

ETERNUS

ETERNUS SMI-S Server version 3.0.1.0

Release Notes

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Preface

This manual explains the ETERNUS SMI-S Server.

Second Edition
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The Structure and Contents of this Manual

This manual is composed of the following eight chapters and an appendix.

- Chapter 1 Overview

This chapter provides an overview of the ETERNUS SMI-S Server.

- Chapter 2 Support Models

This chapter describes the models that are supported by the ETERNUS SMI-S Server.

- Chapter 3 System Requirements

This chapter describes the system requirements for operating the ETERNUS SMI-S Server.

- Chapter 4 Prerequisite

This chapter describes the necessary conditions for installing the ETERNUS SMI-S Server.

- Chapter 5 Installation

This chapter explains how to install the ETERNUS SMI-S Server.

- Chapter 6 Windows Service

This chapter describes the ETERNUS SMI-S Server, which is a Windows service.

- Chapter 7 Restrictions

This chapter describes restrictions that apply when operating the ETERNUS SMI-S Server.

- Chapter 8 Support Class and Method

This chapter describes classes and methods that are supported by the ETERNUS SMI-S Server.

"Directory Structure" is described in the appendix.

Naming Conventions

■ Product names

- Microsoft® Windows Server® products are as described below.

Product Names	Abbreviation
Microsoft® Windows Server® 2003, Enterprise Edition Microsoft® Windows Server® 2003, Enterprise x64 Edition Microsoft® Windows Server® 2003 R2, Enterprise Edition Microsoft® Windows Server® 2003 R2, Enterprise x64 Edition	Windows Server 2003
Microsoft® Windows Server® 2003, Standard Edition Microsoft® Windows Server® 2003, Standard x64 Edition Microsoft® Windows Server® 2003 R2, Standard Edition Microsoft® Windows Server® 2003 R2, Standard x64 Edition	
Microsoft® Windows® Storage Server 2003 R2, Standard Edition	
Microsoft® Windows Server® 2008 Datacenter Microsoft® Windows Server® 2008 Datacenter (64-bit) Microsoft® Windows Server® 2008 R2 Datacenter Microsoft® Windows Server® 2008 R2 Datacenter (64-bit)	
Microsoft® Windows Server® 2008 Enterprise Microsoft® Windows Server® 2008 R2 Enterprise Microsoft® Windows Server® 2008 R2 Enterprise (64-bit)	
Microsoft® Windows Server® 2008 Standard Microsoft® Windows Server® 2008 R2 Standard Microsoft® Windows Server® 2008 R2 Standard (64-bit)	

■ Other names

- "ETERNUS DX Disk storage system" refers to the ETERNUS DX8700 S2 Disk storage system.
- "Web GUI" refers to "ETERNUS Web GUI".
- "CLI" refers to "ETERNUS CLI".

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Chapter 1

Overview



The ETERNUS SMI-S Server is a Windows service application for an SMI-S Server of the ETERNUS DX Disk storage system. The ETERNUS SMI-S Server runs on a Windows machine that is connected with the ETERNUS DX Disk storage system in an Ethernet network.

The ETERNUS SMI-S Server receives the request from an SMI-S client, converts the request to the proprietary interface, and then redirects the request to the ETERNUS DX Disk storage system.

The ETERNUS SMI-S Server is compliant with SMI-S v1.4.

The administrator starts and stops the SMI-S Server by the activation and deactivation of the Windows service of the ETERNUS SMI-S Server.

Chapter 2

Support Models



The ETERNUS SMI-S Server supports the following ETERNUS Array models:

- ETERNUS DX8700 S2

Chapter 3

System Requirements

The implementation model of ETERNUS SMI-S Server is called a Proxy SMI-S Server defined in SMI-S Specification. It requires another Windows server that should act as a bridge role between the SMI-S interface and the proprietary ETERNUS DX Disk storage system interface. From the SMI-S client view, the ETERNUS SMI-S Server works as an ETERNUS DX Disk storage system. The client does not communicate with ETERNUS DX Disk storage system directly.

