array\_sn**=*SN*] [ **vlun\_id**={ *ID* | *ID1*,*ID2*... | *ID1-ID2* } ] (Only applies to UVP systems.)

## Parameters

| Parameter                                                | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Default Value                                                                                                                                                                                            |
|----------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>workingmode</b> ={ <i>priority</i>   <i>balance</i> } | HyperMetro working mode.<br>Possible values are priority and balance, where: <ul style="list-style-type: none"> <li>● priority: primary array mode</li> <li>● balance: load balance mode</li> </ul>                                                                                                                                                                                                                                                                                                                                        | priority<br><b>NOTE</b><br>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. |
| <b>primary_array_id</b> = <i>ID</i>                      | ID of the primary array.<br>You can run <b>show array</b> to display all array IDs.<br><b>NOTE</b> <ul style="list-style-type: none"> <li>● In priority mode, the primary array indicates the array that delivers I/O first.</li> <li>● In balance mode, the primary array indicates the array where the first fragment range resides.</li> <li>● 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.</li> </ul> | None                                                                                                                                                                                                     |

| Parameter                                    | Description                                                                                                                                                                                                                                                                    | Default Value |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>primary_array_sn=SN</b>                   | SN of the primary array.<br><br>Run <b>show array</b> to obtain the SN of the primary array or obtain the SN on the array.<br><br><b>NOTE</b> <ul style="list-style-type: none"> <li>● Only applies to UVP systems.</li> <li>● The array SN contains 20 characters.</li> </ul> | None          |
| <b>vlun_id={ ID   ID1,ID2...   ID1-ID2 }</b> | ID of an virtual HyperMetro LUN.<br><br>Run the <b>show vlun type=hypermetro</b> command to obtain the IDs of the virtual HyperMetro LUNs.                                                                                                                                     | None          |

## Level

User **root**

## Usage Guidelines

### NOTE

Setting the HyperMetro working mode of a specified virtual LUN with a higher priority than that of storage systems. If the HyperMetro working mode of a virtual LUN has been set, its working mode remains unchanged after the HyperMetro working mode of storage systems is set.

- When the working mode is set to primary array mode, UltraPath delivers I/Os to the priority array. UltraPath will deliver I/Os to non-priority arrays only when the primary array encounters a fault.
- When the working mode is set to load balance mode, UltraPath chooses to deliver a specific array based on the start address of I/Os, fragment size, and priority array.  
For example, if the fragment size is 128 MB, then the I/Os with start addresses from 0 MB to 128 MB are delivered to the priority array, and the I/Os with start addresses from 128 MB to 256 MB are delivered to non-priority arrays.
- Run the **set hypermetro workingmode={ priority | balance } primary\_array\_id** command to set the HyperMetro working mode for all storage systems.
- Run the **set hypermetro workingmode={ priority | balance } primary\_array\_id=ID vlun\_id={ ID | ID1,ID2... | ID1-ID2 }** command to set the HyperMetro working mode of a specific virtual LUN.

### NOTE

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

## Example

- Set the HyperMetro working mode to **primary array mode** for all storage systems, and set the storage systems whose ID is **0**, to the primary array.

```
UltraPath CLI #2 >set hypermetro workingmode=priority primary_array_id=0
Succeeded in executing the command.
```

- Set the HyperMetro working mode of the virtual LUNs whose ID is **0**, to **primary array mode**, and set the storage systems whose ID is **0**, to the primary array.

```
UltraPath CLI #3 > set hypermetro workingmode=priority primary_array_id=0
vln_id=0
Succeeded in executing the command.
```

## 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.

### Format

**start migration vln\_id=ID direction={ source | target } rollback={ enable | disable }**

### Parameters

| Parameter                            | Description                                                                                                                                                                                                                                     | Default Value |
|--------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>vln_id=ID</b>                     | ID of a virtual LUN.<br>Run the <b>show vln</b> command to obtain the ID of a virtual LUN.                                                                                                                                                      | None          |
| <b>direction={ source   target }</b> | Switch I/O to the target array or source array.<br>Possible values are source and target, where: <ul style="list-style-type: none"> <li>● source: switch I/O to the source array.</li> <li>● target: switch I/O to the target array.</li> </ul> | None          |

| Parameter                                           | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Default Value |
|-----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>rollback</b> ={ <i>enable</i>   <i>disable</i> } | <p>Enable or disable automatic I/O switchback.</p> <p>Possible values are enable or disable, where:</p> <ul style="list-style-type: none"> <li>● <b>enable</b>: automatic I/O switchback is enabled. If an online migration fails, I/Os can be switched back to the source array.</li> </ul> <p><b>NOTE</b><br/>This value can be used only when <b>direction</b> equals <i>target</i>.</p> <ul style="list-style-type: none"> <li>● <b>disable</b>: automatic I/O switchback is disabled. If an online migration fails, I/Os cannot be switched back to the source array.</li> </ul> | None          |

## Level

User **root**

## Usage Guidelines

None

## Example

Switch over the I/Os of the LUN whose ID is **0** to the target array and enable automatic switchback.

```
UltraPath CLI #3 >start migration vlun_id=0 direction=target rollback=enable
Succeeded in executing the command.
```

## System Response

None

## A.4.6 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=value**

## Parameters

| Parameter                     | Description                                                                                                                                   | Default Value |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>vlun_id</b> = <i>ID</i>    | ID of a virtual LUN.<br>Run the <b>show vlun</b> command to obtain the ID of a virtual LUN.                                                   | None          |
| <b>timeout</b> = <i>value</i> | I/O suspension timeout period.<br>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 **root**

## Usage Guidelines

**start iosuspension** is a blocking command. It runs only when all I/Os of a specific LUN return to UltraPath.

## Example

Set the I/O suspension time of the LUN whose ID is **0** to 20 seconds.

```
UltraPath CLI #3 >start iosuspension vlun_id=0 timeout=20
Succeeded in executing the command.
```

## System Response

None

## A.4.7 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 |
|-------------------|-------------------------------------------------------------------------------------------------|---------------|
| <b>vlun_id=ID</b> | IDs of the virtual LUNs.<br>Run the <b>show vlun</b> command to obtain the ID of a virtual LUN. | None          |

## Level

User **root**

## 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 Other UltraPath Commands

This section describes UltraPath commands that are not included in the preceding command categories.

