FUJITSU Storage
ETERNUS DX S4/S3 series Hybrid Storage Systems,
ETERNUS AF series, ETERNUS DX200F All-Flash Arrays

ETERNUS Web GUI User's Guide

Settings/operations/maintenance via Web GUI

FUJITSU

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Preface

This manual provides operational information on how to set up, operate, and manage the FUJITSU Storage ETERNUS DX S4/S3 series Hybrid Storage Systems, ETERNUS AF series, and ETERNUS DX200F All-Flash Arrays via Web GUI (hereinafter referred to as "ETERNUS Web GUI").

This manual is written for controller firmware versions V10L82 and later. (V10L83 and later in a Unified Storage environment.) Some of the functions herein may not be supported for firmware versions V10L81 and earlier.

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Trademarks

Third-party trademark information related to this product is available at:

http://www.fujitsu.com/global/products/computing/storage/eternus/trademarks.html

About This Manual

Intended Audience

This manual is intended for storage system administrators who configure and manage the ETERNUS DX/AF, and field engineers who maintain the ETERNUS DX/AF. Read this manual as required.
Knowledge of UNIX or Windows® system management is required.

Target Models

Product name	Model name
Hybrid Storage Systems	ETERNUS DX60 S4/DX100 S4/DX200 S4 ETERNUS DX500 S4/DX600 S4 ETERNUS DX60 S3/DX100 S3/DX200 S3 ETERNUS DX500 S3/DX600 S3 ETERNUS DX8100 S3/DX8700 S3/DX8900 S3
All-Flash Arrays	ETERNUS AF250 S2/AF650 S2 ETERNUS AF250/AF650 ETERNUS DX200F

Related Documents

The latest version of this manual and the latest information for your model are available at:

http://www.fujitsu.com/global/support/products/computing/storage/disk/manuals/

Refer to the following manuals as required.
- Overview
- Site Planning Guide
- Design Guide (Basic)
- Configuration Guide (Basic)
- Operation Guide (Basic)
- Configuration Guide (NAS)
- Configuration Guide -Server Connection-
- Configuration Guide (Web GUI)
- ETERNUS CLI User's Guide
- ETERNUS SF KM
- ETERNUS SF Storage Cruiser Operation Guide
- ETERNUS vCenter Plug-in User's Guide
- ETERNUS SMI-S Server SMI-S API Reference

The Structures and Contents of ETERNUS Web GUI Manuals

The ETERNUS Web GUI manual is composed of the following two manuals.
- Configuration Guide (Web GUI)
- ETERNUS Web GUI User's Guide (this manual)

The following table describes the contents of each manual.

Manual name	Contents
Configuration Guide (Web GUI)	This manual describes the installation and the environmental settings for the ETERNUS DX/AF storage systems. For basic settings that are not described in this manual, refer to "Configuration Guide (Basic)" of the model.
ETERNUS Web GUI User's Guide	This manual describes the procedures, setup parameters, input conditions, and the default values for ETERNUS Web GUI that are not described in "Configuration Guide (Web GUI)". In addition, this manual describes how to check the states during operation and how to check the parameters during the configuration of the ETERNUS DX/AF.

Document Conventions

■ Third-Party Product Names

- Oracle Solaris may be referred to as "Solaris", "Solaris Operating System", or "Solaris OS".
- Microsoft® Windows Server® may be referred to as "Windows Server".
- Trademark symbols such as ™ and ® are omitted in this document.

■ Notice Symbols

The following notice symbols are used in this manual:

▶ Caution	Indicates information that you need to observe when using the ETERNUS storage system. Make sure to read the information.
⬤ N o t e	Indicates information and suggestions that supplement the descriptions in this manual.

■ **Naming Conventions**

ETERNUS DX Hybrid Storage Systems, ETERNUS AF All-Flash Arrays, and ETERNUS DX200F All-Flash Arrays are here-inafter referred to as "storage system" or "ETERNUS DX/AF (storage systems)". For other models, refer to the following table.

ETERNUS storage system models	Naming conventions
ETERNUS DX60 S4/DX100 S4/DX200 S4, ETERNUS DX500 S4/DX600 S4, ETERNUS DX60 S3/DX100 S3/DX200 S3, ETERNUS DX500 S3/DX600 S3, ETERNUS DX8100 S3/DX8700 S3/DX8900 S3 Hybrid Storage Systems, ETERNUS DX200F All-Flash Arrays	storage system
	ETERNUS DX
	ETERNUS DX storage systems
ETERNUS DX60 S4/DX100 S4/DX200 S4, ETERNUS DX500 S4/DX600 S4, ETERNUS DX60 S3/DX100 S3/DX200 S3, ETERNUS DX500 S3/DX600 S3, ETERNUS DX8100 S3/DX8700 S3/DX8900 S3 Hybrid Storage Systems	ETERNUS DX S4/S3 series
ETERNUS DX60 S4/DX100 S4/DX200 S4, ETERNUS DX500 S4/DX600 S4 Hybrid Storage Systems	ETERNUS DX S4 series
ETERNUS DX60 S3/DX100 S3/DX200 S3, ETERNUS DX500 S3/DX600 S3, ETERNUS DX8100 S3/DX8700 S3/DX8900 S3 Hybrid Storage Systems	ETERNUS DX S3 series
ETERNUS AF250 S2/AF650 S2, ETERNUS AF250/AF650 All-Flash Arrays	ETERNUS AF
	ETERNUS AF series
ETERNUS AF250 S2/AF650 S2 All-Flash Arrays	ETERNUS AF S2
	ETERNUS AF S2 series
ETERNUS DX60 S4/DX100 S4/DX200 S4, ETERNUS DX500 S4/DX600 S4, ETERNUS DX60 S3/DX100 S3/DX200 S3, ETERNUS DX500 S3/DX600 S3, ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, ETERNUS AF250 S2/AF650 S2, ETERNUS AF250/AF650, ETERNUS DX200F, ETERNUS DX90 S2, ETERNUS DX410 S2/DX440 S2, ETERNUS DX8100 S2/DX8700 S2, ETERNUS DX90, ETERNUS DX410/DX440, ETERNUS DX8100/DX8400/DX8700, ETERNUS4000/ETERNUS8000, ETERNUS6000	ETERNUS storage system

■ **Units in this manual**

Except as otherwise noted, the following units are used in this manual:
- Drive capacity assume that 1KB = 1000 bytes, 1MB = 1000KB, 1GB = 1000MB, and 1TB = 1000GB (example: "600GB drive").
- Other capacities (such as for RAID Groups and volumes) assume that 1KB = 1024 bytes, 1MB = 1024KB, 1GB = 1024MB, and 1TB = 1024GB.

Setting Procedures in This Manual

For detailed information about the setting items (descriptions and input conditions), refer to "A. Parameter List" (page 964).

Note that the screen shots in this manual were captured during development of the software and the actual screens may be different.

Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation.

Notes for ETERNUS Web GUI

Notes for Using ETERNUS Web GUI

Note the following points when using ETERNUS Web GUI:

- If the PC and the ETERNUS DX/AF belong to a different network and the transfer rate setting for each network does not match, the retransmission of packets occurs more frequently and the operation screen for ETERNUS Web GUI may take more time to be displayed.
  By setting the same transfer rate for each network, the time to display the operation screen can be reduced. Note the following points when setting the transfer rate.
  - Set the same transfer rate for each network (or adjust to the lowest of the transfer rates)
  - When the transfer rate for the ETERNUS DX/AF is not "Auto-negotiation", the same transfer rate must also be set for the network switches
- Do not use the standard buttons of each browser (for example, the [Back] button, the [Forward] button, and the [Refresh] button), the [F5] (refresh) key, or the [Back Space] (back) key.
- If any of the following messages is displayed after the operation is started, operations cannot be continued. The messages and how to deal with them are as follows.
  - If the message "Lock was relinquished to another user or expired by timeout." appears
    The ETERNUS Web GUI operation is suspended due to an update by another user or a timeout. Click the [OK] button to return to the previous screen and then restart the related function.
  - If the error message "The configuration was updated. The process was aborted." appears
    The data update in ETERNUS Web GUI failed due to an operation by another user. Click the [OK] button to return to the previous screen. Check whether the operation target data was updated and restart the related function as required.
  - If the confirmation message "Do you wish to forcibly acquire the lock?" appears
    Another user is updating data. If the [OK] button is clicked, the data update of the other user may fail. Click the [Cancel] button to return to the previous screen. Any newly added or changed information is discarded. Restart the related function.
  - If the warning message "The login authority was lost." appears
    The login state of ETERNUS Web GUI for the current user is lost. Click the [OK] button to return to the login screen. Log in again to continue using ETERNUS Web GUI.

Operating Environment

The following PC environment is required to use ETERNUS Web GUI.

Confirmed operating environment		Version
Web browser	Microsoft Internet Explorer	9.0, 10.0 (desktop version), 11.0 (desktop version)
	Mozilla Firefox	ESR 45, ESR 52
Display resolution	• 1024 × 768 or more • 24-bit color or more is recommended	–

▷ **Caution**

- Note the following points:
  - Set "Do not use proxy server" as the proxy setting
  - Configure the temporary file (cache) setting of pages so that the pages are updated every time the browser is started
    For example, when using Microsoft Internet Explorer, select "Every time I start Internet Explorer".
  - Enable the JavaScript setting
  - When Auto Reading of pages is available, enable the setting
- Furthermore, when using ETERNUS Web GUI with Microsoft Internet Explorer, note the following points:
  - [Allow websites to open windows without address or status bars] must be enabled. Click the [Custom Level] button under the Internet Options-Security tab and select the [Allow websites to open windows without address or status bars] radio button.
  - The SmartScreen Filter function must be disabled. If the SmartScreen Filter function is enabled, click the [Custom Level] button under the Internet Options-Security tab and disable [Use SmartScreen Filter].
  - Set the following items for [Compatibility View Settings] under the Tools menu.
    - If an address for the ETERNUS DX/AF is displayed in the [Websites you've added to Compatibility View:] field, select and then delete the address
    - Clear the "Display intranet sites in Compatibility View" checkbox
    - Clear the "Display all websites in Compatibility View" checkbox (if this item is displayed)
  - When using SSL (https), note the following points:
    - On the Internet Options-Advanced tab, scroll to Security, and select [Use TLSx] (x: version number). When firmware version V10L70 or later is used, the SSL version for HTTPS (ETERNUS Web GUI) that is used for communication between the ETERNUS DX/AF and the setting PC can be specified. Refer to "Setup SSL Version" (page 153) for details.
    - On the Internet Options-Advanced tab, scroll to Security, and clear the "Do not save encrypted pages to disk" checkbox.
  - To use an IPv6 device address, click the [LAN Settings] button under the Internet Options-Connections tab and disable [Use automatic configuration script].

Screen Operations for ETERNUS Web GUI

This chapter describes the ETERNUS Web GUI screen operations.
Click the [?] icon or the [Help] link for a detailed explanation of the functions used during operation. An explanation (help) screen of the function is displayed.

> ▷ **Caution**
>
> - Be sure to log out after all necessary operations are completed.
> - If the operation screen is not updated when accessing ETERNUS Web GUI, close the web browser, and log in again.

Overview

Overview screen appears immediately after logging in to ETERNUS Web GUI. The status of the ETERNUS DX/AF storage systems and the usage of RAID groups, Thin Provisioning Pools (TPPs), and Snap Data Pools (SDPs) can be checked in this screen.

> ▷ **Caution**
>
> - The [Initial Setup] screen is displayed for the first login after installation of the ETERNUS DX/AF is complete.
> - If the system message "Currently Network Configuration is set to factory default." is displayed, the network environment settings for the MNT port must be performed. Use the [Setup Network Environment] function in the [Network] screen under the [System] navigation. Some functions are not available if the network environment settings are incomplete.
> - If one of the following system messages is displayed, the password must be changed. If the password expires, it cannot be used to log in.
>   - Your password will expire in x days. (x: 1 - 14)
>   - Your password will expire in 24 hours.
>   - Your password has expired and must be changed.
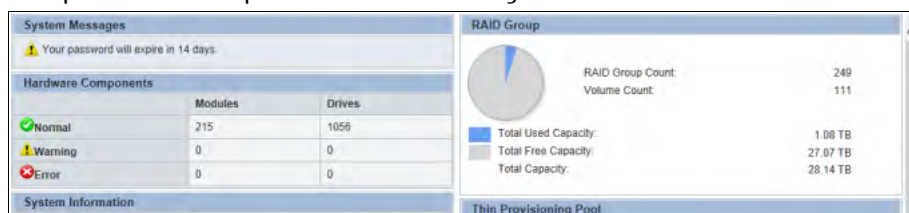
> - If the system message "Configuration was applied to storage system." is displayed, the ETERNUS DX/AF must be rebooted. Any setting processes cannot be performed until the applied configuration information is enabled by rebooting the storage system.
> - If the system message ""Expand Volume Mode" was updated. Please restart the storage system to update "Expand Volume Mode" effectively." is displayed, the ETERNUS DX/AF must be rebooted. The number of volumes and copy sessions is not increased until the ETERNUS DX/AF is rebooted and the new "Expand Volume Mode" is specified.
> - When the application schedule for controller firmware is being reserved, a message to that effect as well as "Firmware Version", "Application Start Date", and "Apply Mode" are displayed. When the application mode is "Update & Reboot", the ETERNUS DX/AF is automatically rebooted after the controller firmware is applied.

- If the message which indicates that the controller firmware application has been reserved disappears before the reserved application date, the reservation may be canceled automatically. In this case, reserve the application schedule for the controller firmware again. Refer to "Apply Controller Firmware" (page 216) for details.

🔵 **N o t e**

- If the system message "Unified Storage license has been registered." is displayed, the unified upgrade must be performed. Note that "Maintenance Operation" policy is required to perform the unified upgrade.
- To set the expiration date for the password, specify "Password Policy". Refer to "Modify User Policy" (page 107) for details. The password expiration date is monitored if the "Password Policy" setting is enabled for the user account with the [Setup User Account] function. To change the password, refer to "Change User Password" (page 48).
- TPP usage is displayed only when the Thin Provisioning function is enabled.
- SDP usage is displayed when one of the following conditions applies:
    - Advanced Copy function license has been registered
    - "Enable" is displayed for the "Unified Storage" field

■ **For the ETERNUS DX60 S4 and the ETERNUS DX60 S3**
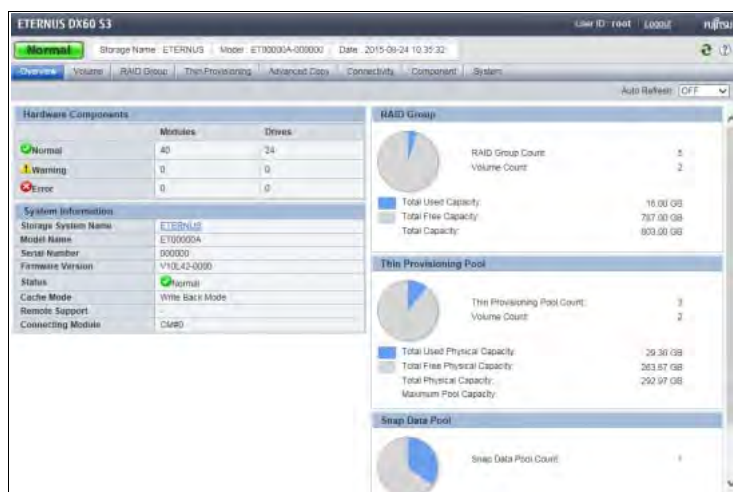
■ **For the ETERNUS DX100 S4 and the ETERNUS DX100 S3**
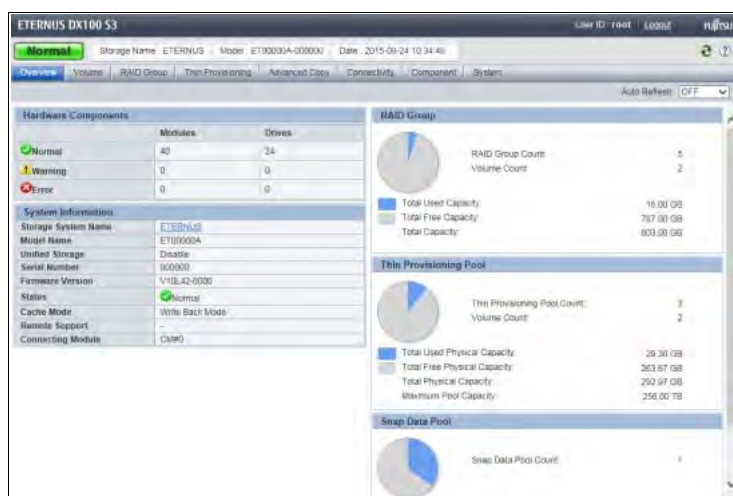
■ **For the ETERNUS DX200 S4, the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX200 S3, the ETERNUS DX500 S3/DX600 S3, the ETERNUS AF250 S2/AF650 S2, the ETERNUS AF250/AF650, and the ETERNUS DX200F**
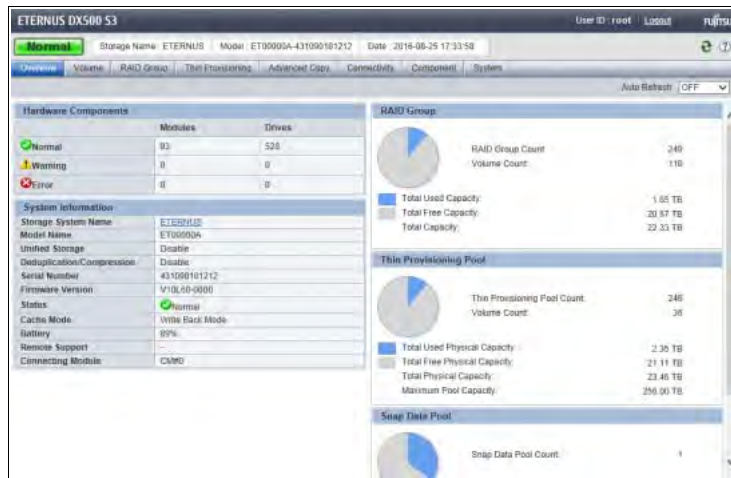
■ **For the ETERNUS DX8100 S3**
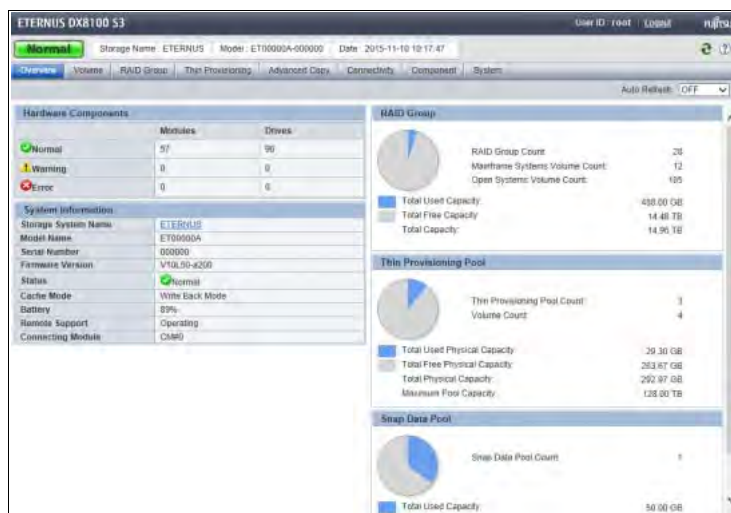
■ **For the ETERNUS DX8700 S3/DX8900 S3**
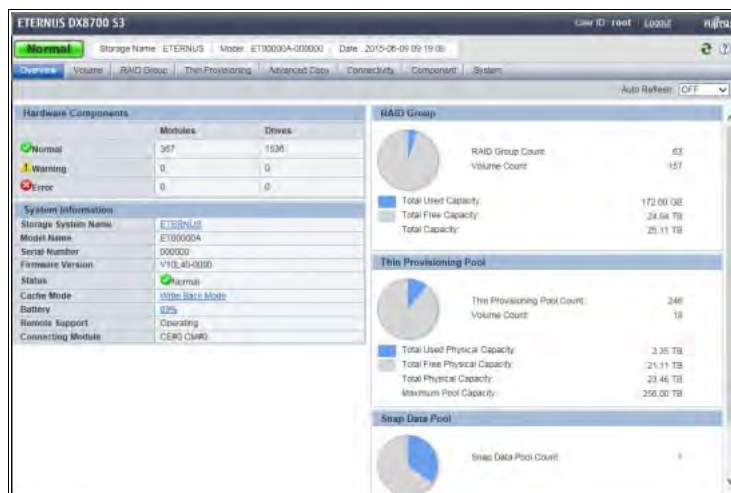
■ **Auto Refresh**

The [Overview] screen is refreshed at the specified update interval.

Select the update interval to refresh the [Overview] screen from "OFF", "60 sec.", "120 sec.", or "180 sec.". The initial state is "OFF".
The monitoring time is reset to "0" when the update interval is changed or the [⟳] icon is clicked. If the specified interval is a value other than "OFF", the new update interval is applied after the monitoring time is reset.
The update interval works while the user is logged in to ETERNUS Web GUI even when other functions are started from the [Overview] screen. The update interval returns to the initial state ("OFF") when the Master CM is switched or when the user logs out of ETERNUS Web GUI.

> ▷ **Caution**
>
> Auto refresh is available only for the [Overview] screen. Screens other than [Overview] are refreshed when the [⟳] icon is clicked or a screen is redisplayed.

■ **System Messages**

A system message is displayed.

- ⓘ Message
  When any information from the ETERNUS DX/AF exists, an information message is displayed.

- ⚠ Message
  When an event causes warning status, a warning message is displayed.
  If a warning message is generated, the LCD message is displayed.
  If an Advanced Copy path in warning status exists, a message is displayed.

- ❌ Message
  When an event causes error status, an error message is displayed.
  If an error message is generated, the LCD message is displayed.
  If an Advanced Copy path in error status exists, a message is displayed.

> ⬤ **N o t e**
>
> An "LCD message" is a message to notify if a failure or warning status occurs. It is displayed when the Master CM is used to operate the ETERNUS DX (or when a user logs in to the ETERNUS DX8700 S3/DX8900 S3 by specifying the Master IP address (*1) via a web browser).
>   *1:   Refer to "Setup Network Environment" (page 114) for details.

■ **Hardware Components**

The number of components for each status is displayed.

- ✅ Normal
  - Modules
    The number of components (*1) in normal status (" ✅ " or " ⬜ ") is displayed.

- Drives
  The number of drives in normal status (" ✅ " or " 🔵 ") is displayed.

- ⚠️ Warning
  - Modules
    The number of components (*1) in warning status (" 🚫 " or " ⚠️ ") is displayed.

  - Drives
    The number of drives in warning status (" 🚫 " or " ⚠️ ") is displayed.

- ❌ Error
  - Modules
    The number of components (*1) in error status (" ❌ ") is displayed.

  - Drives
    The number of drives in error status (" ❌ ") is displayed.

*1:   The number of components that can be maintained. The number of components does not include the number of drives.

■ System Information

The information of the ETERNUS DX/AF is displayed.

- Storage System Name
  The name for the ETERNUS DX/AF is displayed.
  When logged in with a user account that can display detailed component information (*1), a link is displayed on the storage system name.
  Click this link to display the [Storage] screen in the [Component] navigation.

  *1:   A user account with the "Status Display" policy or the "Maintenance Operation" policy can display detailed component information. When logged in with a user account that has a "Monitor", "Admin", "StorageAdmin", "SecurityAdmin", or "Maintainer" default role, a link is displayed on the storage system name.

- Model Name
  The model name of the ETERNUS DX/AF is displayed.

- Unified Storage
  The support status of the unified storage function is displayed.
  If the Unified Storage function is enabled, the ETERNUS DX can be used as a Unified Storage system (a SAN and NAS system).
  For the ETERNUS DX60 S4, the ETERNUS DX60 S3, and the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, this item is not displayed.
  For the ETERNUS AF250 S2/AF650 S2, the ETERNUS AF250/AF650, and the ETERNUS DX200F, "Disable" is displayed.

  > **🔵 N o t e**
  >
  > When upgrading a SAN system to a Unified Storage system, after the unified firmware is applied to the active and inactive controllers, this item is changed to "Enable".

- Deduplication/Compression
  Whether the Deduplication/Compression function is enabled or disabled is displayed.
  For the ETERNUS DX60 S4/DX100 S4, the ETERNUS DX60 S3/DX100 S3, and the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, this item is not displayed.

- Serial Number
  The serial number of the ETERNUS DX/AF is displayed.

- Firmware Version
  The current controller firmware version is displayed.
  - VxxLyy-zzzz (Vxx: Version, Lyy: Level, zzzz: Release number)

- Status
  The detailed general status of the ETERNUS DX/AF is displayed. If the storage system is in normal status, " ✓ " is displayed. Refer to "Storage System General Status (Detail)" (page 1372) for details.

- Cache Mode
  The current cache mode and the factor of the mode are displayed. The normal status is "Write Back Mode".
  For the ETERNUS DX8700 S3/DX8900 S3, click this item to display the [Controller Enclosure] screen. Refer to "Controller Enclosure" (page 681) for details.
  - Write Back Mode
    When a Write request is issued from the host, "Write Complete" is displayed after writing to the cache area is complete.
  - Write Through Mode
    When a Write request is issued from the host, "Write Complete" is displayed after writing to the cache area and the drives is complete.
    In the Write Through Mode, "Write Through (factors)" is displayed. When there are multiple factors, all the factors are separated with a "/" (slash) and displayed.
    The factors of the Write Through Mode are described below:
    - Write Through (Pinned Data)
      A large amount of pinned data (*1) occurred in the ETERNUS DX/AF.
    - Write Through (Battery)
      The battery charge level is low.
    - Write Through (Maintenance)
      One of the following functions is currently being used:
      - Upgrading the controller firmware in hot mode
      - Changing the Controlling CM of the RAID group
      - Adding the Controller Module (*2)
      - Setting the Deduplication/Compression mode (when enabling)
      - Setting the exclusive read cache size
    - Write Through (1CM)
      The ETERNUS DX/AF operated with 1CM. (*3)
    *1: "Pinned data" is the data left in the cache memory due to unsuccessful write-back to the volume from the cache memory.
    *2: When reassigning the Controlling CM for the RAID group using all normal CMs including the added CM, the cache mode is temporarily changed to "Write Through Mode" during a configuration.
    *3: This mode is displayed when "1CM Write Through" is enabled by using the procedure in "Setup Subsystem Parameters" (page 65) and the ETERNUS DX/AF is operated with 1CM (only 1CM can be used due to an error such as a CM failure). The "1CM Write Through" setting for the "Setup Subsystem Parameters" function is displayed and can be changed when logged in using a user account with the "Maintenance Operation" policy. The initial state is "Disable".

- Battery
  The battery charge level is displayed.
  When the battery charge level is 90% or more, "Full Charge" is displayed. When the battery charge level is less than 90%, "xx%" is displayed.
  For the ETERNUS DX8700 S3/DX8900 S3, the lowest battery charge level among all Controller Enclosures (CEs) is displayed. Click this item to display the [Controller Enclosure] screen. Refer to "Controller Enclosure" (page 681) for details.
  This item is displayed for the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, the ETERNUS AF650 S2, and the ETERNUS AF650.

- Remote Support
  The Remote Support status (REMCS or AIS Connect) is displayed.
  - Operating
    The Remote Support is operating.
  - Maintenance in Progress
    The ETERNUS DX/AF is under maintenance and the Remote Support is temporarily stopped.
    After the maintenance is complete, Remote Support is automatically resumed.

- Stopped
  The Remote Support has been stopped.
- "-"
  The Remote Support setting is not performed.

- Connecting Module
  The Controller Module (CM) to which ETERNUS Web GUI is connected is displayed.

■ RAID Groups

The usage of RAID groups is displayed.

- Pie chart
  The pie chart indicates the total used capacity and the total free capacity in the RAID groups.
  Blue: Total used capacity
  Gray: Total free capacity

- RAID Group Count
  The number of RAID groups registered in the ETERNUS DX/AF is displayed.
  The "RAID Group Count" includes the number of RAID groups that configure TPPs, the number of RAID groups that configure Flexible Tier Pools (FTRPs), the number of RAID groups that are registered as REC Disk Buffers, and the number of RAID groups that are registered as Extreme Cache Pools (EXCPs).

- Volume Count
  The number of volumes registered in the ETERNUS DX/AF is displayed.
  The "Volume Count" displays the number of "Standard" type volumes and "Wide Striping Volumes (WSVs)".

- Total Used Capacity
  The total used capacity of the RAID groups [TB/GB/MB] is displayed. The "Total Used Capacity" is the total capacity of all of the RAID groups that are used. An example of this capacity is space that is used for volumes in the RAID groups. The "Total Used Capacity" includes the capacity of the RAID groups that configure TPPs, the capacity of the RAID groups that configure FTRPs, the capacity of the RAID groups that are registered as REC Disk Buffers, and the capacity of the RAID groups that are registered as EXCPs.

- Total Free Capacity
  The total free capacity of the RAID groups [TB/GB/MB] is displayed. The "Total Free Capacity" is a total of unused capacities in the RAID groups. The "Total Free Capacity" includes the capacity of the RAID groups that configure TPPs, the capacity of the RAID groups that configure FTRPs, the capacity of the RAID groups that are registered as REC Disk Buffers, and the capacity of the RAID groups that are registered as EXCPs.

- Total Capacity
  The total capacity of the RAID groups [TB/GB/MB] is displayed. The "Total Capacity" is the total capacity of all the RAID groups in the ETERNUS DX/AF. The "Total Capacity" includes the capacity of the RAID groups that configure TPPs, the capacity of the RAID groups that configure FTRPs, the capacity of the RAID groups that are registered as REC Disk Buffers, and the capacity of the RAID groups that are registered as EXCPs.

> Total Free Capacity = Total Capacity - Total Used Capacity

■ Thin Provisioning Pool

The usage of TPP is displayed.

- Pie chart
  The pie chart indicates the total used physical capacity and the total free physical capacity in the TPPs.
  Blue: Total used physical capacity
  Gray: Total free physical capacity

- Thin Provisioning Pool Count
  The number of TPPs registered in the ETERNUS DX/AF is displayed.

- Volume Count
  The number of volumes registered in the ETERNUS DX/AF is displayed.
  This value displays the number of "TPV" type volumes.

- Total Used Physical Capacity
  The total used physical capacity of the TPPs [PB/TB/GB/MB] is displayed. "Total Used Physical Capacity" is the total physical capacity of all the TPPs that are allocated to the volumes.

- Total Free Physical Capacity
  The total free physical capacity of the TPPs [PB/TB/GB/MB] is displayed. "Total Free Physical Capacity" is the total physical capacity of all the TPPs that are not allocated to the volumes.

- Total Physical Capacity
  The total physical capacity of the TPPs [PB/TB/GB/MB] is displayed. The "Total Physical Capacity" is the total physical capacity of all the TPPs in the ETERNUS DX/AF.

  > Total Free Physical Capacity = Total Physical Capacity - Total Used Physical Capacity

- Maximum Pool Capacity
  The maximum pool capacity is displayed.
  The maximum pool capacity is the maximum total capacity for TPPs and FTRPs that can be created in the ETERNUS DX/AF.
  The "Maximum Pool Capacity" is specified by using the [Set Thin Provisioning] function. Refer to "Set Thin Provisioning" (page 536) for details.

■ **Snap Data Pool**

The usage of SDP is displayed.

- Pie chart
  The pie chart indicates the total used capacity and the total free capacity in the SDP.
  Blue: Total used capacity
  Gray: Total free capacity

- Snap Data Pool Count
  The number of SDPs that are registered in the ETERNUS DX/AF is displayed.
  SDP becomes available when creating a Snap Data Pool Volume (SDPV). One SDP is created in the ETERNUS DX/AF.

- Total Used Capacity
  The total used capacity of the SDP [TB/GB/MB] is displayed. The "Total Used Capacity" is the total capacity of the SDP that is used for volumes.

- Total Free Capacity
  The total free capacity of the SDP [TB/GB/MB] is displayed. The "Total Free Capacity" is the total unused capacity of the SDP.

- Total Capacity
  The total capacity of the SDP [TB/GB/MB] is displayed. The "Total Capacity" is the total capacity of the SDP in the ETERNUS DX/AF.

  > Total Free Capacity = Total Capacity - Total Used Capacity

Screen Structures

This section describes screen layouts for functions other than Overview screen.
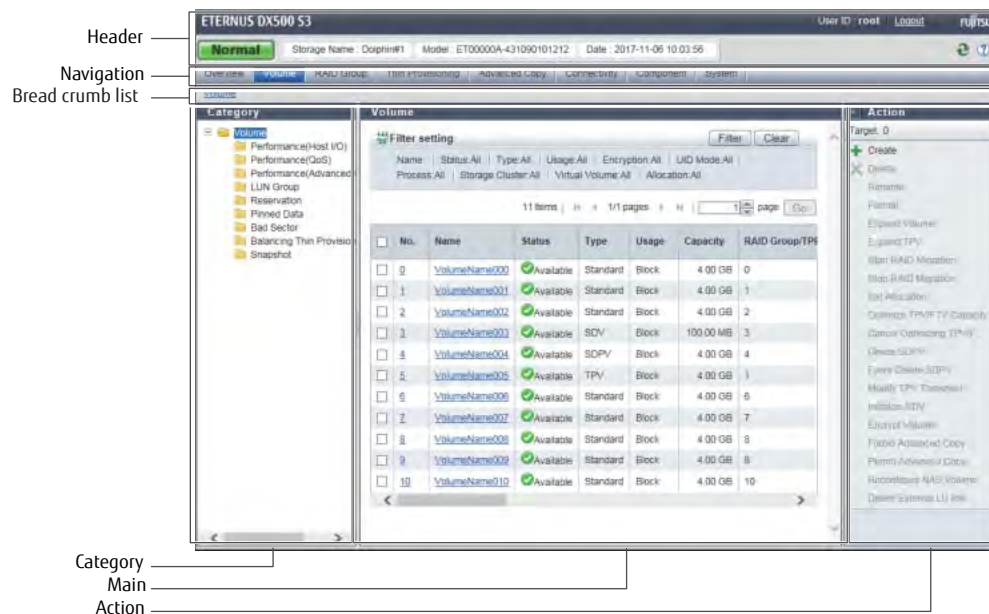
■ Header
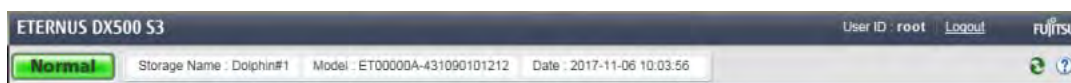
User ID, [Logout] link, general status, storage system name, model name, date, [🔄] icon (Refresh), and [❓] icon (Help) are displayed in the header. Only when the maintenance is being performed for the ETERNUS DX/AF, [🔧 Maintenance Mode] icon is displayed.
The header is always displayed.

• General status of the ETERNUS DX/AF
   Status of each component in the ETERNUS DX/AF is monitored periodically, and the result is displayed as a general status icon with character strings. Refer to "Storage System General Status" (page 1372) for details about the general status.

■ Navigation

Clicked tab

Overview, Volume, RAID Group, Thin Provisioning, Advanced Copy, Connectivity, Component, and System tabs are displayed.
Click the tab for the function that is to be used. The tab turns light blue and a list screen for that function is displayed.
The navigation is always displayed.

■ **Bread crumb list**

Volume

Bread crumb indicates the location of the current screen on ETERNUS Web GUI.
Click the link to display the list screen of the target item.

■ **Category**
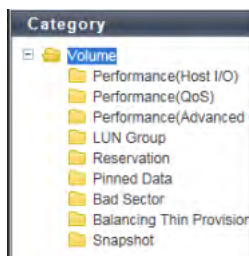
The subordinate items are displayed for an item that is clicked in the navigation. The category directory is used for switching the contents that are displayed in the Main screen. Click the item for the function that is to be used. The horizontal width of the category area can be changed.

■ **Main**
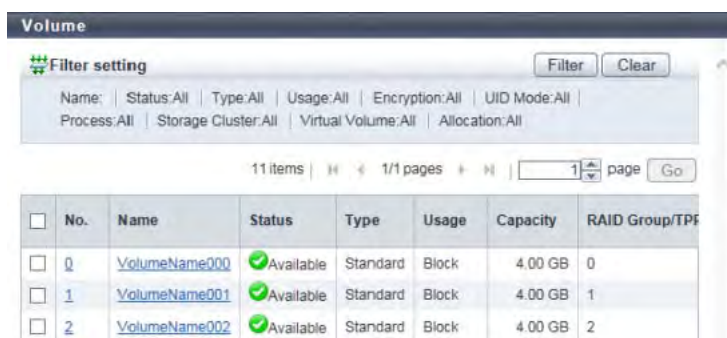
A list of items is displayed for an item that is clicked on the navigation or in the category.
The filter setting area may also be displayed for some lists.

■ **Action**
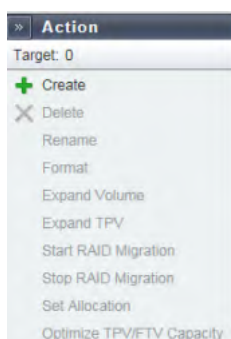
Only the available functions for the selected items from the navigation or in the category are displayed. Click the function that is to be used to display the screen.
Click the [>>] button to switch the display of the action area.
The number of operation targets that is selected in the Main area is displayed in the "Target:" field. When no selections are made, "0" is displayed.

List Screen/Detailed Screen

There are two types of main screens; a list screen and a detailed screen.
The header, bread crumb list, and navigation areas are not included in the screen shots in this section.

■ List screen

A list of the items that were clicked on the navigation or in the category is displayed. For items with detailed information, links to the detailed screens are displayed.

(1/4)
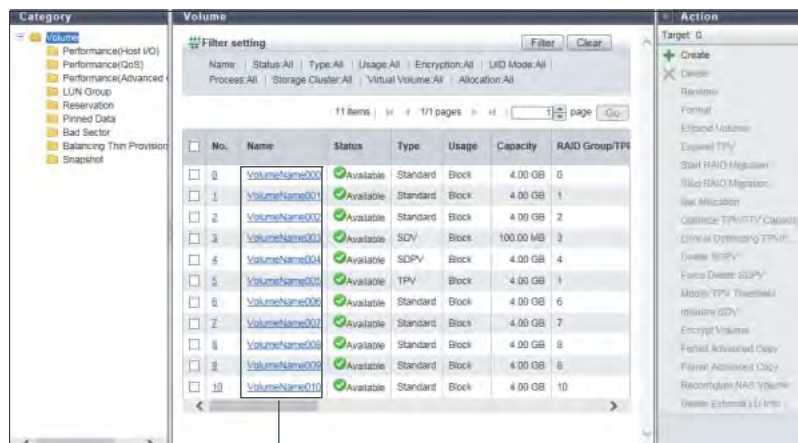
Links to detailed screen

(2/4)

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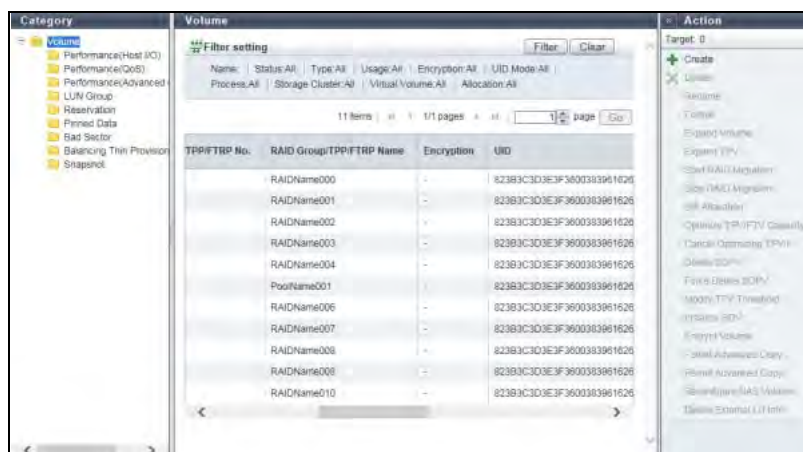
(3/4)
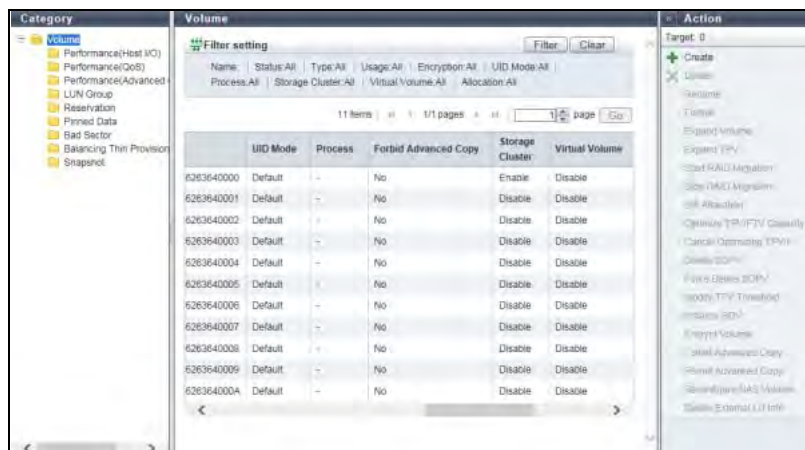
(4/4)
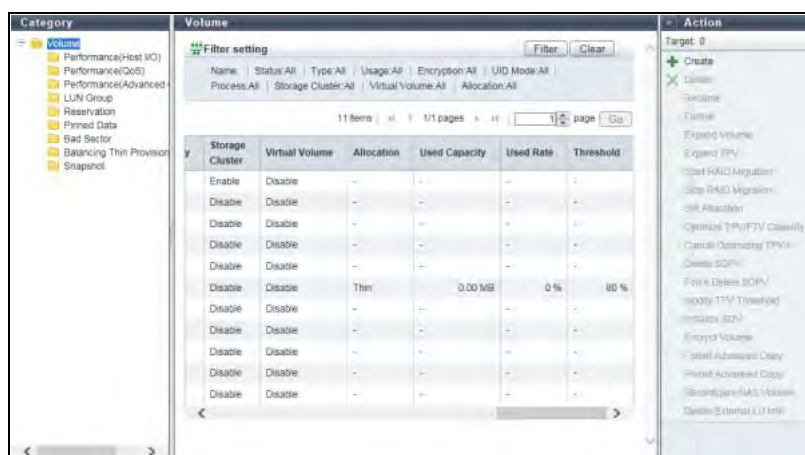
■ Detailed screen

Click the link for each item in the list screen to display a detailed screen. Click the tabs that are displayed to switch the display.

Tabs to change detailed screens
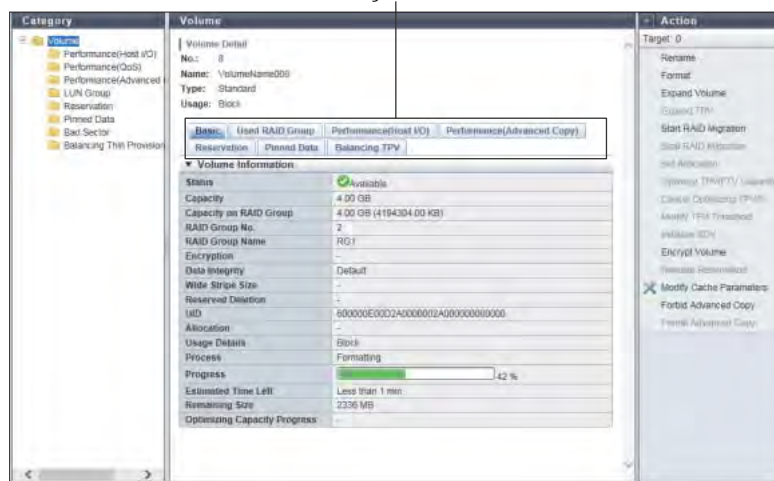
> **◯ N o t e**
>
> For some items, the same information may be displayed for the list screen and the detailed screen. From "8. System Status" (page 634) onward, only the information for items in the detailed screen that is different from the list screen is described.