3.1 Platform

The user shall prepare a host platform to run the ETERNUS SMI-S Server program code. The minimum specification for the platform is as follows:

Operating System	Windows Server 2003 or Windows Server 2008
CPU	Minimum: 1.4 GHz (x86 processor)
Memory Usage	Minimum: 512 MB RAM (2GB recommended)
Available Disk Capacity	300MB

No additional hardware or software is required if the machine is ready for the above operating systems. The memory size to be required depends upon the configuration to be managed.

3.2 Network

The SMI-S Server uses the Ethernet network for the following purposes:

- SMI-S interface
The ETERNUS SMI-S Server listens to the TCP port 5988 for http protocol access and port 5989 for https protocol access from the SMI-S client software.
- ETERNUS DX Disk storage system proprietary interface
The ETERNUS SMI-S Server initiates the access to the TCP port 1372 and 22 on the ETERNUS DX Disk storage system to manage the ETERNUS DX Disk storage system using the ETERNUS DX Disk storage system proprietary protocol.
- Service Location Protocol
The ETERNUS SMI-S Server runs the Service Location Protocol (SLP) that listens to the UDP port 427.

The administrator of the ETERNUS SMI-S Server shall make sure that the Windows operating system and any related software like firewall permit the above accesses.

Chapter 4

Prerequisite

The Administrator shall prepare the system for SMI-S environment to operate as follows.

4.1 CA Configuration

The ETERNUS DX Disk storage system has several modes that control the behavior of the Channel Adapter for the masking and mapping feature. The mode is setup individually for each Channel Adapter Port.

The mode name expected is model-dependent: Host Affinity Mode. LUN Mapping Mode.

If the setting of the channel port is not supported, the configuration is displayed on SMI-S interface but it cannot be changed. A change operation, such as expose additional logical volume, would be suppressed by the ETERNUS SMI-S Server and reply an appropriate error code to the SMI-S client.

4.2 Host Response Mode

Host Response Mode is the ETERNUS Disk storage system terminology that means the collection of settings that define how the ETERNUS DX Disk storage system should behave against SCSI initiator. Administrator shall setup the Host Response Mode from Web GUI. The mode includes the VPD (Vital Product data) page83 setting.

The Host Response setting should be set for each Host Platform type as specified in the Server Connection Guide for each ETERNUS DX Disk storage system model. ETERNUS SMI-S Server depends on VPD83 Type3 ID to correlate the logical volume views from SCSI and SMI-S interface so the VPD83 setting should not be modified from the default setting of Type3 or it would impact the correlation function.

4.3 Network Configuration

The ETERNUS SMI-S Server and the ETERNUS DX Disk storage system communicate via Ethernet network on ETERNUS DX Disk storage system proprietary management protocol. The network port of ETERNUS DX Disk storage system is called as USER port which may be shared with other purposes not only for SMI-S feature.

The ETERNUS DX Disk storage system has the capability to filter the incoming IP packet according to the source IP address of the packet if it comes from unregistered network segment it has different subnet address. The administrator register the subnet address on the allow list in Web GUI so that the ETERNUS SMI-S Server can communicate to the ETERNUS DX Disk storage system if the subnet of ETERNUS DX Disk storage system and the ETERNUS SMI-S Server is different.

4.4 Authentication

Administrator shall define the shared secret of authentication for the SMI-S client to access the ETERNUS SMI-S Server. The secret information consists of the user ID and password. The ETERNUS SMI-S Server keeps multiple sets of the user ID and password. The authentication information is shared by all SMI-S clients that may access the ETERNUS SMI-S Server.

The SMI-S client shall provide the authentication method for the Administrator to specify the information required to access the ETERNUS SMI-S Server.

See the section ["5.3 Registration of User ID" \(page 15\)](#).

4.5 Namespace

The Namespace is a keyword defined in Common Information Model (CIM) and SMI-S. It is defined as a domain of instances that ensures the unique access to the instance. The SMI-S client must present the Namespace name to access the ETERNUS SMI-S Server. The name is a fixed string for the ETERNUS SMI-S Server implementation and it is not variable.