Except the CLI management commands of upadmin, UltraPath V100R008 also supports part commands of upadm, [Table A-2](#) lists the upadm commands. For the details please see *UltraPath for Linux User Guide V100R003*.

**Table A-2** upadm commands

| Command name            | Command Function                                                           |
|-------------------------|----------------------------------------------------------------------------|
| <b>upadm help</b>       | Displaying the brief help information of upadm                             |
| <b>upadm show path</b>  | Displaying the path information                                            |
| <b>upTools -S</b>       |                                                                            |
| <b>upadm show array</b> | Display the information about all storage systems managed by the UltraPath |
| <b>upTools -a</b>       |                                                                            |

| Command name                                                             | Command Function                                                                             |
|--------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| <b>upadm show option</b>                                                 | Display the current value of each parameter of the UltraPath                                 |
| <b>upadm show version</b>                                                | Display the UltraPath version                                                                |
| <b>upTools -V</b>                                                        |                                                                                              |
| <b>upadm show connectarray</b>                                           | Display the information about all storage systems connected to the server                    |
| <b>upadm show lun array=array_id</b><br>{dev=lun_id}                     | Display the information about the specified storage system managed by the UltraPath          |
| <b>upadm show iostat array=array_id</b><br>{lun=lun_id interval=seconds} | Display the I/O performance statistics                                                       |
| <b>upadm start hotscan</b>                                               | Identify the LUN dynamically                                                                 |
| <b>upadm start updateimage</b>                                           | Update the system configuration.                                                             |
| <b>upadm set lbcontroller={on   off}</b>                                 | Set whether to enable load balancing between controllers                                     |
| <b>upadm set failover={on   off}</b>                                     | Set whether to enable the switchover between operating and owning controllers of the LUN     |
| <b>upadm set failback_interval=seconds</b>                               | Set the failback latency                                                                     |
| <b>upadm set iopolicy</b>                                                | Set the load balancing algorithm                                                             |
| <b>upadm set holdio={0   1}</b><br>[timeout=seconds]                     | Set the type and time-out period of the I/O hang function for the current application server |

## A.5.1 Updating the System Image File

### Function

Updates the system image file.

### Format

**upLinux updateImage**

### Parameters

None

### Level

User **root**

## Usage Guidelines

After this parameter is used, a new system image file is generated in the **/boot** directory. When the UltraPath is installed using the SAN Boot method, you must first update the system image file before you save the changes to the parameters of UltraPath. When the UltraPath is installed using the boot from Local method first time, you must run this command to make the HBA parameters setting effect.

### Example

None

### System Response

None

## A.5.2 Upgrading the Operating System Kernel (UltraPath Is Not Reinstalled)

### Function

The **upLinux updateForNewKernel** command applies to scenarios where the operating system kernel is upgraded in boot from SAN mode and UltraPath is not reinstalled.

### Format

**upLinux updateForNewKernel**

### Parameters

None

### Level

User root

## Usage Guidelines

After the command is executed, the kernel will be obtained from the default BootLoader startup item in system boot mode. UltraPath loads its kernel module to the system kernel that is obtained, generates a new system image, and modifies the system startup item. The modifications take effect after the operating system is restarted.

### Example

```
[root@localhost RHEL]# upLinux updateForNewKernel
The new kernel is 2.6.32-220.el6.x86_64.
The running service is deleted successfully.
The UltraPath startup guide items are deleted successfully.
remove nxup from dracut.
The UltraPath files are deleted successfully.
User configuration is saved successfully.
append nxup to dracut.
```



```
The mirror is updated successfully.  
append UltraPath title to bootloader successfully. [/boot/grub/menu.lst]  
The running service is installed successfully.  
The system kernel is updated successfully in UltraPath. Please reboot.
```

## System Response

None

## A.5.3 Updating LUN Information

The Linux operating system cannot automatically detect mapping changes made on the storage side. To help users manage storage devices more easily and efficiently, the UltraPath provides the **upRescan** command for users to update LUN information.

### Function

The **upRescan** command is used to update LUN information.

### Format

**upRescan**

### Parameters

None

### Level

User **root**

### Usage Guidelines

Updating LUN information includes the following aspects:

- Increasing or reducing LUN mappings
- Changing LUN mappings
- Increasing or reducing the number of paths
- Increasing or reducing disk arrays

#### NOTE

The **hot\_add** command is an **upRescan** link that is compatible with the old version's command used to scan for LUNs.

### Example

Run the **upRescan** command.

```
#upRescan  
Begin deleting non-existent luns.  
Begin deleting Luns which have been changed.  
Begin scan [host3]  
Begin scan [host4]  
rescan complete.
```

## System Response

None

## A.5.4 Generating a Random Number

### Function

The **genprkey** command is used to generate a random 19-digit number.