Basic Operation

Select the desired item and execute the selected operation.

■ Selecting an operation

When an item in the navigation or category is clicked, a list items for the selected item is displayed. Select the checkbox or checkboxes of the listed items for the desired operation. Note that some operations, such as creating new volumes, do not require the item to be selected.
The following operations are available in the list screen:

- Filter setting
  Filter setting is a function used to display a list of only the items that meet all the specified conditions. The settings that can be specified vary depending on the function that is selected. No filtering is set by default. For "Name", "WWN" (World Wide Name), "iSCSI Name", and "SAS Address", items that match or partially match the input characters or numbers are displayed.
  The procedure to filter the displayed items is as follows:

> **Procedure**

1 The current filter setting is displayed in the "Filter setting" field. Click the [Filter] button to set a filter condition.
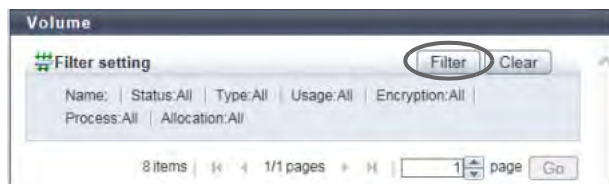
→ The [Filter setting] screen appears.

2   Specify a filter condition and click the [OK] button.
For multiple filters, AND is used as the condition.

→ This list screen is displayed after the filter is set.

3   Click the [Clear] button.

→ This list screen is displayed after the filter setting is cleared.

End of procedure

● Number of operation target items

Number of operation target items

The number of operation target items that are registered in the ETERNUS DX/AF is displayed.

● Page specification

Page specification

Page specification is a function used to display the specified page. This setting is available when lists are displayed on multiple pages. The total number of pages and the current page number is displayed.
   - Click the [<<] button to display the first page.
   - Click the [<] button to display the previous page.
   - Click the [>] button to display the next page.
   - Click the [>>] button to display the last page.
When specifying the page that is to be displayed, input the numeric character in the page specification spin box and click the [Go] button. A list for the specified page is displayed.

● Sort
Sorting is a function that rearranges the order of the display items in ascending order (A - Z or 0 - 9), in descending order (Z - A or 9 - 0), or in a specific order. Click the sorting criteria to change the order. The item that is furthest to the left is displayed in ascending order by default. Note that the order of some display items that have specific meanings (such as the concatenation order of volumes) cannot be sorted.

The example procedure to sort the volume list by "Name" is as follows.

Procedure

1   Click "Name".

☐	No.	Name	Status	Type	Usage	Capacity	RAI

→   The "Name" cell turns light blue and the ascending order mark is displayed.

2   Click "Name".

→   The name list is sorted in descending order.

3   Click "Name".

→   The name list is returned to ascending order.

End of procedure

- Select All checkbox
  The "Select All" checkbox is the first item in the left of the item field. Click this checkbox to select all of the checkboxes that are listed. This checkbox is left clear by default.

  The example procedure to select all items in the volume list is as follows.

Procedure

1 Select the checkbox to the left of the item field of the volume list.

	No.	Name	Status	Type	Usage	Capacity	RAI
☐	0	OLU#0	✅Available	Standard	Block	256.00 MB	0
☐	1	OLU#1	✅Available	Standard	Block	256.00 MB	0
☐	2	OLU#2	✅Available	Standard	Block	256.00 MB	0
☐	3	OLU#3	✅Available	Standard	Block	256.00 MB	0
☐	4	OLU#4	✅Available	Standard	Block	256.00 MB	1
☐	5	OLU#5	✅Available	Standard	Block	256.00 MB	1
☐	6	OLU#6	✅Available	Standard	Block	256.00 MB	1
☐	7	OLU#7	✅Available	Standard	Block	256.00 MB	1

The checkboxes for all the volumes in the list are selected.

☑	No.	Name	Status	Type	Usage	Capacity	RAI
☑	0	OLU#0	✅Available	Standard	Block	256.00 MB	0
☑	1	OLU#1	✅Available	Standard	Block	256.00 MB	0
☑	2	OLU#2	✅Available	Standard	Block	256.00 MB	0
☑	3	OLU#3	✅Available	Standard	Block	256.00 MB	0
☑	4	OLU#4	✅Available	Standard	Block	256.00 MB	1
☑	5	OLU#5	✅Available	Standard	Block	256.00 MB	1
☑	6	OLU#6	✅Available	Standard	Block	256.00 MB	1
☑	7	OLU#7	✅Available	Standard	Block	256.00 MB	1

End of procedure

■ Displaying multiple items

When there are multiple display targets, a display target and a [Show...] link are displayed. Click the [Show...] link to display all of the items and a [Hide...] link. Click the [Hide...] link to return to the default display.

The following are examples of when multiple CA reset group members are displayed.

- When the [Show...] link is displayed

[Show...] link ⎯⎯

CA Reset Group

1 items | ⫷ ◁ 1/1 pages ▷ ⫸ | 1 page Go

☐	CA Reset Group Member
☐	CM#0 CA#0 Port#0, CM#0 CA#0 Port#1 Show...

- • When the [Hide...] link is displayed
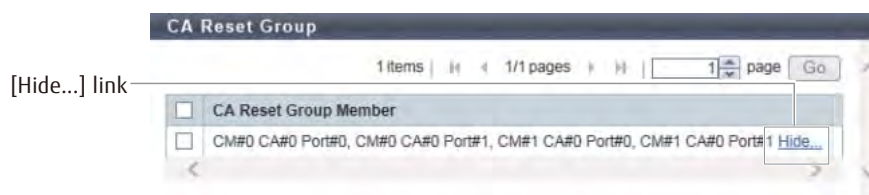
■ Executing an operation

Select the desired operation item from the navigation or category, and then select the function that is to be executed in the Action field.
Some functions in the Action field require one target item from the list to be selected, some functions require multiple target items to be selected, and other functions can be performed without selecting any items. Only the available functions can be clicked.

The example procedure to select [Rename] in [Action] from the volume list screen is as follows.

Procedure

1 Click the [Volume] navigation tab.
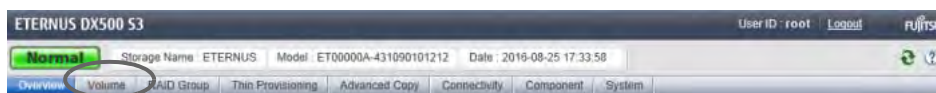
→ The [Volume] screen is displayed.

2 Select the operation target volume.
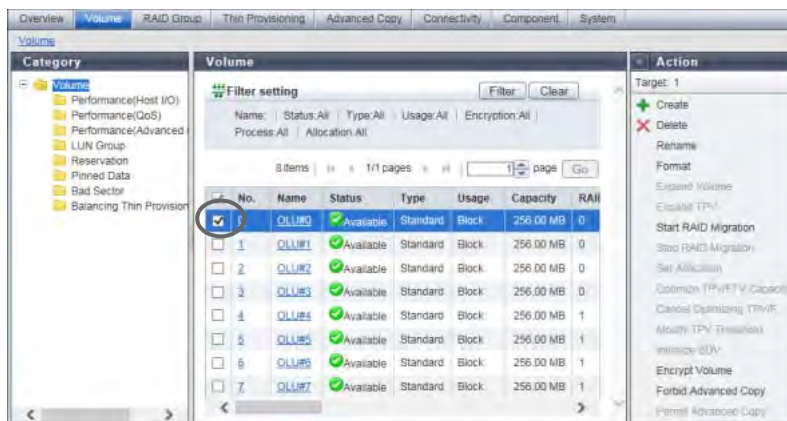
→ The background of the selected volume information turns light blue.

3   Click [Rename] in [Action].
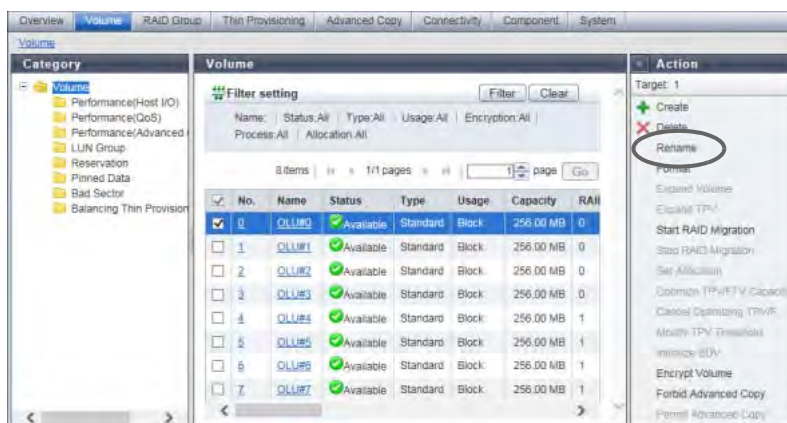
→   The [Rename Volume] screen is displayed.

4   Rename the volume.
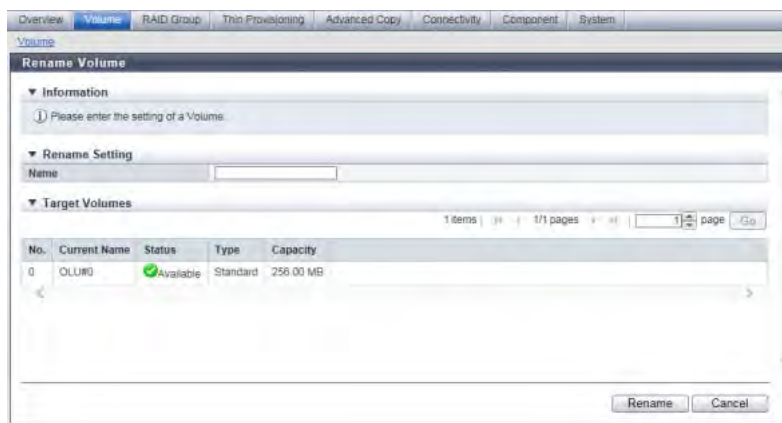
End of procedure

- [Cancel] button

[Cancel] button

Deletes the newly added or changed information, and then returns to the previous screen. Or cancels the current operation, and then returns to the previous screen.

■ Confirming the operation
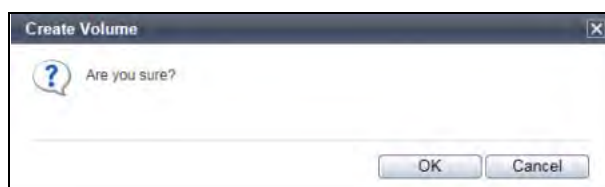
To continue the operation, click the [OK] button. Clicking this button starts the process.
To cancel the operation, click the [Cancel] button. Clicking this button discards any newly added or changed information and returns to the start screen, or cancels the current process and returns to the start screen.

■ Updating the screen display

[Refresh] icon
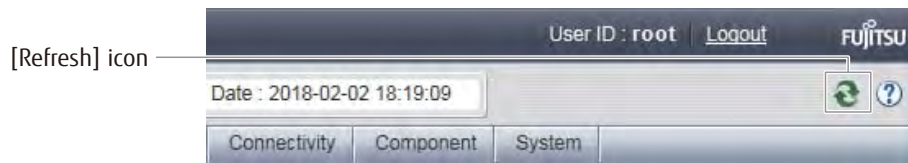
When the [ ] icon in the global header is clicked or a category, a navigation, or an action is selected, the most recently updated screen is obtained. If a tab is clicked, the screen is not updated. Note that only the [Overview] screen automatically updates periodically according to the specified update interval.

> **N o t e**
>
> The header, bread crumb list, and navigation areas are not included in the screen shots in the following chapters and sections.

Part 1

Settings

1. System Management

This chapter describes system management.

When using functions in the Action area, select the desired function from the Action area that is displayed in the status display screen.
The functions in the Action area for System can be performed from the following display functions:

Functions in the Action area for System	Display function
Initial Setup	• System (Basic Information)
Change User Password	
Set SSH Public Key	
Set Deduplication/Compression Mode	
Register Non-disruptive Storage Migration License	
Delete Non-disruptive Storage Migration License	
System Settings	–
Modify Storage System Name	• System Settings
Modify Date and Time	
Change Box ID	
Setup Subsystem Parameters	
Setup Encryption Mode	
Setup SMI-S Environment	
Register SED Authentication Key	
Setup Power Management	
Setup Extreme Cache	
Setup Exclusive Read Cache	
Setup Disk Drive Patrol	
Setup Debug Mode	
Utility Management	–
Shutdown/Restart Storage System	• Utility
Backup Configuration	
Export Configuration	
Start/Stop Performance Monitoring	
Clear Cache	
Eco-mode Management	–
Modify Eco-mode General Setting	• Eco-mode
Create Eco-mode Schedule	
Delete Eco-mode Schedule	
Modify Eco-mode Schedule	

Functions in the Action area for System	Display function
User Management	–
Setup User Account	• Define Role
Initialize User Account	
Modify User Policy	
Modify RADIUS	
Add Role	
Delete Role	
Modify Role	
Network Management	–
Setup Network Environment	• Network
Setup Firewall	
Setup SNMP Agent Basic Interface	
Setup SNMP Manager	
Setup SNMP Agent MIB Access View	
Setup SNMP Agent User	
Setup SNMP Agent Community	
Setup SNMP Agent Trap	
Download MIB File	
Send SNMP Trap Test	
Display SMTP Log	
Setup E-Mail Notification	
Setup Syslog	
Setup SSH Server Key	
Create Self-signed SSL Certificate	
Create Key/CSR	
Register SSL Certificate	
Setup SSL Version	
Event/Dump Management	–
Setup Event Notification	• Event/Dump
Display/Delete Event Log	
Export/Delete Log	
Export/Delete Panic Dump	
Audit Log Management	–
Enable Audit Log	• Audit Log
Disable Audit Log	
Setup Audit Log	

Functions in the Action area for System	Display function
Key Management	–
Setup Key Management Machine Name	• Key Management
Add Key Server	
Delete Key Server	
Modify Key Server	
Create Key Group	• Key Group
Delete Key Group	
Modify Key Group	
Update SED Authentication Key	
Import SSL/KMIP Certificate	
Storage Migration Management	–
Start Storage Migration	• Storage Migration
Download Template File for Storage Migration Settings	
Delete Storage Migration Path	
Download Storage Migration Result	• Path Group Information Detail screen
Restart Storage Migration	
Suspend Storage Migration	
Stop Storage Migration	
External Drive Management	–
Create External Drive	• External Drive
Delete External Drive	
Remote Support Management (REMCS)	–
Display Communication Log	• Remote Support Management (REMCS)
Setup Remote Support	
Update Customer Information	
Update Communication Environment Information	
Setup Log Sending Parameters	
Stop/Restart Remote Support	
Remote Support Management (AIS Connect)	–
Setup AIS Connect Environment	• Remote Support Management (AIS Connect)
Setup Remote Session Permission	
Send Log	
Test Server Connectivity	
Send AIS Connect Test Event	
Import Root Certificate	
Firmware Management	–
Apply Controller Firmware	• Firmware Maintenance
Delete Controller Firmware Schedule	

Initial Setup

This function performs the initial settings that must be set before operating the ETERNUS DX/AF storage systems on a series of wizard screens.
Initial Setup is divided into "Initial Setup 1" and "Initial Setup 2".

- Initial Setup 1
  Performs the minimum settings required before using the ETERNUS DX/AF.
  Refer to "Initial Setup 1" in "Configuration Guide (Web GUI)" for details.

  The "Initial Setup 1" provides the following functions.

  (1) Set Storage System Name

  (2) Change User Password

  (3) Set Thin Provisioning

  (4) Register Advanced Copy License

  (5) Register SED Authentication Key

  (6) Set Network Environment

- Initial Setup 2
  Makes the reporting settings for when an error occurs in the ETERNUS DX/AF. The settings can be omitted if the reporting function will not be used.
  Refer to "Initial Setup 2" in "Configuration Guide (Web GUI)" for details.

  The "Initial Setup 2" provides the following functions.

  (1) Set Date and Time

  (2) Setup SNMP Agent Basic Interface

  (3) Setup SNMP Manager

  (4) Setup SNMP Agent MIB Access View

  (5) Setup SNMP Agent User

  (6) Setup SNMP Agent Community

  (7) Setup SNMP Agent Trap

  (8) Setup E-Mail Notification

  (9) Setup Syslog

  ○ **N o t e**

  If "Initial Setup 2" is not used, configure each reporting function if necessary.

Change User Password

This function changes the current user's (your) password.

> ▷ **Caution**
>
> • When RADIUS Authentication is used for login, the password cannot be changed.
> • If one of the following information appears in the "Days To Password Change" field in "User Information", the password cannot be changed during that period.
>   - Number of days
>   - Less than 24 hours

> 🔵 **N o t e**
>
> If a date and time is displayed for the "Last Password Setting Date" field in "User Information", "Password Policy" for the relevant user account is enabled. Check the "Password Policy" setting before changing the password. Refer to "Modify User Policy" (page 107) for details.

For details on the parameters for this function, refer to "A. Change User Password" (page 964).

The procedure to change the password is as follows:

Procedure

1 Click [Change User Password] in [Action].

2 Specify the parameters.

The main setting items are as follows.

● **Password Setting**

   • Old Password

   • New Password

   • Confirm New Password

3 Click the [Change] button.

4 A confirmation screen appears. Click the [OK] button.
→ Changing of the user password starts.

5 Click the [Done] button to return to the [System] screen.

End of procedure

Set SSH Public Key

This function registers, changes, or deletes the current user's (your) Secure Shell (SSH) client public key.

▷ **Caution**

- When using the SSH Client Key authentication, create a pair of the SSH client public key and the SSH client secret key in advance, using the creation tool. One public key can be registered per user account. When this function is executed, the public key is registered in the ETERNUS DX/AF.
- The following types (formats) of public keys can be used:
  - IETF style DSA for SSH v2
  - IETF style RSA for SSH v2

  The maximum of encryption strength of the supported public key is 4096-bit.

For details on the parameters for this function, refer to "A. Set SSH Public Key" (page 966).

The procedure to set the SSH public key is as follows:

Procedure

1   Click [Set SSH Public Key] in [Action].

2   Specify the SSH Public Key.
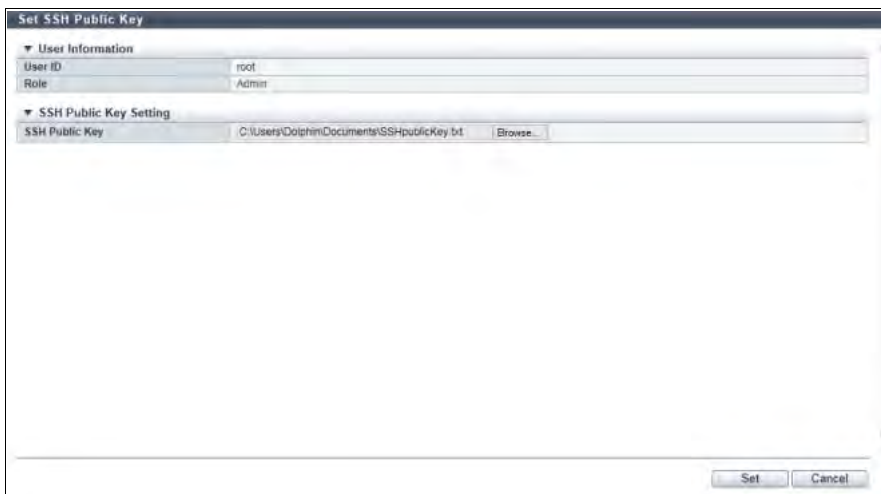
The main setting item is as follows.

● **SSH Public Key Setting**

- SSH Public Key

  🔵 **N o t e**

  To delete the SSH client public key, select the "Delete" checkbox and click the [Set] button.

3   Click the [Set] button.

4   A confirmation screen appears. Click the [OK] button.
      → The registration of the SSH public key starts.

5 Click the [Done] button to return to the [System] screen.

End of procedure

Set Deduplication/Compression Mode

This function enables Deduplication/Compression for the ETERNUS DX/AF.
If Deduplication/Compression is enabled, the duplicated data blocks in TPP are deleted and compressed to reduce the used area of the drive.

> ▷ **Caution**

- The Deduplication/Compression function is not available for the ETERNUS DX200 S4/DX200 S3 1CM model because the Thin Provisioning function is not provided.
- In a Unified Storage environment, the Deduplication/Compression setting cannot be set for both NAS user volumes (TPVs) and SAN volumes (TPVs).
- If this function is enabled, the performance may be reduced depending on the I/O environment. For notes on using this function, refer to "Design Guide (Basic)" for each model.
- Only Deduplication/Compression Volumes in the same TPP are the targets of Deduplication/Compression. TPVs that are not Deduplication/Compression Volumes, and NAS volumes are not supported.
- Checking for duplications across multiple TPPs is not supported.
- To use this function with the ETERNUS DX200 S4, the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX200 S3 and the ETERNUS DX500 S3/DX600 S3, install "Memory Extension" in advance.
- When this function is enabled, the cache mode is temporarily changed to "Write Through Mode". The workload I/O performance of the entire ETERNUS DX/AF is lowered when the cache mode is transitioning to "Write Through Mode". Therefore, it is recommended to use this function when workload I/O is low. This process may take up to several tens of minutes.
- If this function is changed from "Enable" to "Disable", reboot the ETERNUS DX/AF. Note that rebooting the ETERNUS DX/AF is not required if this function is changed from "Disable" to "Enable".
- If the Deduplication/Compression Volume is used as a copy source volume, the copy process is performed after the data is decompressed. If the Deduplication/Compression Volume is used as a copy destination volume, the data that is transferred from the copy source is deduplicated and compressed. Because of that, the copy performance is affected.
- This function cannot be used when the storage system status is "Not Ready".
- This function cannot be enabled under the following conditions:
    - The ETERNUS DX is used in a Unified Storage environment
    - The memory size for each CM is less than 32GB when using the ETERNUS DX200 S4, the ETERNUS DX500 S4, the ETERNUS DX200 S3, or the ETERNUS DX500 S3
    - The memory size for each CM is less than 64GB when using the ETERNUS DX600 S4 or the ETERNUS DX600 S3
- This function cannot be disabled under the following conditions:
    - TPPs that have Deduplication, Compression, or both enabled exist
    - The current user does not have the "Maintenance Operation" policy

> ⬤ **N o t e**

Check "Deduplication/Compression" in the [System] screen. If "Enable" is displayed for "Deduplication/Compression", skip this function. Refer to for details.

For the factory default settings for this function, refer to .

Configuration procedure for the Deduplication/Compression function

(1) Install "Memory Extension" in the ETERNUS DX (only if it is not installed).
Note that the [Add Memory] function can be performed by a maintenance engineer who has the "Maintenance Operation" policy.

(2) Use this function to enable Deduplication/Compression for the ETERNUS DX.

(3) Enable the Thin Provisioning function and then select the maximum pool capacity. Refer to "Set Thin Provisioning" (page 536) for details.

(4) Select "Automatic" for "Create Mode" and create a TPP with "Deduplication", "Compression", or both enabled. Refer to "Create Thin Provisioning Pool" (page 539) for details.
(Deduplication/Compression System Volumes (or the DEDUP_SYS Volume and the DEDUP_MAP Volume) are automatically created in the relevant TPP.)

(5) Expand the logical capacity of the DEDUP_SYS Volume.
The logical capacity of the DEDUP_SYS Volume must be expanded to a size that is larger than the capacity that is to be written. This is because the data for all Deduplication/Compression Volumes (or TPVs) in the TPP are written to the DEDUP_SYS Volume after the Deduplication/Compression. If the capacity that is to be written cannot be estimated, expand the DEDUP_SYS Volume to a size larger than the total capacity of all Deduplication/Compression Volumes (or TPVs) in the TPP.
The following shows an example when creating ten 10TB Deduplication/Compression Volumes (or TPVs) in the same TPP.

- When the estimated data reduction rate is 2:1, expand the DEDUP_SYS Volume capacity to 50TB
- When the estimated data reduction rate is 4:1, expand the DEDUP_SYS Volume capacity to 25TB

Refer to "Expand Thin Provisioning Volume" (page 281) for details.

(6) Create the Deduplication/Compression Volumes (or TPVs) in the TPP that was created in Step (4). Refer to "Creating Deduplication/Compression Volumes" (page 263) for details.

◯ N o t e

If "Manual" is selected in the Step (4), create a TPP using the following procedure.

(1) Create a TPP of which the chunk size is "21 MB". Refer to "Create Thin Provisioning Pool" (page 539) for details.
(In order to distribute the load for the Deduplication/Compression process, make sure to create multiple RAID groups in the TPP.)

(2) After configuring the environment to use the Deduplication/Compression function, enable "Deduplication", "Compression", or both for the TPP that was created in Step (1). Refer to "Set Deduplication/Compression" (page 557) for details.
(Deduplication/Compression System Volumes (or the DEDUP_SYS Volume and the DEDUP_MAP Volume) are automatically created in the relevant TPP.)

(3) Return to Step (5) of the Configuration procedure.

The procedure to enable Deduplication/Compression for the ETERNUS DX/AF is as follows:

Procedure

1   Click [Set Deduplication/Compression Mode] in [Action].

2 Click the [Set] button.

3 A confirmation screen appears. Click the [OK] button.
→ The Deduplication/Compression mode setting starts.

4 Click the [Done] button to return to the [System] screen.

End of procedure

Register Non-disruptive Storage Migration License

This function registers the Non-disruptive Storage Migration License.
By registering this license, the Non-disruptive Storage Migration function can be used.
For the Non-disruptive Storage Migration function, the volume information of the external storage system is inherited by the local storage system and the data is migrated without stopping operations in the local storage system.
This license is registered in the local storage system.
This function is displayed only if the Non-disruptive Storage Migration License has not been registered.

> **▷ Caution**

- By registering this license, the shared area in the cache memory is assigned for controlling the Non-disruptive Storage Migration function.
  The shared area in the cache memory is not only used for the Non-disruptive Storage Migration function, but also used for copy tables, REC Buffers, the Thin Provisioning function (*1), and the Storage Cluster function (*1). Note that this license cannot be registered if the maximum value is specified for each parameter described below.
    - Memory capacity in the ETERNUS DX/AF
    - Copy table size
    - REC Buffer size
    - Maximum pool capacity
    - Total TFOV capacity (*2)
  For the ETERNUS DX60 S4/DX60 S3, a registration error for this license due to insufficient memory capacity does not occur because the ETERNUS DX60 S4/DX60 S3 uses an area other than the shared area in the cache memory.
  *1: The shared area in the cache memory is used for the following conditions.
    - The maximum pool capacity for the ETERNUS DX8700 S3/DX8900 S3 is expanded to "1.5 PB" or larger
    - The maximum pool capacity for the ETERNUS DX600 S4, the ETERNUS DX600 S3, the ETERNUS AF650 S2, or the ETERNUS AF650 is expanded to "1024 TB" or larger
    - The total TFOV capacity (*2) has been expanded from the default capacity
      Refer to "Default TFOV capacity for each model" (page 537) for details.
  *2: The total TFOV capacity indicates the total capacity of the volumes that are used for the Storage Cluster function in an ETERNUS DX/AF. To change the total TFOV capacity, use ETERNUS CLI or ETERNUS SF Storage Cruiser.
- Delete this license immediately after the data migration is completed successfully. Deleting this license releases the shared area in the cache memory that is acquired for controlling the Non-disruptive Storage Migration function. Refer to "Delete Non-disruptive Storage Migration License" (page 59) for details.

> **◯ N o t e**

- The registration status of this license can be checked. Refer to "System (Basic Information)" (page 635) for details.
- Because the RAID Migration function is used for migrating data, the maximum number of simultaneous processes is 32 and the total capacity of the simultaneous processes is 128TB.

For details on the parameters for this function, refer to "A. Register Non-disruptive Storage Migration License" (page 966).

The procedure to register the Non-disruptive Storage Migration License is as follows:

Procedure

1 Click [Register Non-disruptive Storage Migration License] in [Action].

2 Input the license key.
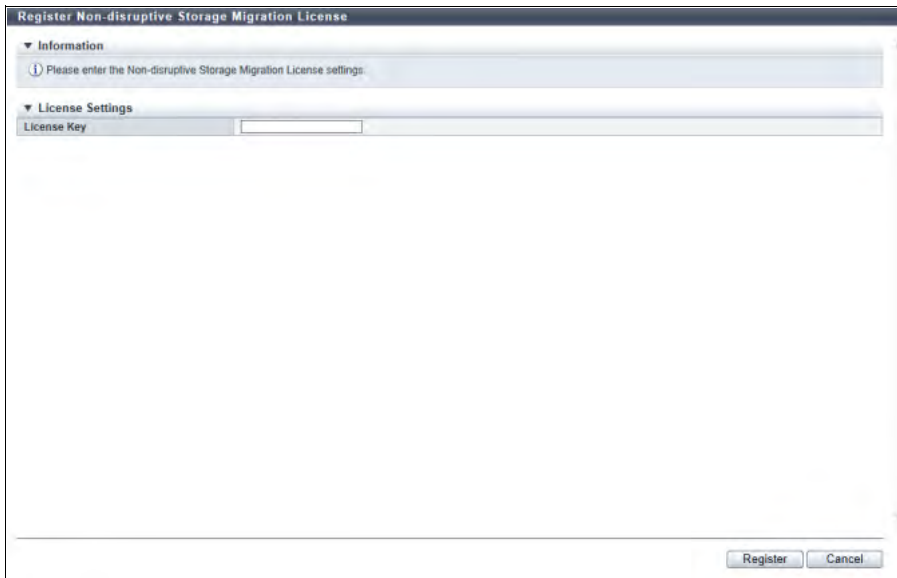
The main setting item is as follows.

● **License Settings**

• License Key

3 Click the [Register] button.

4 A confirmation screen appears. Click the [OK] button.
→ The Non-disruptive Storage Migration License registration starts.

5 Click the [Done] button to return to the [System] screen.

> ◯ **N o t e**
>
> If this license is successfully registered, the actions and items related to the Non-disruptive Storage Migration function are displayed. Perform a data migration. Refer to "Data migration flow using the Non-disruptive Storage Migration function" (page 57) for details.

End of procedure

Data migration flow using the Non-disruptive Storage Migration function

The workflow sequence for Non-disruptive Storage Migration is described below.

(1) Use this function to register the Non-disruptive Storage Migration License and then change the mode of the FC port used for migration in the local storage system to "Initiator" ("Modify Port Mode" (page 433)).

(2) Set port parameters to the FC-Initiator port ("Modify FC Port Parameters" (page 418)).

(3) Connect the external storage system and the local storage system with either of the following.
  - FC cable
  - Via a switch

(4) Create External Drives ("Create External Drive" (page 192)).
  a Confirm that the "Inherit" checkbox for "External LU Information" is selected.
  b Select the external storage system (source storage system) for migrating the data.
  c Select the migration target volume from the external storage system.
  d Have the local storage system inherit the volume information of the migration target volume in the external storage system.
     The volume that inherits the volume information is called "External Drive" in the local storage system.

(5) Create External RAID Groups from External Drives ("Create External RAID Group" (page 531)).

(6) Create a volume in the External RAID Group ("Creating Standard Type Volumes, SDVs, or SDPVs" (page 248)).
  a Select "Standard" for "Type" and select the "Enable" checkbox for "Use External Drive".
  b Select an External RAID Group for creating a volume.
  c Create a volume in the External RAID Group.
     The created volume is called "External Volume" in the local storage system (destination storage system).

(7) Set host affinity to allow the host to recognize the volume that is created in Step (6) ("Create Host Affinity" (page 337)).

> ▷ **Caution**
>
> • If a LUN group is created, the host LUN to be allocated to the External Volume must be the same as the host LUN that is allocated to the relevant volume in the external storage system. Refer to "Add LUN Group" (page 437) for details.
> • The host response setting for the host group must be the same as the host response setting of the external storage system. Refer to "Add FC/FCoE Host Group" (page 359), "Add iSCSI Host Group" (page 366), or "Add SAS Host Group" (page 371) for details.

(8) From the host, create a path between the host and the local storage system.
    Confirm that a multipath is configured from the host to the migration target volume.

(9) Disconnect the path between the host and the external storage system.

(10) Confirm that the multipath from the host to the migration target volume is disconnected.

(11) Migrate the data in the volume that is created in Step (6) to the destination volume. Refer to "Start RAID Migration" (page 296) for details.

When starting a RAID migration, select automatic or manual for "Data Sync after Migration".

- Automatic Stop
  The procedure continues to the next step after all the RAID migrations are successfully completed.
- Manual Stop
  Manually stop the data synchronization between the migration source volume and the migration destination volume after all the RAID migrations are successfully completed. Refer to "Stop External Volume Data Synchronization" (page 311) for details.

▷ **Caution**

- Select one of the following depending on whether the data must be synchronized between the migration source and migration destination volumes until all data migrations of the Non-disruptive Storage Migration are completed.
  - If the data must be synchronized until all data migrations are completed
    Select "Manual Stop" for "Data Sync after Migration"
  - If the data synchronization can be stopped every time a data migration is completed
    Select "Automatic Stop" for "Data Sync after Migration"
- Up to 32 RAID migration processes can be performed simultaneously. If "Manual Stop" is selected, the total number of External Volumes to be migrated must be 32 or less.

Progress of migration can be checked on the [Volume] screen. Refer to "Volume (Basic Information)" (page 775) for details.

(12) Delete the External RAID Group ("Delete External RAID Group" (page 533)).

(13) Delete the External Drive that was used to create the External RAID Group ("Delete External Drive" (page 195)).

▷ **Caution**

The number of volumes that can migrate the data in the single operation described in Step (4) to Step (13) is 512 volumes per external storage system. Perform the operation again from Step (4) for the following conditions.

- 513 or more volumes are migrated from a single external storage system
- Volumes are migrated from multiple external storage systems (if the information can be obtained from the FC-Initiator port)

(14) Delete this license ("Delete Non-disruptive Storage Migration License" (page 59)).
Deleting this license releases the shared area in the cache memory that is acquired for controlling the Non-disruptive Storage Migration function.

(15) Delete the External LU Information that is inherited to the volume after completing a data migration only if Non-disruptive Storage Migration is performed from a storage system other than the ETERNUS storage system to the ETERNUS DX/AF ("Delete External LU Information" (page 333)).

Delete Non-disruptive Storage Migration License

This function deletes the Non-disruptive Storage Migration License registered in the ETERNUS DX/AF.
This function is available only if the Non-disruptive Storage Migration License has been registered.

> ▷ **Caution**
>
> - Delete all the External Drives before using this function. The registration status of the External Drives can be checked in the [External Drives] screen. Refer to "External Drives" (page 668) for details.
> - Delete this license immediately after the data migration completes successfully. Deleting this license releases the shared area in the cache memory that is acquired for controlling the Non-disruptive Storage Migration function.

> ⊙ **N o t e**
>
> The registration status of this license can be checked. Refer to "System (Basic Information)" (page 635) for details.

The procedure to delete the Non-disruptive Storage Migration License is as follows:

Procedure

1 Click [Delete Non-disruptive Storage Migration License] in [Action].

> ▷ **Caution**
>
> If External Drives are registered in the ETERNUS DX/AF, an error screen appears. Check the parameter settings.

2 A confirmation screen appears. Click the [OK] button.
→ The Non-disruptive Storage Migration License deletion starts.

3 Click the [Done] button to return to the [System] screen.

End of procedure

System Management

This section describes system management.

System management provides the following functions:

- Modify Storage System Name
- Modify Date and Time
- Change Box ID
- Setup Subsystem Parameters
- Setup Encryption Mode
- Setup SMI-S Environment
- Register SED Authentication Key
- Setup Power Management
- Setup Extreme Cache
- Setup Exclusive Read Cache
- Setup Disk Drive Patrol
- Setup Debug Mode

Modify Storage System Name

This function registers the name, administrator, and the installation site of the ETERNUS DX/AF.
Information registered in this screen is used for the following functions and screens:

- Network management using Simple Network Management Protocol (SNMP)
- Storage system name displayed in the login screen and the operation screens

> ▷ **Caution**

Once the storage system name has been specified, it cannot be deleted (it can be changed).

For details on the parameters for this function, refer to "A. Modify Storage System Name" (page 966).

The procedure to change the storage system name is as follows:

Procedure

1 Click [Modify Storage Name] in [Action].

2   Specify the parameters.
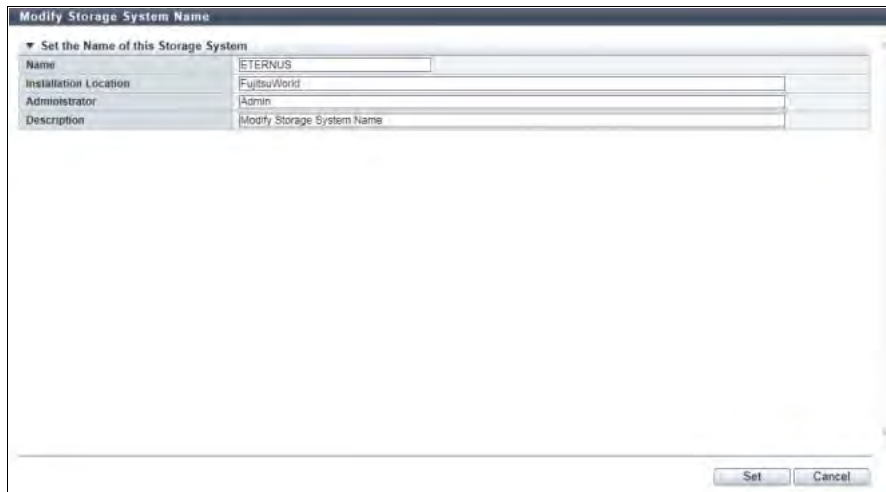
The main setting items are as follows.

● **Set the Name of this Storage System**

- Name
- Installation Location
- Administrator
- Description

3   Click the [Set] button.

4   A confirmation screen appears. Click the [OK] button.
→   Setting of the storage system name starts.

5   Click the [Done] button to return to the [System Settings] screen.

End of procedure

Modify Date and Time

This function sets the date/time and time zone (storage system location) of the internal clock in the ETERNUS DX/AF.
The clock is used for checking the internal log of the ETERNUS DX/AF and in the Eco-mode, etc. The time zone setting is used for the Remote Support function.
This function is used when moving the ETERNUS DX/AF to a new installation site, and/or changing the system date/time.
It is possible to setup the NTP server to automatically set the time. If the NTP server cannot be used, resetting the time once a month is recommended.

▷ **Caution**

- When the network environment is set to the factory default, the NTP function cannot be used. To perform the network environment settings, refer to "Setup Network Environment" (page 114).
- When using Eco-mode, make sure to set the time/date correctly.
  If the date/time of the ETERNUS DX is wrong, processes for stopping and starting the disk motor cannot be performed in accordance with the Eco-mode schedule.
- The [Modify Date and Time] function cannot be used while time synchronization with the NTP server is being performed.

⬤ **N o t e**

- When using the NTP server, the time modification method is the step mode (modify immediately).
- When using the NTP server, the ETERNUS DX/AF is synchronized with the NTP server every three hours.

For details on the parameters for this function, refer to "A. Modify Date and Time" (page 967).
For the factory default settings for this function, refer to "B. Modify Date and Time" (page 1252).

The procedure to set the date and time is as follows:

Procedure

1 Click [Modify Date and Time] in [Action].

2 Specify the parameters.
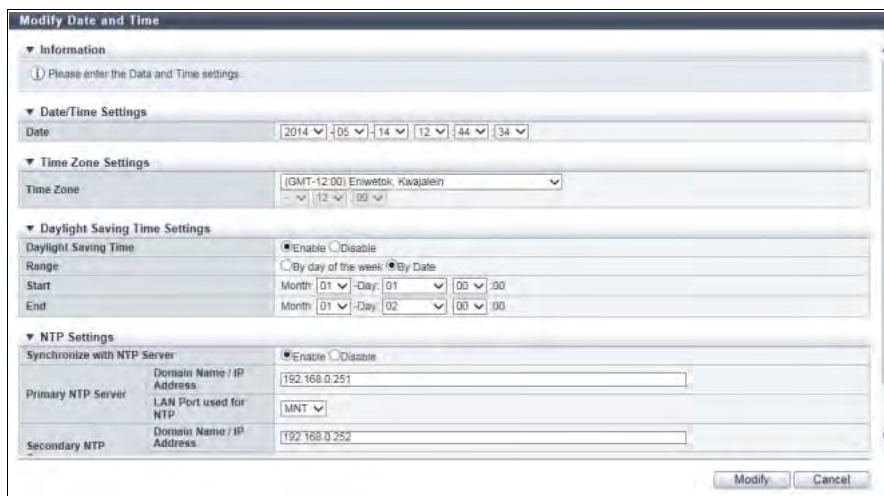
The main setting items are as follows.

● **Date/Time Information**

- Date

● **Time Zone Settings**

- Time Zone
- Time Zone (time difference setting)

● **Daylight Saving Time Settings**

- Set

- Range (By day of the week)

- Range (By Date)

● **NTP Settings**

- Synchronize with NTP Server

- NTP server

- LAN Port used for NTP

▷ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
- A non-existent date has been specified for the date/time setting or the daylight saving time
- The start day/time and the end day/time for the daylight saving time setting are the same
- "Yes" is selected for "Synchronize with NTP Server", the LAN port that is used for the NTP server is "MNT", and the IPv4 address of the NTP server and the broadcast address of the MNT port are the same
- "Yes" is selected for "Synchronize with NTP Server", the LAN port that is used for the NTP server is "RMT", and the IPv4 address of the NTP server and the broadcast address of the RMT port are the same
- "Yes" is selected for "Synchronize with NTP Server" and one of the following conditions applies:
    - The domain or IP address for the primary NTP server and the secondary NTP server are the same
    - The IPv4 address for the NTP server and the local host address are the same
    - The IP address (IPv4 address or IPv6 address) for the NTP server and the network address are the same
    - The IP address (IPv4 address or IPv6 address) for the NTP server and the IP address for the MNT port are the same
    - The IP address (IPv4 address or IPv6 address) for the NTP server and the IP address for the RMT port are the same
    - The IP address (IPv4 address) for the NTP server and the IP address for the FST port are the same (for the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, the ETERNUS AF650 S2, and the ETERNUS AF650)

🔵 **N o t e**

- When "By day of the week" is selected for the range of daylight saving time, "Last" can be selected to specify the start or end week.
- When "By Date" is selected for the range of daylight saving time, "Last Day" can be selected to specify the start or end date.

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.

▷ **Caution**

If "Yes" is selected for "Synchronize with NTP Server" when there is no NTP server connection or when communication with the NTP server is unstable, the required time for the date and time setting may take longer. Wait until the screen is updated. Even if a connection to the NTP server fails, the date and time setting appears to complete successfully. To confirm that the ETERNUS DX/AF is successfully connected to the NTP server, start this function again and check "Access Status" in the "NTP Settings" field.

→ Date/time information is specified.