The Namespace name is "interop".

The SMI-S client shall have the method for the administrator to specify the Namespace for each ETERNUS SMI-S Server. The above string shall be specified for any ETERNUS SMI-S Server.

(CIM: <http://www.dmtf.org/standards/cim/>)

4.6 LUN Group Name

LUN Group is assigned any string or left to be null on Web GUI. ETERNUS SMI-S Server requires LUN Group assigned any string name, not null. Otherwise SMI-S operations against the LUN Group are restricted.

LUN Group created by ETERNUS SMI-S Server is assigned any specific name automatically.

4.7 SSH Server Key

In order that ETERNUS SMI-S Server may connect with ETERNUS DX Disk storage system by SSH, please create a SSH server key by the following method.

Web GUI	: [Network Management] - [Set SSH Public Key] Menu
CLI	: create ssh-server-key

Chapter 5

Installation

The installation is performed by Inno Setup.

5.1 Inno Setup

The file name of Setup program used to launch the Inno Setup is the following;

ETERNUS_smis_setup_v3.0.0.0.exe

The clause "v3.0.0.0" in the above is the version code and will be different for each version to be installed. The location of the Setup program is not significant. It can be invoked at any directory because the install directory will be determined by the installation program.

The following items are required for installation.

- Install Directory

The install directory can be specified during installation process. The default directory is the following;

C:\Program Files\Fujitsu\ETERNUS SMI-S Server\

All files are copied only under the install directory. No files are copied into other directories, such as the Windows system directory. See ["Appendix A Directory Structure" \(page 24\)](#) for directory structure detail.

5.2 Configuration File

The ETERNUS SMI-S Server has a configuration file that is used to configure the SMI-S Server. The file type is an ASCII file that can be changed by any text editor. Changes to the configuration file will be reflected to the SMI-S Server when the ETERNUS SMI-S Server service is restarted.

The location of the configuration file is the following;

`<install_directory>\env\smis_env.inf`

The following is the example.

```
[Common]
ConnectionTimeout=300
PollingInterval=300
DeviceStatusInterval=60
StorageIP=10.21.134.239
StorageIP=10.21.134.241

[LifeCycle]
PortLinkStatus=600
Session=300
SessionStatistics=300
RecPath=300
```

The file consists of several lines. Each line is setup as follows:

```
<Item-name> = <value>
```

The *item-name* is the key word name defined in the following description. The *value* is a string separated by the space delimiter.

- **StorageIP**
The ETERNUS SMI-S Server manages multiple ETERNUS DX Disk storage systems. It specifies the ETERNUS DX Disk storage system by IP address. The format of the IP address, e.g. "10.0.0.2", must be valid.
- **MaxStorageIP**
It specifies the number of the maximum ETERNUSDX Disk storage system. If the keyword MaxStorageIP is not specified or value is not specified, the default - 10 - is used. Max value is 15, and min value is 1. It does not exist immediately after installation.
- **PollingInterval**
It specifies the interval time to refresh the SMI-S Server repository. The unit is in seconds. The ETERNUS SMI-S Server will refresh the repository periodically for the specified interval, if the device configuration is changed. If the keyword PollingInterval is not specified or a NULL string is specified, the default interval - 300 - is used. See also the section ["7.2 ETERNUS DX Disk Storage System Status Coherency" \(page 18\)](#) for additional information. Max value is 86400, and min value is 60.