### Format

**genprkey**

### Parameters

None

### Level

User **root**

### Usage Guidelines

Run the command once when UltraPath is being installed. The random 19-digit number will be written to the configuration file to make the UltraPath work in a SCSI-2 cluster environment.

### Example

Run the **upadmin** command to log in to the CLI. Then run the **genprkey** command to generate a random 19-digit number.

```
UltraPath CLI #1 >genprkey  
1688015227050849615
```

## System Response

None

## A.5.5 Query the Timeout Period of a SCSI Device

### Function

The **upLinux show scsi\_timeout** command is used to query the timeout period of a SCSI device that is taken over by UltraPath.

### Format

**upLinux show scsi\_timeout**

### Parameters

None

## Level

User **root**

## Usage Guidelines

After the command is executed, the timeout period of a SCSI device that is taken over by UltraPath will be read and displayed. If the timeout period of the SCSI device is different from that in the udev file of UltraPath, the device information will be displayed.

### NOTE

SUSE 9 and Red Hat 4 do not support the command.

## Example

Run the **upLinux show scsi\_timeout** command.

```
#upLinux show scsi_timeout
scsi timeout:30
```

## System Response

None

# A.5.6 Modify the Timeout Period of a SCSI Device

## Function

The **upLinux set scsi\_timeout** command is used to modify the timeout period of a SCSI device that is taken over by UltraPath.

## Format

**upLinux set scsi\_timeout=*num***

## Parameters

| Parameter  | Description                                                                                   | Default Value |
|------------|-----------------------------------------------------------------------------------------------|---------------|
| <i>num</i> | Timeout period that has been set. It is expressed in seconds. The value ranges from 1 to 600. | 30            |

## Level

User **root**

## Usage Guidelines

After the command is executed, the timeout period in the udev file of UltraPath will be modified and the value of this parameter will be synchronized to the SCSI device that is taken over by UltraPath.

### NOTE

- If third-party udev rules are used to modify the timeout period of the SCSI device, the command cannot be used to modify the timeout period of the SCSI device that is taken over by UltraPath.
- SUSE 9 and Red Hat 4 do not support the command.

## Example

Run the **upLinux set scsi\_timeout** command.

```
#upLinux set scsi_timeout=30
Succeeded in changing the value of the timeout parameter in the 99-
ultrapath.rules to 30.
Succeeded in modifying the timeout parameter of the SCSI devices managed by
UltraPath.
```

## System Response

None

## A.5.7 Configuring Automatic Startup of InfiniBand Drivers

### Function

The **upLinux config ib** command is used to configure automatic startup of InfiniBand drivers.

### Format

**upLinux config ib**

### Parameters

None

### Level

User **root**

## Usage Guidelines

- This command only supports a direct-connection network between a host with InfiniBand HCAs and the storage system.
- Running this command adds the subnet management (**opensm**) and link management (**run\_srp\_daemon**) configurations of InfiniBand drivers to host system services and automatically reports disk arrays connected to InfiniBand interface modules to the host for takeover.

## Example

Configure automatic startup of InfiniBand drivers.

```
# upLinux config ib
Warning: This command can only be used in direct connection mode, verify the
networking environment before running this command. Do you want to go?
<Y|N>:y
Config ib successfully.
```

## System Response

None

## A.5.8 Querying InfiniBand Driver Configurations

### Function

The **upLinux show ib\_config** command is used to query InfiniBand driver configurations.

### Format

**upLinux show ib\_config**

### Parameters

None

### Level

User **root**

## Usage Guidelines

You can run this command to query whether automatic startup of InfiniBand drivers has been added to system services and whether the subnet management (**opensm**) and link management (**run\_srp\_daemon**) have been configured for each port on the InfiniBand interface module. If subnet management and link management are configured for the InfiniBand ports, **normal** is displayed. Otherwise, **abnormal** is displayed.

## Example

Query InfiniBand driver configurations.

```
# upLinux show ib_config
UltraPath IB service is configured.
IB port information:
mlx4_0:port1  normal
mlx4_0:port2  normal
```

## System Response

None

## A.5.9 Clearing InfiniBand Driver Configurations

### Function

The **upLinux unconfig ib** command is used to clear InfiniBand driver configurations.

### Format

**upLinux unconfig ib**

### Parameters

None

### Level

User **root**

### Usage Guidelines

You can run this command to clear the subnet management (**opensm**) and link management (**run\_srp\_daemon**) from system services, and cancel automatic startup configurations of InfiniBand drivers.

### Example

Clear InfiniBand driver configurations.

```
# upLinux unconfig ib
Warning: The operation will clear up the configuration of ib. Do you want to go
on?
<Y|N>:y
Unconfig ib successfully.
Warning: The operation will stop opensm and run_srp_daemon of all ib ports. Do
you want to go on?
<Y|N>:y
Stop opensm and run_srp_daemon successfully.
```

### System Response

None

## A.5.10 Timeout Parameter Settings upon a Link Interruption Failure

### Function

**upLinux set linkdown\_tmo** is used to set the timeout interval for the HBA to return the **linkdown** error code after a link is down.

### Format

**upLinux set linkdown\_tmo=timeout**

## Parameters

| Parameter      | Description                                                              | Default Value |
|----------------|--------------------------------------------------------------------------|---------------|
| <i>timeout</i> | Timeout interval<br>The value ranges from 1 to 60, expressed in seconds. | None          |

## Level

User **root**

## Usage Guidelines

- If this parameter is 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 command modifies driver parameters and applies to all storage device links on the host.