5   Click the [Done] button to return to the [System Settings] screen.

<div align="right">**End of procedure**</div>

Change Box ID

This function changes the Box ID that identifies an ETERNUS DX/AF in the user system.
Box ID is used as information to identify the ETERNUS DX/AF from applications connected to the ETERNUS DX/AF.
The initial Box ID is a device ID that is created by combining device information (series name, model, serial number, etc.).
If upgrading or replacing the ETERNUS DX/AF, the existing Box ID will change with the ETERNUS DX/AF change. Therefore, there is a risk that the backup data saved in the previous ETERNUS DX/AF cannot be used, so it is necessary to reconfigure the user system after the ETERNUS DX/AF is upgraded or replaced. This function changes the device BOX ID to the same ID as that of the previous ETERNUS DX/AF in order to avoid any problems and also use the same backup data in the new storage system.

> ▷ **Caution**
>
> - A Box ID is a unique name in the user system. Make the Box ID different from that of other ETERNUS storage systems in the user system. If the Box ID is not changed, the device ID is used as a Box ID.
> - If the ETERNUS DX/AF Box ID is changed after setting the Advanced Copy path information, Remote Advanced Copy (REC) will no longer run. After recreating the Advanced Copy path information with the new Box ID, reconfigure the Advanced Copy path information on all ETERNUS storage systems that are set with a path to the ETERNUS DX/AF that had the Box ID changed.
> - This function cannot be used under the following conditions:
>   - An Advanced Copy session (except an Offloaded Data Transfer (ODX) session, an Extended Copy (XCOPY) session, and a Virtual Volume session) exists
>   - A volume that is used for the Storage Cluster function exists

For details on the parameters for this function, refer to "A. Change Box ID" (page 970).
For the factory default settings for this function, refer to "B. Change Box ID" (page 1252).

The procedure to set the Box ID is as follows:

> **Procedure**

1   Click [Change Box ID] in [Action].

2   The current Box ID setting appears. To change the value, enter a new Box ID.

The main setting item is as follows.

● Change Box ID

- Box ID

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
→ The specified Box ID is registered.

5 Click the [Done] button to return to the [System Settings] screen.

> **N o t e**
>
> If the Box ID entered is less than 40 characters, a "#" hash key character is appended to the Box ID for each character short. Then, the 40-digit Box ID is registered in the ETERNUS DX/AF.

End of procedure

Setup Subsystem Parameters

This function specifies the subsystem parameters.
Subsystem parameters are the information which controls the ETERNUS DX/AF operation when it is connected to hosts. The ETERNUS DX/AF operates according to the specified subsystem parameters, for all the hosts to be connected.

> **Caution**
>
> - If a change to subsystem parameters is required, the recommended time is when the load is low in the ETERNUS DX/AF.
> - Some subsystem parameters may require rebooting of the server or the ETERNUS DX/AF after changes have been made. Refer to "Conditions for changing subsystem parameters" (page 65) for details.

Conditions for changing subsystem parameters

Category	Subsystem parameter	Changing parameters while accessing the host	Rebooting	
			ETERNUS DX/AF	Server
Setup Subsystem Parameters	Thin Provisioning Allocation Mode	OK	–	–
	Flexible Write Through	OK	–	–
	Turbo Mode	OK	–	–
	Writeback Limit Count	OK	–	–
	Expand Volume Mode	OK	Required	
Setup Host	Load Balance	OK	–	–
	Reject INQUIRY from Unauthorized Host	OK	–	Required
	Optimize for Advanced Format SSD	OK	–	Required
	Expand Host Mode	N/A	–	–
Setup Disk Drive	Checkcode Enforcement	OK	–	–
	Copybackless	OK	–	–

Category	Subsystem parameter	Changing parameters while accessing the host	Rebooting	
			ETERNUS DX/AF	Server
Web GUI Settings	Function to Add Host	OK	–	–
Deduplication/Compression Settings	Data Compare when hash collision occurs	OK	–	–

Changing parameters while accessing the host
    OK: Parameters can be changed.
    N/A: Parameters cannot be changed.
Server reboot
    Required: The server must be rebooted after a parameter change.
    –: The server does not require a reboot.

For details on the parameters for this function, refer to "A. Setup Subsystem Parameters" (page 971).
For the factory default settings for this function, refer to "B. Setup Subsystem Parameters" (page 1253).

The procedure to set the subsystem parameters is as follows:

Procedure

1 Click [Setup Subsystem Parameters] in [Action].

2 Specify the parameters.

■ For the ETERNUS DX100 S4/DX200 S4 and the ETERNUS DX100 S3/DX200 S3

■ For the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS AF650 S2, and the ETERNUS AF650
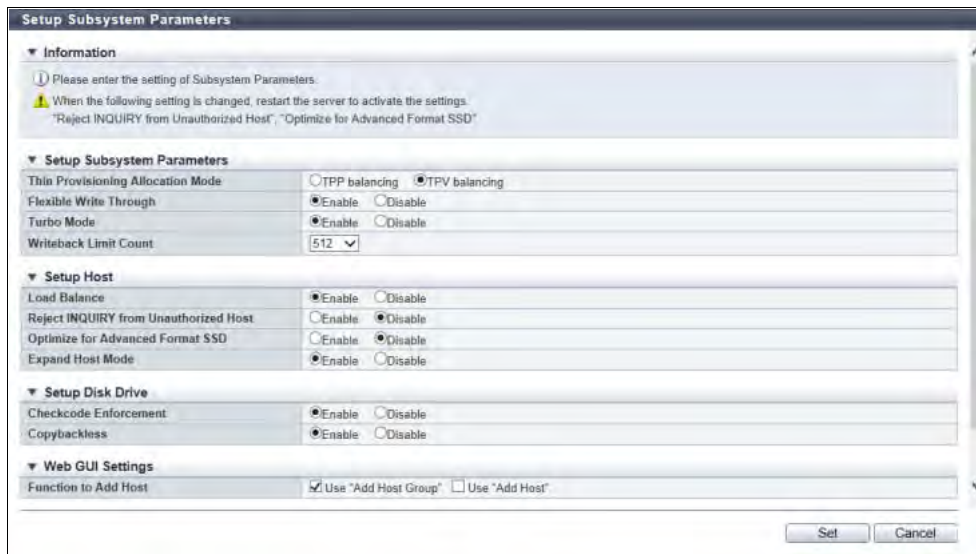
■ For the other models

The main setting items are as follows.

● **Setup Subsystem Parameters**

  • Thin Provisioning Allocation Mode
  • Expand Volume Mode (for the ETERNUS DX100 S4/DX200 S4 and the ETERNUS DX100 S3/DX200 S3)

● **Setup Host**

  • Load Balance
  • Reject INQUIRY from Unauthorized Host
  • Expand Host Mode (for the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETER-NUS AF650 S2, and the ETERNUS AF650)

● **Setup Disk Drive**

  • Copybackless

● **Web GUI Settings**

• Function to Add Host

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
   → Setting of the subsystem parameter starts.

5 Click the [Done] button to return to the [System Settings] screen.

End of procedure

Setup Encryption Mode

This function sets the encryption mode to encrypt volumes by using the CM.
There are two methods to encrypt a volume.

• Encryption by firmware (CM)
   To encrypt volumes by the CM, use this function to enable the encryption mode (*1). After the encryption mode is enabled, create volumes of which "Encryption by CM" is set to "On". Refer to "Create Volume" (page 246) for details.
   *1:   The encryption mode is enabled by selecting "Fujitsu Original Encryption", "AES" (Advanced Encryption Standard), "AES-128", or "AES-256".

• Encryption by drive (SED)
   To encrypt volumes by the self encrypting drive (SED), create volumes in RAID groups or TPPs that are configured with SEDs. Refer to "Create Volume" (page 246) for details. In this case, encrypted volumes can be created even when "Encryption Mode" is set to "Disable".
   Note that ETERNUS Web GUI cannot be used to create volumes in FTRPs. To create volumes in FTRPs, use ETERNUS CLI or ETERNUS SF Storage Cruiser.

Use either "Encryption by CM" or "Encryption by SED" for each volume. Note that because "Encryption by CM" reduces the volume access performance, using "Encryption by SED" is recommended.

▷ **Caution**

• Encryption related functions are only available after the encryption mode is enabled.
• When disabling the encryption mode, reboot the ETERNUS DX/AF.
• Once a volume has been encrypted, it cannot be changed back to an unencrypted volume.
• The encryption mode cannot be changed for volumes or pools with the following conditions.
   - Volumes that are already encrypted by CM
   - Pools (TPPs and FTRPs) that are already encrypted by CM
   - Volumes that are being encrypted by CM
• When using the encryption function in a Unified Storage environment, set the "Encryption Mode" as described below.
   - For the ETERNUS DX100 S4/DX100 S3
      Select "Fujitsu Original Encryption" for the encryption mode. If "AES", "AES-128", or "AES-256" is selected, the performance of the NAS function is reduced.
   - For the other models
      Selecting "Fujitsu Original Encryption" for the encryption mode is recommended.

> **● N o t e**
>
> - The encryption mode can be changed even if volumes or pools (TPPs or FTRPs) in the ETERNUS DX/AF are already encrypted by the SED.
> - If the encryption mode is enabled with this function (*1), existing unencrypted volumes (or "Standard", "WSV", and "SDV" type volumes) can be encrypted. Refer to "Encrypt Volume" (page 279) for details.
> - The encryption mode setting can be checked. Refer to "System Settings" (page 672) for details.
>
> *1:   The encryption mode is enabled by selecting "Fujitsu Original Encryption", "AES", "AES-128", or "AES-256".

For details on the parameters for this function, refer to "A. Setup Encryption Mode" (page 979).
For the factory default settings for this function, refer to "B. Setup Encryption Mode" (page 1253).

The procedure to set the encryption mode is as follows:

Procedure

1   Click [Setup Encryption Mode] in [Action].

2   Select the encryption mode.

■ For controller firmware versions "V10L50-3000", "V10L52-3000", and "V10L53" and later
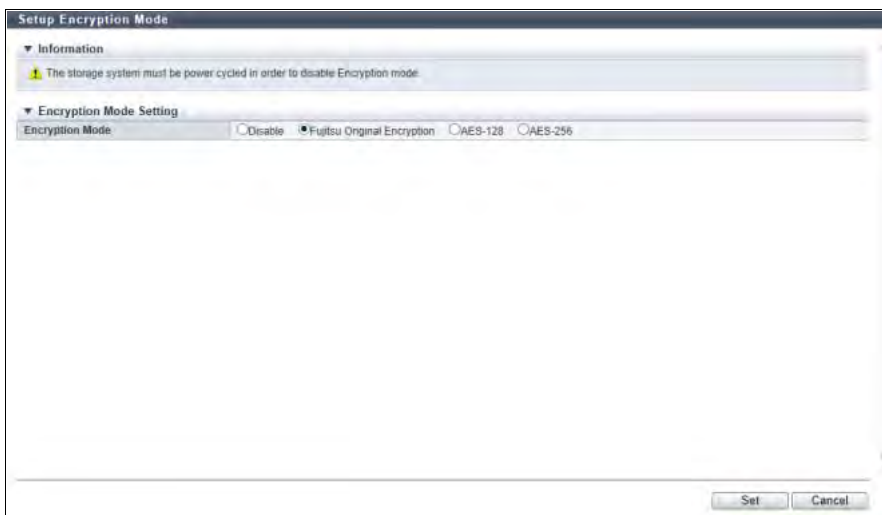
■ For controller firmware versions other than the above
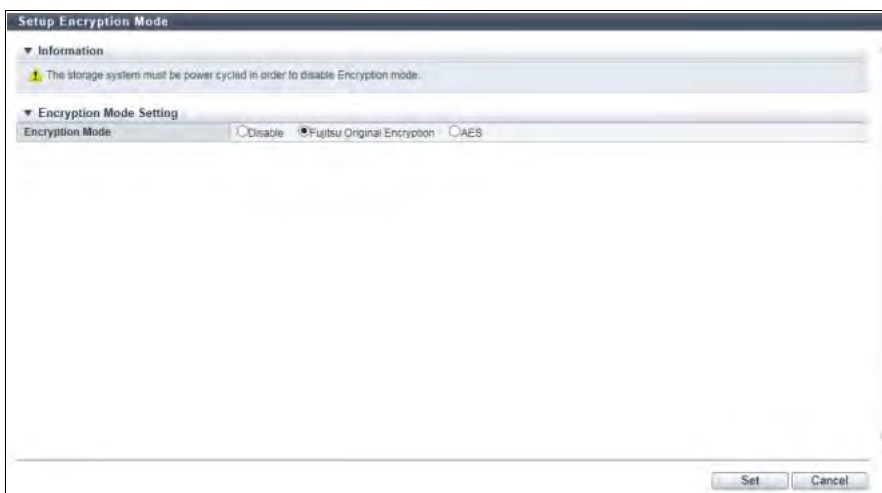
The main setting item is as follows.

● **Encryption Mode Setting**

- Encryption Mode

3	Click the [Set] button.

4	A confirmation screen appears. Click the [OK] button.
→	The encryption mode setting is performed.

5	Click the [Done] button to return to the [System Settings] screen.

> ▶ **Caution**
>
> When the encryption mode is disabled, reboot the ETERNUS DX/AF.

End of procedure

Setup SMI-S Environment

This function enables or disables the Storage Management Initiative - Specification (SMI-S).
SMI-S is a standard specification concerning storage management technologies by Storage Networking Industry Association (SNIA).

When enabling the SMI-S setting, the ETERNUS DX/AF can be managed from general storage management applications that support the SMI-S.

> ▶ **Caution**
>
> - To continue using SMI-S when a warning message related to the change of the SSL certificate appears, disable SMI-S and then enable it again.
> - When enabling or disabling of the SMI-S is being performed, the [Setup SMI-S Environment] action cannot be clicked.
> - The SMI-S settings and performance information settings cannot be changed for the following conditions.
>   - The storage system status is "Not Ready"
>   - A CM that is not in the "Normal" state exists
> - The available SMI-S setting varies depending on the active controller firmware version. Refer to "ETERNUS SMI-S Server SMI-S API Reference" for details.

> 🔵 **N o t e**
>
> - The current SMI-S setting can be checked. Refer to <u>"System Settings" (page 672)</u> for details.
> - The parameter settings for "SSL Certificate" and "Performance Information" are retained even when the "SMI-S" setting is changed from "Enable" to "Disable".
> - To enable the SMI-S performance information response, start the performance monitoring. Refer to <u>"Start/Stop Performance Monitoring" (page 90)</u> for details.

For details on the parameters for this function, refer to <u>"A. Setup SMI-S Environment" (page 980)</u>.
For the factory default settings for this function, refer to <u>"B. Setup SMI-S Environment" (page 1254)</u>.

The procedure to enable or disable the SMI-S function and the performance information response is as follows:

Procedure

1 Click [Setup SMI-S Environment] in [Action].

2 Select the parameters.

The main setting item is as follows.

● **SMI-S Settings**

- SMI-S
- SSL Certificate
- Performance Information

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
   → SMI-S setting starts.

5 Click the [Done] button to return to the [System Settings] screen.

End of procedure

Register SED Authentication Key

This function registers the SED authentication key (common key) that is managed in the ETERNUS DX/AF.
SEDs are used to prevent the leakage of the stored data when physically removed disks are stolen or lost.

▷ **Caution**

- Register the SED authentication key before installing SEDs in the ETERNUS DX/AF. If a SED is installed without registering the SED authentication key, data leakage in a SED that is removed may occur.
- If a SED is installed before registering the SED authentication key, register the SED authentication key and reboot the ETERNUS DX/AF.
- The SED authentication key can only be set once in the ETERNUS DX/AF. The SED authentication key cannot be changed or deleted after being set.
- Registering a common key is also required when the SED authentication key that is managed in the key server is used.

> **⬤ N o t e**
>
> - After this function is executed, the SED authentication key is automatically generated and registered in the SED.
> - The registration status of the SED authentication key can be checked. Refer to "System Settings" (page 672) for details.

The procedure to register SED authentication key is as follows:

Procedure

1 Click [Register SED Key] in [Action].

2 Click the [Register] button.

3 A confirmation screen appears. Click the [OK] button.
→ The SED authentication key registration starts.

4 Click the [Done] button to return to the [System Settings] screen.

End of procedure

Setup Power Management

This function connects the external device and controls the ETERNUS DX/AF power.

> **▷ Caution**
>
> If this function is enabled by mistake, the ETERNUS DX/AF may shut down unexpectedly. Make sure to check setting contents before performing settings.

For details on the parameters for this function, refer to "A. Setup Power Management" (page 980).
For the factory default settings for this function, refer to "B. Setup Power Management" (page 1254).

The procedure to perform power management setting is as follows:

Procedure

1 Click [Setup Power Management] in [Action].

2 Specify the parameters.

■ For the ETERNUS DX8700 S3/DX8900 S3

■ For the other models

The main setting items are as follows.

● **Power Control by External Device**

- RCIL
- Auto Power
- Power Resume

● **Connection Module Settings (for the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3)**

- PWC

● **PWC Connection Settings**

- Connection CM (for ETERNUS DX/AF storage systems other than the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3)
- Delay until Shutdown
- Set management unit interface
- Power Failure Signal
- Low Battery Signal
- UPS Shutdown Signal

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
→ Setting of the power management starts.

5 Click the [Done] button to return to the [System Settings] screen.

End of procedure

Setup Extreme Cache

This function is used to perform the following operations for Extreme Cache.

- Select the cache to be used (Extreme Cache (EXC) or EXCP)
- Set the cache memory size to be used
- Set the tuning parameters

To use an EXC, PCIe Flash Modules (PFMs) installed in the CM are required.
To use an EXCP, SSDs installed in the CE or Drive Enclosure (DE) are required.

▷ Caution

- PFMs can be installed in the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, and the ETERNUS DX8700 S3/DX8900 S3.
- The available operations with this function depend on the installation status of the PFMs. For the ETERNUS DX500 S4/DX600 S4 and the ETERNUS DX500 S3/DX600 S3, the same number of PFMs must be installed in each CM. Refer to <u>"Availability of the EXC setting according to the number of installed PFMs" (page 984)</u> for details.
- EXC or EXCP cannot be enabled under the following conditions:
  - The storage system status is "Not Ready"
  - Pinned data exists in the ETERNUS DX
  - A CM that is not in the " ✅ Normal" state exists
  - A PFM that is not in the " ✅ Normal" or " ⚠ Warning" state exists (when "Extreme Cache" is selected)
  - All of the following conditions are satisfied.
    - The ETERNUS DX8700 S3 is used
    - "GS License" has been registered in the ETERNUS DX (*1)
    - The usable memory size is 8GB/CM
      (or "Cache expansion License for DX8700 S3 GS(16GB to 32GB)" has not been registered (*1))
    *1: The registration status of "GS License" and "Cache expansion License" can be checked when logged in using a user account with the "Maintenance Operation" policy.
- If an EXCP includes a RAID group without an " ✅ Available" state, the setting values and set state of the tuning parameter cannot be changed (when "Extreme Cache Pool" or "Extreme Cache Pool (Expanded)" is selected).

> **N o t e**
>
> - Note the following points:
>   - The cache to be used, the cache memory size, and the tuning parameters can be changed during business operations.
>   - When "Not Used" is selected for "Cache Used", the cache memory size for EXC or EXCP changes to "0 GB".
>   - The selected state of the "Cache Used" (the set state of EXC for the ETERNUS DX), and the set states of EXC and EXCP for each volume do not cooperate. Regardless of the selected state of the "Cache Used", the default state of EXC and EXCP for each volume is "Enable".
>   - Regardless of whether the EXC or EXCP setting is enabled (or disabled), External Volumes do not use the EXC and EXCP.
>   - EXC and EXCP for each volume is not changed regardless of whether "Cache Used" is changed by using this function.
>   - The current EXC or EXCP setting can be checked. Refer to <u>"System Settings" (page 672)</u> for details.
>   - The cache hit rate of EXC or EXCP for each volume can be checked in the [Performance Information] screen. Refer to <u>"Performance (Host I/O)" (page 782)</u> or <u>"Performance (Advanced Copy)" (page 788)</u> for details.
> - Furthermore, when using EXC, note the following points:
>   - In either of the following conditions, the EXC memory size that can be used for the relevant CM is reduced to the smallest capacity.
>   - The PFM capacity in each CM for the ETERNUS DX500 S4/DX600 S4 does not match
>   - The PFM capacity in each CM for the ETERNUS DX500 S3/DX600 S3 does not match
>   - For the ETERNUS DX8700 S3/DX8900 S3, installing the same number of PFMs for each CM is not required. By clicking the [Set] button, the PFM capacity that is installed in each CM is set as the available EXC memory size.
>   - When the performance monitoring process is started, the current PFM busy rate can be checked. Refer to <u>"Performance (PCIe Flash Module)" (page 691)</u> for details.
>   - To enable or disable EXC for each volume, use ETERNUS CLI or ETERNUS SF Storage Cruiser.
>   - EXCs can only be used when "Extreme Cache" is selected for "Cache Used" and EXC is enabled for the volume.
> - Furthermore, when using EXCP, note the following points:
>   - Enabling or disabling EXCP for each volume can be performed with ETERNUS Web GUI. Refer to <u>"Modify Cache Parameters" (page 315)</u> for details.
>   - EXCPs can only be used when "Extreme Cache Pool" or "Extreme Cache Pool (Expanded)" is selected for "Cache Used" and EXCP is enabled for the volume.

For details on the parameters for this function, refer to <u>"A. Setup Extreme Cache" (page 983)</u>.
For the factory default settings for this function, refer to <u>"B. Setup Extreme Cache" (page 1254)</u>.

The procedure for selecting the cache to be used and setting the cache memory size to be used is as follows.

■ When Setting the EXC

> **N o t e**
>
> The target of the EXC setting is the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, and the ETERNUS DX8700 S3/DX8900 S3.

Procedure

1 Click [Setup Extreme Cache] in [Action].

2   Select "Extreme Cache" for "Cache Used" and input the detailed information.

■ For the ETERNUS DX8700 S3/DX8900 S3
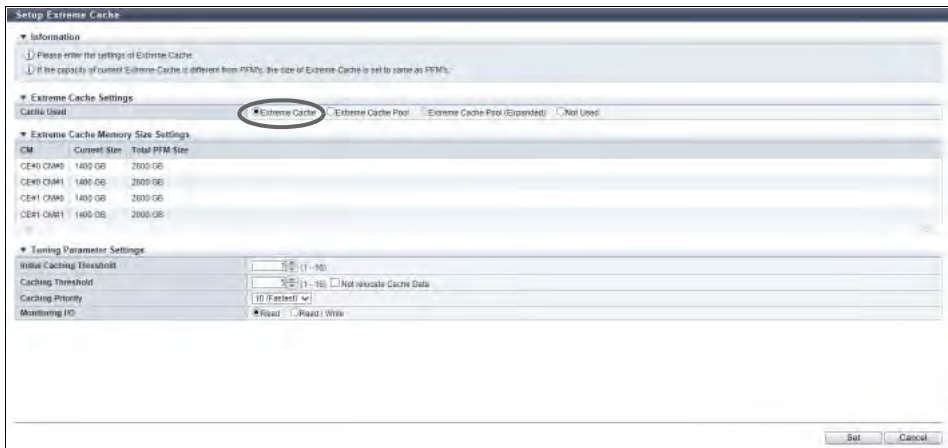
■ For the other models
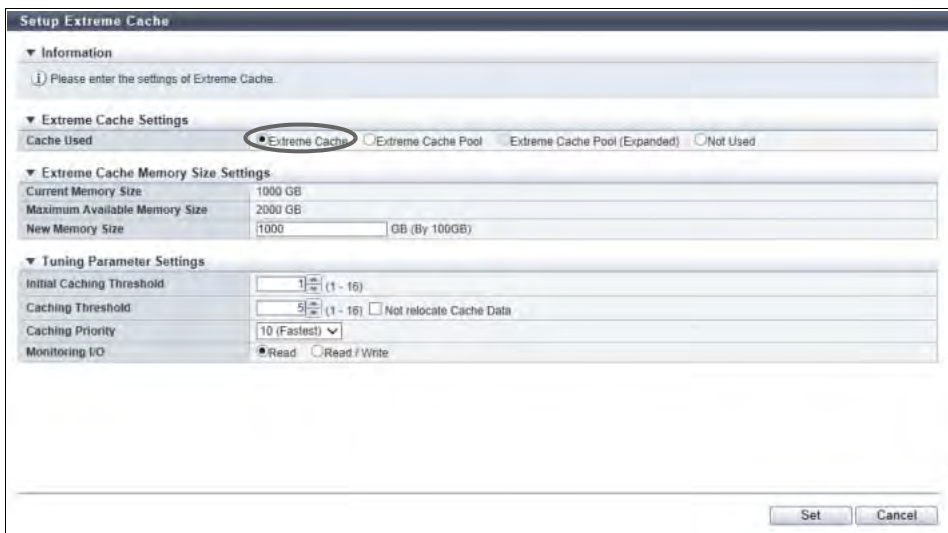
The main setting item is as follows.

● **Extreme Cache Memory Size Settings**

• New Memory Size (for the ETERNUS DX500 S4/DX600 S4 and the ETERNUS DX500 S3/DX600 S3)

> **N o t e**
>
> For the ETERNUS DX8700 S3/DX8900 S3, the EXC size that is currently set in the target CM is displayed in
> "Current Size". In "Total PFM Size", the total capacity of the PFMs that are installed in the target CM is dis-
> played.
> If "Current Size" and "Total PFM Size" in each CM are not matched for the ETERNUS DX8700 S3/DX8900 S3,
> setting the EXC memory size is required. By clicking the [Set] button, EXC memory size is automatically set
> to the same size as the "Total PFM Size".

> ⯈ **Caution**

- • When using the ETERNUS DX8700 S3/DX8900 S3 and if the EXC memory size is not set after adding the PFM, the "Current Size" (or EXC memory size) of the target CM is not updated. To use EXC, use this function to set the EXC memory size. Adding the PFM must be performed by a maintenance engineer with a user account that has the "Maintenance Operation" policy.
- • When using the ETERNUS DX8700 S3/DX8900 S3 and if the EXC memory size is not set after removing the PFM, the "Current Size" (or EXC memory size) of all the CMs is changed to "0 GB". To use EXC, use this function to set the EXC memory size. Removing the PFM must be performed by a maintenance engineer with a user account that has the "Maintenance Operation" policy.

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
   → The EXC setting starts.

5 Click the [Done] button to return to the [System Settings] screen.

End of procedure

■ When Setting the EXCP

RAID groups that are used as EXCPs are configured with RAID0 including at least one drive.

> ⯈ **Caution**

- • EXCP does not work when operating in an environment with a high cache hit rate.
- • It is recommended that "Extreme Cache" is used instead of "Extreme Cache Pool" for the ETERNUS DX500 S4/ DX600 S4, the ETERNUS DX500 S3/DX600 S3, and the ETERNUS DX8700 S3/DX8900 S3. "Extreme Cache" operates faster than "Extreme Cache Pool".

Requirements for selecting drives

- • The drive requirements for creating RAID groups are listed below.
  - - The drive status is " 🔵 Present"
  - - The drives are not registered in any RAID group, TPP, FTRP, REC Disk Buffer, or EXCP
  - - The drives are not registered as hot spares
  - - When using the ETERNUS DX8700 S3/DX8900 S3, the drives that are installed in the DE that is connected to the CE with the CM where the EXCP memory size is to be set must be selected
- • Drive recommendations for creating RAID groups are listed below.
  - - Select drives with the same capacity. If drives of different capacities exist in a RAID group, the smallest capacity becomes the standard, and all other drives are regarded as having the same capacity as the smallest drive. In this case, the remaining drive space is not used.
  - - Select SSDs with the same type (SSD-M/SSD). If different types of SSDs exist in a RAID group, the access performance for all SSDs in the RAID group is adjusted to the SSD of the lowest interface speed.
    Note that Value SSDs are not supported for configuring an EXCP.

Procedure

1 Click [Setup Extreme Cache] in [Action].

2   Select "Extreme Cache Pool" or "Extreme Cache Pool (Expanded)" for "Cache Used".

■ For the ETERNUS DX8700 S3/DX8900 S3
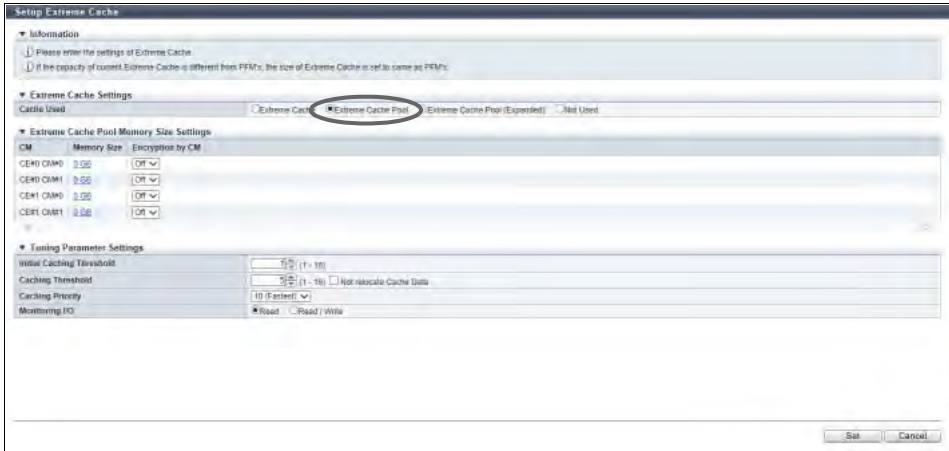
■ For the ETERNUS DX100 S4/DX200 S4
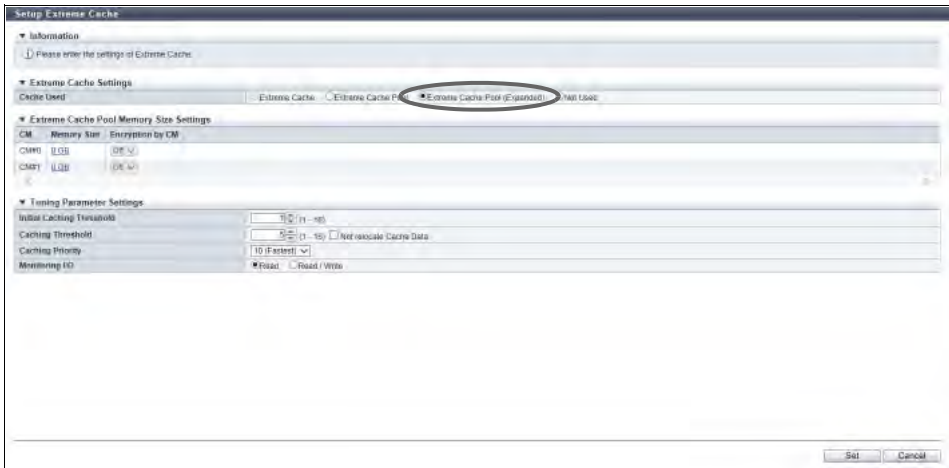
■ For the other models
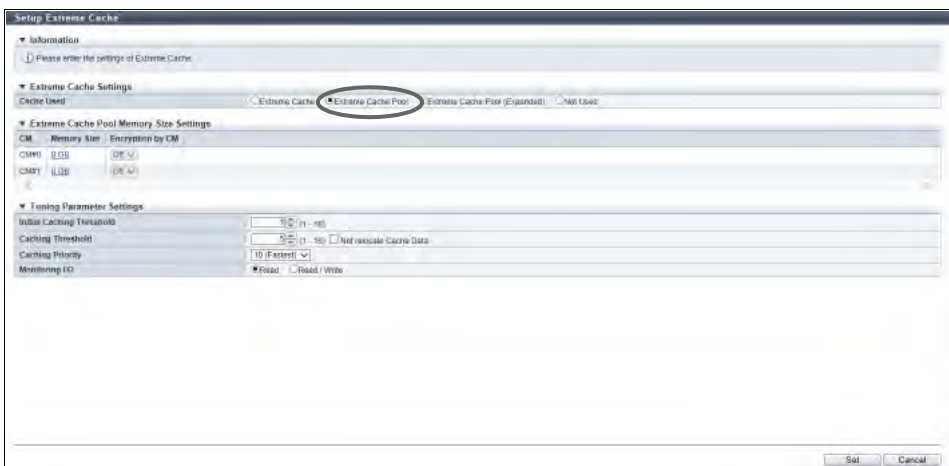
3 Click the [Memory Size] link for the CM to set an EXCP.

■ For the ETERNUS DX8700 S3/DX8900 S3
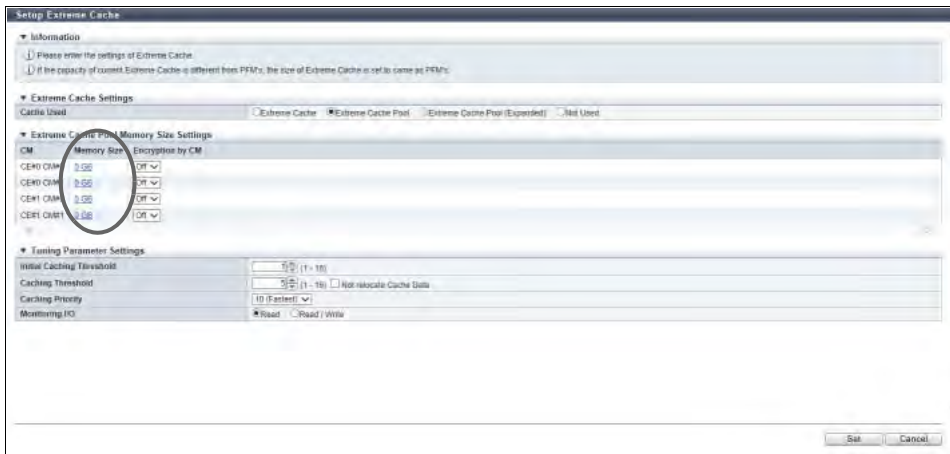
■ For the other models (when "Extreme Cache Pool" is selected)
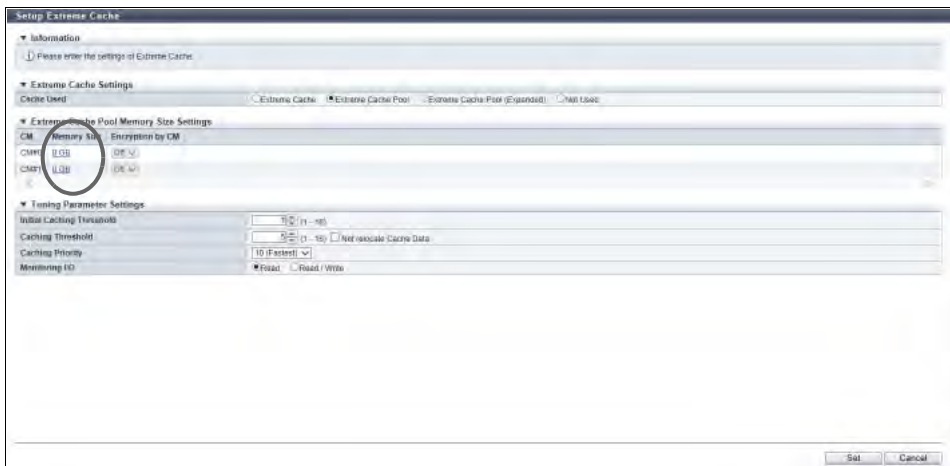
→ The [Extreme Cache Pool Memory Size Settings] screen appears.

4 Select SSDs from the list or the installation image to configure an EXCP.

> **Caution**

SSDs with an interface speed of 12Gbit/s (SSD-Ms) must be installed in a high-density drive enclosure with the same interface speed. When these SSDs are installed in a high-density drive enclosure with an interface speed of 6Gbit/s, the SSDs operate at 6Gbit/s.

■ Select SSDs from the list

Click the [Tabular] tab to select SSDs from the list.
For the ETERNUS DX8700 S3/DX8900 S3, only unused SSDs in the DE that is connected to the CE with the CM where the EXCP memory size is to be set are displayed. For the other models, unused SSDs in the ETERNUS DX are displayed.

The main setting items are as follows.
- Checkbox to select drives

■ Select SSDs from the installation image

Click the [Graphic] tab to select SSDs from the drive installation image.
The installation images of all the drives installed in the ETERNUS DX are displayed. Checkboxes are displayed for unused SSDs.

- For the ETERNUS DX8700 S3/DX8900 S3
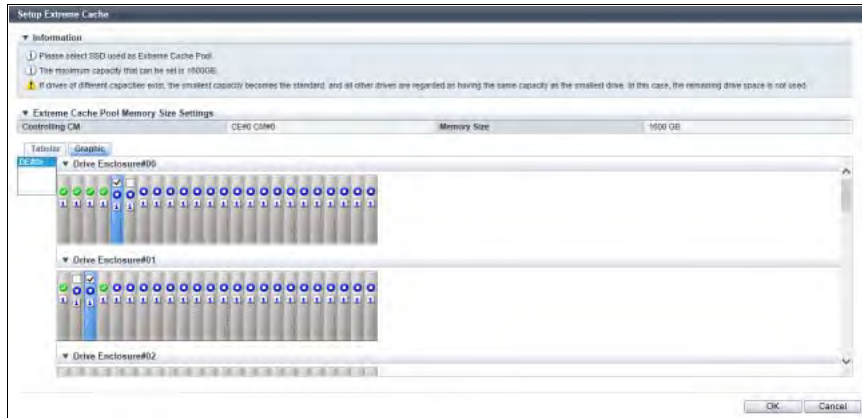
- For the other models (when "Extreme Cache Pool" is selected)
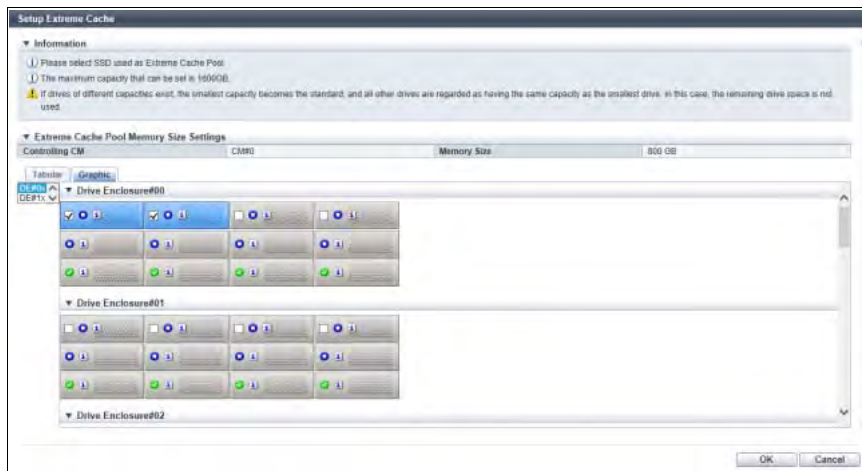
The main setting items are as follows.

- DE selection list box
- Checkbox to select drives

5 Click the [OK] button.
→ Returns to the [Extreme Cache Settings] screen.

6 To set EXCP memory sizes in multiple CMs, repeat Step 3 through Step 5.

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7   Check the EXCP memory size, and click the [Set] button.

■ For the ETERNUS DX8700 S3/DX8900 S3
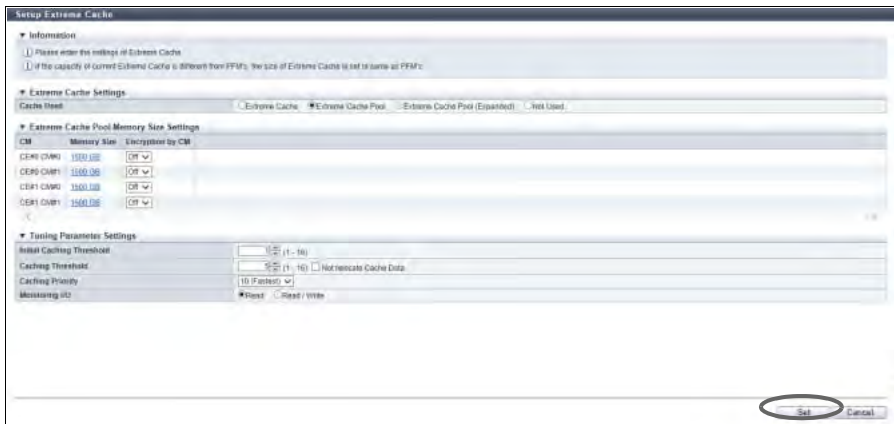
■ For the other models (when "Extreme Cache Pool" is selected)
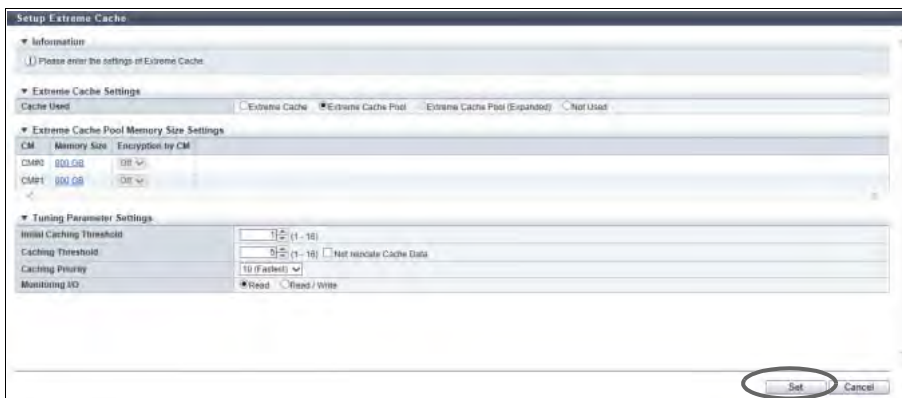
> **Ｎ ｏ ｔ ｅ**
>
> • The RAID group capacity that is configured with selected SSDs is displayed in the "Memory Size" field. "0GB" is displayed when no SSD is selected. When the maximum number of SSDs has already been selected, a "-" (hyphen) is displayed.
>   The number of selectable SSDs and the available capacity are described below:
>   - ETERNUS DX100 S4/DX200 S4
>   1 or 2 (*1) (0GB / 400GB / 800GB)
>   - ETERNUS DX500 S4/DX600 S4 and ETERNUS DX500 S3/DX600 S3
>   1 - 4 (0GB / 400GB / 800GB / 1200GB / 1600GB)
>   - ETERNUS DX100 S3/DX200 S3
>   1 (0GB / 400GB)
>   - ETERNUS DX8700 S3/DX8900 S3
>   1 - 4 (0GB / 400GB / 800GB / 1200GB / 1600GB)
>   Refer to "Available EXCP memory size (per CM)" (page 984) for details.
>   *1:   Two SSDs can be selected only if an ETERNUS DX100 S4/DX200 S4 is being used and "Extreme Cache Pool (Expanded)" is selected for "Cache Used".
> • For the EXCP memory size, the value assumed that "1TB = 1000GB" is displayed.

8   A confirmation screen appears. Click the [OK] button.
→ The EXC setting starts.

9   Click the [Done] button to return to the [System Settings] screen.

<div align="right">

End of procedure

</div>

Setup Exclusive Read Cache

This function sets the ratio for an exclusive read cache area in the CM cache memory.
By setting the exclusive read cache area, the read I/O performance may be maintained regardless of the write I/O when the ETERNUS DX/AF is in a high-load state.

> ▷ **Caution**
>
> - If exclusive read cache is specified, the I/O performance may be reduced depending on the operating environment. Do not change the default setting ("0%") for normal use.
> - Using this function when the ETERNUS DX/AF load is low is recommended. This function can be used during system operations, but the cache mode is temporarily changed to "Write Through Mode" during a configuration.

> ⬤ **N o t e**
>
> - The same exclusive read cache area size is secured in all CMs.
> - If "0%" is set for "Exclusive Read Cache" or if the calculated value is less than "64MB", "64MB" is secured for each CM.