- **DeviceStatusInterval**
It specifies the interval time to monitor the ETERNUS DX Disk storage system device status. The unit is in seconds. The ETERNUS SMI-S Server will refresh the repository when it finds that ETERNUS DX Disk storage system status changed "Error" or "Degraded". If the keyword DeviceStatusInterval is not specified or a NULL string is specified, the default interval - 60 - is used. See also the section ["7.2 ETERNUS DX Disk Storage System Status Coherency" \(page 18\)](#) for additional information. Max value is 3600, and min value is 30.
- **ConnectionTimeout**
It specifies the time-out interval to communicate with ETERNUS DX Disk storage system. The unit is in seconds. If the keyword ConnectionTimeout is not specified or a NULL string is specified, the default interval - 300 - is used. Max value is 86400, and min value is 60.
- **[LifeCycle] section**
In this section, it specifies the lifetime interval of a cache data. The update of this cache data is not periodic, updated by the request. Therefore, each information individually has the life time. The unit is in seconds. Max value is 86400, and min value is 0. 0 means that the request to view the instance always accesses to the ETERNUS DX Disk storage system.
 - **PortLinkStatus**
PortLinkStatus is related to FUJITSU_FCPort.Speed and FUJITSU_EthernetPort.Speed.
If the keyword PortLinkStatus is not specified or a NULL string is specified, the default - 600 - is used.
 - **Session**
Session is related to FUJITSU_iSCSISession.
If the keyword Session is not specified or a NULL string is specified, the default - 300 - is used.
 - **SessionStatistics**
SessionStatistics is related to FUJITSU_iSCSISessionStatistics.
If the keyword SessionStatistics is not specified or a NULL string is specified, the default - 300 - is used.
 - **RecPath**
RecPath is related to CIM_MemberOfCollection, CIM_SAPAvailableForElement, FUJITSU_ConnectivityCollection.InstanceID, FUJITSU_ConnectivityCollection.ConnectivityStatus and FUJITSU_ConnectivityCollection.BoxID.
If the keyword RecPath is not specified or a NULL string is specified, the default - 600 - is used.

5.3 Registration of User ID

Administrator should register the user ID of authentication for the SMI-S client to access the ETERNUS SMI-S Server. It is necessary to start "ETERNUS SMI-S Server" service to register user ID. Perform registration of user ID using the following commands.

```
cimuser -a -u username [ -w password ]
```

The user ID to register specifies the user ID registered into the Windows system.

5.4 Registration of ETERNUS DX Disk Storage System User ID

Administrator should register the user ID of authentication for the ETERNUS SMI-S Server to access the ETERNUS DX Disk storage system. Perform registration of ETERNUS DX Disk storage system user ID using the following commands.

```
cliuser -a storageIP -u username -w password
```

Register ETERNUS user ID in advance by the following methods.

CLI: create user -name [username] -role Software

5.5 Upgrade

The Setup program is not supporting upgrade.
Perform installation after uninstalling ETERNUS SMI-S Server, when upgrading.

5.6 Uninstall

The ETERNUS SMI-S Server is uninstalled by using "Add or Remove Program" from the Control Panel in Windows.
The Setup program also can uninstall it by "Remove" button click.

Chapter 6

Windows Service

The installer of ETERNUS SMI-S Server installs a Windows service: ETERNUS SMI-S Server.

6.1 ETERNUS SMI-S Server Service

The default Startup Type setting when the ETERNUS SMI-S Server service is registered is "Automatic". This means that the service will start automatically on Windows startup. The Administrator can change it to "Manual".

6.2 Control of Service

When the ETERNUS SMI-S Server service is registered, the following operations are enabled.

- Start
The service is started by the Start menu in Services in Administrative Tools under Windows Control Panel. The ETERNUS SMI-S Server has a cache data for the target ETERNUS DX Disk storage system's configuration and status.
- Stop
The service is stopped by the Stop menu in Services in Administrative Tools under Windows Control Panel.
- Restart
The service is restarted by the Restart menu in Services in Administrative Tools. It is identical with the Stop-Start combination.

The other operations - Pause, Resume - are not available.

Chapter 7

Restrictions

7.1 Concurrent Operation

The ETERNUS DX Disk storage system does not support the concurrent management operation. Only one agent can manage the ETERNUS DX Disk storage system at a time.

When the ETERNUS DX Disk storage system configuration is being changed, the SMI-S Server locks (exclusively controls) the ETERNUS DX Disk storage system to prevent other agents from changing the configuration.