## Example

This example shows how to set link interruption timeout to 5 seconds.

```
# upLinux set linkdown_tmo=5
Warning: This command will modify the driver's parameters, which affects the time
taken to delete a disk when a link is down. This modification also has an impact
on all storage ports that connect to the host. Are you sure you want to modify
the parameters?
<Y|N>:y
The linkdown tmo is set to 5.
```

## System Response

None

## A.5.11 Querying Timeout Parameter Settings upon a Link Interruption Failure

### Function

**upLinux show linkdown\_tmo** is used to query timeout interval upon a link interruption failure.

### Format

**upLinux show linkdown\_tmo**

### Parameters

None

## Level

User **root**

## Usage Guidelines

None

## Example

This command shows how to query timeout interval upon a link interruption failure.

```
# upLinux show linkdown_tmo  
linkdown tmo:5.
```

## System Response

None

# A.5.12 Clearing Timeout Parameter Settings upon a Link Interruption Failure

## Function

**upLinux unset linkdown\_tmo** is used to clear timeout parameter settings upon a link interruption failure.

## Format

```
upLinux unset linkdown_tmo
```

## Parameters

None

## Level

User **root**

## Usage Guidelines

This command clears timeout parameter settings upon a link interruption failure and restores the parameter to the value before modification.

## Example

This example shows how to clear timeout parameter settings upon a link interruption failure.

```
# upLinux unset linkdown_tmo  
Unset the linkdown tmo successfully.
```



## System Response

None

## A.5.13 Updating the Status of Virtual LUNs

### Function

Updates the status of virtual LUNs to check for the changes of LUN mappings. **hot\_add** is a symbolic link file of **upRescan**. This command provides the same function as the **upRescan** command does.

### Format

**hot\_add** [ **-m** | **-q** | **-f** | **-force** | **-s** | **-su** ]

### Parameters

| Keyword and Parameter | Description                                                                                                                                                          | Default Value |
|-----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>-m</b>             | Delete Luns which had not been managed by UltraPath without mutual information.                                                                                      | None          |
| <b>-q</b>             | Delete Luns which had not been managed by UltraPath with mutual information.                                                                                         | None          |
| <b>-f</b>             | Delete no-mapped virtual disks.                                                                                                                                      | None          |
| <b>-force</b>         | Delete virtual disks that do not have physical paths.                                                                                                                | None          |
| <b>-s</b>             | Show interaction information to confirm whether you want to delete the LUNs not managed by UltraPath. The parameter is used when the UltraPath module is not loaded. | None          |
| <b>-su</b>            | Do not delete the LUNs that have been managed by UltraPath and trigger the reporting of newly mapped LUNs.                                                           | None          |

### Level

User **root**

## Usage Guidelines

The LUN information needs to be updated under the following conditions:

- LUN mappings have been added or deleted.
- LUN mappings have been changed.
- Paths have been added or deleted.
- Storage arrays have been added or deleted.

## Example

None

## System Response

None

## A.5.14 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 **root**

### Usage Guidelines

None

### Example

Show all disk array models supported by the UltraPath.

```
UltraPath CLI #0 >show supportarraylist
```

| Vendor | Product |
|--------|---------|
| HUAWEI | S6800E  |
| HUAWEI | V1500   |
| HUAWEI | V1500N  |
| HUAWEI | V1800   |
| HUAWEI | S2100   |
| HUAWEI | S2300   |
| HUAWEI | S2300E  |

```

HUAWEI S2600
HUAWEI S2900
HUAWEI S5300
HUAWEI S5100
HUAWEI S5500
HUAWEI S5600
HUAWEI S8000-I
HUAWEI V1600N
HUAWEI S3900
HUAWEI S6900
HUAWEI S2200T
HUAWEI S2600T
HUAWEI S5500T
HUAWEI S5600T
HUAWEI S5800T
HUAWEI S6800T
HUAWEI S3900-M200
HUAWEI S3900-M300
HUAWEI S5900-M100
HUAWEI S5900-M200
HUAWEI S6900-M100
HUAWEI Dorado2100
HUAWEI Dorado5100
HUASY S2600T
HUASY S3900
HUASY S5300
HUASY S2200T
HUASY S6900
HUASY S5500T
HUASY S5600T
HUASY S5800T
HUASY S6800T
HUASY S3900-M200
HUASY S3900-M300
HUASY S5900-M100
HUASY S5900-M200
HUASY S6900-M100
HUASY S8000-I
HUASY Dorado2100
HUASY Dorado5100
HUAWEI VIS6000
HS VIS6000
HUAWEI VIS6000T
HS VIS6000T
HS V1500
HS V1500N
HS V1800
HS S2100
HS S2300
HS S2300E
HS S2600
HS S2600T
HS S5100
HS S5300
HS S5500
HS S5600
HS S6800E
HS V1600N
HS S8000-I
HS S8000
HUAWEI S8000
HUAWEI Dorado2100 G2
HUAWEI HVS85T
HUAWEI HVS88T
HUAWEI XSG1
Marstor XSG1
UDsafe XSG1
SanM XSG1
AnyStor XSG1

```

```
SUGON      XSG1
NETPOSA    XSG1
-----
```

## System Response

None

## A.5.15 Adding a Disk Array Model Supported by the UltraPath

### Function

The **add supportarraylist** command is used to add a disk array model supported by the UltraPath.