For details on the parameters for this function, refer to "A. Setup Exclusive Read Cache" (page 988).
For the factory default settings for this function, refer to "B. Setup Exclusive Read Cache" (page 1255).

The procedure to set the exclusive read cache is as follows:

Procedure

1   Click [Setup Exclusive Read Cache] in [Action].

2   Select the exclusive read cache.
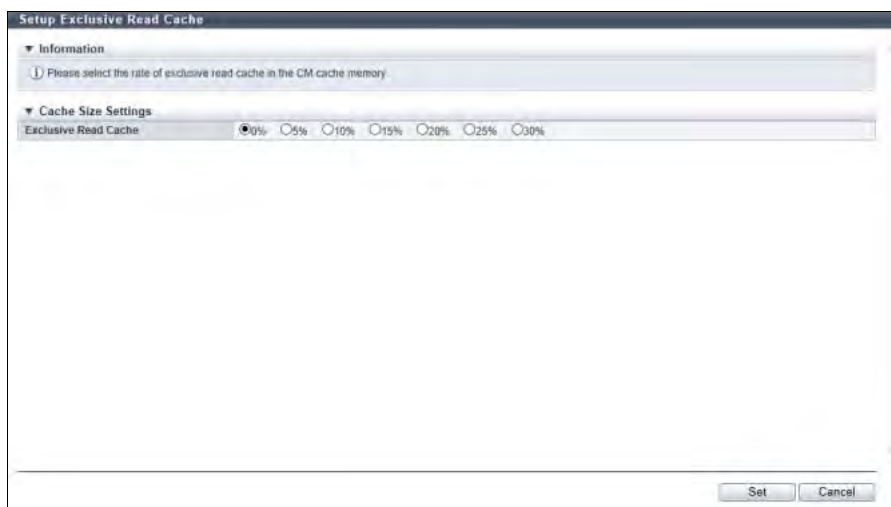
The main setting item is as follows.

● **Cache Size Settings**

   • Exclusive Read Cache

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
   → The exclusive read cache setting starts.

5 Click the [Done] button to return to the [System Settings] screen.

End of procedure

Setup Disk Drive Patrol

This function periodically monitors the operating condition of each drive that is installed in the ETERNUS DX/AF. By performing disk drive patrol, abnormal status can be detected at an early stage and potential drive failures can be averted.
This function is effective for diagnosing the state of drives and hot spares that are not often used. Set this function to detect any drive failures at an early stage.

▷ **Caution**

When drive "Error" is detected by this function, the error is dealt in the same way as usual drive failure.

◯ **N o t e**

   • This function is performed without any relation to Host I/O.
   • The current setting for the disk drive patrol can be checked from the [System Settings] screen. Refer to "System Settings" (page 672) for details.
   • The progress of the disk drive patrol can be checked from the [Drive Detail] screen. Refer to "Drive Detail" (page 748) for details.

For details on the parameters for this function, refer to "A. Setup Disk Drive Patrol" (page 988).
For the factory default settings for this function, refer to "B. Setup Disk Drive Patrol" (page 1255).

The procedure to enable or disable the disk patrol function is as follows:

Procedure

1 Click [Setup Disk Patrol] in [Action].

2   Specify whether to enable or disable the disk patrol function.
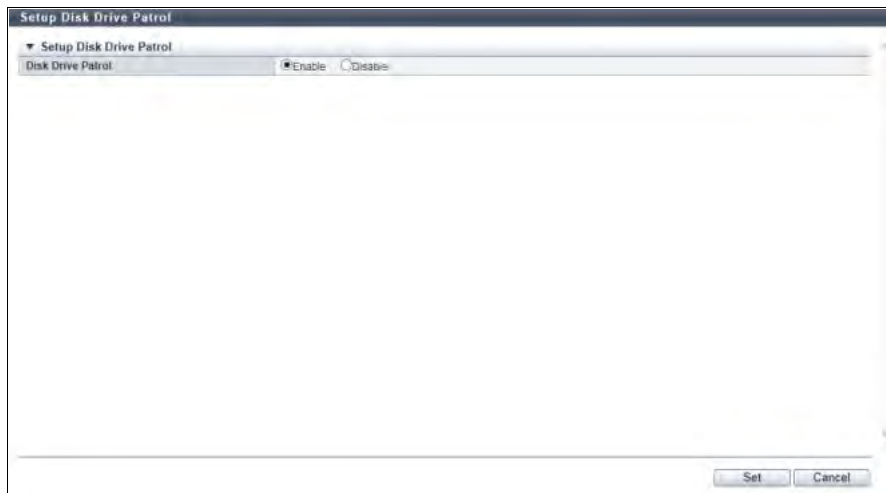
The main setting item is as follows.

● **Disk Drive Patrol Settings**

   • Disk Drive Patrol

3   Click the [Set] button.

4   A confirmation screen appears. Click the [OK] button.
   → The disk drive patrol starts.

5   Click the [Done] button to return to the [System Settings] screen.

End of procedure

Setup Debug Mode

This function sets the trace level to store the storage system information and the collection mode for panic dumps when errors occur.

▷ **Caution**

If you need to change the debug mode settings, follow the Support Department instructions.

◯ **N o t e**

   • Trace information is included in the panic dump.
   • To collect a panic dump, use the [Export/Delete Panic Dump] function. Refer to "Export/Delete Panic Dump" (page 163) for details.

For details on the parameters for this function, refer to "A. Setup Debug Mode" (page 989).
For the factory default settings for this function, refer to "B. Setup Debug Mode" (page 1255).

The procedure to set the collection conditions for the storage system information is as follows:

Procedure

1   Click [Setup Debug Mode] in [Action].

2   Specify the parameters.

3   Click the [Set] button.

4   A confirmation screen appears. Click the [OK] button.
   → The debug mode is set.

5   Click the [Done] button to return to the [System Settings] screen.

End of procedure

Utility Management

This section describes utility management.

Utility management provides the following functions:
- Shutdown/Restart Storage System
- Backup Configuration
- Export Configuration
- Start/Stop Performance Monitoring
- Clear Cache

Shutdown/Restart Storage System

When the ETERNUS DX/AF cannot be shut down directly, perform the shutdown or restart on the screen.

▷ **Caution**

- This function can be used regardless of whether the "Setup Power Management" is enabled or disabled.
- Note that the ETERNUS DX/AF may reboot automatically when "Setup Power Management" is enabled. For example, an ETERNUS DX/AF that is turned off reboots when receiving a power on request from a server during turning off the power.
- This function cannot be used when the ETERNUS DX/AF is in the machine down status. Restart the browser after completion of the process, and then access the login screen after rebooting of the ETERNUS DX/AF is complete.

■ **Shutdown the ETERNUS DX/AF**

The procedure to shut down the ETERNUS DX/AF is as follows:

Procedure

1 Click [Shutdown/Restart] in [Action].

2 Click the [Shutdown] button.
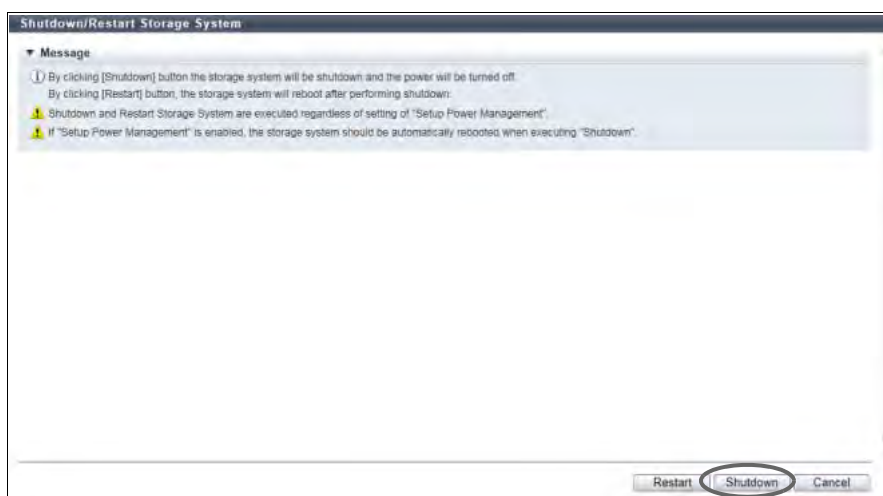
3 A confirmation screen appears. Click the [OK] button.
→ The ETERNUS DX/AF shuts down after 30 seconds.

▷ **Caution**

Note that the ETERNUS DX/AF may reboot automatically when "Setup Power Management" is enabled.

End of procedure

■ **Restart the ETERNUS DX/AF**

The procedure to restart the ETERNUS DX/AF is as follows:

Procedure

1 Click [Shutdown/Restart] in [Action].

2 Click the [Restart] button.

3 A confirmation screen appears. Click the [OK] button.
→ The ETERNUS DX/AF shuts down after 30 seconds. After shutdown, the ETERNUS DX/AF restarts.

End of procedure

Backup Configuration

This function backs up the configuration definition data to the Bootup and Utility Device (BUD) in the CM. Up to four generations of configuration definition data can be stored.

For details on the parameters for this function, refer to "A. Backup Configuration" (page 990).
For the factory default settings for this function, refer to "B. Backup Configuration" (page 1255).

The procedure to backup configuration definition file is as follows:

Procedure

1 Click [Backup Configuration] in [Action].

2 Specify the parameters.
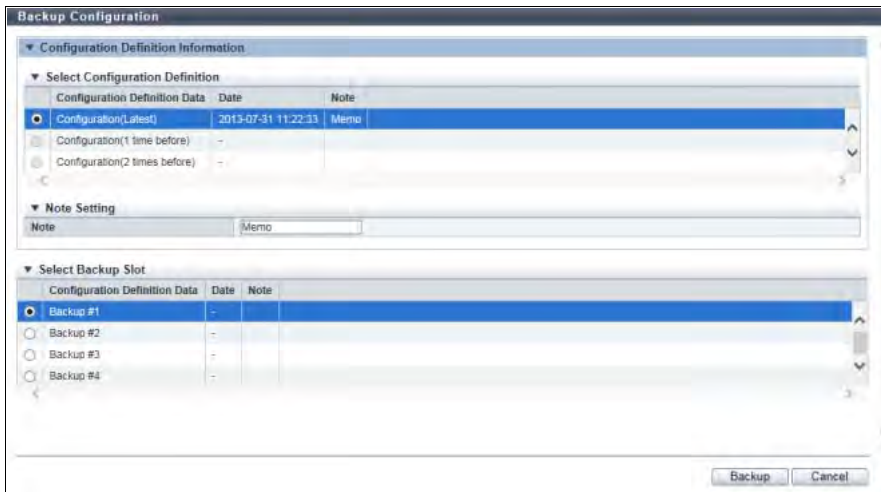
The main setting items are as follows.

● **Select Configuration Definition**
   • Configuration Definition Data
   • Note (text box)

● **Select Backup Slot**
   • Configuration Definition Data

▷ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
   • No data exists in the configuration definition data file
   • An error exists with the configuration definition data file size
   • An error exists in the configuration definition data file

3 Click the [Backup] button.

4 A confirmation screen appears. Click the [OK] button.
   → The configuration definition data is backed up.

5 Click the [Done] button to return to the [Utility] screen.

End of procedure

Export Configuration

This function exports the configuration data from the ETERNUS DX/AF as a configuration file and stores it in the local PC, or other medium.

▷ **Caution**

- The obtained configuration files may be required to restore the ETERNUS DX/AF if an error occurs. When altering the ETERNUS DX/AF configuration information, it is recommended to backup the configuration file before making any changes.
- When exporting of the configuration information has been completed, save the file immediately. The extension of the file to be saved must be ". cfg".
- Applying configuration information must be performed by a maintenance engineer with a user account that has the "Maintenance Operation" policy.

The procedure to export configuration definition file is as follows:

Procedure

1 Click [Export Configuration] in [Action].

2 Click the [Download] button to save the setup information.

3 A confirmation screen appears. Click the [OK] button.
The extension of the file to be saved must be ".cfg".
The default file name is "Conf_serial number for the ETERNUS DX/AF_YYYY-MM-DD_hh-mm-ss.cfg".
(YYYY-MM-DD_hh-mm-ss: the date and time when the download screen (Step 2) is displayed.)
→ The configuration information is exported.

4 Click the [Cancel] button to return to the [Utility] screen.

▷ **Caution**

When exporting of the configuration information has been completed, save the log immediately.

End of procedure

Start/Stop Performance Monitoring

This function acquires performance information and displays the result.
The Start/Stop Performance Monitoring function is used to start or stop acquiring the ETERNUS DX/AF performance information. Acquired information can be checked using the [Performance] function.

> ▷ **Caution**
>
> When the ETERNUS DX/AF is rebooted, the performance monitoring process is stopped.

> ⬤ **N o t e**
>
> - If performance monitoring is started from a monitoring software other than ETERNUS CLI, the process cannot be stopped by ETERNUS Web GUI.
> - If performance monitoring is started from ETERNUS Web GUI, the process can be stopped from other monitoring software.

For details on the parameters for this function, refer to .
For the factory default settings for this function, refer to .

The procedure to start or stop performance monitoring is as follows:

■ Starting performance monitoring

The [Start] button is displayed when the "Monitoring State" is "Stopped".

Procedure

1 Click [Start/Stop Perfmon] in [Action].

2 Specify the interval.
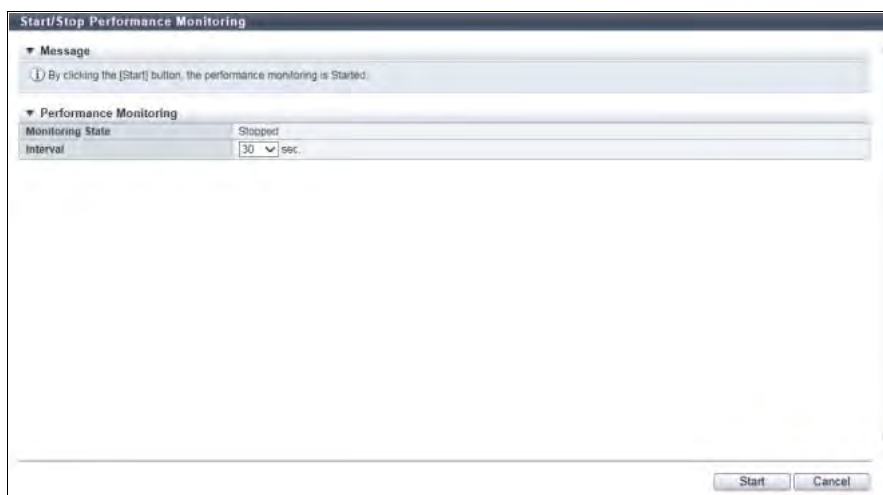
The main setting item is as follows.

● Performance Monitoring

- Interval (sec.)

3 Click the [Start] button.

4 A confirmation screen appears. Click the [OK] button.
→ Acquisition of performance information starts.

5 Click the [Done] button to return to the [Utility] screen.

End of procedure

■ **Stopping performance monitoring**

The [Stop] button is displayed when "Monitoring State" is "Active".

Procedure

1 Click [Start/Stop Perfmon] in [Action].

▷ **Caution**

If the [Stop] button is clicked after starting performance monitoring from other monitoring software, an error screen is displayed.

2 Click the [Stop] button.

3 A confirmation screen appears. Click the [OK] button.
→ Acquisition of performance information stops.

4 Click the [Done] button to return to the [Utility] screen.

End of procedure

Clear Cache

This function clears all of the data on the CM cache memory, data on the EXC, and data on the EXCP (hereinafter collectively referred to as "cache data").
This function is used when monitoring the system performance.

Cache data to be cleared

- Read data on the CM, EXC (*1), and EXCP (*1)
- Multiple cache data to be cleared can be selected from "CM", "EXC (*1)", and "EXCP" (*1).

*1:   Among the "EXC" and "EXCP", only the enabled cache can be the target for clearing.

> **Caution**

- Stopping all host access is recommended before using this function.
- If this function is used during operation, system performance may be temporarily reduced due to clearing the cache data. Make sure to check the access status to the ETERNUS DX/AF before using this function.
- Stop the performance monitoring before using this function. If this function is used during a performance monitoring, the system performance (IOPS, throughput, response time, and cache hit rate) may temporarily and significantly be increased or decreased.
- This function is not available in a Unified Storage environment.
- If Dirty data (cache data that is not written back to the drive) exists in the cache memory, this function cannot be used. In this case, stop the host access. After the Dirty data is written back to the drive (the Cache LED turns off), execute this function.
- This function cannot be used under the following conditions:
  - The storage system status is "Not Ready"
  - The CM status is not "✅ Normal"
  - The PFM status is not "✅ Normal" (when selecting "Extreme Cache")
  - The status of RAID groups registered as EXCPs is not "✅ Available" (when selecting "Extreme Cache Pool")

N o t e

- This function deletes the cache data for Read, however the same data is stored in the drive so there is no data loss.
- Cache data in the EXC can only be cleared when all of the following conditions are satisfied:
  - For the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, or the ETERNUS DX8700 S3/DX8900 S3
  - PFMs are installed in all of the CMs (for the ETERNUS DX500 S4/DX600 S4 or the ETERNUS DX500 S3/DX600 S3)
  - PFMs are installed in the CMs (for the ETERNUS DX8700 S3/DX8900 S3)
  - The EXC is enabled
  - The EXC memory size has been specified (other than "0GB")
- Cache data in the EXCP can only be cleared when all of the following conditions are satisfied:
  - The EXCP is enabled
  - The EXCP memory size has been specified (other than "0GB")

For details on the parameters for this function, refer to .
For the factory default settings for this function, refer to .

The procedure to clear all of the cache data is as follows:

Procedure

1   Click [Clear Cache] in [Action].

2 Select the cache to clear.

The main setting item is as follows.

● **Target Cache Settings**

  • Target Cache

3 Click the [Clear] button.

> **Caution**

If an error screen appears under the following conditions, check the parameter settings.
  • The system or CM status is not normal
  • The PFM status is not normal (when selecting "Extreme Cache")
  • The status of RAID groups registered as EXCPs is not normal (when selecting "Extreme Cache Pool")
  • Dirty data exists in the cache memory

4 A confirmation screen appears. Click the [OK] button.
  → The cache data is cleared.

5 Click the [Done] button to return to the [Utility] screen.

End of procedure

Eco-mode Management

This section describes Eco-mode management.

Eco-mode management provides the following functions.

- Modify Eco-mode General Setting
- Create Eco-mode Schedule
- Delete Eco-mode Schedule
- Modify Eco-mode Schedule

Modify Eco-mode General Setting

This function enables or disables the Eco-mode setting for the ETERNUS DX S4/S3 series.

> **▷ Caution**

Eco-mode is not available for the following drives:
- Hot Spares (except Dedicated Hot Spares)
- SSDs and SSD SEDs
- A drive that is in a RAID group that satisfies the following conditions:
  - A RAID group where no volumes are registered
  - A RAID group where SDPVs are registered
  - A RAID group that is registered as an REC Disk Buffer
  - A RAID group where ODX Buffer volumes are registered

> **◯ N o t e**

To create a new Eco-mode schedule, refer to "Create Eco-mode Schedule" (page 95).

For details on the parameters for this function, refer to "A. Modify Eco-mode General Setting" (page 991).
For the factory default settings for this function, refer to "B. Modify Eco-mode General Setting" (page 1255).

The procedure to set the Eco-mode schedule for a RAID group is as follows:

Procedure

1 Click [Modify Eco-mode Setting] in [Action].

2 Specify the parameters.

The main setting item is as follows.

● **Eco-mode General Setting**

 • Eco-mode

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
 → The application of the Eco-mode general settings starts.

5 Click the [Done] button to return to the [Eco-mode] screen.

End of procedure

Create Eco-mode Schedule

This function specifies the disk operating time (term for activating disk motor constantly) as an Eco-mode schedule.

 • Up to 64 Eco-mode schedules can be created for each storage system.

 • Up to eight events can be specified for a single Eco-mode schedule.

▷ **Caution**

 • To perform schedule operations using this function, the Eco-mode setting for the ETERNUS DX S4/S3 series must be enabled.

 • Disk operation time varies depending on the Eco-mode schedule settings and disk access. A disk is spun up even if it is outside of disk operation time in the following conditions:

  - If disk access occurs while the disk motor is stopped:
    The disk is immediately spun up and can be accessed within 1 - 5 minutes.

  - If a disk is activated more than a set amount of times in a day:
    A state of increased access frequency is assumed and the Eco-mode will cease stopping the disk motor.

> **Note**
>
> • To apply the created Eco-mode schedule to each RAID group, refer to the procedure in "Assign Eco-mode Schedule (RAID Group)" (page 525).
> • To apply the created Eco-mode schedule to each Thin Provisioning Pool, refer to the procedure in "Assign Eco-mode Schedule (Thin Provisioning Pool)" (page 565).

For details on the parameters for this function, refer to "A. Create Eco-mode Schedule" (page 991).
For the factory default settings for this function, refer to "B. Create Eco-mode Schedule" (page 1256).

The procedure to create an Eco-mode schedule is as follows:

Procedure

1   Click [Create Schedule] in [Action].

2   Specify the "Schedule Name".
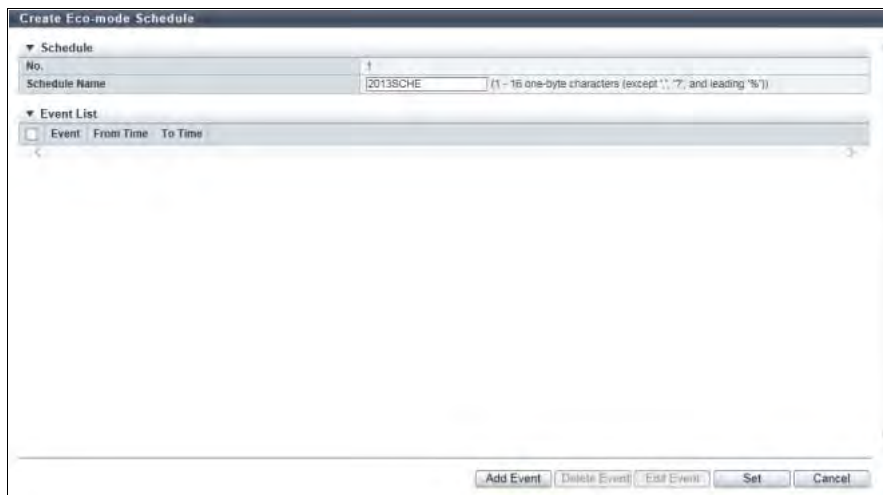
The main setting item is as follows.

● **Schedule**

   • Schedule Name

3   Click the [Add Event] button.

4	Select an event type and set the event details.
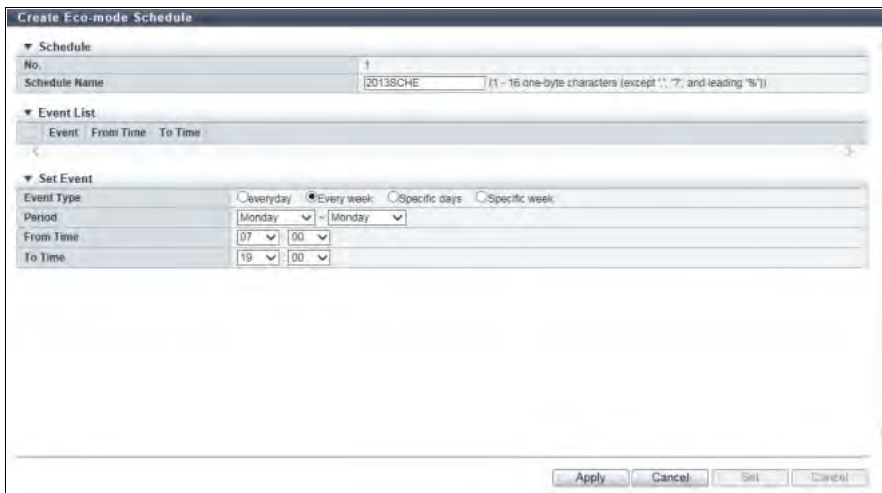
The main setting item is as follows.

● **Set Event**

•	Event Type

⬤ **N o t e**

•	When deleting the added event, select the event, and click the [Delete Event] button.
•	When changing the added event, select the event, and click the [Edit Event] button.

5	Click the [Apply] button.
	→	The event is added to the "Event List".

6	Repeat Step 2 through Step 5 to configure multiple events.

7	After adding all the events, click the [Set] button.
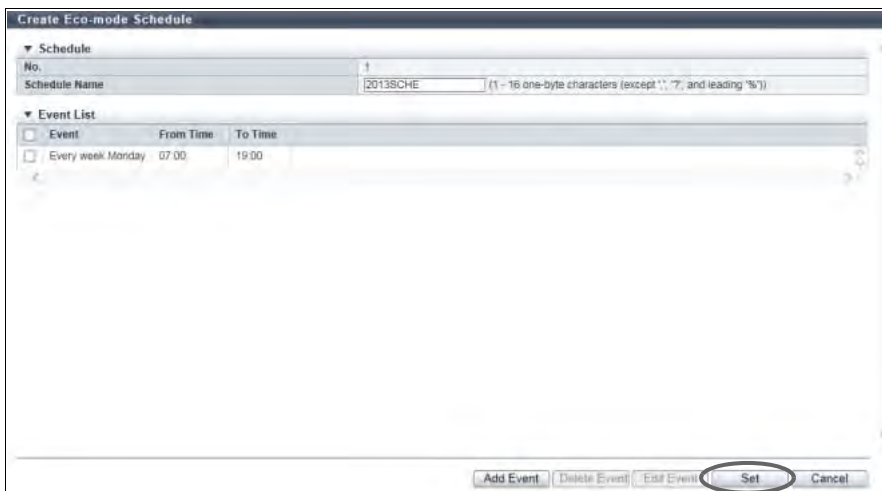
8	A confirmation screen appears. Click the [OK] button.
	→	Creation of the Eco-mode schedule starts.

9   Click the [Done] button to return to the [Eco-mode] screen.

End of procedure

Delete Eco-mode Schedule

This function deletes the Eco-mode schedule.

▷ **Caution**

- An Eco-mode schedule that is allocated to a RAID group cannot be deleted.
- An Eco-mode schedule that is allocated to a Thin Provisioning Pool cannot be deleted.

The procedure to delete an Eco-mode schedule is as follows:

Procedure

1   Select the schedule that is to be deleted (multiple selections can be made) and click [Delete Schedule] in [Action].

2   A confirmation screen appears. Click the [OK] button.
→   Deletion of the Eco-mode schedule starts.

3   Click the [Done] button to return to the [Eco-mode] screen.

End of procedure

Modify Eco-mode Schedule

This function modifies the Eco-mode schedule.
Up to eight events can be specified for a single Eco-mode schedule.

▷ **Caution**

Disk operation time varies depending on the Eco-mode schedule settings and disk access.
A disk is spun up even if it is outside of disk operation time in the following conditions:

- If disk access occurs while the disk motor is stopped:
  The disk is immediately spun up and can be accessed within 1 - 5 minutes.
- If a disk is activated more than a set amount of times in a day:
  A state of increased access frequency is assumed and the Eco-mode will cease stopping the disk motor.

⬤ **N o t e**

- To apply the modified Eco-mode schedule to each RAID group, refer to the procedure in .
- To apply the modified Eco-mode schedule to each Thin Provisioning Pool, refer to the procedure in .

For details on the parameters for this function, refer to .

The procedure to modify an Eco-mode schedule is as follows:

Procedure

1 Select the Eco-mode schedule that is to be edited and click [Modify Schedule] in [Action].

2 Select the event that is to be modified and click the [Edit Event] button.
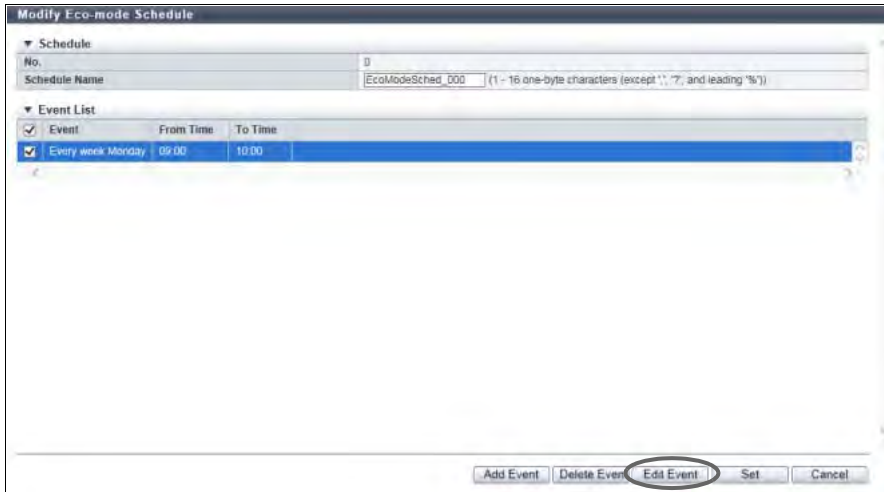
3 Modify the event content.
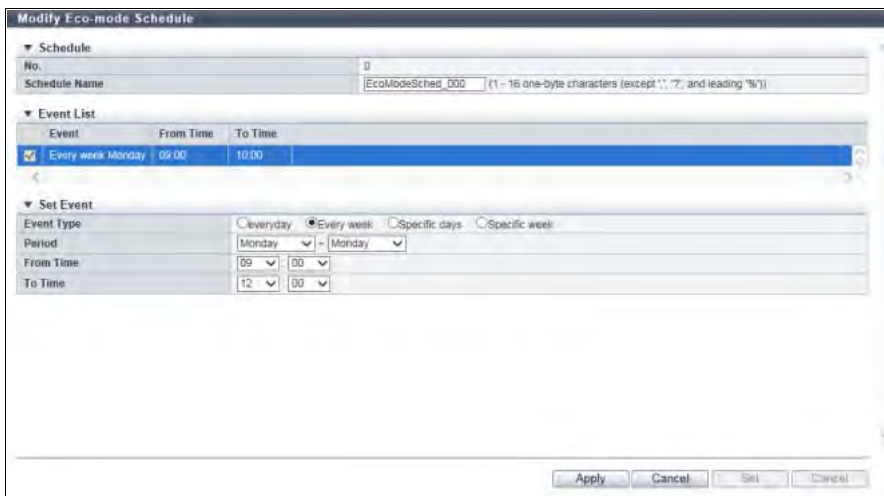
The main setting item is as follows.

● **Set Event**

• Event Type

🔵 **N o t e**

• When adding an event, click the [Add Event] button.
• When deleting the event, select the target event(s) that is to be deleted, and click the [Delete Event] button.

4 Click the [Apply] button.
→ The "Event List" is updated.

5 Repeat Step 2 through Step 4 to edit multiple events.

6 After editing all the events, click the [Set] button.
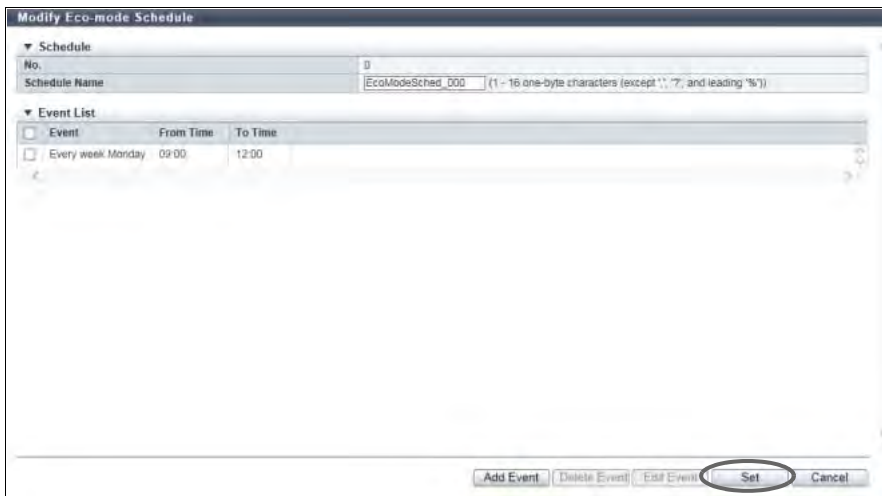
7 A confirmation screen appears. Click the [OK] button.
→ Modification of the Eco-mode schedule starts.

8 Click the [Done] button to return to the [Eco-mode] screen.

End of procedure

User Management

This section describes user management.

User management provides the following functions:

- Setup User Account
- Initialize User Account
- Modify User Policy
- Modify RADIUS
- Add Role
- Delete Role
- Modify Role

Setup User Account

This function adds, edits, and deletes the user account.
Up to 60 user accounts can be set.

> ▷ **Caution**
>
> - The current user's (your) account cannot be changed or deleted.
> - When using the SSH Client Key authentication, create a pair of the SSH client public key and the SSH client secret key in advance, using the creation tool. One public key can be registered per user account. When this function is executed, the public key is registered in the ETERNUS DX/AF.
> - The following types (formats) of public keys can be used:
>   - IETF style DSA for SSH v2
>   - IETF style RSA for SSH v2
>   The supported maximum encryption strength for the public key is 4096-bit.

> ● **N o t e**
>
> - To improve the security level of the password, specify a user policy (password policy and lockout policy). Refer to "Modify User Policy" (page 107) for details. Use this function to set whether to enable or disable a user policy for each user account.
> - When a user account is deleted, the SSH client public key registered in the ETERNUS DX/AF is also deleted.
> - When a user account is initialized, the following settings are initialized. Refer to "Initialize User Account" (page 106) for details.
>   - The password for the default account is restored to the default password.
>   - The user policy for the default account is disabled.
> - To change the current user's (your) password, use the procedure in "Change User Password" (page 48).
> - To change the current user's (your) SSH public key, use the procedure in "Set SSH Public Key" (page 50).

For details on the parameters for this function, refer to "A. Setup User Account" (page 994).
For the factory default settings for this function, refer to "B. Setup User Account" (page 1256).

■ Add User Account

The procedure to add a user accounts is as follows:

> **Procedure**

1 Click [Setup User Account] in [Action].

2 Click the [Add] button.
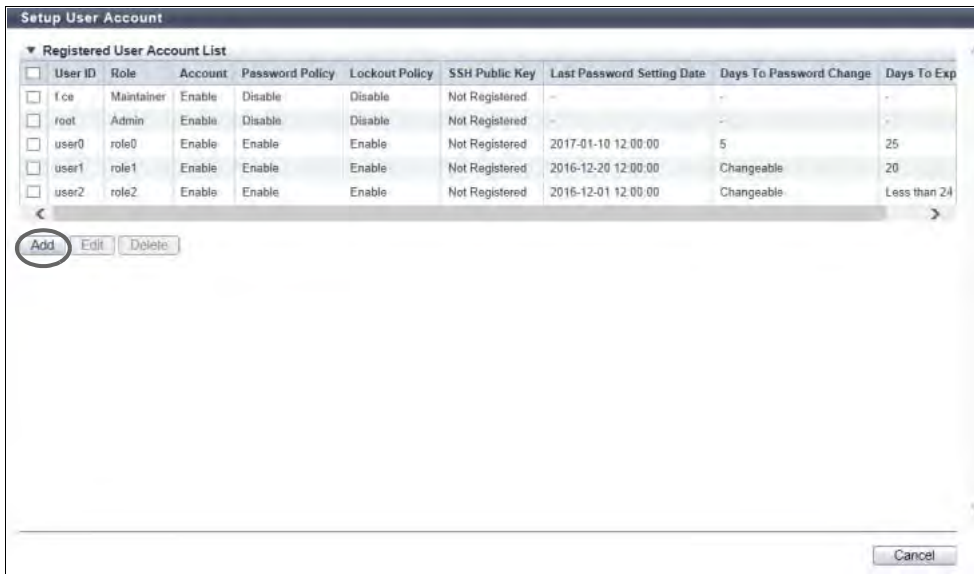
3 Specify the parameters.
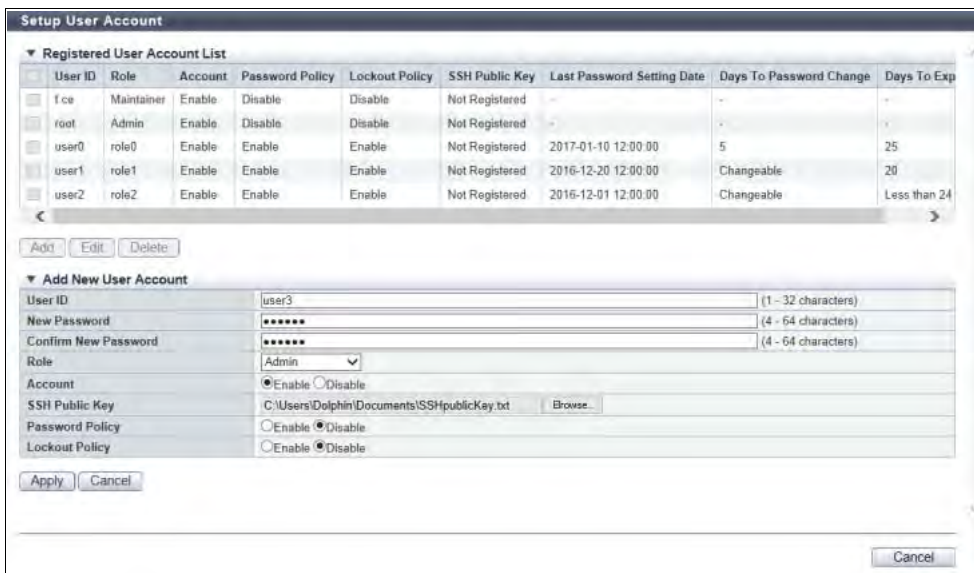
The main setting items are as follows.

● **Add New User Account**

- User ID
- New Password
- Confirm New Password
- Role
- Account
- SSH Public Key
- Password Policy
- Lockout Policy

4 Click the [Apply] button.

5 A confirmation screen appears. Click the [OK] button.
       → Addition of the user account starts.

6 Click the [Done] button to return to the [Define Role] screen.

End of procedure

■ **Edit User Account**

▷ **Caution**

- Any user account information other than the following parameters can be changed.
    - User ID
    - The "Password Policy" and "Lockout Policy" that are applied to a user account set with the "Software" role
- Changed user accounts become available at the next login.

The procedure to edit a user accounts is as follows:

Procedure

1 Click [Setup User Account] in [Action].

2 Select the user account to be modified.
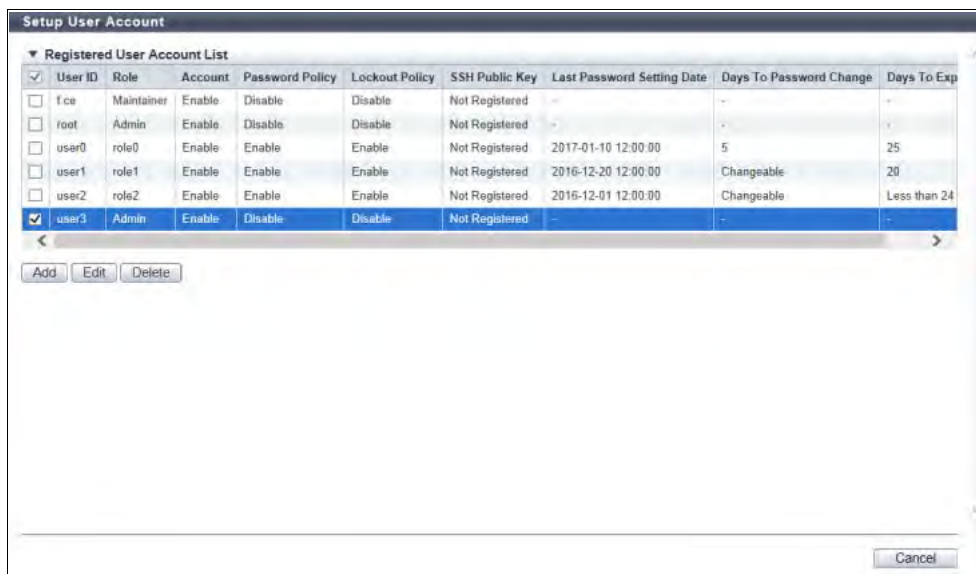
The main setting item is as follows.

● **Registered User Account List**

- Checkbox

3 Click the [Edit] button.

4 Change the parameters.
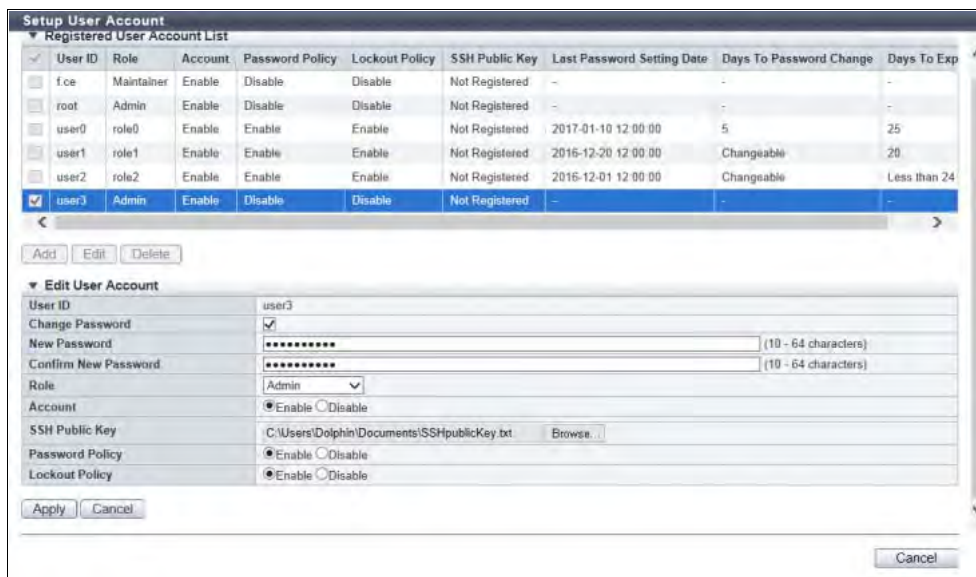
The main setting items are as follows.

● Edit User Account

- Change Password
- New Password
- Confirm New Password
- Role
- Account
- SSH Public Key
- Password Policy
- Lockout Policy

🔵 **N o t e**

- To change the password, select the "Change Password" checkbox.
- To delete an SSH client public key, select the "Delete" checkbox and click the [Apply] button. The "Delete" checkbox appears only if the SSH client public key has already been registered.

5 Click the [Apply] button.

6 A confirmation screen appears. Click the [OK] button.
   → The user account setup starts.

7 Click the [Done] button to return to the [Define Role] screen.

End of procedure

■ Delete User Account

▷ **Caution**

- The last user account with administrator privileges (role of "Admin") assigned cannot be deleted.
- Deleted user accounts become available at the next login.