7.2 ETERNUS DX Disk Storage System Status Coherency

The ETERNUS SMI-S Server has a repository that maintains the status of the target ETERNUS DX Disk storage system. The repository is a cache for quick response against the query from the SMI-S client.

The repository is created when the Windows service of ETERNUS SMI-S Server starts at first connection with ETERNUS DX Disk storage system and is refreshed in the following cases. There is no specific method to cause the refresh manually.

- Periodic update
There is two interval timers for periodic update - one is to monitor the ETERNUS DX Disk storage system configuration is changed and the other is to monitor the ETERNUS DX Disk storage system status changed "Error" or "Degraded". The timer value may be changed in Configuration file - keyword PollingInterval and DeviceStatusInterval.
- Request processing
The ETERNUS SMI-S Server refreshes the repository during the request processing that would change the ETERNUS DX Disk storage system configuration. e.g. Create RAID group request. The refresh, following a command that changes the ETERNUS configuration, ensures that the SMI-S client receives the most up-to-date ETERNUS DX Disk storage system view.

The Administrator shall note the reflection of current status or configuration may be delays up to the respective interval times.

7.3 Restricted Operations for Masking and Mapping

When ETERNUS SMI-S Server manages ETERNUS DX Disk storage system configured by Web GUI, some operations for masking and mapping function might be restricted to keep the integrity because the device configuration created with Web GUI cannot be expressed full functionally in SMI-S management model. The ETERNUS SMI-S Server should suppress the operations that might corrupt the model integrity, and reply specific error code to SMI-S client that SMI Specification defines as vendor unique code.

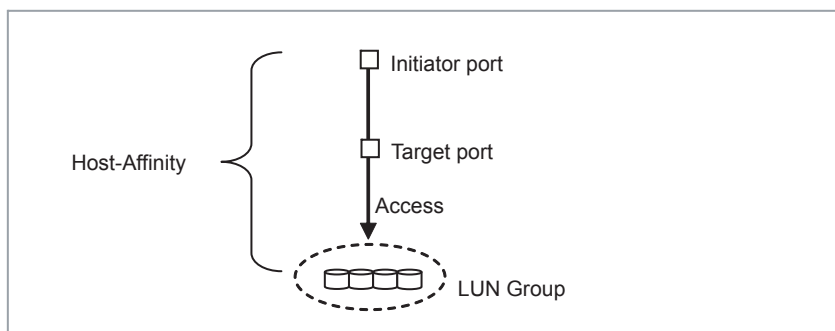
The operation that might be restricted on SMI-S interface is to expose and unexpose the logical volume. The detail and condition to suppress the operations is described in Administrators Guide.

7.4 Volume Type

ETERNUS SMI-S Server cannot create Volume except Open Volume and Thin provisioning Volume. However, it is visible on SMI-S interface.