### Format

```
add supportarraylist vendor=<vendor_id> product=<product_id>
[ driver=<driver_type> ]
```

### Parameters

| Keyword and Parameter      | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Default Value |
|----------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>vendor</b> =<vendor_id> | Vendor ID of a disk array.<br><b>NOTE</b><br>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:<br>#^&= \;><," | None          |

| Keyword and Parameter        | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Default Value |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>product</b> =<product_id> | Product ID of a disk array.<br><b>NOTE</b><br>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          |
| <b>driver</b> =<driver_type> | Driver type of a disk array.<br>The value is <b>default</b> .<br><b>NOTE</b><br>It is recommended that double quotation marks (") are used to mark the driver type of a disk array.                                                                                                                                                                                                                                                                            | None          |

## Level

User **root**

## Usage Guidelines

Run this command when the related disk array is mapped to the host. If you want the UltraPath to manage an LUN mapped to the host after this command is executed, map the LUN to the host again after deleting the mapping.

### **NOTE**

This command is inapplicable to UVP SAN Boot scenarios.

## 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.
```

## System Response

None

## A.5.16 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 |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>vendor</b> =<vendor_id>   | Vendor ID of a disk array.<br><b>NOTE</b><br>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          |
| <b>product</b> =<product_id> | Product ID of a disk array.<br><b>NOTE</b><br>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 **root**

## Usage Guidelines

- In Linux, a mapped disk array model can be deleted.
- Run this command when the related disk array is mapped to the host. If you want the UltraPath not to manage an LUN mapped to the host after this command is executed, delete the mapping. If you want to enable another multipathing software or host to take over an LUN, map the LUN to the host again.

### NOTE

This command is inapplicable to UVP SAN Boot scenarios.

## Example

Delete a disk array model supported by the UltraPath.

```
# upadmin 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.
```

## System Response

None

## A.5.17 Performing Read Operations on Security

### Function

Security reads disks.

### Format

**updd if=xx,xx**

### Parameters

| Keyword and Parameter | Description                           | Default Value |
|-----------------------|---------------------------------------|---------------|
| <b>if=xx,xx</b>       | Indicates the name of a virtual disk. | None          |

## Level

User **root**

## Usage Guidelines

None

## Example

Perform read operations on `/dev/sdc`. Enter `updd if=/dev/sdc`.

After data is read for a certain period, press **Ctrl+C** to terminate the `updd` command.

```
# updd if=/dev/sdc
1146081+0 records in.
1146080+0 records out.
```

## System Response

None

## A.5.18 Executing a Non-disruptive Upgrade of UltraPath

### Function

The `install.sh` command is used to execute a non-disruptive upgrade of UltraPath.

### Format

```
install.sh -ndu [ ndu_free_mem_size=xxx ] [ ndu_used_cpu_percent=yyy ]  
[ ndu_free_disk_space=zzz ]
```

### Parameters

| Keyword and Parameter             | Description                                                                                | Default Value |
|-----------------------------------|--------------------------------------------------------------------------------------------|---------------|
| <code>-ndu</code>                 | Checks whether a non-disruptive upgrade can be implemented.                                | None          |
| <code>ndu_free_mem_size</code>    | Set the minimum system memory for a non-disruptive upgrade.<br>The unit is MB.             | 200           |
| <code>ndu_used_cpu_percent</code> | Set the maximum CPU usage for a non-disruptive upgrade.<br>The value ranges from 0 to 100. | 80            |
| <code>ndu_free_disk_space</code>  | Set the minimum system disk capacity for a non-disruptive upgrade.<br>The unit is MB.      | 200           |



## Level

User **root**

## Usage Guidelines

Run the command to execute a non-disruptive upgrade of UltraPath.

## Example

None

## System Response

None

## A.5.19 Disabling the Host Restart Notification Function

### Function

Disables the host restart notification function.

### Format

**stop\_up\_restart\_warn**

### Parameters

None

### Level

User **root**

### Usage Guidelines

None

### Example

None

### System Response

None

## A.5.20 Viewing the Status of the Host Alarm Push Switch

### Function

**show alarmentable** is used to view the status of the host alarm push switch.

## Format

**show alarmentable**

## Parameters

None

## Level

User **root**

## Usage Guidelines

None

## Example

View the alarm push switch for UltraPath:

```
UltraPath CLI #0 >show alarmentable
alarmentable: on
```

## System Response

None

## A.5.21 Setting the Switch of Host Alarm Push

### Function

**set alarmentable** is used to set the switch of host alarm push.

### Format

**set alarmentable**={ *on* | *off* }

### Parameters

| Parameter                                       | Description                                                                                                                                                                                                                                   | Default Value |
|-------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>alarmentable</b> ={ <i>on</i>   <i>off</i> } | Alarm push switch for UltraPath.<br>The value can be <b>on</b> or <b>off</b> , where:<br><ul style="list-style-type: none"> <li>● <b>on</b>: Enables the alarm push switch.</li> <li>● <b>off</b>: Disables the alarm push switch.</li> </ul> | on            |

## Level

User **root**

## 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 alarmentable=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.5.22 Viewing the Status of the UltraPath Link Degrade Switch

### Function

**show path\_reliability\_enable** is used to view the status of the UltraPath link degrade switch.

### Format

**show path\_reliability\_enable**

### Parameters

None

## Level

User **root**

## 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.5.23 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 |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <code>path_reliability_enable={ on   off }</code> | <p>Link degrade switch for UltraPath.</p> <p>The value can be <b>on</b> or <b>off</b>, where:</p> <ul style="list-style-type: none"> <li>● <b>on</b>: Enables the link degrade switch.</li> <li>● <b>off</b>: Disables the link degrade switch.</li> </ul> | on            |

### Level

User **root**

### 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.5.24 Cancelling I/O Suspension of the Disk

### Function

The **upadmin set stop\_iosuspension** command is used to cancel I/O suspension of the disk that corresponds to specific **scsi\_disk**.

### Format

```
upadmin set stop_iosuspension disk_id
```

### Parameters

| Keyword and Parameter | Description           | Default Value |
|-----------------------|-----------------------|---------------|
| <i>disk_id</i>        | ID of a physical disk | None          |

### Level

User **root**

### Usage Guidelines

This command is used to cancel I/O suspension of a specific disk only when disks are deleted within UltraPath. In other scenarios, running this command may disable the I/O suspension function. Therefore, run this command cautiously.

### Example

Run the command to cancel I/O suspension of the disk that corresponds to **scsi\_disk**.