The procedure to delete a user accounts is as follows:

> **Procedure**

1　Click [Setup User Account] in [Action].

2　Select the deletion target user accounts (multiple selections can be made).
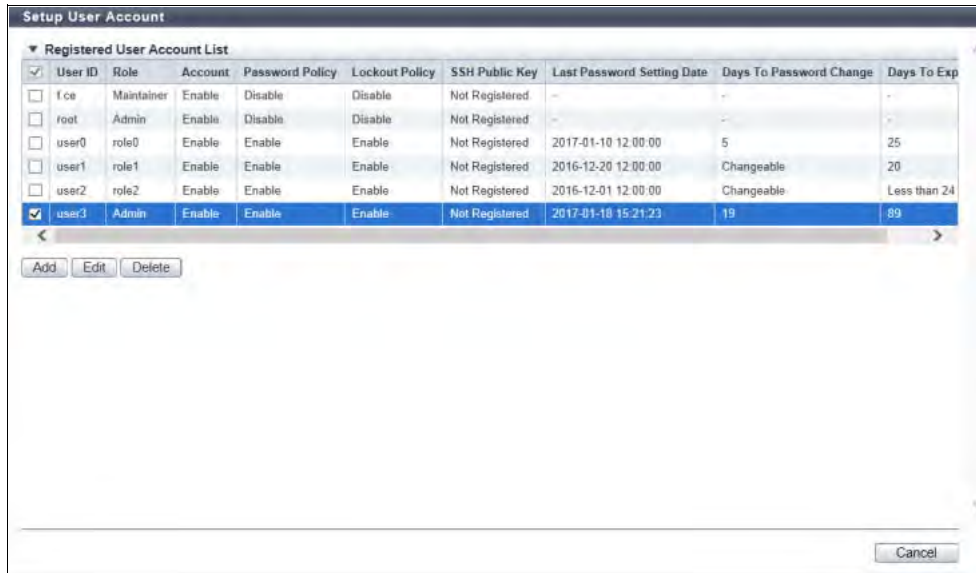
The main setting item is as follows.

● **Registered User Account List**

　• Checkbox to select a user account

3　Click the [Delete] button.

4　A confirmation screen appears. Click the [OK] button.
→ The user account deletion starts.

5　Click the [Done] button to return to the [Define Role] screen.

> **End of procedure**

Initialize User Account

This function initializes the user accounts to the factory default status.

▷ **Caution**

- By using this function, all the registered user accounts are deleted and only the factory default account remains.
- The password for the default account is restored to the default password.
- The user accounts deleted by this function will be unavailable for the next login.

⬤ **N o t e**

- When the user accounts are initialized, the SSH client public keys for all the users registered in the ETERNUS DX/AF are also deleted.
- When user accounts are initialized, the user policy (Password Policy and Lockout Policy) for the default account is disabled.

The procedure to initialize user accounts is as follows:

Procedure

1 Click [Initialize User Account] in [Action].

2 Click the [Initialize] button.

3 A confirmation screen appears. Click the [OK] button.
   → The user account initialization starts.

4 Click the [Done] button to return to the [Define Role] screen.

End of procedure

Modify User Policy

This function specifies a user policy (Password Policy and Lockout Policy) for user accounts to be registered in the ETERNUS DX/AF.
"Password Policy" indicates the creation guidelines for a password such as the complexity and lifetime. This setting is applied when the password for the new user account is registered or when the password for an existing user account is changed. "Lockout Policy" indicates the guidelines for a lockout when the authentication fails. This setting is used when users log in to the ETERNUS DX/AF.
Use this function to improve the Internal Authentication (*1) security. Set whether to enable or disable a user policy for each user account.

*1:   This is the standard authentication type. Internal Authentication uses user account information stored in the ETERNUS DX/AF to verify the input user account.

▷ **Caution**

- A user policy cannot be applied for the following user accounts.
  - User accounts with the "Software" role that is used for external software
  - User accounts used for RADIUS authentications
- The specified contents of this function are applied to the ETERNUS DX/AF immediately after the settings are complete. Note that the "Lockout Policy" is applied the next time the relevant user logs in.
- If a user account with the "Password Policy" setting enabled is used to log in and the "Maximum Password Age" of the relevant user account has expired, the [Change Password] screen appears. Users cannot log in until the password is changed.
- If a user account with the "Lockout Policy" setting enabled is used to log in and the number of failed authentications exceeds the "Lockout Threshold", the relevant user account is locked out. The lockout is not released until the specified "Lockout Duration" passes.

● **N o t e**

- One user policy can be specified in the ETERNUS DX/AF. Select whether to enable or disable the user policy for each user account when creating new user accounts or when editing existing user accounts. A user policy can also be set for the default user IDs ("root" and "f.ce"). Refer to "Setup User Account" (page 101) for details.
- When a user account is initialized, the user policy for the default account is changed to "Disable". Refer to "Initialize User Account" (page 106) for details.

For details on the parameters for this function, refer to "A. Modify User Policy" (page 998).
For the factory default settings for this function, refer to "B. Modify User Policy" (page 1257).

The procedure to modify the user policy is as follows:

Procedure

1   Click [Modify User Policy] in [Action].

2 Specify the parameters.

The main setting items are as follows.

● **Password Policy**

- Minimum Password Length
- Password Complexity
- Password History
- Minimum Password Age
- Maximum Password Age

● **Lockout Policy**

- Lockout Threshold
- Lockout Duration

3 Click the [Modify] button.

4 A confirmation screen appears. Click the [OK] button.
→ The user policy setting starts.

5 Click the [Done] button to return to the [Define Role] screen.

End of procedure

Modify RADIUS

This function specifies the external server (RADIUS server) that is used for authentication when logging in.
Up to two RADIUS Authentication servers can be registered.

> ▷ **Caution**

- Enable or disable RADIUS Authentication for each storage system.
- If RADIUS Authentication fails when "No" has been selected for "Recovery Mode" in the RADIUS Setting field, logging in to ETERNUS Web GUI will not be available.
- RADIUS Authentication cannot be used when logging in to the Slave CM.
- When "Yes (Communication error)" has been selected for "Recovery Mode" in the RADIUS Setting field, Internal Authentication (*1) is performed if authentication fails in both the primary and the secondary servers due to a network error in either or both of the servers.

  *1:   This is the standard authentication type. Internal Authentication uses user account information stored in the storage system to verify the input user account.

> ● **N o t e**

- There are supplementary notes when using RADIUS Authentication. Refer to "H. Using RADIUS Authentication" (page 1356) for details.
- When using RADIUS Authentication, registering user account information (user ID, password, and role) in RADIUS server is required. For details, refer to the manuals provided with the server.
- Even if the RADIUS Authentication function has been changed to "Disable", RADIUS setting information in the ETERNUS DX/AF is maintained.

For details on the parameters for this function, refer to "A. Modify RADIUS" (page 1000).
For the factory default settings for this function, refer to "B. Modify RADIUS" (page 1257).

The procedure to modify RADIUS is as follows:

| **Procedure**

1   Click [Modify RADIUS] in [Action].

2   Specify the parameters.

The main setting items are as follows.

● RADIUS Setting

- RADIUS Authentication
- Recovery Mode

● Primary Server (required) / Secondary Server

- Domain Name / IP Address
- Port No.
- LAN Port
- Authentication Mode
- Shared Secret
- Retry Out Time

3 Click the [Modify] button.

> ▷ Caution

An error screen appears if the specified IP address of the RADIUS server conflicts with the internal IP address of the ETERNUS DX/AF. If this occurs, check the parameter settings.

4 A confirmation screen appears. Click the [OK] button.
→ Setting of the RADIUS Authentication starts.

5 Click the [Done] button to return to the [Define Role] screen.

End of procedure

Add Role

This function combines several user policies and creates a user-specific role (custom role).
Up to 20 roles can be created per storage system.

Policy

The 16 types of access privileges shown below are available.

Policies	Description
Status Display	Status display functions (storage system status, RAID group list, volume list, copy session list, etc.)
RAID Group Management	RAID group, Thin Provisioning Pool, Eco-mode, hot spare disk setting functions, etc.
Volume - Create / Modify	Volume setting functions (register/modify/expand), etc.
Volume - Delete / Format	Volume setting functions (delete/format), etc.
Host Interface Management	Host interface management functions (host group settings, Channel Adapter (CA) port group settings, Logical Unit Number (LUN) group settings, host affinity settings), etc.
NAS Management (*1)	NAS setting functions (create NAS interface, create NAS shared folders), etc.
Advanced Copy Management	Local Advanced Copy setting functions, Remote Advanced Copy setting functions, etc.
Copy Session Management	Advanced Copy session management functions (start/stop/delete), etc.
Storage Migration Management	Storage Migration setting functions (start/suspend/stop/restart/delete path), etc.

Policies	Description
Storage Management	Configuration setting functions of the ETERNUS DX/AF (date and time, network, remote support), etc.
User Management	User account setting functions (create/change/delete), etc.
Authentication / Role	External authentication and role setting functions (create/change/delete), etc.
Security Setting	Encryption setting functions of drives, etc.
Maintenance Information	Exporting and deleting functions of maintenance information (performance information, configuration information, events, storage system logs, panic dumps), etc.
Firmware Management	Firmware management functions (for users without the "Maintenance Operation" policy who need to set the controller firmware)
Maintenance Operation	Maintenance operation/preventive maintenance operation of hardware and firmware

*1:   This policy is displayed in a Unified Storage environment.

▷ **Caution**

A role without any user policies cannot be created.

🔵 **N o t e**

- The ETERNUS DX/AF has default roles. Refer to "Default Role" (page 1293) for details.
- Multiple policies can be allocated to one role.
- A role that is created can be allocated to a user account by using the procedure in "Setup User Account" (page 101).

For details on the parameters for this function, refer to "A. Add Role" (page 1002).
For the factory default settings for this function, refer to "B. Add Role" (page 1257).

The procedure to add a user role is as follows:

Procedure

1   Click [Add Role] in [Action].

2   Input the role name and select the policies for the role.
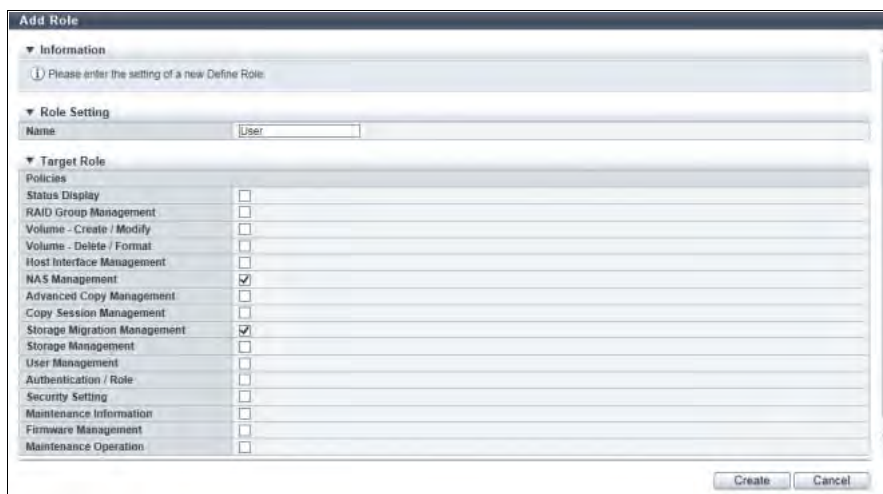
The main setting items are as follows.

● **Role Setting**

 • Name

● **Target Policy**

 • Policies

3   Click the [Create] button.

4   A confirmation screen appears. Click the [OK] button.
     → Application of the role settings starts.

5   Click the [Done] button to return to the [Define Role] screen.

End of procedure

Delete Role

This function deletes the user role (custom role) which was registered by a user.

▷ **Caution**

 • The existing role (default role) cannot be deleted.
 • The user role which is allocated to a user account cannot be deleted.

The procedure to delete a role is as follows:

Procedure

1   Select the user role to be deleted (multiple selections can be made) and click [Delete Role] in [Action].

2   A confirmation screen appears. Click the [OK] button.
     → The user role is deleted.

3   Click the [Done] button to return to the [Define Role] screen.

End of procedure

Modify Role

This function modifies the policies of the user-specific role (custom role).
This function can be used when a custom role is created.

▷ **Caution**

 • Policies of the existing role (default role) cannot be changed.
 • A role without any policies cannot be created.

> **◉ N o t e**
>
> - Multiple policies can be allocated to one role.
> - Policies which have been granted to the user account while logged in, can also be modified. Note that the modifications become valid only after the next login.
> - The modified role can be granted to the user account using the procedure in "Setup User Account" (page 101).
> - Refer to "Policy" (page 110) for available policies.

For details on the parameters for this function, refer to "A. Modify Role" (page 1003).

The procedure to modify a user role is as follows:

Procedure

1 Select the role to be modified, and click [Modify Role] in [Action].

2 Change the role settings.
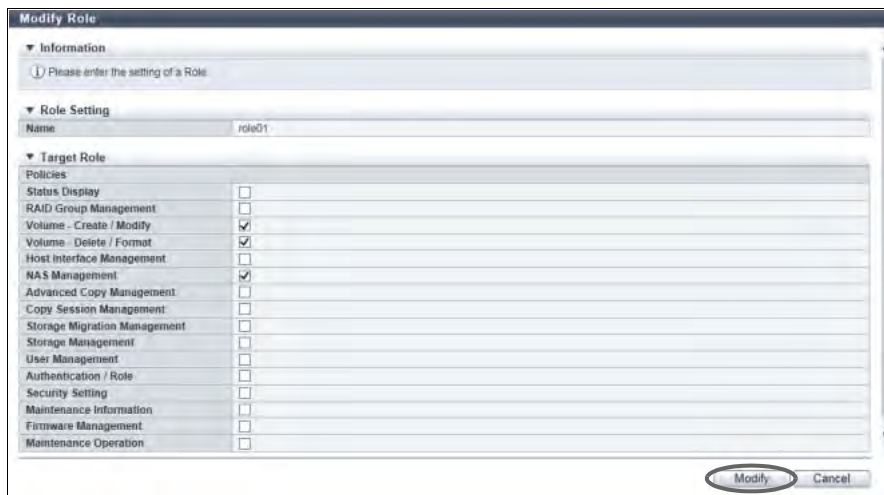
The main setting item is as follows.

● **Target Role**

- Policies

3 Click the [Modify] button.

4 A confirmation screen appears. Click the [OK] button.
→ Modification of the role settings starts.

5 Click the [Done] button to return to the [Define Role] screen.

End of procedure

Network Management

This section describes the network environment settings.
The following functions are available for the network environment settings:

- Setup Network Environment
- Setup Firewall
- Setup SNMP Agent Basic Interface
- Setup SNMP Manager
- Setup SNMP Agent MIB Access View
- Setup SNMP Agent User
- Setup SNMP Agent Community
- Setup SNMP Agent Trap
- Download MIB File
- Send SNMP Trap Test
- Display SMTP Log
- Setup E-Mail Notification
- Setup Syslog
- Setup SSH Server Key
- Create Self-signed SSL Certificate
- Create Key/CSR
- Register SSL Certificate
- Setup SSL Version

Setup Network Environment

This function sets up an the environment for the ETERNUS DX/AF to communicate with an external network. Config-
uration is required for each MNT, RMT and FST port.

- MNT port
  The MNT port is used for general communication between the ETERNUS DX/AF and the external hosts.
- RMT port
  The RMT port is used when the line must be separated from the MNT port.
  For the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250
  S2, the ETERNUS AF250, and the ETERNUS DX200F, this port is also used for maintenance of the ETERNUS DX/AF.
- FST port
  The FST port is used for maintenance of the ETERNUS DX/AF.
  For the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS DX8100 S3/DX8700 S3/
  DX8900 S3, the ETERNUS AF650 S2, and the ETERNUS AF650, this port must be configured.

> ▶ **Caution**

- If the message "Currently Network Configuration is set to factory default." is displayed in the system message
  field, the network environment settings must be performed. Some functions are not available if the network
  environment settings for the MNT port are incomplete. Refer to "Functions that cannot be performed in a fac-
  tory default network environment" (page 115) for details.
- Logging in again may be required after the settings are complete.

> **Note**
> - MNT ports and RMT ports support both "IPv4" and "IPv6". FST ports only support "IPv4".
> - Both or either "IPv4 address" and "IPv6 address" can be set for a port.
> - When the network environment settings are the same as the factory default, all the input items in the [IPv4 Settings] tab for the MNT port are cleared. Information that is configured in the ETERNUS DX/AF is not displayed. Note that in the [IPv6 Settings] tab, the information that is configured in the ETERNUS DX/AF is displayed.
> - When SNMP Manager exists in a different subnetwork from the ETERNUS DX/AF, specify the IP address or the network address of SNMP Manager in "Allowable IP Address" of this function.
> - Available operations vary depending on the models and ports. Refer to "Available port operations for each model" (page 115) for details.
> - To enable or disable each service (such as HTTP and HTTPS), use the procedure in "Setup Firewall" (page 123).

Functions that cannot be performed in a factory default network environment

- All of the [Network] navigation functions (except the [Setup Network Environment] and [Setup Firewall] functions)
- All of the [Remote Support] navigation functions (all of the REMCS / AIS Connect functions)
- All of the [Key Management] navigation functions
- Modify RADIUS
- All of the [Audit Log] navigation functions
- Setup SMI-S Environment
- Modify Date and Time (NTP settings)
- Hot controller firmware upgrade (cold controller firmware upgrade is available)
- Add Memory
- Add Channel Adapter and Remove Channel Adapter

Available port operations for each model

Model	MNT port			RMT port			FST port		
	Setting	Modification	Deletion	Setting	Modification	Deletion	Setting	Modification	Deletion
ETERNUS DX60 S4/DX100 S4/DX200 S4 ETERNUS DX60 S3/DX100 S3/DX200 S3	OK	OK	OK (*1)	OK	OK	OK (*1)	N/A	–	–
ETERNUS DX500 S4/DX600 S4 ETERNUS DX500 S3/DX600 S3	OK	OK	OK (*1)	OK	OK	OK (*1)	OK	OK	N/A
ETERNUS DX8100 S3/DX8700 S3/ DX8900 S3	OK	OK	OK (*1)	OK	OK	OK (*1)	OK	OK	N/A
ETERNUS AF250 S2 ETERNUS AF250	OK	OK	OK (*1)	OK	OK	OK (*1)	N/A	–	–
ETERNUS AF650 S2 ETERNUS AF650	OK	OK	OK (*1)	OK	OK	OK (*1)	OK	OK	N/A
ETERNUS DX200F	OK	OK	OK (*1)	OK	OK	OK (*1)	N/A	–	–

OK: Port operation is available
N/A: Port operation is not available
–: Not supported
*1:   If no other ports are available, this cannot be deleted.

For details on the parameters for this function, refer to "A. Setup Network Environment" (page 1004).
For the factory default settings for this function, refer to "B. Setup Network Environment" (page 1257).

■ **When using IPv4**

The procedure to set network environment using IPv4 address is as follows:

Procedure

1 Select which port to set the network environment for, and click [Setup Network Environment] in [Action].

2 Specify the parameters.
If the gateway is specified, the information of the remote storage systems for which network access will be allowed can be input.

The main setting items are as follows.

● **LAN**

• Speed and Duplex
• Wake on LAN

● **Interface**

• Master IP Address
• Slave IP Address
• Subnet Mask
• Gateway

● **DNS**

• Primary DNS
• Secondary DNS

3 To allow access from a different subnetwork to the ETERNUS DX/AF, click the [Add] button.
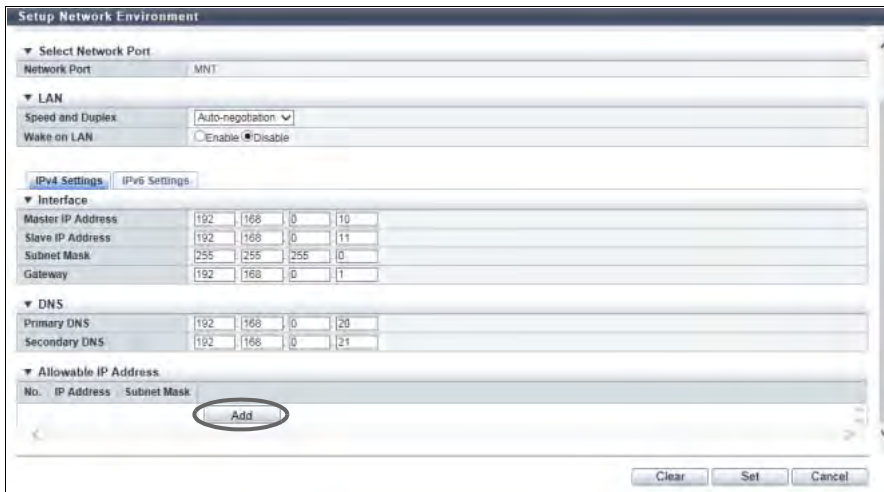
→ The [Add Allowable IP Address] screen appears.

4 Input the IP address and the subnet mask.
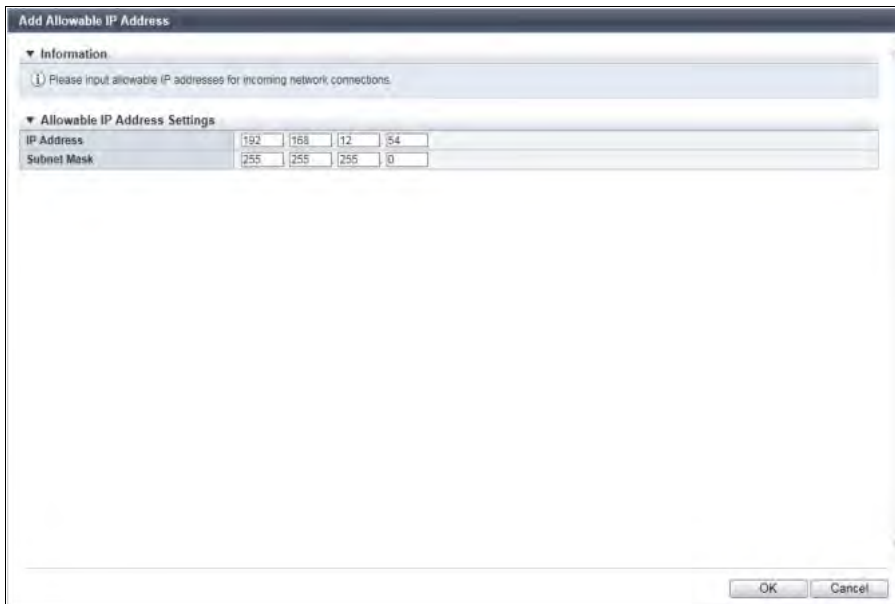
The main setting items are as follows.

● **Allowable IP Address Settings**

• IP Address

• Subnet Mask

5 Click the [OK] button.
→ Returns to the [Setup Network Environment] screen.

6   Repeat Step 3 through Step 5 when registering several allowable IP addresses.

▷ **Caution**

- When specifying the IP address or the subnet mask, note the following points:
  - IP addresses must be specified with the IPv4 format.
  - The IP address of the RMT port must be in a different subnetwork from the MNT port.
  - Specify the IP address of the Slave CM when connecting to the Slave CM. The IP address of the Slave CM must be in the same subnetwork as the Master CM.
  - Specify the IP address of "Gateway" when allowing access from outside of the subnetwork. The IP address must be in the same subnetwork as the port.
  - For "Allowable IP Address", specify the IP address or the network address that allows access to the ETERNUS DX/AF. These settings are not required for access from the network address (same subnetwork) which the ETERNUS DX/AF belongs to.
- Click the [Clear] button to delete setting parameters. Note that the parameters cannot be deleted if no other ports are available.

7   After registering the allowable IP addresses is complete, click the [Set] button.

8   A confirmation screen appears. Click the [OK] button.
→ The network environment setting starts.

9   Click the [Done] button to return to the [Network] screen.

▷ **Caution**

Device management operation cannot be continued if the IP address of the ETERNUS DX/AF has been changed. Logging in again with the new IP address is required.

End of procedure

■ **When using IPv6**

The procedure to set network environment using IPv6 address is as follows:

Procedure

1 Select which port to set the network environment for, and click [Setup Network Environment] in [Action].

2 Specify the parameters.
If the gateway is specified, the information of the remote storage systems for which network access will be allowed can be input.

The main setting items are as follows.

● **LAN**

• Speed and Duplex
• Wake on LAN

● **Interface**

• Master IP Link Local Address
• Master Connect IP Address
• Slave IP Link Local Address
• Slave Connect IP Address
• Length of Subnet Prefix
• Gateway

● **DNS**

• Primary DNS
• Secondary DNS

🔵 N o t e

Click the [Automatic discovery] button to automatically obtain "Master IP Link Local Address", "Master Connect IP Address", "Slave IP Link Local Address", "Slave Connect IP Address", "Length of Subnet Prefix", and "Gateway". Input the IPv6 address of the Domain Name System (DNS) server if required.

3 To allow access from a different subnetwork to the ETERNUS DX/AF, click the [Add] button.
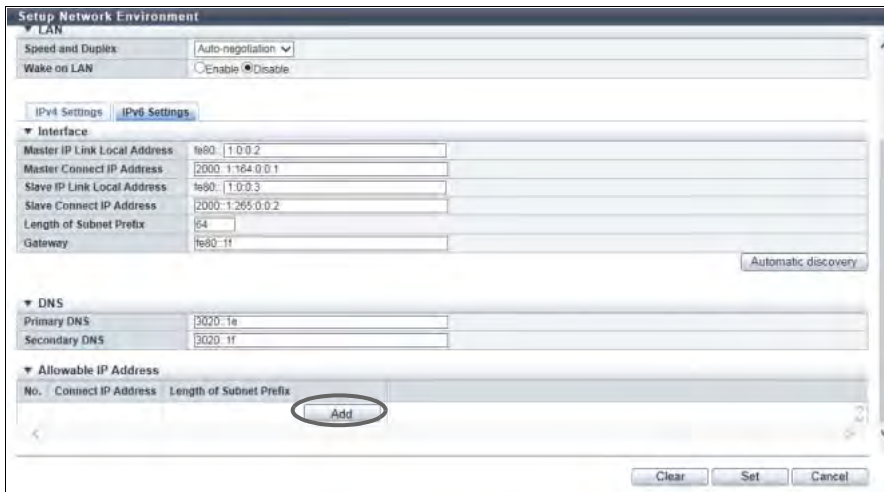
→ The [Add Allowable IP Address] screen appears.

4 Input "Connect IP Address" and "Length of Subnet Prefix".
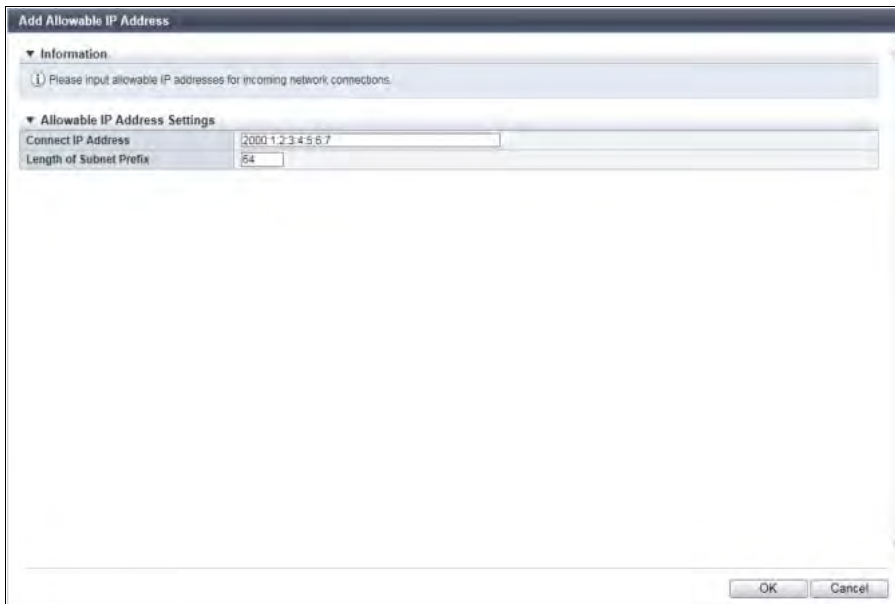
The main setting items are as follows.

● **Allowable IP Address Settings**

- Connect IP Address
- Length of Subnet Prefix

5 Click the [OK] button.
→ Returns to the [Setup Network Environment] screen.

6 Repeat Step 3 through Step 5 when registering several allowable IP addresses.

> ▷ **Caution**

- Note the following points when specifying an IP address:
  - IP addresses must be specified with the IPv6 format. Refer to "IPv6 Address Notation (Setup Network Environment)" (page 122) for details.
  - The connect IP address of the RMT port must be in a different subnetwork from the MNT port
  - Specify the connect IP address of the Slave CM when connecting to the Slave CM. The connect IP address of the Slave CM must be in the same subnetwork as the Master CM.
  - Specify the IP address of "Gateway" when allowing access from outside of the subnetwork. The IP address must be in the same subnetwork as the port.
  - For "Allowable IP Address", specify the IP address or the network address that allows access to the ETERNUS DX/AF. These settings are not required for access from the network address (same subnetwork) which the ETERNUS DX/AF belongs to.
- Click the [Clear] button to delete setting parameters. Note that the parameters cannot be deleted if no other ports are available.

7 After registering the allowable IP addresses is complete, click the [Set] button.

8 A confirmation screen appears. Click the [OK] button.
→ The network environment setting starts.

9 Click the [Done] button to return to the [Network] screen.

> ▷ **Caution**

Device management operation cannot be continued if the IP address of the ETERNUS DX/AF has been changed. Logging in again with the new IP address is required.

End of procedure

● **Available IPv6 Address**

No.	Allocated addresses	Settable range for addresses	Length of subnet prefix
1	Global address	2000::1 - 3fff:ffff:ffff:ffff:ffff:ffff:ffff:ffff	3 - 128
2	Unique local address	fc00::1 - fdff:ffff:ffff:ffff:ffff:ffff:ffff:ffff	7 - 128
3	Link local address	fe80::1 - fe80::ffff:ffff:ffff:ffff	64-bit static IP address
4	6to4 address	2002:<IPv4 address in hexadecimal>::1 - 2002:<IPv4 address in hexadecimal>::ffff:ffff:ffff:ffff	48 - 128

● **IPv6 Address Notation (Setup Network Environment)**

Since the IPv6 address is 128-bit and extremely long, this address is displayed using "xxxx", which describes 16-bit in hexadecimals as being one block that is separated by colons (":").

xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
- Use 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) for inputting an IPv6 address.
- The current setting is displayed with 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
- Up to 128-bit
- The first 64-bit (prefix) of the link local address is fixed to "fe80::".

The following three abbreviation methods are available for IPv6 addresses:
(1) Omission of the first "0" of a block that follows consecutive zeros.

[Example] 2001:1000:0120:0000:0000:0123:0000:0000

2001:1000:120:0000:0000:123:0000:0000

(2) Replacement of "0000" blocks with "0".

[Example] 2001:1000:120:0000:0000:123:0000:0000

2001:1000:120:0:0:123:0:0

(3) Replacement of a block with consecutive zeros by "::" is performed only once.

[Example] 2001:1000:120:0:0:123:0:0

2001:1000:120::123:0:0 is OK
2001:1000:120::123:: is not allowed

(Replacement of a block with consecutive zeros by "::" is allowed only once.)

▷ **Caution**

The following IP addresses cannot be specified:
- Link local addresses for which all of the values for the low 64-bit are "0"
- Connect IP addresses (*1) for which the first 3-bit are not "001" or the first 7-bit are not "1111110"
  *1:   The connect IP address indicates a "global address", "unique local address", or "6to4 address".
- The first 64-bit of the gateway is "fe80::" and all of the values for low 64-bit are "0"
- Network addresses for which the first 3-bit of the gateway are "001"
- Network addresses for which the first 7-bit of the gateway are "1111110"
- DNS server IP addresses for which the first 3-bit are not "001" or the first 7-bit are not "1111110"

■ Supplementary Information

- When accessing of the ETERNUS DX/AF from a different subnetwork is not allowed
  Specify "IP Address" and "Subnet Mask" of the ETERNUS DX/AF.
  Only accessing from the same subnetwork is allowed.
- When accessing of the ETERNUS DX/AF from a different subnetwork is allowed (*1)
  Specify "Gateway" and "Allowable IP Address ("IP Address" (or the network address) and "Subnet Mask")".
  *1: Allowing access from a different subnetwork is required when using ETERNUS Web GUI or ETERNUS CLI of PCs in a different network to log in to the ETERNUS DX/AF. Allowing access from a different subnetwork is also required when using Systemwalker Centric Manager or SNMP Manager that is connected to a different subnetwork to monitor the ETERNUS DX/AF.

[Example] Allowable IP Address (for IPv4)

• When accessing of the ETERNUS DX/AF from a specific client outside the subnetwork is allowed, specify "IP Address" and "Subnet Mask".
  IP Address: 10.20.30.40
  Subnet Mask: 255.255.255.255
• When accessing of the ETERNUS DX/AF from a specific subnetwork outside the subnetwork is allowed, specify "Network Address" and "Subnet Mask".
  IP Address: 10.20.30.0
  Subnet Mask: 255.255.255.0

For IPv6, "IP Address" corresponds to "Connect IP Address", and "Subnet Mask" corresponds to "Length of Subnet Prefix".

Setup Firewall

This function configures a firewall for each service.
Configuration is required for each MNT, RMT and FST port.

• MNT port
  The MNT port is used for general communication between the ETERNUS DX/AF and the external hosts.
• RMT port
  The RMT port is used when the line must be separated from the MNT port.
  For the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F, this port is also used for maintenance of the ETERNUS DX/AF.
• FST port
  The FST port is used for maintenance of the ETERNUS DX/AF.
  For the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, the ETERNUS AF650 S2, and the ETERNUS AF650, this port must be configured.

▷ **Caution**

• If both the HTTP connection and the HTTPS connection have been disabled, ETERNUS Web GUI cannot access the ETERNUS DX/AF.
• If both the Telnet connection and the SSH connection have been disabled, ETERNUS CLI cannot access the ETERNUS DX/AF.
• If ports of all the services are disabled, access to the ETERNUS DX/AF is not allowed.
• When the firewall setting is changed, it takes approximately 10 seconds to update the storage system information. To display the most recently updated screen, wait at least 10 seconds and click the [ ] icon in the [Network] screen or click [Network] in the category.

> **N o t e**
>
> - To configure the network environment of the ETERNUS DX/AF, use the procedure in "Setup Network Environment" (page 114).
> - The following table shows the protocols, the port numbers, and the direction for each service.

Service	Protocol	tcp/udp	Port number	Direction (*1)
ETERNUS Web GUI	HTTP	tcp	80	from
	HTTPS		443	from
ETERNUS CLI	Telnet	tcp	23	from
	SSH		22	from
Ping	ICMP	–	–	from
Maintenance-Secure	Unique protocol	tcp	1372	from
SNMP (excluding SNMP trap)	SNMP	udp	161	from
RCIL	IPMI	udp	623 / 664	from
ETERNUS DX Discovery	Unique protocol	udp	9686	from

> *1: The direction of the first communication. "From" indicates that the first communication is performed from an external server or an external client to the ETERNUS DX/AF.

For details on the parameters for this function, refer to "A. Setup Firewall" (page 1008).
For the factory default settings for this function, refer to "B. Setup Firewall" (page 1259).

The procedure to set a firewall is as follows:

Procedure

1 Select which port to set the firewall for (multiple selections can be made) and click [Setup Firewall] in [Action].

2 Specify whether to enable or disable the connection of each service.

- For the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F
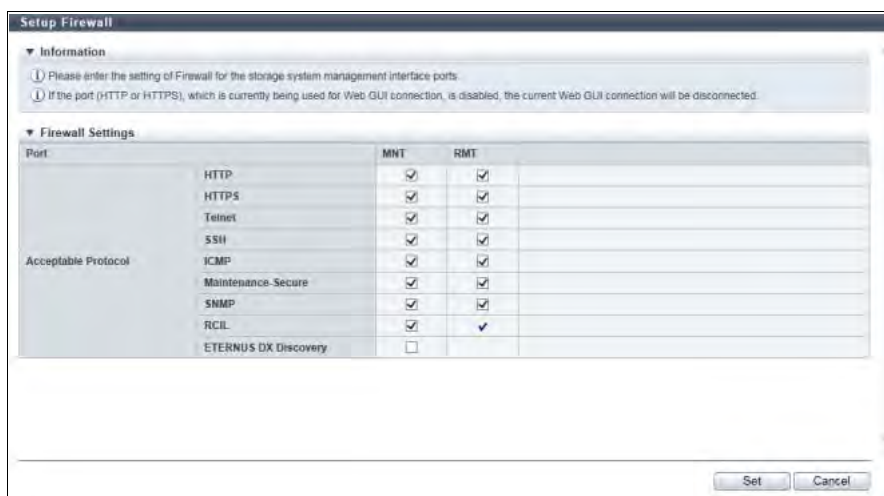
■ For the other models
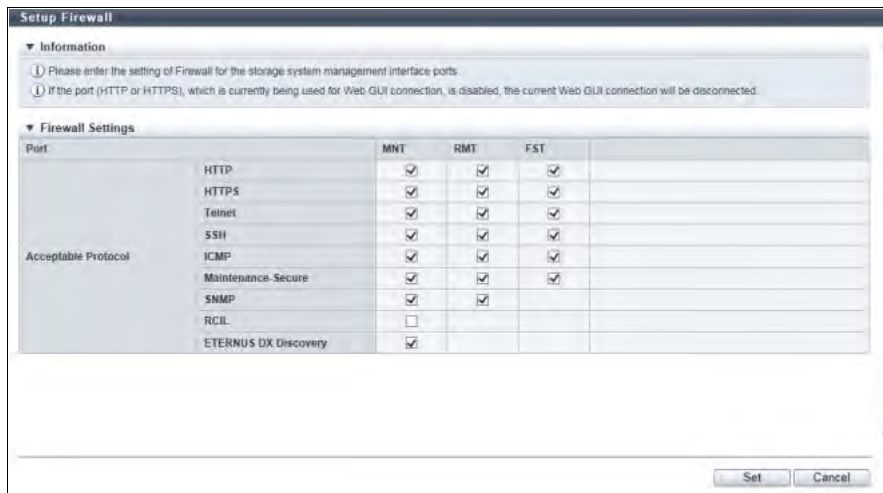
The main setting items are as follows.

● **Firewall Settings**

- HTTP
- HTTPS
- Telnet
- SSH
- ICMP
- Maintenance-Secure
- SNMP
- RCIL
- ETERNUS DX Discovery

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
   → Setting of the firewall starts.

5 Click the [Done] button to return to the [Network] screen.

End of procedure

Setup SNMP Agent Basic Interface

This function sets up the SNMP Agent basic interface in the ETERNUS DX/AF.
SNMP is a standard protocol used for network management.

▷ **Caution**

- When SNMP Manager exists in a different subnetwork from where the ETERNUS DX/AF belongs, specify the IP address or the network address of SNMP Manager in "Allowable IP Address" using the procedure in "Setup Network Environment" (page 114).
- Before enabling the SNMP function, use the procedure in "Setup Firewall" (page 123) to allow the "SNMP" for the setting target LAN port.

N o t e

- By using "Initial Setup" (page 47), the SNMP Agent environment can be configured with the wizard. Refer to "Initial Setup" in "Configuration Guide (Web GUI)". When the [Initial Setup] function is not used, configure the SNMP Agent environment in the following order:

  - When using SNMPv1 or SNMPv2c for SNMP communication

  (1) Setup SNMP Agent Basic Interface

  (2) Setup SNMP Manager

  (3) Setup SNMP Agent MIB Access View

  (4) Setup SNMP Agent Community

  (5) Setup SNMP Agent Trap

  - When using SNMPv3 for SNMP communication

  (1) Setup SNMP Agent Basic Interface

  (2) Setup SNMP Manager

  (3) Setup SNMP Agent MIB Access View

  (4) Setup SNMP Agent User

  (5) Setup SNMP Agent Trap

- The parameter settings specified using this function remain even when the "SNMP Function" setting is changed from "Enable" to "Disable".

For details on the parameters for this function, refer to "A. Setup SNMP Agent Basic Interface" (page 1009).
For the factory default settings for this function, refer to "B. Setup SNMP Agent Basic Interface" (page 1259).

The procedure to set the basic information of SNMP Agent is as follows:

Procedure

1 Click [Setup SNMP Interface] in [Action].

2 Specify the parameters.

The main setting items are as follows.

● **Basic Interface**

- SNMP Function
- LAN Port used for SNMP
- Authentication Failure

3   Click the [Set] button.

4   A confirmation screen appears. Click the [OK] button.
→ Setting of the SNMP Agent basic interface starts.

5   Click the [Done] button to return to the [Network] screen.

| End of procedure |

Setup SNMP Manager

This function specifies the IP address of the SNMP Manager.
The SNMP Manager is used when accessing the ETERNUS DX/AF using the community name or the user name, or when sending a trap from the ETERNUS DX/AF to the SNMP Manager.
Up to ten SNMP Managers can be specified for each ETERNUS DX/AF.

▷ **Caution**

- If the "SNMP Function" is disabled, this function cannot be used.
- The IP address of the SNMP Manager that is used in the settings in "Setup SNMP Agent Community" (page 133) or "Setup SNMP Agent Trap" (page 135) cannot be changed or deleted.
- When SNMP Manager exists in a different subnetwork from where the ETERNUS DX/AF belongs, specify the IP address or the network address of SNMP Manager in "Allowable IP Address" using the procedure in "Setup Network Environment" (page 114).

For details on the parameters for this function, refer to "A. Setup SNMP Manager" (page 1011).
For the factory default settings for this function, refer to "B. Setup SNMP Manager" (page 1259).

The procedure to set the SNMP Manager is as follows:

Procedure

1   Click [Setup SNMP Manager] in [Action].

2 When adding a Manager IP address, click the [Add] button. Click the [Manager] link to edit the Manager IP address.

> ⬤ **N o t e**
>
> To delete the existing Manager IP address, click the [Delete] button for the target IP address.
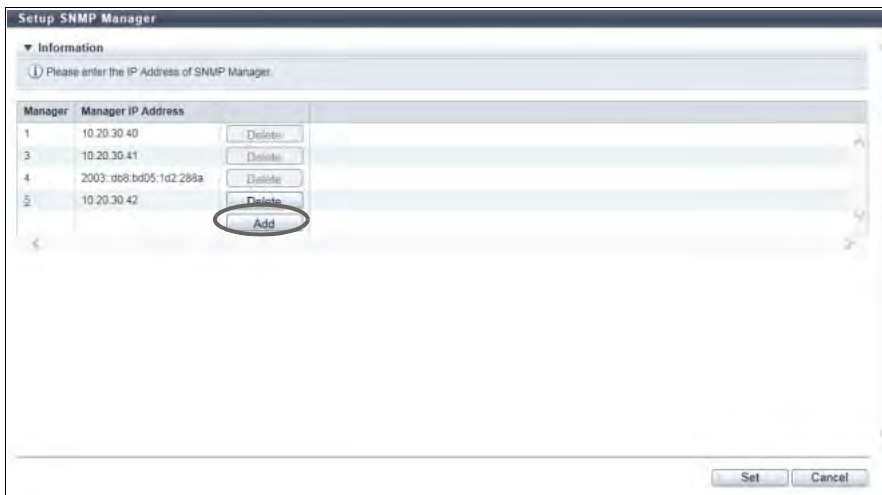
→ The [Manager] screen appears.