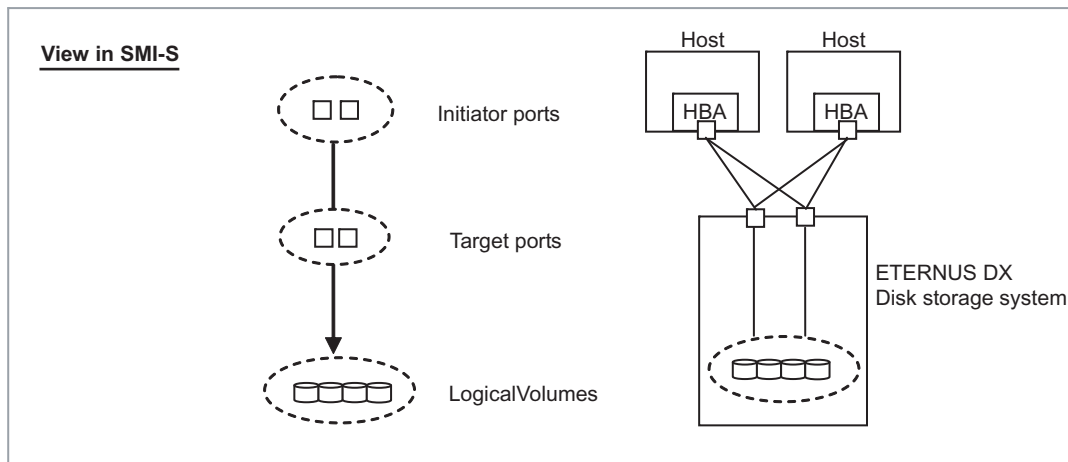
7.5 Masking and Mapping

7.5.1 LUN Group and Host-Affinity



"LUN Group" and "Host-Affinity setting" are concepts to manage the masking and mapping function in ETERNUS DX Disk storage system. LUN Group is a set of logical volumes and volume number mapping information. Host-Affinity setting binds an LUN Group to an initiator port on a target port. The masking and mapping function is realized by LUN Group and Host-Affinity setting in ETERNUS DX Disk storage system.

7.5.2 View

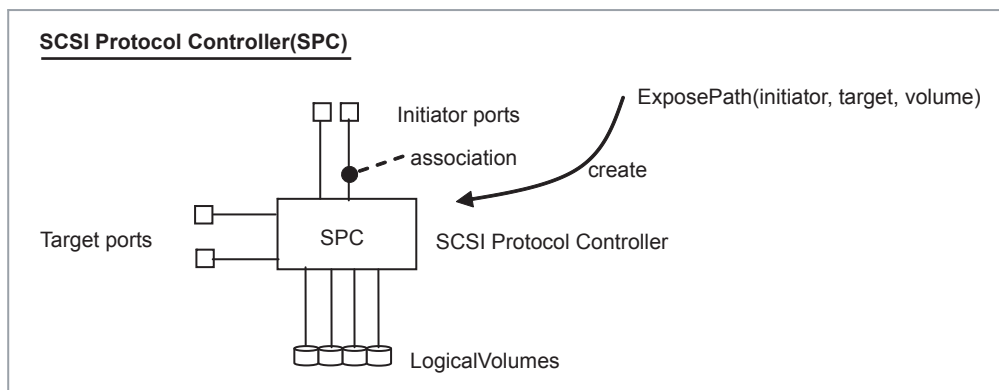


The SMI-S specification defines "view" as key concept to manage the masking and mapping function. The view consists of a set of the following items and represents logical volumes reported by SCSI REPORT LUNS command from any initiator port through any target port in the view.