```
linux:~ # upadmin set stop_iosuspension 3  
linux:~ #
```

## System Response

None

## A.5.25 Clearing Inactive Drivers in Online Upgrade Process

### Function

The **ouc** command is used to clear drivers that do not take effect during an online upgrade.

## Format

**ouc -r**

## Parameters

| Parameter | Description                                                     | Default Value |
|-----------|-----------------------------------------------------------------|---------------|
| <b>-r</b> | Clear drivers that do not take effect during an online upgrade. | None          |

## Level

User **root**

## Usage Guidelines

Use CLI to switch to the **/UltraPath/install/otherTools** directory where UltraPath for Linux is installed and run the **ouc -r** command.

Run **ouc -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.

```
# ./ouc -r
Clear invalid nxup driver success
```

## System Response

None

## A.5.26 Preparing the UVP SAN Boot Environment

### Function

The **fs\_sanboot\_env\_update** command is used to prepare the UVP SAN Boot environment.

### Format

**fs\_sanboot\_env\_update**

### Parameters

None

### Level

User **root**

## Usage Guidelines

In UVP SAN Boot scenarios, after UltraPath is installed, you can run this command to prepare the environment for UltraPath to support SAN Boot.

### Example

None

### System Response

None

## A.5.27 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 **root**

## Usage Guidelines

This command is used to show the status of the UltraPath working thread. Administrators can view last refresh time and present time to determine whether the working thread is blocked and calculated the block duration.

### Example

View the status of the UltraPath working thread.

```
UltraPath CLI #0 > show workerstate
worker name: USIImmediateWkq_1      last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: USIDefererdWkq_1      last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: KLSWriteLogWorkQueue_1 last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: VLMVLunNotifyWkq_1    last refresh time: 2016-07-26 08:13:06
present time: 2016-07-26 08:13:07
worker name: CodeStreamWorkQueue_1 last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: LPMSyncCmdPost_1      last refresh time: 2016-07-26 08:13:06
```

```

present time: 2016-07-26 08:13:07
worker name: LPMPATHMgrWkq_1      last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PingSpecialWorkQueue_1  last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PingWorkQueue_1        last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PcmCmdWorkQueue_0_1     last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PcmCmdWorkQueue_1_1     last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PcmCmdWorkQueue_2_1     last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PcmCmdWorkQueue_3_1     last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PcmCmdWorkQueue_4_1     last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07
worker name: PCM_AttachCmdWkQueue_1  last refresh time: 2016-07-26 08:13:07
present time: 2016-07-26 08:13:07

```

## System Response

| Parameter         | Description                                                  | Default Value |
|-------------------|--------------------------------------------------------------|---------------|
| worker name       | Working thread name.                                         | None          |
| last refresh time | Last refresh time of the working thread.                     | None          |
| present time      | Current system time, that is, execution time of the command. | None          |

## A.5.28 Configuring I/O Suspension Support Policy (Applicable to UVP Cluster Scenarios)

### Function

**set suspndioforcluster** is used to set whether to support I/O suspension in UVP cluster scenarios.

#### NOTE

This command only applies to a cluster in reservation mode.

### Format

**set suspndioforcluster**={on|off} [ **array\_id**=ID | **vlun\_id**={ ID | ID1,ID2... | ID1-ID2 } ]



## Parameters

| Parameter                                                                    | Description                                                                                                                                                                                                                                                                                   | Default Value |
|------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|
| <b>suspendioforcluster</b> ={ <i>on</i>   <i>off</i> }                       | I/O suspension support policy in cluster scenarios<br>The value can be <b>on</b> or <b>off</b> .<br><ul style="list-style-type: none"> <li>● <b>on</b>: supports I/O suspension in cluster scenarios.</li> <li>● <b>off</b>: does not support I/O suspension in cluster scenarios.</li> </ul> | off           |
| <b>array_id</b> = <i>ID</i>                                                  | Storage system ID<br>Run the <b>show array</b> command without parameters to obtain IDs of storage arrays.                                                                                                                                                                                    | None          |
| <b>vlun_id</b> ={ <i>ID</i>   <i>ID1</i> , <i>ID2</i> ...   <i>ID1-ID2</i> } | ID of a virtual LUN<br>Run the <b>show vlun type=all</b> command to query the ID information about all virtual LUNs.                                                                                                                                                                          | None          |

## Level

User **root**

## Usage Guidelines

- Run **set suspendioforcluster**={*on*|*off*} to set the I/O suspension support policy in all cluster scenarios of storage systems.
- Run **set suspendioforcluster**={*on*|*off*} **array\_id**=*ID* to set the I/O suspension support policy in a specified cluster scenario of storage systems.
- Run **set suspendioforcluster**={*on*|*off*} **vlun\_id**={ *ID* | *ID1*,*ID2*... | *ID1-ID2* } to set the I/O suspension support policy in a specified virtual LUN cluster scenario.

### 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.
- Run **show upconfig** to check the I/O suspension support policy in a cluster scenario.

## Example

Set the storage system with an ID of **0** to support I/O suspension in a cluster scenario.