3 Add or edit the Manager IP address.
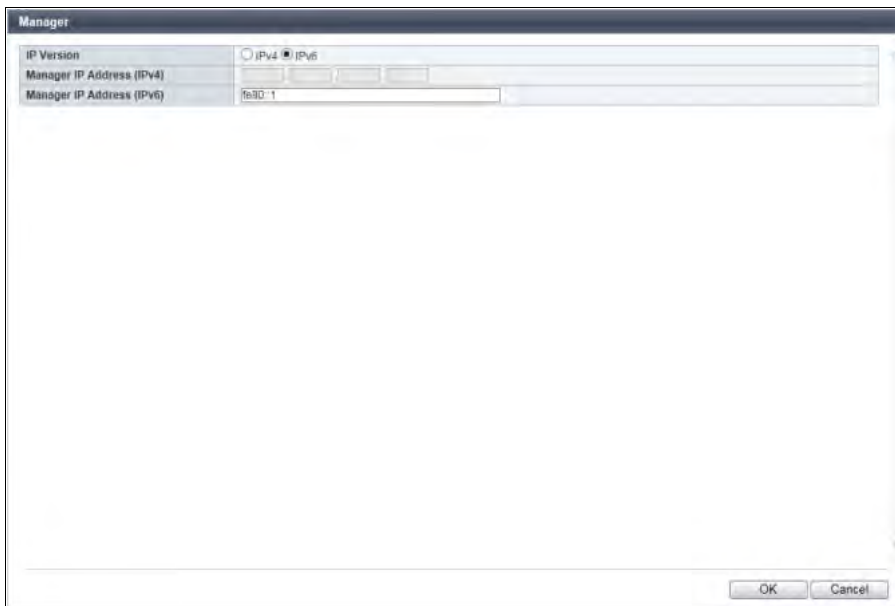
The main setting items are as follows.

● **Manager**

- IP Version
- Manager IP Address (IPv4)
- Manager IP Address (IPv6)

4 Click the [OK] button.
→ Returns to the original screen.

5 Repeat Step 2 through Step 4 when registering several Manager IP addresses.

6 After adding or editing the Manager IP address, click the [Set] button.
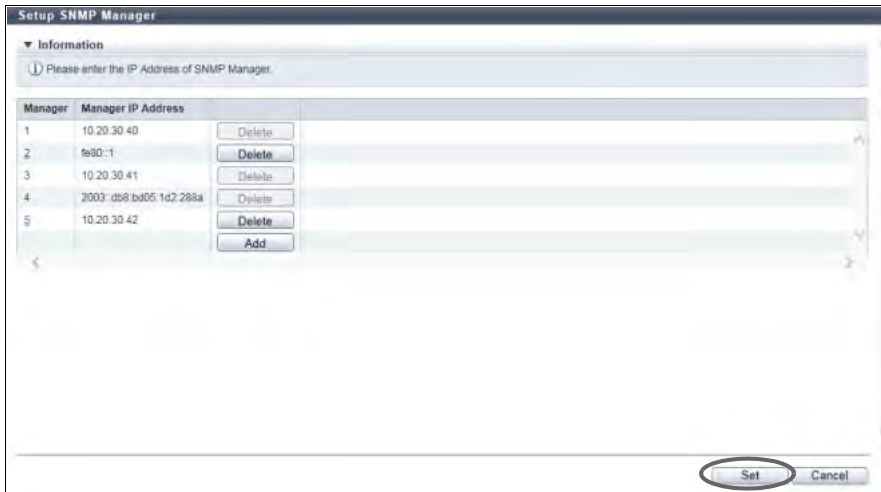
7 A confirmation screen appears. Click the [OK] button.
→ Setting of the SNMP Manager starts.

8 Click the [Done] button to return to the [Network] screen.

End of procedure

Setup SNMP Agent MIB Access View

This function sets up the SNMP Agent MIB View.
MIB View is used for defining the accessible area in the Management Information Base (MIB) database, with a tree type structure. Use this item when defining the accessible area in the MIB database.
Up to ten MIB Views, including the default view, can be created for each ETERNUS DX/AF.
There are three types of default views: "ViewALL", "View-mib2", and "View-exmib".

▷ **Caution**

- If the "SNMP Function" is disabled, this function cannot be used.
- The view name that is used in the settings in "Setup SNMP Agent User" (page 131) or "Setup SNMP Agent Community" (page 133) cannot be changed or deleted. However, note that the MIB View (Subtree) can be changed.
- The default view can be changed or deleted.

For details on the parameters for this function, refer to "A. Setup SNMP Agent MIB Access View" (page 1011).
For the factory default settings for this function, refer to "B. Setup SNMP Agent MIB Access View" (page 1260).

The procedure to change the SNMP Agent MIB view is as follows:

Procedure

1 Click [Setup SNMP MIB View] in [Action].

2   When adding an MIB View, click the [Add] button. Click the [View Name] link to edit the MIB View.

> 🔵 **N o t e**
>
> To delete the existing MIB View, click the [Delete] button for the target MIB View.
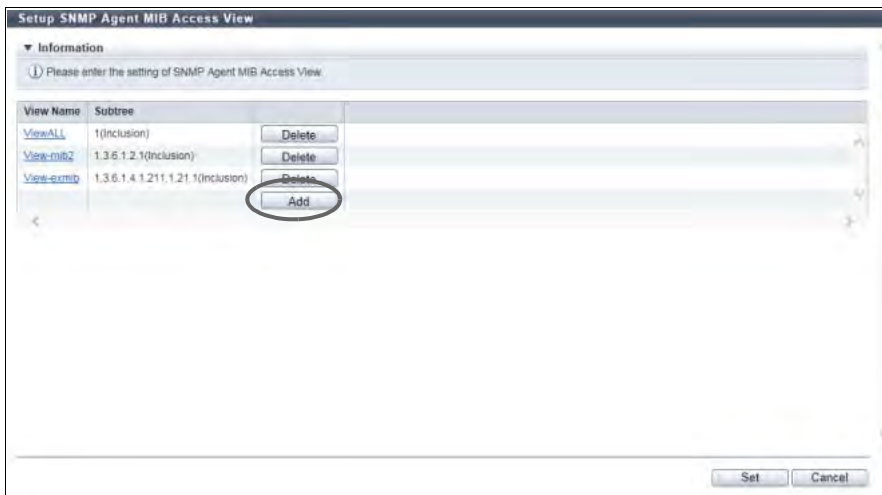
→   The [MIB Access View] screen appears.

3   Add or edit the MIB View
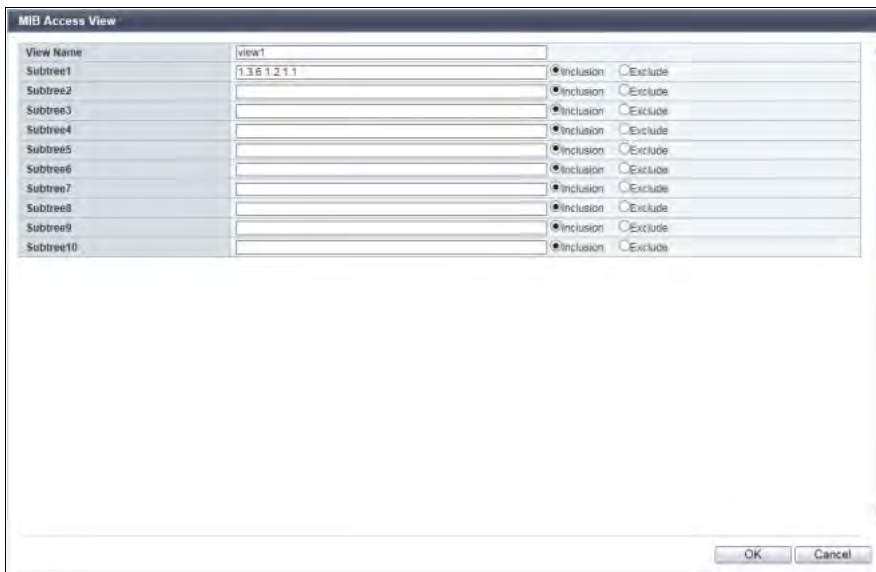
The main setting items are as follows.

● **MIB Access View**

- View Name
- Subtree1 - Subtree10

4   Click the [OK] button.
→   Returns to the original screen.

5   Repeat Step 2 through Step 4 to configure multiple MIB Views.

6 After adding or editing the MIB View, click the [Set] button.
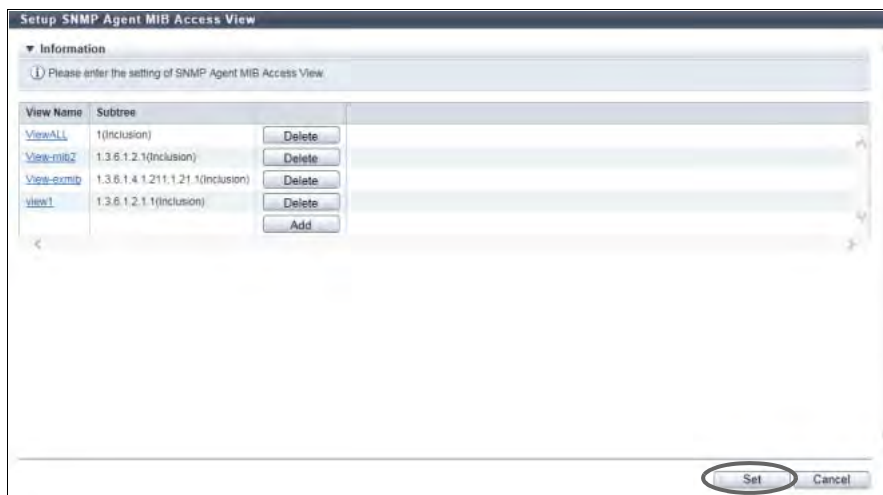
7 A confirmation screen appears. Click the [OK] button.
→ Setting of the SNMP Agent MIB View starts.

8 Click the [Done] button to return to the [Network] screen.

End of procedure

Setup SNMP Agent User

This function sets up the user which accesses the SNMP Agent.
The security level and the MIB access range are configured for each user.
Up to ten users can be specified for each ETERNUS DX/AF.

▷ **Caution**

- If the "SNMP Function" is disabled, this function cannot be used.
- The user name that is used in the settings in "Setup SNMP Agent Trap" (page 135) cannot be changed or deleted. However, note that some of the user information (MIB View Setting, Authentication, and Encryption) can be changed.
- This function must be used when using SNMPv3 in SNMP communication between the SNMP Agent and the SNMP Manager. This setting is not necessary when SNMPv1 or SNMPv2c is used for SNMP communication.

● **N o t e**

The authentication and encryption can be enabled/disabled, and also the MIB access range can be specified, for each user.

For details on the parameters for this function, refer to "A. Setup SNMP Agent User" (page 1012).
For the factory default settings for this function, refer to "B. Setup SNMP Agent User" (page 1260).

The procedure to set the user to access the SNMP Agent is as follows:

Procedure

1 Click [Setup SNMP User] in [Action].

2   When adding a user, click the [Add] button. Click the [User Name] link to edit the user.

> **◯ N o t e**
>
> To delete the existing user, click the [Delete] button for the target user.
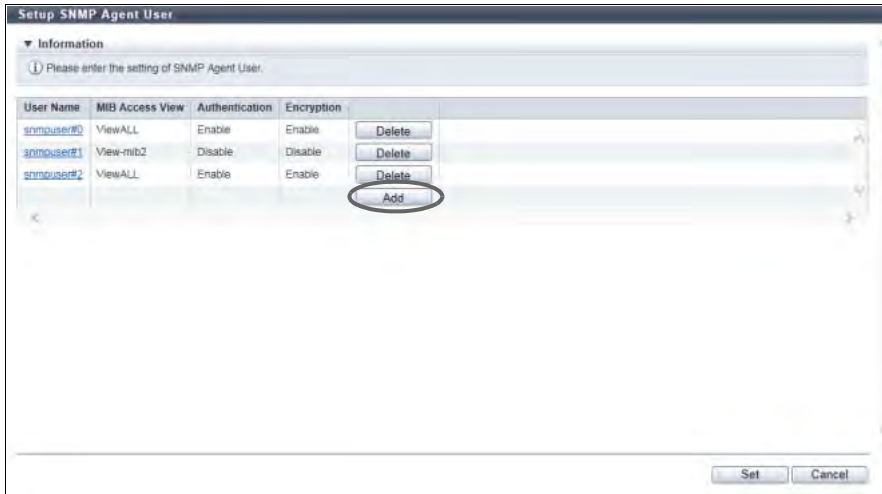
→ The [Setup SNMP Agent User] screen appears.

3   Add or edit the user.
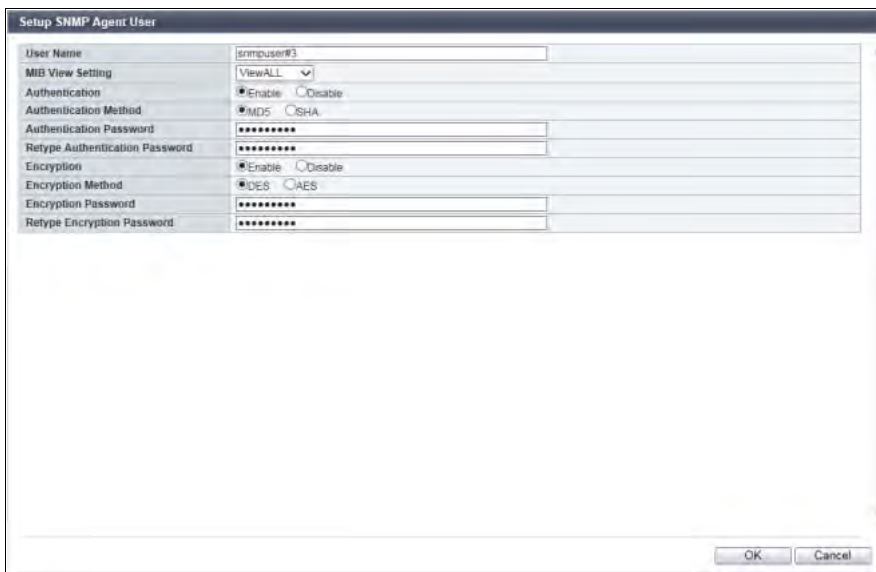
The main setting items are as follows.

● **Setup SNMP Agent User**

- User Name
- MIB View Setting
- Authentication
- Authentication Method
- Authentication Password
- Retype Authentication Password
- Encryption

- Encryption Method
- Encryption Password
- Retype Encryption Password

4 Click the [OK] button.
→ Returns to the original screen.

5 Repeat Step 2 through Step 4 to configure several users.

6 After adding or editing the user, click the [Set] button.
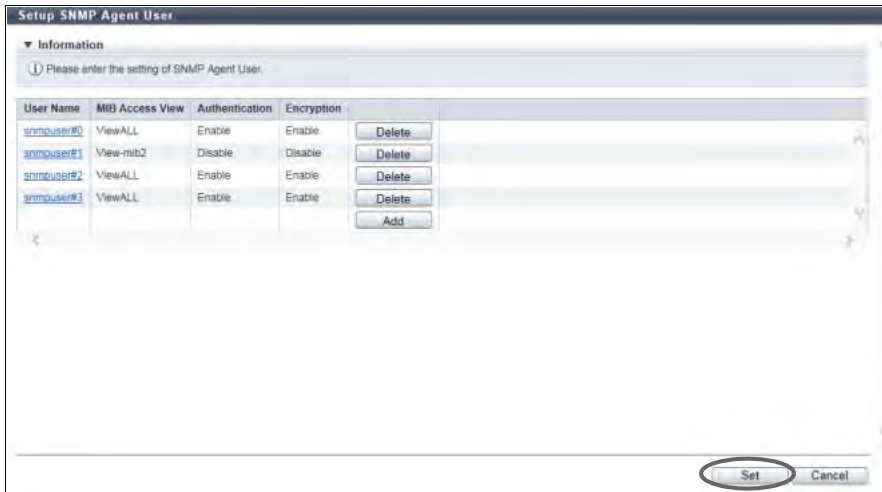
7 A confirmation screen appears. Click the [OK] button.
→ Setting of the SNMP Agent user starts.

8 Click the [Done] button to return to the [Network] screen.

End of procedure

Setup SNMP Agent Community

This function sets up the SNMP Agent Community.
The Community is a range of available networks for SNMP.
The setting value is used as the password for SNMP Manager to access the SNMP Agent of the ETERNUS DX/AF.
The SNMP Agent only accepts a request from SNMP Manager if the specified community names for SNMP Manager and SNMP Agent are the same.
Up to ten communities can be specified for each ETERNUS DX/AF.

▷ **Caution**

- If the "SNMP Function" is disabled, this function cannot be used.
- The community name that is used in the settings in "Setup SNMP Agent Trap" (page 135) cannot be changed or deleted.
- This function must be used when using SNMPv1 or SNMPv2c in SNMP communication between the SNMP Agent and the SNMP Manager. This setting is not necessary when using SNMPv3 only.

◯ **N o t e**

The SNMP Managers which are allowed to access, and the MIB access range, can be specified for each community.

For details on the parameters for this function, refer to "A. Setup SNMP Agent Community" (page 1014).
For the factory default settings for this function, refer to "B. Setup SNMP Agent Community" (page 1260).

The procedure to set the SNMP Agent community is as follows:

Procedure

1   Click [Setup SNMP Community] in [Action].

2   When adding a community, click the [Add] button. Click the [Community Name] link to edit the community.

> ⬤ **N o t e**
>
> To delete the existing community, click the [Delete] button for the target community.
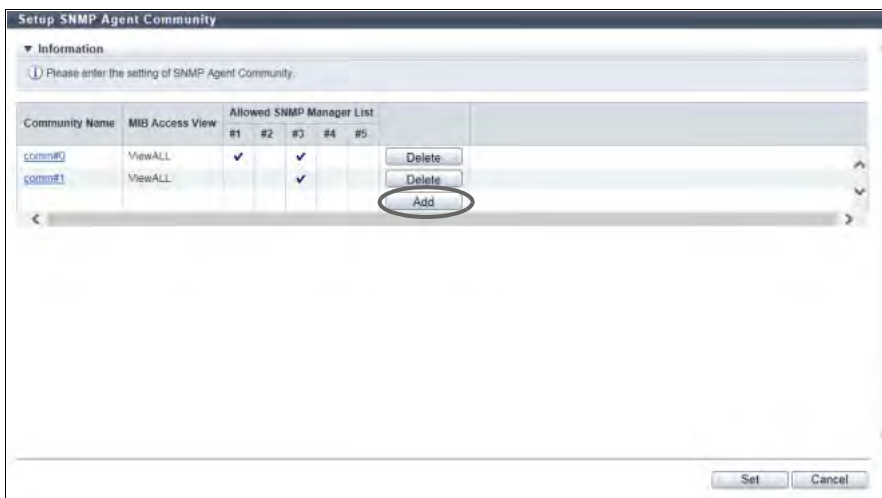
→ The [Setup SNMP Agent Community] screen appears.

3   Add or edit the community.
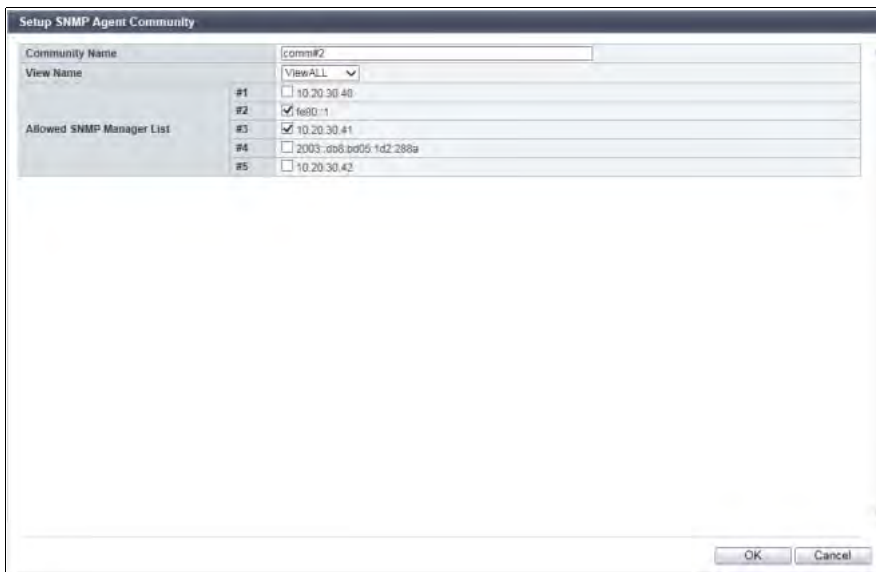
The main setting items are as follows.

● **Setup SNMP Agent Community**

- Community Name
- View Name
- Allowed SNMP Manager List

4 Click the [OK] button.
→ Returns to the original screen.

5 Repeat Step 2 through Step 4 to configure several communities.

6 After adding or editing the community, click the [Set] button.
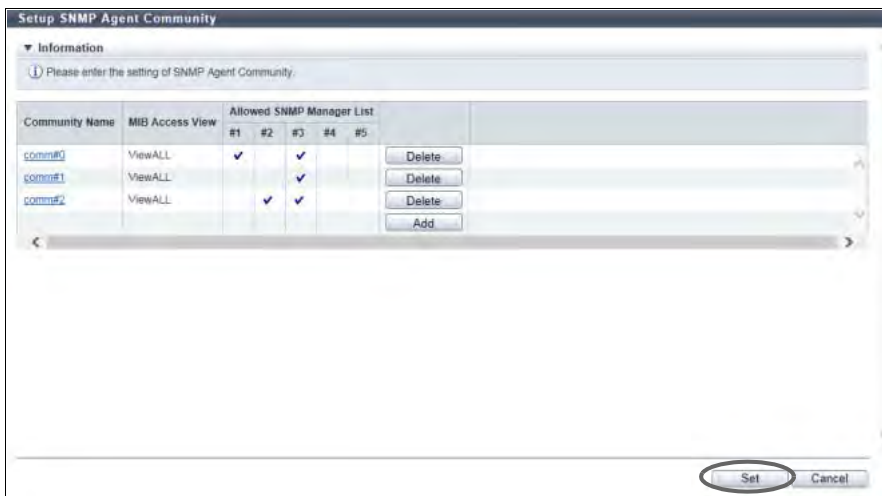
7 A confirmation screen appears. Click the [OK] button.
→ Setting of the SNMP Agent Community starts.

8 Click the [Done] button to return to the [Network] screen.

End of procedure

Setup SNMP Agent Trap

This function notifies events that occur in the ETERNUS DX/AF to the SNMP Manager by an SNMP Trap.
This function configures the trap destination, the trap version, etc.
Up to ten traps can be specified for each ETERNUS DX/AF.

▶ **Caution**

- If the "SNMP Function" is disabled, this function cannot be used.
- When SNMP Manager exists in a different subnetwork from where the ETERNUS DX/AF belongs, specify the IP address or the network address of SNMP Manager in the "Allowable IP Address" using the procedure in "Setup Network Environment" (page 114).

For details on the parameters for this function, refer to "A. Setup SNMP Agent Trap" (page 1015).
For the factory default settings for this function, refer to "B. Setup SNMP Agent Trap" (page 1260).

The procedure to set the SNMP Agent trap is as follows:

Procedure

1 Click [Setup SNMP Trap] in [Action].

2 When adding a trap, click the [Add] button. Click the [Trap No.] link to edit the trap.

> **◯ N o t e**
>
> To delete the existing trap, click the [Delete] button for the target trap.
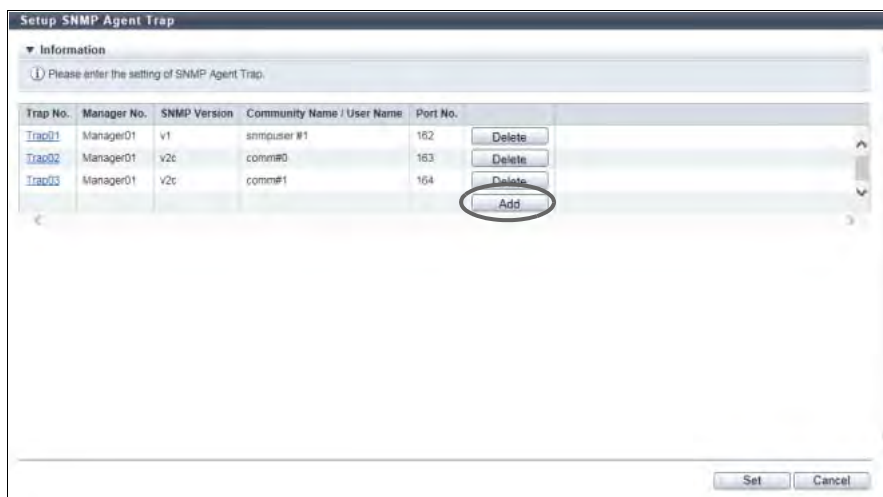
→ The [Setup SNMP Agent Trap] screen appears.

3 Add or edit the trap information.
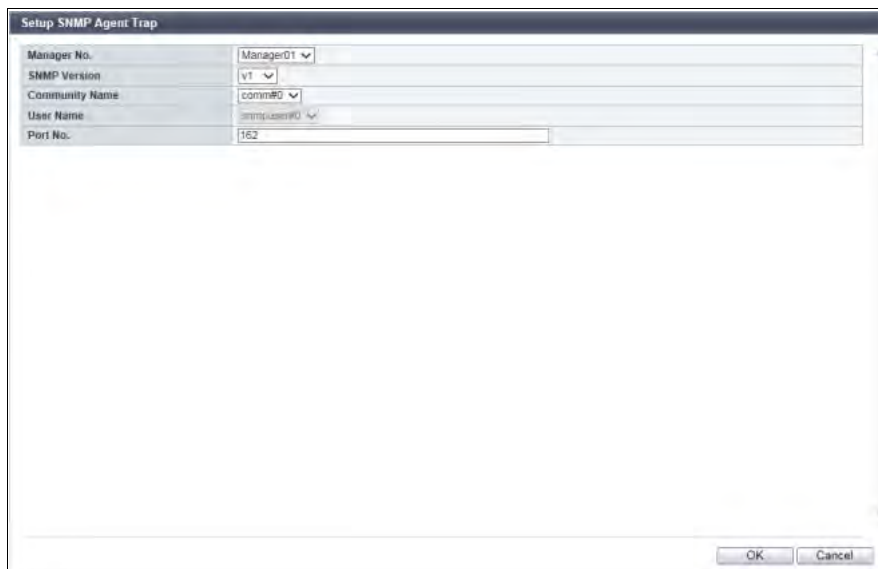
The main setting items are as follows.

● **Setup SNMP Agent Trap**

- Manager No.
- SNMP Version
- Community Name

- User Name
- Port No.

4 Click the [OK] button.
→ Returns to the original screen.

5 Repeat Step 2 through Step 4 to configure several traps.

> ► **Caution**
>
> If an error screen appears under the following conditions, check the parameter settings.
> - When "Manager No. " or "Community Name/User Name" is not input
> - When a trap with the same parameters (except the "Trap No. ") exists
> - When a trap with the same parameters (except the "Trap No. " and the "Port No. ") exists

6 After adding or editing traps, click the [Set] button.
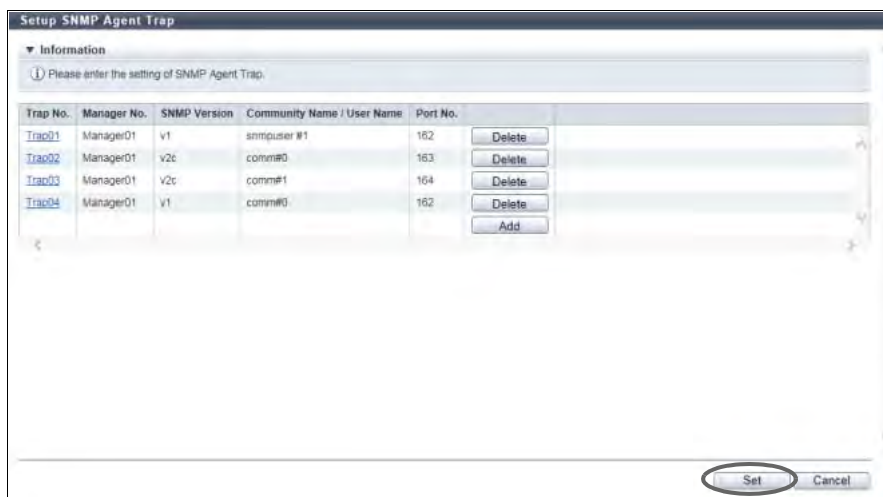
7 A confirmation screen appears. Click the [OK] button.
→ Setting of the SNMP Agent Trap starts.

8 Click the [Done] button to return to the [Network] screen.

End of procedure

Download MIB File

This function downloads the MIB definition file in the ETERNUS DX/AF.
MIB is the information for managing SNMP Agent that is transferred by using SNMP Manager with the SNMP.
The MIB definition file is used by the application which uses SNMP (SNMP Manager).

For details on the parameters for this function, refer to "A. Download MIB File" (page 1016).
For the factory default settings for this function, refer to "B. Download MIB File" (page 1260).

The procedure to download an MIB file as follows:

Procedure

1 Click [Download MIB File] in [Action].

2   Specify the parameters.
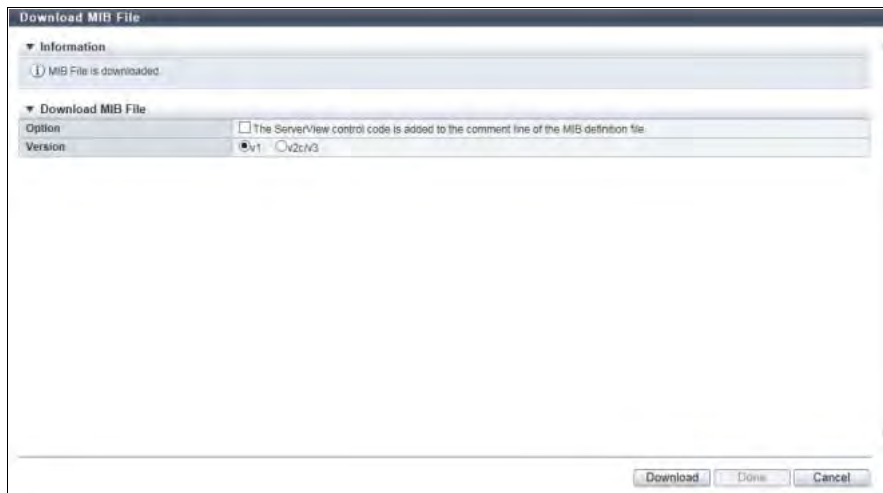
The main setting items are as follows.

● **Download MIB File**

- Option
- Version

3   Click the [Download] button.

4   A confirmation screen appears. Click the [OK] button.
→   A dialog box to download the file appears.

5   Save the downloaded file.
The default file name is as follows.

- For the ETERNUS DX8700 S3/DX8900 S3
  FJDARY-E152.MIB

- For the other models
  FJDARY-E150.MIB
→   The downloaded file is saved.

6   Click the [Done] button to return to the [Network] screen.

End of procedure

Send SNMP Trap Test

This function transmits the test trap from the SNMP Agent to the SNMP Manager.
The SNMP Trap is the event information reported by the ETERNUS DX/AF (SNMP Agent).
Perform SNMP Agent and SNMP Manager settings before executing this test.

> **▶ Caution**
>
> - Perform the following settings before executing this test. If the SNMP function is disabled, the trap test cannot be performed.
>   - Setup Network Environment
>   - Setup SNMP Agent Basic Interface
>   - Setup SNMP Manager
>   - Setup SNMP Agent MIB Access View
>   - Setup SNMP Agent User
>   - Setup SNMP Agent Community
>   - Setup SNMP Agent Trap
> - This function transmits a test trap.
> - When SNMP Manager exists in a different subnetwork from where the ETERNUS DX/AF belongs, specify the IP address or the network address of SNMP Manager in the "Allowable IP Address" using the procedure in "Setup Network Environment" (page 114).

The procedure to perform the SNMP Trap test is as follows:

Procedure

1 Click [Send SNMP Trap] in [Action].

2 Click the [Send] button.
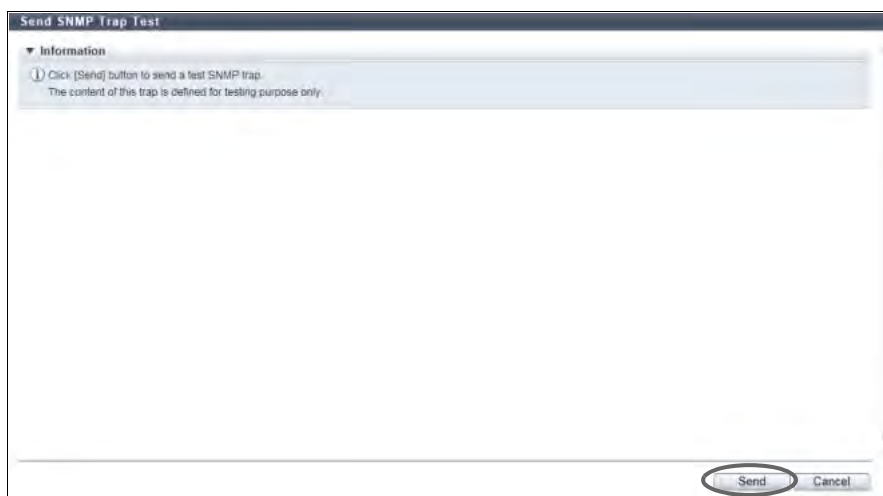
3 A confirmation screen appears. Click the [OK] button.
→ The SNMP Trap test is performed.

4 Click the [Done] button to return to the [Network] screen.

> **▶ Caution**
>
> Confirm that the trap has been successfully received by SNMP Manager after the SNMP Trap test has been performed.

End of procedure

Display SMTP Log

This function displays the E-Mail communication log between the ETERNUS DX/AF and the E-Mail server. If the E-Mail communication is not operated properly, this function may identify the cause of problem.
The E-Mail communication log contains requests from the ETERNUS DX/AF to the server and responses from the server to the ETERNUS DX/AF. Only the E-Mail communication log for the last executed event is displayed.

> ▷ **Caution**
>
> Server connection related settings for the server is required in advance. Refer to "Setup E-Mail Notification" (page 141) for details.

The procedure to display SMTP log is as follows:

Procedure

1 Click [Display SMTP Log] in [Action].

2 Check the displayed "Event Type" and the "Communication Log".
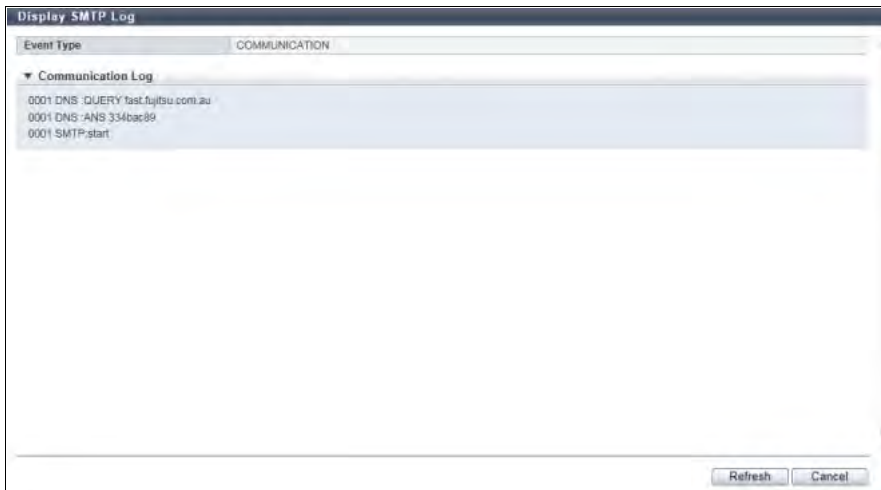
> ◯ **N o t e**
>
> Click the [Refresh] button to update to the latest screen.

3 Click the [Cancel] button to return to the [Network] screen.

End of procedure

Setup E-Mail Notification

This function is used to configure the mail notification settings for the various events detected by the ETERNUS DX/AF.
To specify event notification, refer to "Setup Event Notification" (page 155).

> **Caution**

When stopping the event notification via E-Mail, perform one of the following procedures.
- Disable the "Notification E-Mail"
- Clear the E-Mail checkbox of the notification method using the procedure in "Setup Event Notification" (page 155).

For details on the parameters for this function, refer to "A. Setup E-Mail Notification" (page 1016).
For the factory default settings for this function, refer to "B. Setup E-Mail Notification" (page 1261).

The procedure to set a E-Mail notification is as follows:

Procedure

1 Click [Setup E-Mail Notification] in [Action].

2 Specify the parameters.

The main setting items are as follows.

● **Notification E-Mail Settings**

- Notification E-Mail
- Destination E-Mail Address
- Comment

● **Mail Server Settings**

- LAN Port used for SMTP Connection
- SMTP Server
- SNMP Port No.
- Sender E-Mail Address
- SMTP over SSL

- SMTP requires authentication
- Authentication Method
- User Name
- Password

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
   → The specified E-mail notification setting is performed.

5 Click the [Done] button to return to the [Network] screen.

End of procedure

N o t e

Perform the following operations to confirm that an E-Mail can be sent to the specified address.

1. Select "Yes" for "Notification E-Mail", and click the [Set] button to save the changes. (Even if "Yes" is already selected for "Notification E-Mail", the settings must be saved when settings such as the destination E-Mail address are changed.)
2. Restart this function and then click the [Send Test E-Mail] button.

Setup Syslog

This function sets up external servers (Syslog server) for sending logs of events that are detected by the ETERNUS DX/AF.
Up to two Syslog servers can be registered.

The following events are sent as Syslogs:

- All the notification target events that are configured using the procedure in "Setup Event Notification" (page 155)
- Logins and logouts from ETERNUS Web GUI and ETERNUS CLI

▷ Caution

- Select whether to send ("on") or not send ("off") Syslogs for each ETERNUS DX/AF.
- Confirm that the Syslog has been successfully sent to the Syslog server by logging in and out from ETERNUS Web GUI or ETERNUS CLI and performing a transmission test to the Syslog server.
- Even if a communication error occurs between the ETERNUS DX/AF and the Syslog server, the Syslog is not sent again.

N o t e

- Use the procedure in "Setup Event Notification" (page 155) for specifying events to be notified as a Syslog.
- Syslogs are sent to both Syslog servers at the same time.
- If the wrong Syslog settings information is specified, an error message appears during configuration.
- The parameter settings for Syslog remain even when the "Send Log" setting is changed to "off".

For details on the parameters for this function, refer to "A. Setup Syslog" (page 1019).
For the factory default settings for this function, refer to "B. Setup Syslog" (page 1261).

The procedure to set up the Syslog is as follows:

Procedure

1   Click [Setup Syslog] in [Action].

2   Specify the parameters.

The main setting items are as follows.

● **Syslog Server**

• Send Log

• Domain Name / IP Address

• Port No.

• LAN Port

▶ **Caution**

An error screen appears if the specified IP address of the Syslog server conflicts with the internal IP address of the ETERNUS DX/AF. If this occurs, check the parameter settings.

N o t e

Up to two Syslog servers can be configured. When configuring a second Syslog server, specify the required parameters in "Syslog Server2".

3   Click the [Set] button.

4   A confirmation screen appears. Click the [OK] button.
     → Setting of the Syslog starts.

5   Click the [Done] button to return to the [Network] screen.

End of procedure

Setup SSH Server Key

This function sets up the SSH server key that is used when encrypting communication using SSH.
SSH is used when accessing from ETERNUS CLI.

> ▷ **Caution**

After the SSH server key setting has been changed, the information must be updated in the storage system before accessing from ETERNUS CLI via the SSH connection. Log out from ETERNUS CLI and wait a few minutes before logging in again.

> ⬤ **N o t e**

- The SSH server key is specified in the factory settings (Key Length: 2048 bits).
- Even if the SSH server key setting has been changed, the setting PC, which has logged into ETERNUS CLI via the Telnet connection, will not be affected.

For details on the parameters for this function, refer to "A. Setup SSH Server Key" (page 1020).
For the factory default settings for this function, refer to "B. Setup SSH Server Key" (page 1261).

The procedure to set SSH server key is as follows:

Procedure

1 Click [Setup SSH Server Key] in [Action].

2 Specify the parameters.
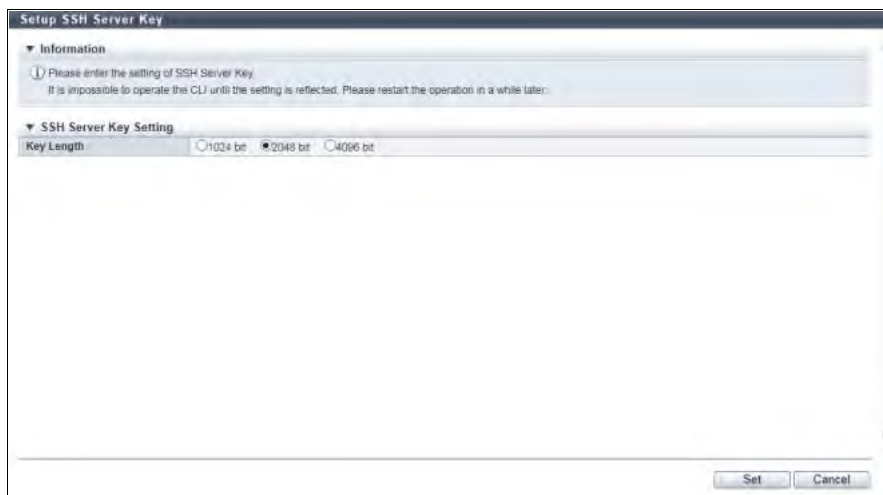
The main setting item is as follows.

● **SSH Server Key Setting**

- Key Length

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
   → Setting of the SSH server key starts.

5 Click the [Done] button to return to the [Network] screen.

> ▷ **Caution**

> After setting the SSH server key, the information must be updated in the ETERNUS DX/AF before being accessed from ETERNUS CLI via the SSH connection. Log out from ETERNUS CLI and wait a few minutes before logging in again.

End of procedure

Create Self-signed SSL Certificate

This function performs settings for creating the SSL server key and the self-signed SSL certificate to be used when encrypting communication using Secure Socket Layer (SSL).
SSL is used when accessing from ETERNUS Web GUI via the HTTPS connection.

> ▷ **Caution**

> - The HTTPS connection from ETERNUS Web GUI is disabled in the factory settings.
> - After the SSL server key and the self-signed SSL certificate have been created, the information must be updated in the storage system before accessing from ETERNUS Web GUI via the HTTPS connection. Log out from ETERNUS Web GUI and wait a few minutes before logging in again.
> - The self-signed SSL certificate must be registered on the browser in the setting PC. Until the registration has been completed, a warning message is displayed when accessing from ETERNUS Web GUI via the HTTPS connection.
> - If this function is executed while the following conditions are all satisfied, a message requesting the reboot of SMI-S appears in the result screen. Refer to "Setup SMI-S Environment" (page 70) for details.
>   - "Enable" is selected for "SMI-S"
>   - "Web GUI SSL Certificate" is selected for "SSL Certificate"

> ◉ **N o t e**

> - There are two types of SSL certificates: the "self-signed SSL certificate" that is created by this function and the "SSL server certificate". Register one of the certificates in the ETERNUS DX/AF when using the HTTPS connection. To use the "SSL server certificate", refer to "Create Key/CSR" (page 146) and "Register SSL Certificate" (page 148).
> - When using the key server to manage the SED authentication key, a trusted SSL certificate (a self-signed SSL certificate or an SSL server certificate) is required to establish communication between the ETERNUS DX/AF and the key server. When using the key management server linkage function to manage the key, register the SSL certificate for the ETERNUS DX/AF. The SSL certificate is transferred to the key server from the ETERNUS DX/AF when the key is updated. Refer to "Update SED Authentication Key" (page 177) for details.
> - Refer to "Installing the Security Certificate" in "Configuration Guide (Web GUI)" for procedure to install the self-signed SSL certificate.

For details on the parameters for this function, refer to "A. Create Self-signed SSL Certificate" (page 1020).
For the factory default settings for this function, refer to "B. Create Self-signed SSL Certificate" (page 1261).