- List of initiator ports
- List of target ports
- List of logical volumes

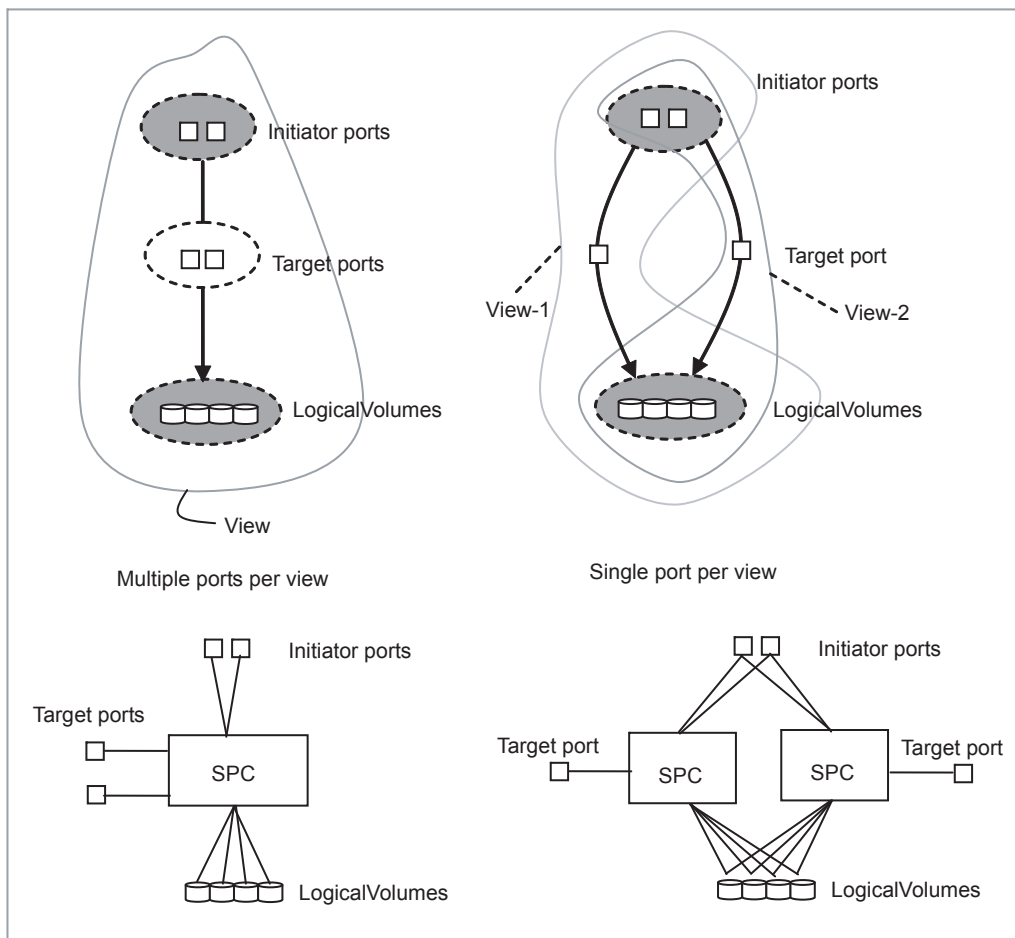
Each initiator/target port and logical volume can be shared by multiple views, but any initiator and target port pair never be shared by multiple views.

7.5.3 SCSI Protocol Controller (SPC)



The method `ExposePath` is defined in SMI-S specification as a function to create view.

It requires initiator/target ports and logical volumes as parameters and reply one or several SPC (SCSIProtocolController) that is an architecture element to keep relationship between each item. Each initiator/target port and logical volume has a relationship called association to SPC.



ETERNUS SMI-S Server implementation has an option for SPC - Single port per view. It means that a SPC can be related to only one target port. In single port per view, the view specified by ExposePath may be split into multiple views for each target port when multiple target ports are specified, and creates multiple SPCs.

As ExposePath method processing, ETERNUS SMI-S Server creates one LUN Group that consists of logical volumes specified by ExposePath method and then binds the LUN Group to each initiator port on each target port by Host-Affinity setting. One LUN Group corresponds to multiple views.

7.5.4 Operation

SMI-S specification defines the following use cases as operations to the view that must be supported at least by any ETERNUS SMI-S Server. The view may be created by ETERNUS SMI-S Server or Web GUI.

- Case1: Add/Remove initiator port in a view
- Case2: Add/Remove target port in a view
- Case3: Add/Remove logical volume in a view

The case 1 and 2 corresponds to ETERNUS DX Disk storage system configuration scheme in straightforward. So, there is no restriction and no need of special consideration for the operation. ETERNUS SMI-S Server performs Host-Affinity setting for the specified initiator/target port.

The case 3 requires special consideration because an LUN Group may be shared by multiple views. The operation to add/remove logical volume to a view is converted by ETERNUS SMI-S Server to the add/remove operation against an LUN Group. If the target LUN Group corresponds to multiple views, the change will be reflected to the other views.

7.5.5 Requisite of SMI-S Client

It is implementation specific how SMI-S client models the "view" and how shows SPC friendly name. SMI-S client may not look SPC friendly name at all because the support of SPC friendly name is optional for ETERNUS DX Disk storage system in SMI-S specification.

If SMI-S client does not present SPC friendly name, Administrator can never identify which views are related on an LUN Group.

7.5.6 Summary

LUN Group is a basic unit to expose logical volume in ETERNUS DX Disk storage system system. It is that one LUN Group is used repeatedly for Host- LUN Group setting in multiple target ports configuration.