```
UltraPath CLI #3 >set suspendioforcluster=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

# B Files Related to the UltraPath

After UltraPath is correctly installed on a Linux operating system, UltraPath adds or modifies certain files in the following table to ensure proper operation. Files to be added or modified vary depending on the operating system. Do not modify or delete these files unnecessarily.

## Files Added to the UltraPath

| Name                                    | File path                                                                            | Description                                                                                           |
|-----------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------|
| nxup.ko<br>nxupext_a.ko<br>nxupext_b.ko | /lib/modules/xxx/kernel/<br>drivers/scsi or /UltraPath/<br>install/kernelModules/xxx | UltraPath driver file                                                                                 |
| up.conf<br>user_cfg.xml                 | /etc/up.conf<br>/etc/user_cfg.xml                                                    | UltraPath configuration file                                                                          |
| upadmin                                 | /usr/sbin/upadmin                                                                    | UltraPath R8 CLI tool                                                                                 |
| upadm                                   | /usr/sbin/upadm                                                                      | CLI tool compatible with<br>UltraPath R3                                                              |
| UltraPath                               | /opt/UltraPath                                                                       | UltraPath backup and log<br>directory                                                                 |
| ultrath-*.img                           | /boot/ ultrath-*.img                                                                 | Start image file generated<br>when the UltraPath uses the<br>boot from SAN method for<br>installation |
| nxup-*.img                              | /boot/nxup-*.img                                                                     | Soft link that points to /boot/<br>ultrath-*.img                                                      |
| UltraPath                               | /UltraPath                                                                           | Installation file directory of<br>the UltraPath                                                       |
| nxup                                    | /etc/init.d/nxup                                                                     | Script for starting the<br>UltraPath service                                                          |

| Name                                | File path                                                                                             | Description                                                                                                                 |
|-------------------------------------|-------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|
| up.conf.save_R8<br>user_cfg.xml.old | /etc/up.conf.save_R8/etc/<br>user_cfg.xml.old                                                         | Backup configuration file<br>after UltraPath<br>uninstallation                                                              |
| UltraPath.packages.info             | /etc/UltraPath.packages.info                                                                          | UltraPath installation<br>information file                                                                                  |
| upRescan                            | /sbin/upRescan                                                                                        | UltraPath R8 LUN-scanning<br>file                                                                                           |
| hot_add                             | /usr/sbin/hot_add                                                                                     | UltraPath R3 LUN-scanning<br>file                                                                                           |
| upLinux                             | /usr/sbin/upLinux                                                                                     | UltraPath R8 restricted<br>commands                                                                                         |
| upTools                             | /usr/sbin/upTools                                                                                     | UltraPath R3 CLI tool                                                                                                       |
| 56-nxup.rules                       | /etc/udev/rules.d/56-<br>nxup.rules                                                                   | udev rule file generated after<br>the UltraPath is installed                                                                |
| up.hostinfo                         | /etc/up.hostinfo                                                                                      | UltraPath host information<br>file                                                                                          |
| systemd-nxup.service                | /etc/systemd/system/<br>sysinit.target.wants or /lib/<br>systemd/system                               | Script for starting the<br>UltraPath system service<br>when systemd startup mode<br>is used                                 |
| systemd-nxup.service                | /usr/lib/systemd/system                                                                               | Soft link that points to the<br>script for starting the<br>UltraPath system service<br>when systemd startup mode<br>is used |
| systemd-nxup.service                | /usr/lib/systemd/system/<br>sysinit.target.wants or /lib/<br>systemd/system/<br>sysinit.target.wants/ | Soft link that points to the<br>script for starting the<br>UltraPath system service<br>when systemd startup mode<br>is used |
| nxup.service                        | /usr/lib/systemd/system<br>or /lib/systemd/system                                                     | Script for starting the<br>UltraPath service when<br>systemd startup mode is<br>used                                        |
| nxup.service                        | /etc/systemd/system                                                                                   | Soft link that points to the<br>script for starting the<br>UltraPath service when<br>systemd startup mode is<br>used        |

| Name                 | File path                                                              | Description                                                                                              |
|----------------------|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------|
| nxup.service         | /etc/systemd/system/multi-user.target.wants                            | Soft link that points to the script for starting the UltraPath service when systemd startup mode is used |
| nxupBoot             | /usr/sbin                                                              | Script for executing the UltraPath system service when systemd startup mode is used                      |
| nxupServBoot         | /usr/sbin                                                              | Script for executing the UltraPath system service when systemd startup mode is used                      |
| stop_up_restart_warn | /sbin/stop_up_restart_warn                                             | Script for stopping the warning restart service of the UltraPath.                                        |
| boot.010LoadNxup     | /etc/init.d/boot.010LoadNxup                                           | Script for starting the UltraPath system service                                                         |
| 90nxup               | /usr/lib/dracut/modules.d/90nxup or /usr/share/dracut/modules.d/90nxup | Configuration directory for the UltraPath to start the mirroring function in Red Hat 6 or Red Hat 7.     |

## File Modified by the UltraPath

When the **boot fromSAN** command is used to install the UltraPath, you may need to modify the following file.