The procedures to create SSL server key and the self-signed SSL certificate are as follows:

Procedure

1 Click [Create SSL Certificate] in [Action].

2   Specify the parameters.
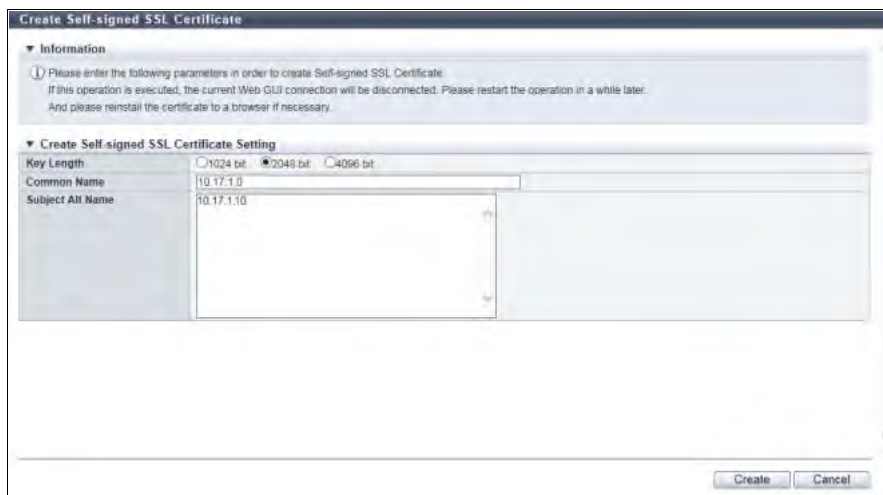
The main setting items are as follows.

● **Create Self-signed SSL Certificate Setting**

- Key Length
- Common Name
- Subject Alt Name

3   Click the [Create] button.

4   A confirmation screen appears. Click the [OK] button.
→ Creation of the self-signed SSL certificate starts.

5   Click the [Done] button to return to the [Network] screen.

> ▷ **Caution**

- After the SSL server key or the self-signed SSL certificate is created, the information must be updated in the ETERNUS DX/AF before being accessed from ETERNUS Web GUI via the HTTPS connection. Log out from ETERNUS Web GUI and wait a few minutes before logging in again.
- If SMI-S is enabled, a message requesting the reboot of SMI-S appears. Refer to "Setup SMI-S Environment" (page 70) for details.

End of procedure

Create Key/CSR

This function performs settings for creating and exporting the SSL server key and the Certificate Signing Request (CSR) which are used to acquire a SSL server certificate.
CSR is a certificate application form to submit to the certification authority.

> ▷ **Caution**

Check the necessary items for authentication beforehand.

> **Note**
>
> • When using the key server to manage the SED authentication key, a trusted SSL certificate (a self-signed SSL certificate or an SSL server certificate) is required to establish communication between the ETERNUS DX/AF and the key server. When using the key management server linkage function to manage the key, register the SSL certificate for the ETERNUS DX/AF. The SSL certificate is transferred to the key server from the ETERNUS DX/AF when the key is updated. Refer to "Update SED Authentication Key" (page 177) for details.
> • Refer to "Register SSL Certificate" (page 148) for detailed procedure to register the SSL server key and SSL server certificate.

For details on the parameters for this function, refer to "A. Create Key/CSR" (page 1022).
For the factory default settings for this function, refer to "B. Create Key/CSR" (page 1261).

The procedure to create a CSR is as follows:

Procedure

1 Click [Create Key/CSR] in [Action].

2 Specify the parameters.

The main setting items are as follows.

● **Create Key/CSR Setting**

• Key Length
• Country Name
• State or Province Name
• Locality Name
• Organization Name
• Organization Unit Name
• Common Name
• Subject Alt Name

3 Click the [Create] button.

4   A confirmation screen appears. Click the [OK] button.

→ The creation of the CSR starts. When the creation of the CSR is complete, the screen for downloading the file is displayed.

5   Select the file that is to be downloaded.
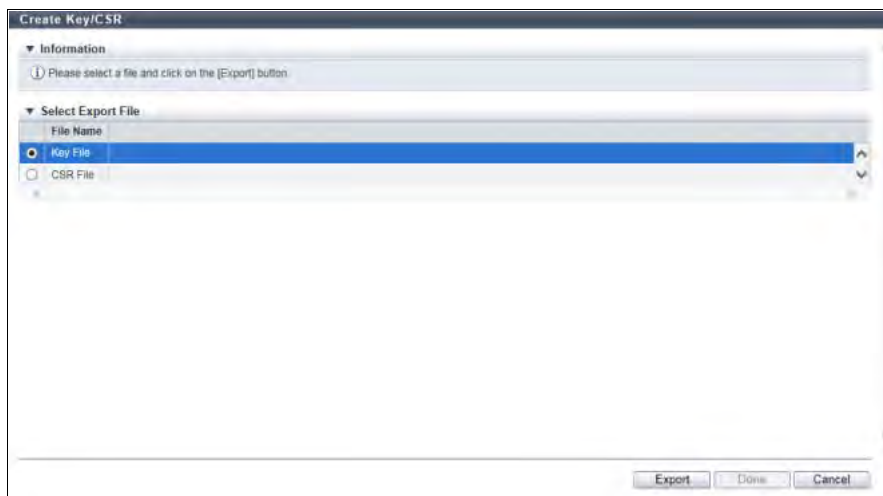
The main setting item is as follows.

● **Select Export File**

• File Name

6   Click the [Export] button.

→ A dialog box to download the file appears.

7   Save both the key file and the CSR file.

The default key file name is "ServerKey_serial number for the ETERNUS DX/AF_YYYY-MM-DD_hh-mm-ss.txt".
The default CSR file name is "ServerCsr_serial number for the ETERNUS DX/AF_YYYY-MM-DD_hh-mm-ss.txt".
(YYYY-MM-DD_hh-mm-ss: the date and time when the download screen (Step 5) is displayed.)

→ The files are saved.

> 🔵 **N o t e**
>
> Perform Step 5 and Step 7 for each server key file and CSR file that is to exported.

8   Click the [Done] button to return to the [Network] screen.

End of procedure

Register SSL Certificate

This function registers the SSL server key and the SSL server certificate which was obtained from the certification authority.
The following two methods are available for obtaining an "SSL server key" and an "SSL server certificate".

• Using the [Create Key/CSR] function of the ETERNUS DX/AF ("Create Key/CSR" (page 146))
Create an "SSL server key" and a "CSR" using the [Create Key/CSR] function and send them to the certification authority to obtain an "SSL server certificate".

- Using a tool or website other than the ETERNUS DX/AF
  Use a publicly available tool or website to obtain an "SSL server key" and an "SSL server certificate" issued from the certification authority.

▷ **Caution**

- The HTTPS connection from ETERNUS Web GUI is disabled in the factory settings.
- The "SSL server certificate" in the PFX format must be converted to the Privacy Enhanced Mail (PEM) format in advance. This function does not support "SSL server certificates" in the PFX format. Refer to "How to convert and register "SSL server certificates" in the PFX format" (page 149) for details.
- Register the SSL server key and the SSL server certificate as a pair in the ETERNUS DX/AF. If the combination of the SSL server key and the SSL server certificate is incorrect, accessing from ETERNUS Web GUI via the HTTPS connection is not possible.
- After the SSL server key and the SSL server certificate have been created, the information must be updated in the storage system before accessing from ETERNUS Web GUI via the HTTPS connection. Log out from ETERNUS Web GUI and wait a few minutes before logging in again.
- When the SSL server key and the SSL server certificate have been registered in the ETERNUS DX/AF, the setting PC, which has accessed from ETERNUS Web GUI via the HTTPS connection, will be forced to disconnect.
- If this function is executed while the following conditions are all satisfied, a message requesting the reboot of SMI-S appears in the result screen. Refer to "Setup SMI-S Environment" (page 70) for details.
  - "Enable" is selected for "SMI-S"
  - "Web GUI SSL Certificate" is selected for "SSL Certificate"

⬤ **N o t e**

There are two types of SSL certificate: the "SSL server certificate" and the "self-signed SSL certificate". Register either of the certificates in the ETERNUS DX/AF when using the HTTPS connection. To use the "self-signed SSL certificate", refer to "Create Self-signed SSL Certificate" (page 145).

How to convert and register "SSL server certificates" in the PFX format

The ETERNUS DX/AF supports the registration of certificates in the Privacy Enhanced Mail (PEM) format, but does not support certificates in the PFX format. Use software such as OpenSSL to convert certificates in the PFX format to the PEM format, and then register the "secret key (key file)" and the "SSL server certificate (crt file)" in the ETERNUS DX/AF.

The following shows an example when OpenSSL is used.

customer.pfx: Files in the PFX format before the conversion
customer.key: Files in the PEM format after the conversion (secret keys)
customer.crt: Files in the PEM format after the conversion (SSL server certificates)

(1) Confirm that the PFX formatted "SSL server certificate" includes the secret key and the SSL server certificate.
    openssl pkcs12 -nodes -info -in customer.pfx

(2) Convert the PFX formatted "SSL server certificate" to the PEM formatted "secret key (key file)".
    openssl pkcs12 -in customer.pfx -out customer.key -nodes -nocerts

(3) Convert the PFX formatted "SSL server certificate" to the PEM formatted "SSL server certificate (crt file)".
    openssl pkcs12 -in customer.pfx -out customer.crt -nodes -nokeys

(4) Register the PEM formatted "secret key (key file)" and "SSL server certificate (crt file)" in the ETERNUS DX/AF by using this function.

> **Caution**

Depending on the version of the software that is used for conversions, registration of the converted files may fail. Use the latest version of the software and confirm that the conversion is performed successfully.

For details on the parameters for this function, refer to "A. Register SSL Certificate" (page 1023).

The procedures to create SSL server key and the SSL server certificate are as follows:

Procedure

1 Click [Register SSL Certificate] in [Action].

> **Caution**

Either of the following items must be obtained in advance:
- The "SSL server key" downloaded using the procedure in "Create Key/CSR" (page 146) and the "SSL server certificate" obtained from the certification authority
- An "SSL server certificate" that is created with a tool or website other than the ETERNUS DX/AF and is obtained from a certification authority

If the "SSL server certificate" (including the "secret key" and the "SSL server certificate" pair) is in the PFX format, convert it to the PEM format and then register the converted files in the ETERNUS DX/AF. Refer to "How to convert and register "SSL server certificates" in the PFX format" (page 149) for details.

2 Click the [Browse...] button to specify the path to the "SSL Server Key File".
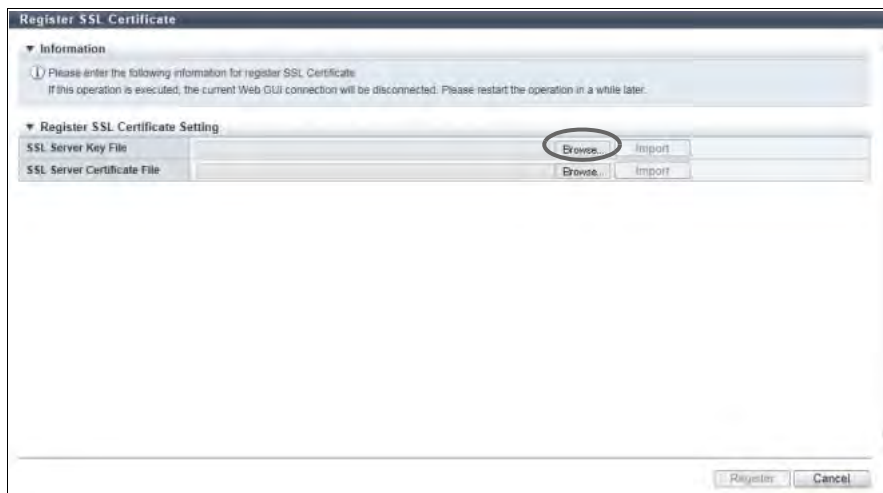
The main setting item is as follows.

● **Register SSL Certificate Setting**

- SSL Server Key File

3 Click the [Import] button.
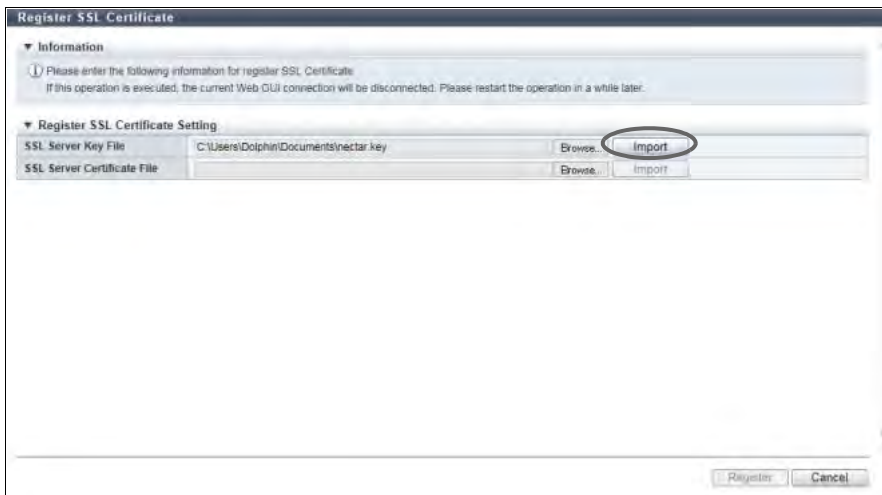
→ "Imported" is displayed.

4 Click the [Browse...] button to specify the path to the "SSL Server Certificate File".
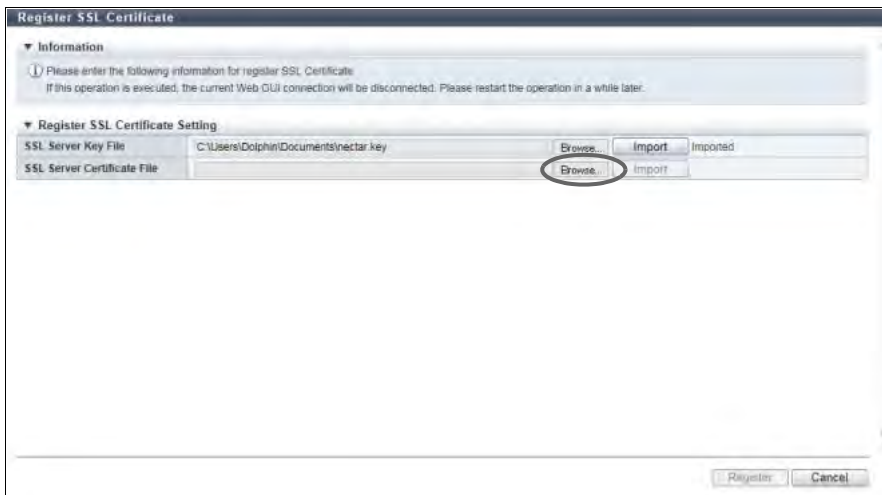
The main setting item is as follows.

● **Register SSL Certificate Setting**

• SSL Server Certificate File

5 Click the [Import] button.
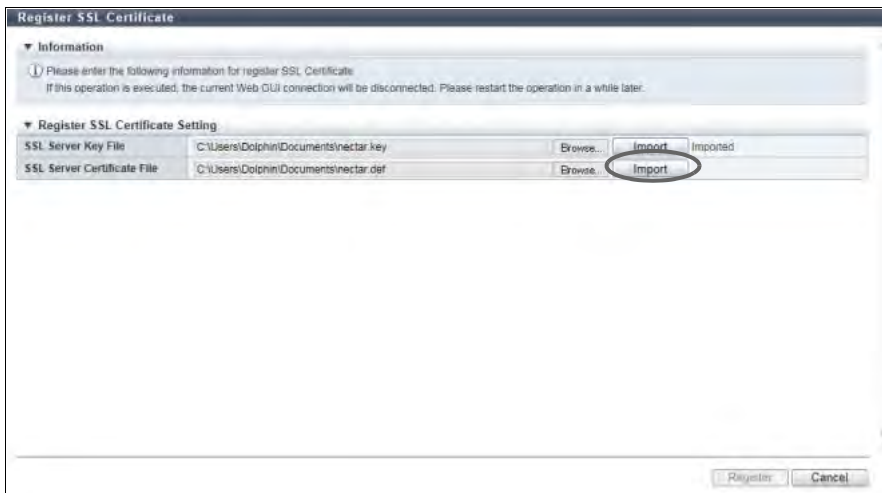
→ "Imported" is displayed.

6 Confirm that the "SSL Server Key File" and the "SSL Server Certificate File" have been imported, and click the [Register] button.

> ▶ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
   • When the imported file was not the "SSL server key file"
   • When the imported file was not the "SSL server certificate file"
   • When the imported "SSL server certificate file" was not the certificate which corresponds to the SSL server key
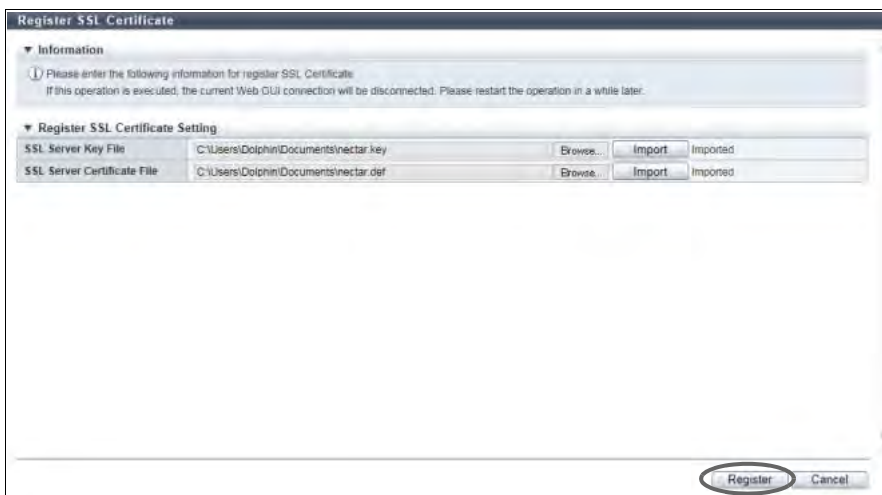
7 A confirmation screen appears. Click the [OK] button.
   → The registration of the SSL server key and SSL server certificate starts.

8 Click the [Done] button to return to the [Network] screen.

> ▷ **Caution**
>
> • After registering the SSL server key or SSL server certificate, the information must be updated in the ETERNUS DX/AF before being accessed from ETERNUS Web GUI via the HTTPS connection. Log out from ETERNUS Web GUI and wait a few minutes before logging in again.
> • If SMI-S is enabled, a message requesting the reboot of SMI-S appears. Refer to "Setup SMI-S Environment" (page 70) for details.

End of procedure

Setup SSL Version

This function sets the SSL version (TLS1.0/TLS1.1/TLS1.2) of the ETERNUS DX/AF for each of the following protocols to realize more secure communication.

• HTTPS (GUI)
• HTTPS (SMI-S)
• Maintenance-Secure

> ▷ **Caution**
>
> • Enable the SSL version for HTTPS (GUI) that is used for communication between the ETERNUS DX/AF and the setting PC. If the enabled SSL version setting used for communication is different between the ETERNUS DX/AF and the setting PC (web browser), access to the ETERNUS DX/AF from Web GUI is not allowed.
> • At least one SSL version (TLS1.0/TLS1.1/TLS1.2) must be enabled for HTTPS (GUI).

> ⦿ **N o t e**
>
> • After the SSL version for HTTPS (GUI) is specified, the new SSL session is applied from the next access (screen transition).
> • The SSL version that is specified with this function is applied to all LAN ports (MNT/RMT/FST).

For details on the parameters for this function, refer to "A. Setup SSL Version" (page 1024).
For the factory default settings for this function, refer to "B. Setup SSL Version" (page 1262).

The procedures to set the SSL version are as follows:

Procedure

1 Click [Setup SSL Version] in [Action].

2 Select whether to "Enable" or "Disable" for each protocol.
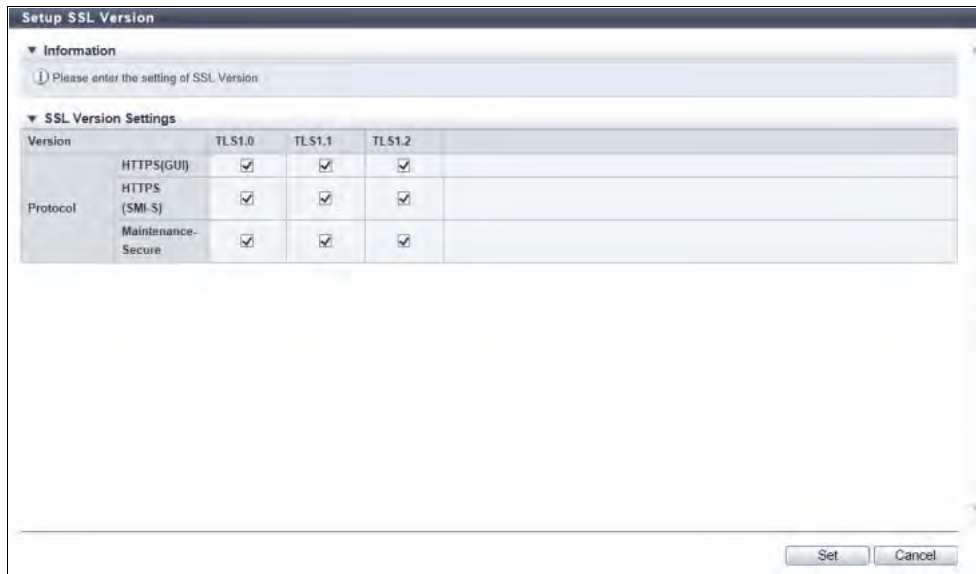
The main setting items are as follows.

● **SSL Version Settings**

- HTTPS (GUI)
- HTTPS (SMI-S)
- Maintenance-Secure

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
→ The SSL version setting starts.

5 Click the [Done] button to return to the [Network] screen.

End of procedure

Event/Dump Management

This section describes event/dump management.

Event/dump management provides the following functions:

- Setup Event Notification
- Display/Delete Event Log
- Export/Delete Log
- Export/Delete Panic Dump

Setup Event Notification

This function specifies whether to report events that are detected in the ETERNUS DX/AF.
There are six methods for event notification: Host Sense Key Code Qualifier, SNMP Trap, E-Mail, syslog, REMCS, and AIS Connect.
A notification setting can be selected for each type of event.

▷ **Caution**

- For SNMP Trap notification, performing procedures in the following sections is required.
    - "Setup SNMP Agent Basic Interface" (page 125)
    - "Setup SNMP Manager" (page 127)
    - "Setup SNMP Agent MIB Access View" (page 129)
    - "Setup SNMP Agent User" (page 131)
    - "Setup SNMP Agent Community" (page 133)
    - "Setup SNMP Agent Trap" (page 135)
- For E-Mail notification, performing procedure in "Setup E-Mail Notification" (page 141) is required.
- For syslog notification, performing procedure in "Setup Syslog" (page 142) is required.
- For REMCS notification, performing procedure in "Setup Remote Support" (page 198) is required.
- For AIS Connect notification, performing procedure in "Setup AIS Connect Environment" (page 209) is required.

For details on the parameters for this function, refer to "A. Setup Event Notification" (page 1024).
For the factory default settings for this function, refer to "B. Setup Event Notification" (page 1262).

The procedure to set the event notification is as follows:

Procedure

1 Click [Setup Event Notification] in [Action].

2 Specify whether to notify each event.

> 🔵 **N o t e**
>
> - The events are classified into three levels: "Error Severity Level", "Warning Level", and "Informational Level".
>   Click the [Setting based on Severity] tab, [Error Severity Level] tab, [Warning Level] tab or [Informational Level] tab to display the setting fields for each level.
> - Event notifications can be reset to the default state. Click the [System Defaults] button to display the default state and click the [Set] button. For the settings, refer to "Initial setting list" (page 1039).
> - When setting the REMCS recommended pattern, click the [REMCS Defaults] button to display the REMCS recommended pattern and click the [Set] button. For the settings, refer to "REMCS recommended setting list" (page 1042).
> - For the ETERNUS DX8700 S3/DX8900 S3, the notification methods that are specified in this function determine whether to display the LCD message on the Overview screen and the Operation Panel.

■ Setting based on Severity (for the ETERNUS DX8700 S3/DX8900 S3)
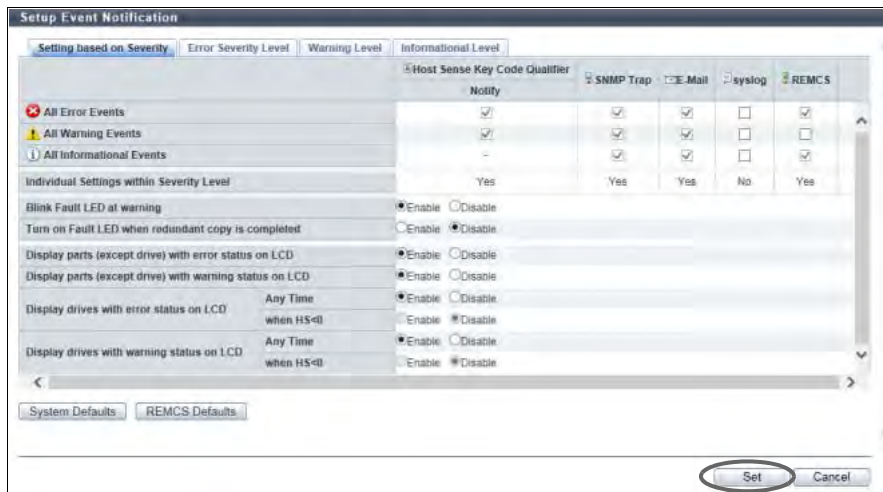
■ Setting based on Severity (for the other models)
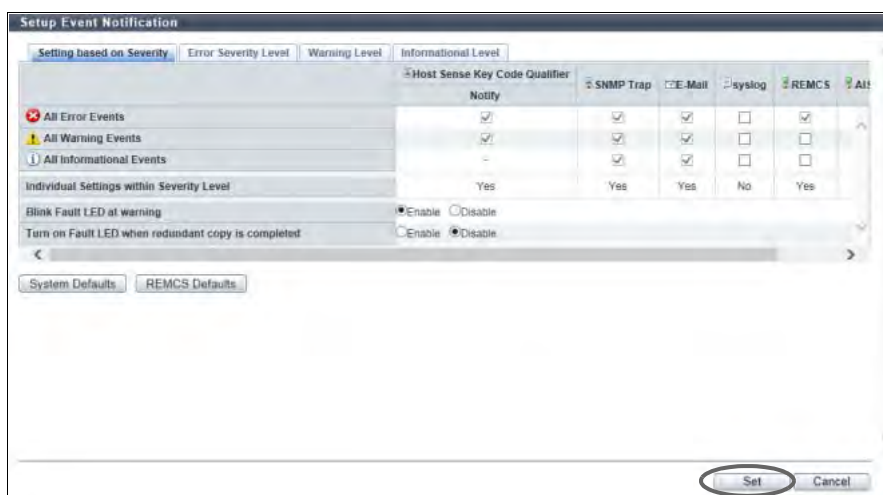
The main setting items are as follows.

● **Setting based on Severity**

- ❌ All Error Events

- ⚠️ All Warning Events

- ℹ️ All Informational Events

■ Error Severity Level

■ Warning Level
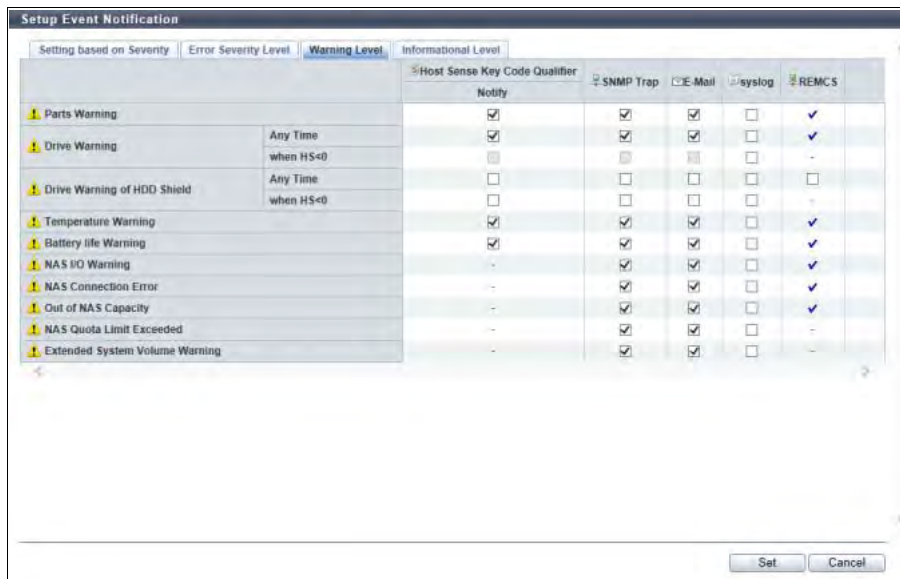
■ Informational Level
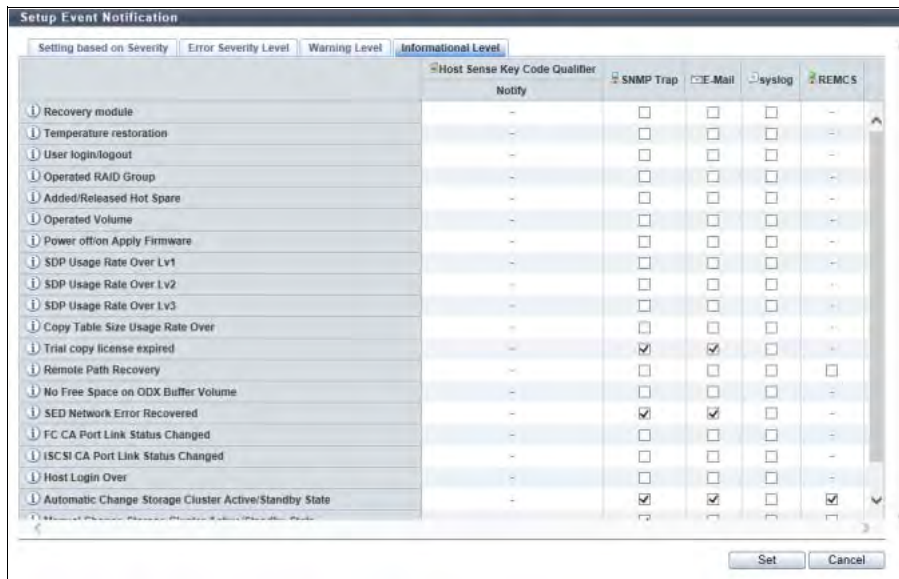
3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
→ Setting of the event notification starts.

5 Click the [Done] button to return to the [Event/Dump] screen.

End of procedure

Display/Delete Event Log

This function displays the event history of the ETERNUS DX/AF.
The event log is one of the internal logs stored in the ETERNUS DX/AF. The event log contains a history of events that are related to configuration information changes, such as module failures and volume creation.
Up to 400 per CM event logs can be displayed. If the number of event logs exceeds the maximum number, the oldest event log is overwritten. Once the recorded event log is no longer required, it can also be deleted.

▷ **Caution**

Even after deleting the event log using the [Delete Event Log] function, the maintenance information log remains stored in the ETERNUS DX/AF.

◯ **N o t e**

All event logs are deleted in a single operation.

■ **Display event logs**

The procedure to display event logs is as follows:

Procedure

1 Click [Display/Delete Event Log] in [Action].

2   Check the displayed event logs.
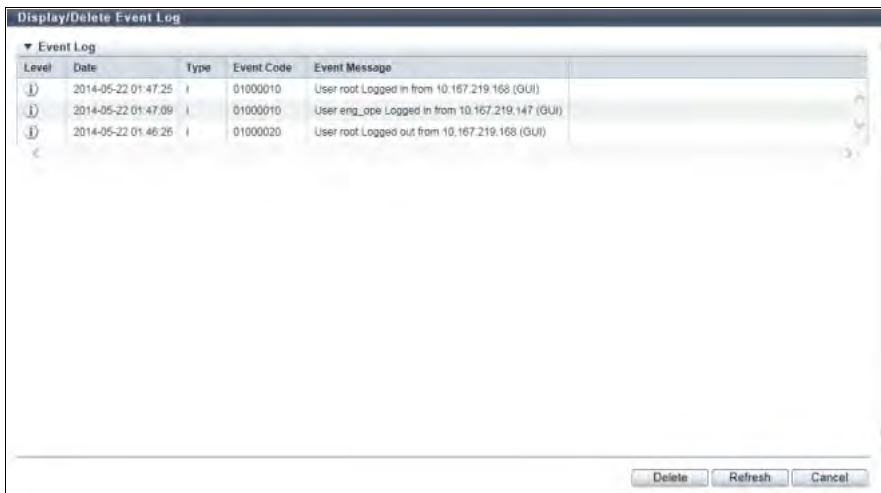
> **● N o t e**
>
> - Click the [ ] icon or the [Refresh] button to display the latest screen.
> - The event types are displayed using the following symbols.
>   - Error level
>   - Messages that start with "P" are displayed when components fail or degrade, or when a temperature error is detected.
>   - Messages that start with "M" are displayed when an event that requires maintenance occurs.
>   - Messages that start with "E" are displayed when an error-level event occurs.
>   - Warning level
>   - Messages that start with "J" are displayed when components require maintenance or preventive maintenance, or unusual temperatures occur.
>   - Messages that start with "W" are displayed when a warning-level event occurs.
>   - Informational level
>   - Messages that start with "I" are displayed when an information-level event occurs.
>   - Messages that start with "R" are displayed when error or warning level events are restored to a normal state.
>   - Messages that start with "O" are displayed when any other events that are not described above occur.

3   Click the [Cancel] button to return to the [Event/Dump] screen.

End of procedure

■ **Delete event logs**

The procedure to delete event logs is as follows:

Procedure

1   Click [Display/Delete Event Log] in [Action].

2 Click the [Delete] button.
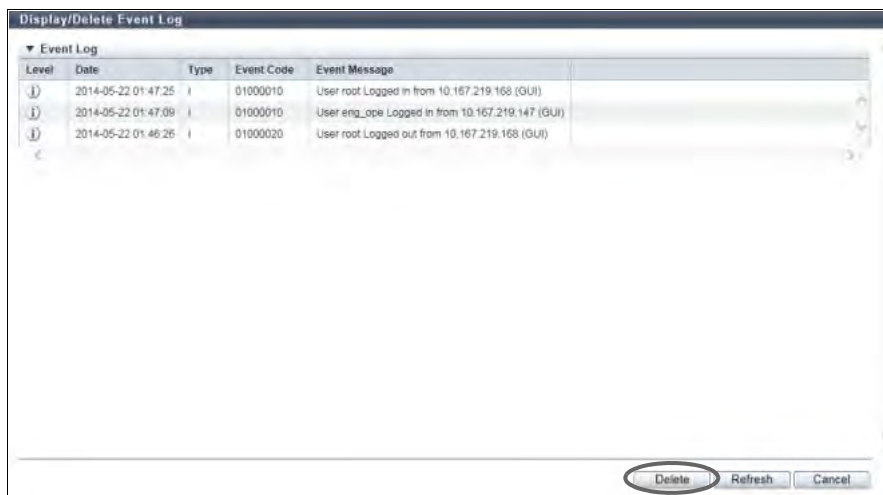
3 A confirmation screen appears. Click the [OK] button.
→ Deletion of event logs starts.

4 Click the [Done] button to return to the [Event/Dump] screen.

End of procedure

Export/Delete Log

This function exports and saves the ETERNUS DX/AF maintenance information (log) in accordance with user-speci-
fied time settings.
An exported log can be stored on a floppy disk or hard disk, or sent by E-mail.
Also, users can select a log segment size to suit the destination it is to be saved.

- Exported Maintenance Information
  - The storage system log includes "internal log" and "configuration information".
    - Internal log
      Detected errors, warnings, and traces
    - Configuration definition information
      Configuration information exported from the ETERNUS DX/AF

  - When an ETERNUS DX in a Unified Storage environment, the storage system log and the NAS Engine log
    (CM#0/CM#1) are stored in the same file.

▷ **Caution**

- The internal log and configuration information cannot be exported separately.
- When exporting the log is complete, save the log file immediately.
- The various pieces of maintenance information are combined together, compressed, and then segmented into
  the user specified segment size before being exported.
  Special tools to read these logs are required.
- In a Unified Storage environment, when log files are exported while the ETERNUS DX is in a high-load state, an
  error may occur due to a timeout. If an error occurs and exporting fails, perform the log export again in a low-
  load state.

For details on the parameters for this function, refer to "A. Export/Delete Log" (page 1045).
For the factory default settings for this function, refer to "B. Export/Delete Log" (page 1262).

The procedure to export logs in the SAN environment is as follows:

Procedure

1   Click [Export/Delete Log] in [Action].

2   Set the detailed information for exporting a log.

■ For a SAN environment

■ For a Unified Storage environment

The main setting items are as follows.

● **Export Option**

• Export Mode
• Specify Time Range

• Start Time

• End Time

• Include I/O Module log

- Include NAS Engine log (only for a Unified Storage environment)
- Log File Size
- Delete of Customer Information

▷ **Caution**

- Even if a time range is specified for NAS Engine logs, all of the NAS Engine logs in the ETERNUS DX are exported.
- The customer information in the NAS Engine logs cannot be deleted. If "Yes" is selected for this item, the NAS Engine logs are not exported.
- If the NAS Engine logs are exported, it may take a long time to export the logs.
- If an error screen appears under the following conditions, check the parameter settings.
  - When the input date and/or time are not valid (For example: February 31st)
  - When the end time is earlier than the start time

3 Click the [Export] button.

4 A confirmation screen appears. Click the [OK] button.
→ Log export starts. The progress screen is displayed.
After the log export is finished, a screen to execute downloading the file is displayed.

5 Click the [Download] button to save the exported log.

▷ **Caution**

When exporting the log is complete, save the log file immediately.

◉ **N o t e**

If "Non-segmentation" is selected in the "Log File Size" field, the [Download] button becomes inactive after the log file has been saved. Proceed to Step 6.

→ A dialog box to download the file appears.

6 Save the log file.

The default file name is "Log_serial number for the ETERNUS DX/AF_YYYY-MM-DD_hh-mm-ss_serial number for log file.zlg". (YYYY-MM-DD_hh-mm-ss: the date and time when the download screen (Step 5) is displayed. When a log file is segmented, the segmented log files are given the same name and numbered serially (01 -).)

▶ **Caution**

When exporting segmented log files, make sure to export the segment within five minutes. If five minutes pass before exporting the next segment, the log export fails. After finishing saving each segment, save the following segment immediately.

→ If the log file is segmented, download and save the next segment (save all the segmented files).

7 Click the [Finish] button to return to the [Event/Dump] screen.

→ Exporting log has been completed.

⬤ **N o t e**

When exporting the log is complete, make sure to export a panic dump.

End of procedure

Export/Delete Panic Dump

"Panic Dump" is the action of outputting (dump) memory information when an error (panic) occurs, and also the name of the output information itself. This function exports and saves the memory information of the Controller Module that is stored in the panic dump data, in a segment size specified by the user. An exported panic dump can be stored on a floppy disk or hard disk, or sent by E-mail.
Panic dump is used to analyze the cause of a firmware abnormality or hardware error.

▶ **Caution**

- This function cannot be used when there is no panic dump to be exported in the ETERNUS DX/AF.
- If one user performs any settings while another user is downloading a panic dump, a timeout occurs and the setting operation may be stopped due to an error.
- Up to two panic dumps can be stored in a single CM.

For details on the parameters for this function, refer to "A. Export/Delete Panic Dump" (page 1047).
For the factory default settings for this function, refer to "B. Export/Delete Panic Dump" (page 1262).

The procedure to export the panic dump is as follows:

Procedure

1 Click [Export/Delete Panic Dump] in [Action].

2 Specify the panic dump to be exported and the segment file size.
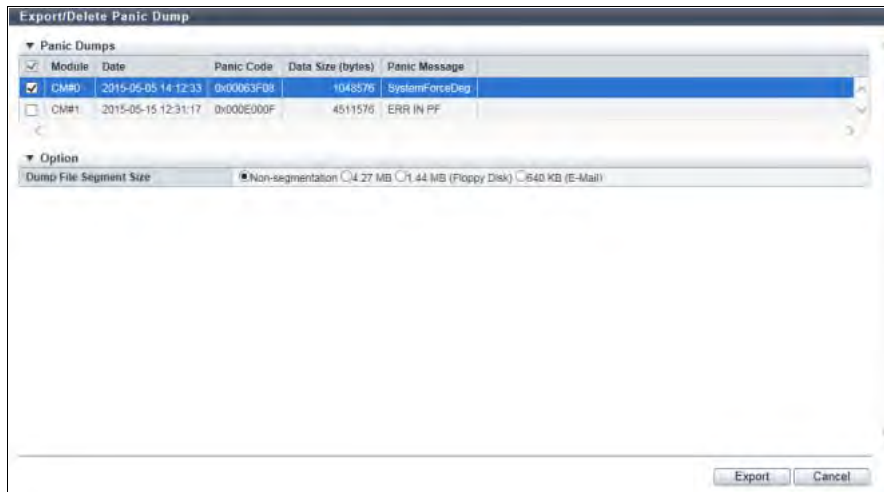
The main setting items are as follows.

● **Panic Dumps**

• Panic Dumps

● **Option**

• Dump File Segment Size

3 Click the [Export] button.

4 A confirmation screen appears. Click the [OK] button.

→ Exporting of the panic dump starts. The progress screen is displayed. After the panic dump export is finished, a screen to execute downloading the file is displayed.

5 Click the [Download] button to save the exported panic dump.

> ▶ **Caution**
>
> When exporting of the panic dump has been completed, save the panic dump immediately.

> ⬤ **N o t e**
>
> If "Non-segmentation" is selected in the "Dump File Segment Size" field, the [Download] button becomes inactive after the log file has been saved. Proceed to Step 6.

→ A dialog box to download the file appears.

6 Save the panic dump.
The default file name is as follows.

- For the ETERNUS DX8700 S3/DX8900 S3
  "Panic_serial number for the ETERNUS DX_YYYY-MM-DD_hh-mm-ss_CExCMy_serial number for panic dump file.zlg"
  (YYYY-MM-DD_hh-mm-ss: the date and time when the panic has occurred. x: CE number in which the panic has occurred. y: CM number in which the panic has occurred. When a panic dump file is segmented, the segmented panic dump files are given the same name and numbered serially (01 -).)
- For the other models
  "Panic_serial number for the ETERNUS DX/AF_YYYY-MM-DD_hh-mm-ss_CMy_serial number for panic dump file.zlg"
  (YYYY-MM-DD_hh-mm-ss: the date and time when the panic has occurred. y: CM number in which the panic has occurred. When a panic dump file is segmented, the segmented panic dump files are given the same name and numbered serially (01 -).)

> ▶ **Caution**
>
> When saving segmented panic dump files, make sure to save the segment within five minutes. If five minutes pass before exporting the next segment, the panic dump export fails. After finishing saving each segment, save the following segment immediately.

→ If the panic dump file is segmented, download and save the next segment (save all the segmented files).

7 Click the [Finish] button.

8 A confirmation screen appears. Click the [OK] button to return to the [Event/Dump] screen.

End of procedure

Audit Log Management

This section describes audit log management.
The following functions are available with Audit log management:
- Enable Audit Log
- Disable Audit Log
- Setup Audit Log

Enable Audit Log

This function enables the audit log function.

> ▷ **Caution**

- Enable the "Audit Log" setting, and then specify the destination external server. Refer to "Setup Audit Log" (page 168) for details. Audit logs are sent after the external server is specified.
- Note that the ETERNUS DX/AF does not save the audit log. The audit log is only sent to the specified external server.