ETERNUS SMI-S Server presents views per target port to SMI-S client. When SMI-S client issues a request to add a logical volume to the view, ETERNUS SMI-S Server adds the logical volume to the LUN Group underlying the view. It has side effect to other views sharing the LUN Group.

7.6 Advanced Copy Type

ETERNUS SMI-S Server is not supporting OPC/QuickOPC.

Chapter 8

Support Class and Method



Refer to "ETERNUS SMI-S User's Guide" for the class and method which ETERNUS SMI-S Server is supporting.

The classes and methods that are different from those for an embedded SMI-S Server in "ETERNUS SMI-S User's Guide" are shown below.

■ Notification for device configuration changes

A notification condition of "When the total device status is changed" is added. By registering the notification condition in the SMI-S Server, the listener is notified when the device status is changed.

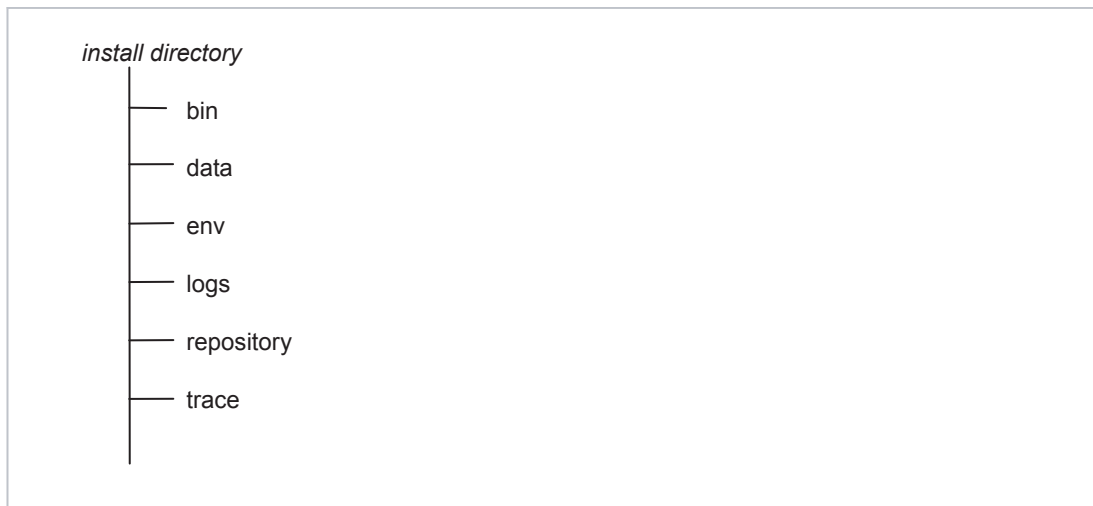
A notification condition of "When an error occurs in the device" is reported to the listener when either of the following statuses occurs:

- Free space in a Thin Provisioning Pool or Thin Provisioning Volume reaches the threshold value
- Free space in a Thin Provisioning Pool or Thin Provisioning Volume is insufficient

Appendix A

Directory Structure

The following is the structure under the install directory of the ETERNUS SMI-S Server.



- **install directory**
The root directory of the SMI-S Server system. The directory path is specified during installation sequence by Administrator. The installer does not copy any files into other directory. All files that consist of the ETERNUS SMI-S Server are located under the *install directory*.
- **bin**
The major part of ETERNUS SMI-S Server. The ETERNUS SMI-S Server consists of two parts - CIMOM (CIM Object Manager) and Provider.
- **data**
The cache data for the target ETERNUS DX Disk storage system's configuration and status.
- **env**
There is a configuration file to configure ETERNUS SMI-S Server under this directory. This 'smis_env.inf' is a generic ASCII file to be edited by any appropriate editor, e.g. notepad tool on Windows.
- **logs**
The ETERNUS SMI-S Server makes internal log files under this directory.
- **repository**
The repository of classes and instances.
- **trace**
The ETERNUS SMI-S Server makes internal trace file under this directory.

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