1. Modify the **/boot/grub/menu.lst**, **/etc/ elilo.conf**, or **/etc/ lilo.conf** configuration file. Add the UltraPath option and configure it as a default item. The following is an example:

```
*cat /boot/grub/menu.lst
default 2
timeout 8
...
title Linux with ultrapath
root (hd0,2)
kernel /boot/vmlinuz-X.X.XX.XX-X.XX.X-smp root=/dev/sda2..
initrd /boot/ultrapath-X.X.XX.XX-X.XX.X-smp.img.
```

2. Modify the **/etc/sysconfig/kernel** configuration file. Add the UltraPath configuration parameters. The following is an example:

```
Cat /etc/sysconfig/kernel
...
###UltraPath-tl80s-kernel begin,don't change this!###
if [ `echo "${initrd_image}" | grep -E -c "(/nxup|ultrapath)"` -ne 0 ]
then
    INITRD_MODULES="${INITRD_MODULES} "
    INITRD_MODULES=" ${INITRD_MODULES} "
    INITRD_MODULES="${INITRD_MODULES// nxupext_a / }"
    INITRD_MODULES="${INITRD_MODULES// nxup / }"
    INITRD_MODULES="${INITRD_MODULES// scsi_mod / }"
    INITRD_MODULES="${INITRD_MODULES// sd_mod / }"
```

```
INITRD_MODULES="${INITRD_MODULES// sg / }"
INITRD_MODULES="scsi_mod sd_mod sg nxup nxupext_a ${INITRD_MODULES}"
INITRD_MODULES=$(echo ${INITRD_MODULES})
echo "UltraPath--[INITRD_MODULES=${INITRD_MODULES}]"
fi
###UltraPath-t180s-kernel end,don't change this!###
...
```

---

# C How to Obtain Help

---

If a problem persists in routine maintenance or troubleshooting, contact Huawei for technical support.

## [C.1 Preparations for Contacting Huawei](#)

To better solve the problem, you need to collect troubleshooting information and make debugging preparations before contacting Huawei.

### [C.2 How to Use the Document](#)

Huawei provides guide documents shipped with the device. The guide documents can be used to handle the common problems occurring in daily maintenance or troubleshooting.

### [C.3 How to Obtain Help from Website](#)

Huawei provides users with timely and efficient technical support through the regional offices, secondary technical support system, telephone technical support, remote technical support, and on-site technical support.

### [C.4 Ways to Contact Huawei](#)

Huawei Technologies Co., Ltd. provides customers with comprehensive technical support and service. For any assistance, contact our local office or company headquarters.

## C.1 Preparations for Contacting Huawei

To better solve the problem, you need to collect troubleshooting information and make debugging preparations before contacting Huawei.

### C.1.1 Collecting Troubleshooting Information

You need to collect troubleshooting information before troubleshoot.

You need to collect the following information:

- Name and address of the customer
- Contact person and telephone number
- Time when the fault occurred
- Description of the fault phenomena
- Device type and software version

- Measures taken after the fault occurs and the relevant results
- Troubleshooting level and required solution deadline

## C.1.2 Making Debugging Preparations

When you contact Huawei for help, the technical support engineer of Huawei might help you do certain operations to collect information about the fault or rectify the fault directly.

Before contacting Huawei for help, you need to prepare the boards, port modules, screwdrivers, screws, cables for serial ports, network cables, and other required materials.

## C.2 How to Use the Document

Huawei provides guide documents shipped with the device. The guide documents can be used to handle the common problems occurring in daily maintenance or troubleshooting.

To better solve the problems, use the documents before you contact Huawei for technical support.

## C.3 How to Obtain Help from Website

Huawei provides users with timely and efficient technical support through the regional offices, secondary technical support system, telephone technical support, remote technical support, and on-site technical support.

Contents of the Huawei technical support system are as follows:

- Huawei headquarters technical support department
- Regional office technical support center
- Customer service center
- Technical support website: <http://enterprise.huawei.com>

You can query how to contact the regional offices at <http://enterprise.huawei.com>.

## C.4 Ways to Contact Huawei

Huawei Technologies Co., Ltd. provides customers with comprehensive technical support and service. For any assistance, contact our local office or company headquarters.

Huawei Technologies Co., Ltd.

Address: Huawei Industrial Base Bantian, Longgang Shenzhen 518129 People's Republic of China

Website: <http://support.huawei.com/enterprise/>



# D Acronyms and Abbreviations

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## F

|             |                             |
|-------------|-----------------------------|
| <b>FC</b>   | Fibre Channel               |
| <b>FCoE</b> | Fibre Channel over Ethernet |

## G

|            |                          |
|------------|--------------------------|
| <b>GUI</b> | Graphical User Interface |
|------------|--------------------------|

## H

|            |                  |
|------------|------------------|
| <b>HBA</b> | Host Bus Adapter |
|------------|------------------|

## i

|              |                                           |
|--------------|-------------------------------------------|
| <b>IB</b>    | InfiniBand                                |
| <b>IOPS</b>  | Input/Output Operations Per Second        |
| <b>iSCSI</b> | Internet Small Computer Systems Interface |
| <b>ISM</b>   | Integrated Storage Management             |

## L

|            |                     |
|------------|---------------------|
| <b>LUN</b> | Logical Unit Number |
|------------|---------------------|

## N

|            |                        |
|------------|------------------------|
| <b>NIC</b> | Network Interface Card |
|------------|------------------------|

## R

|             |                                  |
|-------------|----------------------------------|
| <b>RDM</b>  | Raw Device Mapping               |
| <b>S</b>    |                                  |
| <b>SAS</b>  | Serial Attached SCSI             |
| <b>SCSI</b> | Small Computer Systems Interface |
| <b>W</b>    |                                  |
| <b>WWN</b>  | World Wide Name                  |