> 🔵 **N o t e**

The conditions for collecting audit logs are as follows:
- The interface must be ETERNUS Web GUI, ETERNUS CLI, or software (via ETERNUS CLI or SMI-S)
- The user who logs in or is newly logged in when the external server is set after the "Audit Log" is enabled
- Audit log collection target operations (*1)
*1: Refer to "Audit Log" (page 660) for details about log collection target operations.

For the factory default settings for this function, refer to "B. Audit Log" (page 1262).

The procedure to enable the audit log function is as follows:

Procedure

1 Click [Enable Audit Log] in [Action].

> ▷ **Caution**

If the audit log function has already been enabled, [Enable Audit Log] cannot be clicked.

2 A confirmation screen appears. Click the [OK] button.
→ Enabling of the audit log starts.

3 Click the [Done] button to return to the [Audit Log] screen.

End of procedure

Disable Audit Log

This function disables the audit log function.

For the factory default settings for this function, refer to "B. Audit Log" (page 1262).

The procedure to disable the audit log function is as follows:

Procedure

1   Click [Disable Audit Log] in [Action].

▷ **Caution**

If the audit log function has already been disabled, [Disable Audit Log] cannot be clicked.

2   A confirmation screen appears. Click the [OK] button.
→ Disabling of the audit log starts.

3   Click the [Done] button to return to the [Audit Log] screen.

End of procedure

Setup Audit Log

This function sets up external servers (Syslog servers) for sending audit logs that are detected by the ETERNUS DX/AF.
Up to two Syslog servers can be registered.

▷ **Caution**

- Enable the "Audit Log" setting, and then configure the destination Syslog server. Audit logs are sent after the Syslog server is specified.
- Confirm that the audit log has been successfully sent to the Syslog server by logging in and out from ETERNUS Web GUI or ETERNUS CLI and performing a transmission test to the Syslog server.
- Even if a communication error occurs between the ETERNUS DX/AF and the Syslog server, the audit log is not sent again.
- Changing the Syslog server setting is only available when the "Audit Log" setting is "Enable". Note that once "on" is selected for the "Send Audit Log" setting, the "Send Audit Log" setting cannot be changed to "off" for both of the Syslog servers (at least one Syslog server must be "on").

◯ **N o t e**

- The audit log function uses the destination server that has the same interface as the Syslog server. The same server as the Syslog server is also available.
- The audit logs are sent to both Syslog servers at the same time.
- Even if the "Audit Log" setting changed to "Disable", the audit log setting information in the ETERNUS DX/AF is maintained.

For details on the parameters for this function, refer to .
For the factory default settings for this function, refer to .

The procedure to set up the servers for sending audit logs is as follows:

Procedure

1   Click [Setup Audit Log] in [Action].

2   Specify the parameters.

The main setting items are as follows.

● Syslog Server1, Syslog Server2

- Send Audit Log
- Domain Name / IP Address
- Port No.
- LAN Port

> **Caution**

If an error screen appears under the following conditions, check the parameter settings.
- When the "Audit Log" setting is "Disable"
- When the specified IP address of the Syslog server conflicts with the internal IP address of the ETERNUS DX/AF.

Note

Up to two Syslog servers can be configured. When configuring a second Syslog server, specify the required parameters in "Syslog Server2".

3   Click the [Set] button.

4   A confirmation screen appears. Click the [OK] button.
→ Setting of the audit log starts.

5   Click the [Done] button to return to the [Audit Log] screen.

End of procedure

Key Management

This section describes key management.
In this section, the SED authentication key is referred to as "key".

Key management provides the following functions:

- Setup Key Management Machine Name
- Add Key Server
- Delete Key Server
- Modify Key Server
- Create Key Group
- Delete Key Group
- Modify Key Group
- Update SED Authentication Key
- Import SSL/KMIP Certificate

Setup Key Management Machine Name

This function specifies the name of the key management device (Key Management Machine).
The key management device name is used for the device that is to be used to connect to the key server.

▷ **Caution**

The key management device name cannot be specified when a common key (*1) is not registered. Refer to "Register SED Authentication Key" (page 71) for details.
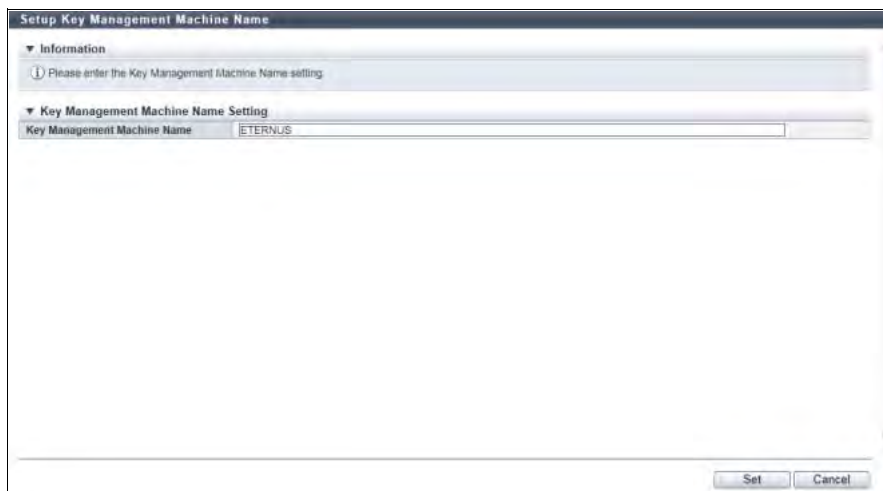
*1: The common key for SEDs that are managed in the ETERNUS DX/AF.

For details on the parameters for this function, refer to "A. Setup Key Management Machine Name" (page 1048).

The procedure to set the key management device name is as follows:

Procedure

1 Click [Setup Key Machine Name] in [Action].

2 Specify the key management device name.

The main setting item is as follows.

● **Key Management Machine Name Setting**

- Key Management Machine Name

> **Caution**

Do not change the key management device name after the key status changes to "Normal". The key status can be checked on the [Key Group] screen. Refer to "Key Group" (page 653) for details.

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
→ Setting of the key management device name starts.

5 Click the [Done] button to return to the [Key Management] screen.

End of procedure

Add Key Server

This function adds a key server.
A key server is an external server that manages the key. By using the key server to obtain and update the key via SSL to establish secure communication with the ETERNUS DX/AF, an environment in which the key can be managed more safely can be created. Up to two key servers can be registered.
For the key server, use a server in which the key management software "ETERNUS SF KM" is installed. Note that "IBM Security Key Lifecycle Manager" is also available as the key management software.

> **Caution**

- The key server cannot be added when the common key (*1) is not registered. Refer to "Register SED Authentication Key" (page 71) for details.
  - *1: The common key for SEDs that are managed in the ETERNUS DX/AF.
- By using a key server to manage the key, the ETERNUS DX/AF can obtain the key from the key server when required. For example, the key is obtained when RAID groups are added to the key group or when maintenance is performed for SEDs that configure a RAID group in the key group. Make sure that communication is always maintained between the ETERNUS DX/AF and the key server. To obtain the key from a key server, the key server must respond to the ETERNUS DX/AF within 30 seconds. Do not use the key server function in an environment in which a network timeout may occur.
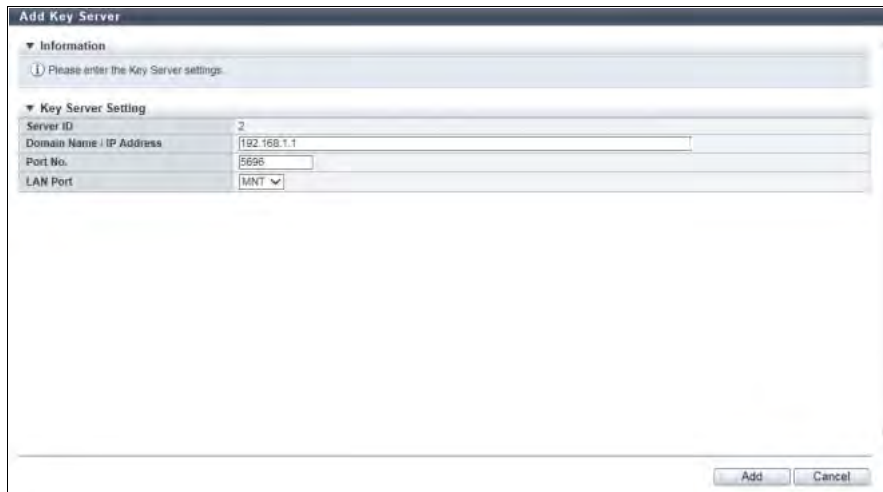
For details on the parameters for this function, refer to "A. Add Key Server" (page 1049).
For the factory default settings for this function, refer to "B. Add Key Server" (page 1263).

The procedure to add a key server is as follows:

Procedure

1 Click [Add Key Server] in [Action].

2   Specify the parameters.

The main setting items are as follows.

● **Key Server Setting**

- Domain Name / IP Address
- Port No.
- LAN Port

> ▶ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
- When inputting a domain name or an IP address that is already used for another key server
- When the IP address that was input and the IP address of the LAN port (MNT or RMT) are the same
- When the IP address that was input and the network address of the LAN port (MNT or RMT)are the same

3   Click the [Add] button.

4   A confirmation screen appears. Click the [OK] button.
     → Adding of the key server starts.

5   Click the [Done] button to return to the [Key Management] screen.

End of procedure

Delete Key Server

This function deletes key servers.

> ▶ **Caution**

A key server that is allocated to a key group cannot be deleted. Refer to the "Master Server" field and the "Slave Server" field in the [Key Group] screen to check whether the key server is allocated to the key group. Refer to "Key Group" (page 653) for details.

The procedure to delete key servers is as follows:

Procedure

1   Select the key server that is to be deleted (multiple selections can be made) and click [Delete Key Server] in [Action].

2   A confirmation screen appears. Click the [OK] button.
→ Deleting of the key server starts.

3   Click the [Done] button to return to the [Key Management] screen.

End of procedure

Modify Key Server

This function changes the key server settings.

> **N o t e**
>
> • Key server settings that are allocated to a key group can be changed.
> • This function can be used to change "Domain Name / IP Address", "Port No.", and "LAN Port".
> • This function can be used even when operations are being performed for the volumes that configures a key management target RAID group.

For details on the parameters for this function, refer to "A. Modify Key Server" (page 1049).

The procedure to change the key server settings is as follows:

Procedure

1   Select the key server that is to be changed and click [Modify Key Server] in [Action].

2   Specify the parameters.

The main setting items are as follows.

● **Key Server Setting**

- Domain Name / IP Address
- Port No.
- LAN Port

▷ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
- When inputting a domain name or an IP address that is already used for another key server
- When the IP address that was input and the IP address of the LAN port (MNT or RMT) are the same
- When the IP address that was input and the network address for the LAN port (MNT or RMT) are the same

3 Click the [Modify] button.

4 A confirmation screen appears. Click the [OK] button.
→ Changing of the key server settings starts.

5 Click the [Done] button to return to the [Key Management] screen.

End of procedure

Create Key Group

This function creates a key group.
The key group combines all of the RAID groups that use the same key. One key group can be created in the ETERNUS DX/AF.

▷ **Caution**

The key group cannot be created when a common key (*1) is not registered. Refer to "Register SED Authentication Key" (page 71) for details.
*1:   The common key for SEDs that are managed in the ETERNUS DX/AF.

⦿ **N o t e**

- The key group can be created even when the key server is not registered.
- The key group can be created even when communication with the key server is not available.
- Register RAID groups that use the same key in the key group. Refer to "Set Key Group (RAID Group)" (page 528) for details.
- The RAID groups that are registered in the key group can be checked by using the [SED Key Group] screen. Refer to "SED Key Group" (page 882) for details.
- There are two types of SED keys: a common key and a key that is managed in the key server. RAID groups that use the common key and RAID groups that use the key managed in the key server (RAID groups that are registered in the key group) can be created in the same storage system.

For details on the parameters for this function, refer to "A. Create Key Group" (page 1050).
For the factory default settings for this function, refer to "B. Create Key Group" (page 1263).

The procedure to create a key group is as follows:

Procedure

1 Click [Create Key Group] in [Action].

2 Specify the parameters.

The main setting items are as follows.

● **Key Group Setting**

- Name
- Storage System Group Name
- Security Level
- Recovery Mode
- Key Valid Period
- Key Server

3 Click the [Create] button.

4 A confirmation screen appears. Click the [OK] button.
→ Key group creation starts.

5 Click the [Done] button to return to the [Key Group] screen.

End of procedure

Delete Key Group

This function deletes the key group.

▷ **Caution**

A key group in which RAID groups are registered cannot be deleted. Use the [SED Key Group] screen to check whether RAID groups are registered in the key group. Refer to "SED Key Group" (page 882) for details.

The procedure to delete a key group is as follows:

Procedure

1 Click [Delete Key Group] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ Deleting of the key group starts.

3 Click the [Done] button to return to the [Key Group] screen.

End of procedure

Modify Key Group

This function changes the key group settings.
The key group combines all of the RAID groups that use the same key.

For details on the parameters for this function, refer to "A. Modify Key Group" (page 1052).

The procedure to change the key group settings is as follows:

Procedure

1 Click [Modify Key Group] in [Action].

2 Specify the parameters.

The main setting items are as follows.

● **Key Group Setting**

- Name
- Storage System Group Name
- Security Level
- Recovery Mode
- Key Valid Period
- Key Server

3 Click the [Modify] button.

4 A confirmation screen appears. Click the [OK] button.
→ Changing of the key group settings starts.

5 Click the [Done] button to return to the [Key Group] screen.

End of procedure

Update SED Authentication Key

This function updates the key in the key group. Updating of the key is performed in the following ways:

- When no key is registered in the key group, a key that has not expired is obtained from the key server.
- When the key is valid and has not expired, this key is replaced with a new key from the key server.

The ETERNUS DX/AF monitors the key on a regular basis and automatically replaces an expired key with a new key. This function is used when a new key is required before the key expiration date has been reached because the user loses the SEDs that were disconnected for maintenance. This function asks whether to use the current key again when replacing the key.

▷ **Caution**

- Replacing a key is only available when the master server is registered. Check the registration status of the master server in the [Key Group] screen. To replace the key, register the master server in advance. Refer to "Modify Key Group" (page 176) for details.
- The key is updated only when communication with the master server is normal.
- If no key is registered in the key group, an error occurs when the first update of the key is performed. In this case, register the SSL certificate of the ETERNUS DX/AF in the key server, accept access from the ETERNUS DX/AF, and then update the key again. The key status changes to "Normal". An SSL certificate of the ETERNUS DX/AF indicates a "self-signed SSL certificate" or an "SSL server certificate".
- The key can only be updated when the SEDs that configure the RAID groups in the key group are in the normal status. If there are SEDs without normal status in the RAID group, make sure to perform maintenance for these SEDs in advance. If the key is updated before required maintenance is performed for the SEDs, the RAID group status changes to " ⚠ Exposed" and updating of the key for the RAID group is not complete (the key status of the key group is not changed from "Modifying"). Updating of the key is complete after performing the SED maintenance and the status of all the RAID groups has returned to " ✅ Available" (the key status of the key group has changed to "Normal").
- If the RAID groups in the key group are blocked (the status is " ❌ SED Locked"), the RAID group status is not changed to " ✅ Available" even after the key is updated. Make sure to recover SEDs before updating the key. Refer to "Recovery SED" (page 530) for details.
- When "Disabled Key" is selected for "Current Key", make sure to compromise (*1) the key in the key server by using CLI for the key server. Note that GUI for the key server does not support the key compromising function.
  *1: The key becomes unavailable in the key server.

🔵 **N o t e**

- This function can be used to replace a key when the expiration date of the key is set to "Unlimited".
- This function can also be used to update the key in a key group in which no RAID groups are registered.

For details on the parameters for this function, refer to "A. Update SED Authentication Key" (page 1052).
For the factory default settings for this function, refer to "B. Update SED Authentication Key" (page 1263).

The procedure to update a key in the key group is as follows:

Procedure

1 Click [Update SED Key] in [Action].

2 Select whether to use the current key again.

The main setting item is as follows.

● **Current SED Authentication Key Setting**

• Current Key

3 Click the [Update] button.

▷ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
   • When the master server for the key group is not registered
   • When one of the following statuses applies to the key in the key group:
      - Unregistered Server Certificate
      - Expired Server Certificate
      - No SSL Certificate
      - Network Error
      - Key Server Error

4 A confirmation screen appears. Click the [OK] button.
   → Updating of the SED Authentication Key starts.

5 Click the [Done] button to return to the [Key Group] screen.

End of procedure

Import SSL/KMIP Certificate

This function registers the SSL/KMIP certificate in the ETERNUS DX/AF. The SSL/KMIP certificate is used for communication with the key server.
When performing management of the SED authentication key (hereinafter referred to as "key") in the key server, communication between the key server and the ETERNUS DX/AF is required. To establish communication, register the "SSL/KMIP certificate" (a trusted certificate of the key server) in the ETERNUS DX/AF.

⬤ **N o t e**

- Export the SSL/KMIP certificate from the key server and register this certificate in the ETERNUS DX/AF.
- To establish communication between the key server and the ETERNUS DX/AF, the SSL certificate of the storage system is also required. Refer to "Create Self-signed SSL Certificate" (page 145) or "Create Key/CSR" (page 146) for details.
- The SSL/KMIP certificate can be registered even when the key server is not specified.
- The SSL/KMIP certificate can be registered even when the key group is not created.

For details on the parameters for this function, refer to "A. Import SSL/KMIP Certificate" (page 1053).

The procedure to register the SSL/KMIP certificate is as follows:

Procedure

1 Click [Import SSL/KMIP Certificate] in [Action].

2 Click the [Browse...] button to specify the path to the "SSL/KMIP Certificate File".
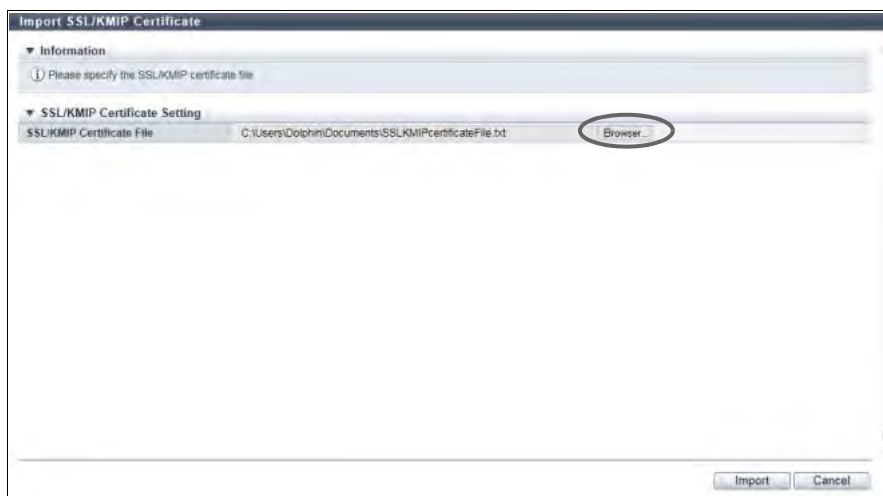
The main setting item is as follows.

⬤ **SSL/KMIP Certificate Setting**

- SSL/KMIP Certificate File

▶ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
- When reading of the "SSL / KMIP Certificate" failed
- When the "SSL / KMIP Certificate" file is larger than 4096 bytes

3 Click the [Import] button.

> ▷ **Caution**

When the imported file was not the "SSL/KMIP Certificate File", an error screen appears. If this occurs, check the parameter settings.

4 A confirmation screen appears. Click the [OK] button.
   → Importing of the SSL/KMIP certificate starts.

5 Click the [Done] button to return to the [Key Group] screen.

End of procedure

Storage Migration Management

This section describes Storage Migration management.

Storage Migration management provides the following functions:
- Start Storage Migration
- Download Template File for Storage Migration Settings
- Delete Storage Migration Path
- Download Storage Migration Result
- Restart Storage Migration
- Suspend Storage Migration
- Stop Storage Migration

Start Storage Migration

This function loads the Storage Migration setting file and starts migration.
Storage Migration is the function for migrating data by connecting other storage systems (migration source) and the ETERNUS DX/AF (migration destination). Data migration is possible regardless of the server and the OS, and without using server resources.
- Data migration is performed in volume units.
- Up to 16 storage systems can be specified as migration source storage systems.
- Up to 8 migration paths can be specified per migration source storage system.
- Up to 512 data migration LUNs can be specified per migration path.
- There are two methods for migrating the data: "offline Storage Migration" and "online Storage Migration".

Both the online Storage Migration and the offline Storage Migration (hereinafter collectively referred to as "Storage Migration") require temporarily stopping the operation. To perform a Storage Migration without stopping operations, use the Non-disruptive Storage Migration function. Refer to "Register Non-disruptive Storage Migration License" (page 55) for details.

To perform Storage Migration, the destination storage systems, the source storage systems, and the destination volumes must satisfy the conditions below.

Requirements for a source storage system and a source LUN:

- An FC interface is available as the host interface
- The storage system is in the normal state
- The source LUN is a type that is accessible from the host (Standard, Thin Provisioning Volume (TPV), Snap Data Volume (SDV), etc.)
- Storage Migration is not yet started

Requirements for a destination storage system and a destination volume:

- An FC interface is available as the host interface
- The storage system is in normal status
- The CA port used for migration is in normal status
- The destination volume is in normal status

  (The status of the migration destination volume is not "⌛ Readying", "⚠ Partially Exposed",

  "⚠ Exposed", "✖ Not Ready", "✖ Broken", "✖ Data Lost", or "❓ Unknown")
- The type of the destination volume is "Standard", "WSV", "TPV", or "Flexible Tier Volume (FTV)"

- A storage system or volume cannot be specified as the destination in the following cases:
  - Hot controller firmware upgrade is being performed in the destination storage system
  - An ODX Buffer volume is selected as a migration destination volume
  - A NAS volume (NAS user volume and NAS backup volume) is selected as a migration destination volume
  - A NAS system volume is selected as a migration destination volume
  - A Deduplication/Compression System Volume is selected as a migration destination volume
  - An External Volume is selected as a migration destination volume
  - The RAID group to which the destination volume belongs to has an Eco-mode schedule configured
  - The TPP to which the destination volume belongs has an Eco-mode schedule configured
  - The destination volume is specified as a RAID migration source or destination (*1)
  - The capacity of the RAID group to which the destination volume belongs is being expanded
  - Encryption is in progress for the destination volume
  - The capacity of the destination volume is being expanded
  - The destination volume is specified as the destination for another Storage Migration operation
  - The mirroring reservation attribute (*2) is added to the destination volume
  - The migration destination volume is used for the Virtual Volume function
  - An Advanced Copy or an XCOPY session is configured for a migration destination volume (*3)
  - A migration using the Flexible Tier is being performed for a migration destination volume (*1)
  - Capacity optimization is being performed for a migration destination volume (*1)

*1:   If "Operation Mode" is "Migration & Host IO", "Migration Status" is changed to "Stop". After the copy sessions are deleted, manually restart the migration.

*2:   The mirroring reservation attribute is added to the volumes that are being created as a Remote Equivalent Copy (REC) path by the Dynamic LUN Mirroring function. Volumes that are not successfully created may have this attribute. Volumes that have the mirroring reservation attribute can be checked in the "Forbid Advanced Copy" field on the [Volume] screen. Refer to "Volume (Basic Information)" (page 775) for details.

*3:   If "Operation Mode" is "Migration & Host IO", "Migration Status" is changed to "Stop". After the process has completed, manually restart the migration.

Requirements for a destination volume and a source LUN:

- The destination volume has the same or larger capacity than the source LUN
  Note that if "Operation Mode" is "Migration & Host IO", the migration destination volume must be the same size as the source LUN.

> **Caution**

- To perform a Storage Migration, stop access from the host to the source LUN.
- The requirements for stopping access from the host to the destination volume varies depending on the operation mode.
  - For "Migration & Host IO", access from the host to the destination volume does not need to be stopped after the migration is started.
  - For "Migration", "Migration + Quick Compare", or "Quick Compare", stop access from the host to the destination volume.
  - For "Migration + Full Compare" or "Full Compare", stop access from the host to all the volumes in the destination storage system.
- Do not specify a volume that has copy sessions as a source or destination.
- Do not specify a volume as the source when formatting is in progress.
- Do not execute the [Start RAID Group Diagnosis] function or the [Start Disk Diagnosis] function on the destination storage system.
- When "Migration + Full Compare" or "Full Compare" is specified for the operation mode, the time to complete the operation after data migration is increased significantly.

> **◯ N o t e**
>
> A started Storage Migration can be suspended, restarted, and stopped in volume units. Refer to "Suspend Storage Migration" (page 189), "Restart Storage Migration" (page 188), or "Stop Storage Migration" (page 190) for details.

Data migration flow using the Storage Migration function

The workflow sequence for Storage Migration is described below.
The host environment must be confirmed and saved before performing the Storage Migration. Ask the system administrator to do it.

(1) Preparation

    a Check and save the host environment so that the ETERNUS DX/AF can be used in the same environment after migration.

    b Check the status of the source and destination storage systems and clear any sense information that has not been reported (*1).

    c When migrating data with multipath, make the configuration so that the same affinity group (LUN group) can be accessed from the multiple FC ports used for migration at the source storage system.

    d Create a destination volume in the destination storage system, or format an existing volume for use as the destination volume.

    *1:   Operations that can be performed when logged in using a user account with the "Maintenance Operation" policy.

(2) Download a template for the Storage Migration setting file ("Download Template File for Storage Migration Settings" (page 186)).

(3) Create the Storage Migration setting file. Refer to "I. Storage Migration Setting Files" (page 1359) for details.

(4) Stop access from the host to the source LUN.

(5) Stop access from the host to the destination volume.
If the operation mode is "Migration + Full Compare" or "Full Compare", stop the access from the host to all the volumes in the destination storage system.

(6) Change the mode of the FC port used for migration in the destination storage system to "Initiator" ("Modify Port Mode" (page 433)).

(7) Set port parameters to the FC-Initiator port ("Modify FC Port Parameters" (page 418)).

(8) Connect the source and destination storage systems using an FC cable, or use a switch to connect the source and destination storage systems.

(9) Load "Storage Migration setting file" that was created in Step (3) in the destination storage system to start Storage Migration ("Start Storage Migration" (page 181)).

(10) The following procedure varies depending on the operation mode.

    ■ If the operation mode is "Migration & Host IO"

      (1) Perform the following procedure with an FC port that is not used for migrations in the destination storage system.

      a Set port parameters to the FC-CA port ("Modify FC Port Parameters" (page 418)).

      b Set host affinity to the FC-CA port ("Create Host Affinity" (page 337) or "Modify Host Affinity" (page 348)).

      c Use the FC-CA port to confirm that the destination storage system and the destination volumes can be accessed correctly from the host.

      d Use the FC-CA port to resume access from the host to the destination volume.

(2) Check the progress of Storage Migration.

(3) After the Storage Migration is successfully completed, perform the following procedure in the destination storage system.

a   Delete the migration path ("Delete Storage Migration Path" (page 187)).

b   Change the FC-Initiator port mode that was used for the migration from "Initiator" to "CA" ("Modify Port Mode" (page 433)).

■   If the operation mode is not "Migration & Host IO"

(1) Check the progress of Storage Migration.

(2) After the Storage Migration is successfully completed, perform the following procedure in the destination storage system.

a   Delete the migration path ("Delete Storage Migration Path" (page 187)).

b   Change the FC-Initiator port mode that was used for the migration from "Initiator" to "CA" ("Modify Port Mode" (page 433)).

c   Set port parameters to the FC-CA port ("Modify FC Port Parameters" (page 418)).

d   Set host affinity to the FC-CA port ("Create Host Affinity" (page 337) or "Modify Host Affinity" (page 348)).

e   Use the FC-CA port to confirm that the destination storage system and the destination volumes can be accessed correctly from the host.

f   Use the FC-CA port to resume access from the host to the destination volume (if the operation mode is "Migration + Full Compare" or "Full Compare", resume access from the host to the destination storage system).

For details on the parameters for this function, refer to "A. Start Storage Migration" (page 1053).

The procedure to start Storage Migration is as follows:

Procedure

1   Click [Start] in [Action].

2   Click the [Browse...] button to select a Storage Migration setting file.
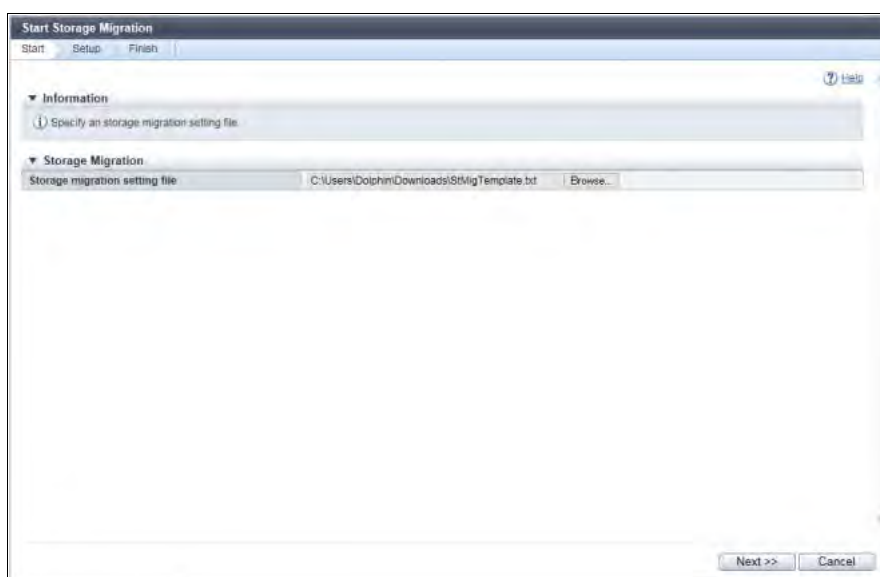
The main setting item is as follows.

● **Storage Migration**

- Storage migration setting file

⬐ **Caution**

- An error screen is displayed if a timeout occurs during the retrieval of destination device information.
- An error screen is displayed if the Storage Migration setting file does not satisfy the required conditions. Check the parameter settings. Refer to "I. Storage Migration Setting Files" (page 1359) for details.
- When an error is detected in the script analysis
- An error screen is displayed when the obtained destination storage system information is in the following conditions:
  - Two or more source storage systems are specified in single "GROUP"
  - The source storage system has other Storage Migration instance already started
  - The source storage system status is not normal
  - The source WWN being set for "PATH" does not exist
  - The source LUN is in the following conditions:
    - The source LUN does not exist.
    - An unusable status is detected.
    - The capacity exceeds that of the destination volume.

3 Click the [Next >>] button.

4 Check the path group, and click the [Start] button.

◯ **N o t e**

- Click the [Path Group] link to display "Path Group Detail Information" (page 664).
- If a CE number is not specified for the migration path in the ETERNUS DX8700 S3/DX8900 S3, "CE#0" is assumed as specified. To change the CE number, cancel the process, edit the Storage Migration setting file, and then restart this function.
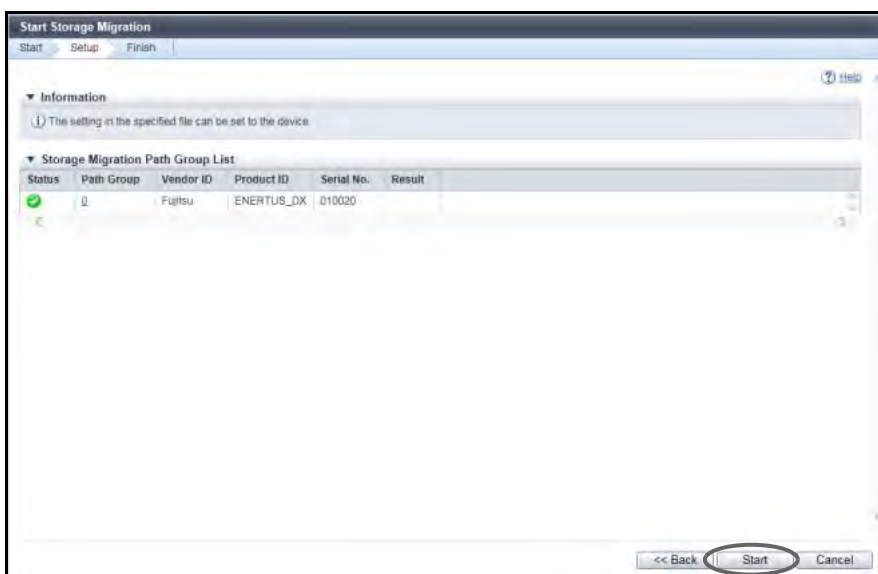
5 A confirmation screen appears. Click the [OK] button.
→ Storage Migration starts.

6 Click the [Done] button to return to the [Storage Migration] screen.

> 🔵 **N o t e**
>
> - Refer to "Storage Migration" (page 662) for progress status of Storage Migration.
> - Click the [Path Group] link to display "Path Group Detail Information" (page 664).

<div align="right">End of procedure</div>

Download Template File for Storage Migration Settings

This function downloads the template of the Storage Migration setting file.
In the Storage Migration setting file, specify the destination CA port, source WWN, source LUN, and destination volumes.

> 🔵 **N o t e**
>
> Refer to "I. Storage Migration Setting Files" (page 1359) for details about the Storage Migration setting files.

The procedure to download the template is as follows:

Procedure

1 Click [Download Template] in [Action].

2 Click the [Download] button.
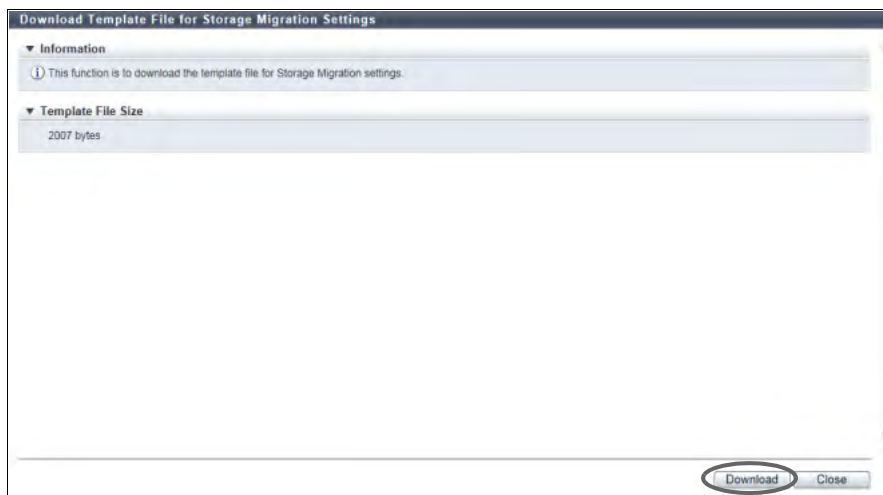
3 A confirmation screen appears. Click the [OK] button.
→ A dialog box to download file appears.

4 Save the template file.
The default file name is "StMigTemplate.txt".
→ Downloading of the template file starts.

5 Click the [Close] button to return to the [Storage Migration] screen.

<div align="right">End of procedure</div>

Delete Storage Migration Path

This function deletes path groups for Storage Migration.

▷ **Caution**

The path groups must be deleted after the data migration is complete. The following operations are not available before path groups are deleted:
- Hot controller firmware upgrade is being performed in the destination storage system
- Eco-mode schedule setting of the RAID group to which the destination volume belongs
- Eco-mode schedule setting of the TPP to which the destination volume belongs
- Capacity expansion of the RAID group to which the destination volume belongs
- RAID migration of the destination volume
- Encryption of the destination volume
- Capacity expansion of the destination volume
- Deletion of the destination volume
- Port mode modification of the destination FC-Initiator port
- Port parameter setting of the destination FC-Initiator port
- Reduction of the CA to which the destination FC-Initiator port belongs

N o t e

The path group can be deleted if all configured paths are in any of the following states:
- "Source LUN Status" of the Storage Migration Volume List is "❌ Not Exist".
- "Migration Status" of the Storage Migration is "Normal End", "Stop", "Initial", or "Waiting".

The procedure to delete the Storage Migration path is as follows:

Procedure

1 Select the path group that is to be deleted (multiple selections can be made) and click [Delete Path] in [Action].

2 A confirmation screen appears. Click the [OK] button.
   → Deletion of the Storage Migration path starts.

3 Click the [Done] button to return to the [Storage Migration] screen.

End of procedure

Download Storage Migration Result

This function downloads the execution result of the Storage Migration.

N o t e

- Download of Storage Migration results is made in path group units.
- Storage Migration results can be downloaded not only after completion of data migration but also during data migration.
- The Storage Migration results are text files. The template is the same as the [Path Group Detail Information] screen. Refer to for details.

The procedure to download the Storage Migration result is as follows:

Procedure

1   Click [Download Result] in [Action].

2   Click the [Download] button.

3   A confirmation screen appears. Click the [OK] button.
   → A dialog box to download file appears.

4   Save the Storage Migration result file.
   The default file name is "StMigResult_serial number for the ETERNUS DX/AF_YYYY-MM-DD_hh-mm-ss.txt".
   (YYYY-MM-DD_hh-mm-ss: the date and time when the download screen (Step 2) is displayed.)
   → Downloading of the Storage Migration result file starts.

5   Click the [Close] button to return to the [Path Group Detail Information] screen.

End of procedure

Restart Storage Migration

This function restarts Storage Migration when it is waiting, suspended, stopped, or error-stopped.

> **N o t e**
>
> • Storage Migration is restarted in volume units.
> • Storage Migration can be restarted when its "Migration Status" is "Waiting", "Suspend", "Stop" or "Error".
> • If Storage Migration is restarted when its "Migration Status" is "Suspend" or "Error", data migration is started from the point of LUN suspension.
> • If Storage Migration is restarted when its "Migration Status" is "Waiting" or "Stop", data migration of the LUN is started over from scratch.

The procedure to restart the Storage Migration is as follows:

Procedure

1 Select the source LUN from which Storage Migration is to be restarted (multiple selections can be made) and click [Restart] in [Action].

> ● **N o t e**
>
> [Restart] cannot be clicked if one or more source LUNs are selected for which the migration status is unavailable for restarting.

2 A confirmation screen appears. Click the [OK] button.

> ● **N o t e**
>
> Note that if the migration status of some LUNs changes to unavailable status after clicking [Restart], only the available LUNs among the selected LUNs are restarted. If LUNs for which the migration status is not unavailable for restarting exist, a message that indicates that the restarting process for these LUNs failed is displayed.

→ Storage Migration restarts.

3 Click the [Done] button to return to the [Path Group Detail Information] screen.

End of procedure

Suspend Storage Migration

This function suspends Storage Migration that is running.

> ▷ **Caution**
>
> If the Storage Migration is suspended when the operation mode is "Migration & Host IO", the host IO stops. Check the host IO status before suspending the Storage Migration.

> ● **N o t e**
>
> • Storage Migration is suspended in volume units.
> • Storage Migration can be suspended when its "Migration Status" is "Running".
> • A suspended Storage Migration can be restarted. Refer to "Restart Storage Migration" (page 188) for details.

The procedure to suspend the Storage Migration is as follows:

Procedure

1 Select the source LUN for which Storage Migration is to be suspended (multiple selections can be made) and click [Suspend] in [Action].

> ⬤ **N o t e**
>
> [Suspend] cannot be clicked if one or more source LUNs are selected for which the migration status is unavailable for suspending.

2 A confirmation screen appears. Click the [OK] button.

> ⬤ **N o t e**
>
> Note that if the migration status of some LUNs changes to unavailable status after clicking [Suspend], only the available LUNs among the selected LUNs are suspended. If LUNs for which the migration status is not unavailable for suspending exist, a message that indicates that the suspending process for these LUNs failed is displayed.

→ Storage Migration suspends.

3 Click the [Done] button to return to the [Path Group Detail Information] screen.

End of procedure

Stop Storage Migration

This function stops Storage Migration when it is migrating, suspended, or error-stopped.

> ▷ **Caution**
>
> If the Storage Migration is stopped when the operation mode is "Migration & Host IO", the host IO stops. Check the host IO status before stopping the Storage Migration.

> ⬤ **N o t e**
>
> • Storage Migration is stopped in volume units.
> • Storage Migration can be stopped when its "Migration Status" is "Running", "Suspend" or "Error".
> • A stopped Storage Migration can be restarted. Refer to <u>"Restart Storage Migration" (page 188)</u> for details.

The procedure to stop the Storage Migration is as follows:

Procedure

1 Select the source LUN for which Storage Migration is to be stopped (multiple selections can be made) and click [Stop] in [Action].

> ⬤ **N o t e**
>
> [Stop] cannot be clicked if one or more source LUNs are selected for which the migration status is unavailable for stopping.

2 A confirmation screen appears. Click the [OK] button.

⬤ **N o t e**

Note that if the migration status of some LUNs changes to unavailable status after clicking [Stop], only the available LUNs among the selected LUNs are stopped. If LUNs for which the migration status is not unavailable for stopping exist, a message that indicates that the stopping process for these LUNs failed is displayed.

→ Storage Migration stops.

3 Click the [Done] button to return to the [Path Group Detail Information] screen.

End of procedure

External Drive Management

This section describes External Drive management.

External Drive management provides the following functions:

- Create External Drive
- Delete External Drive

Create External Drive

This function creates External Drives by transferring the volume information in the external storage system to the local storage system.
This function is available only if the Non-disruptive Storage Migration License has been registered.

The maximum number of External Drives for each model

The maximum number of External Drives varies depending on each model. The following table shows the maximum number of External Drives that can be created for each model.

Model	The maximum number of External Drives (*1)
ETERNUS DX60 S4/DX60 S3	512
ETERNUS DX100 S4/DX100 S3	2048
ETERNUS DX200 S4/DX200 S3	4096
ETERNUS DX500 S4/DX500 S3	8192
ETERNUS DX600 S4/DX600 S3	8192
ETERNUS DX8100 S3	8192
ETERNUS DX8700 S3	16384
ETERNUS DX8900 S3	16384
ETERNUS AF250 S2/AF250	4096
ETERNUS AF650 S2/AF650	8192
ETERNUS DX200F	4096

*1: Up to 512 volumes can be migrated per external storage system in a single operation.

▷ **Caution**

- External Drives that inherit the "External LU Information" cannot be used for the Storage Cluster function.
- The following operations are not available for the created External Drives:
  - Using External Drives as hot spare disks (Global Hot Spares or Dedicated Hot Spares)
  - Creating REC Disk Buffers with the External Drives
  - Setting disk patrol for the External Drives
  - Diagnosing the External Drives
  - Performing the External Drive maintenance operations (or using the [Hot Preventive Maintenance] function, the [Force Enable Module] function, the [Force Disable Module] function, and the [Remove Disk Drive] function)

🔵 **N o t e**

- External Drives that inherit volume information are displayed in the [External Drives] screen. Refer to "External Drives" (page 668) for details.
- External Drives can be deleted. Refer to "Delete External Drive" (page 195) for details.

For details on the parameters for this function, refer to "A. Create External Drives" (page 1053).
For the factory default settings for this function, refer to "B. Create External Drive" (page 1263).

The procedure to create External Drives is as follows:

Procedure

1 Click [Create] in [Action].

2 Select whether the volume information (External LU Information) of the external storage system is inherited and click the [Browse...] button for the "Select External Storage" field.

> **● N o t e**
>
> - To inherit the External LU Information, select the "Inherit" checkbox.
> - For volumes to be used for the Storage Cluster function, clear the "Inherit" checkbox.
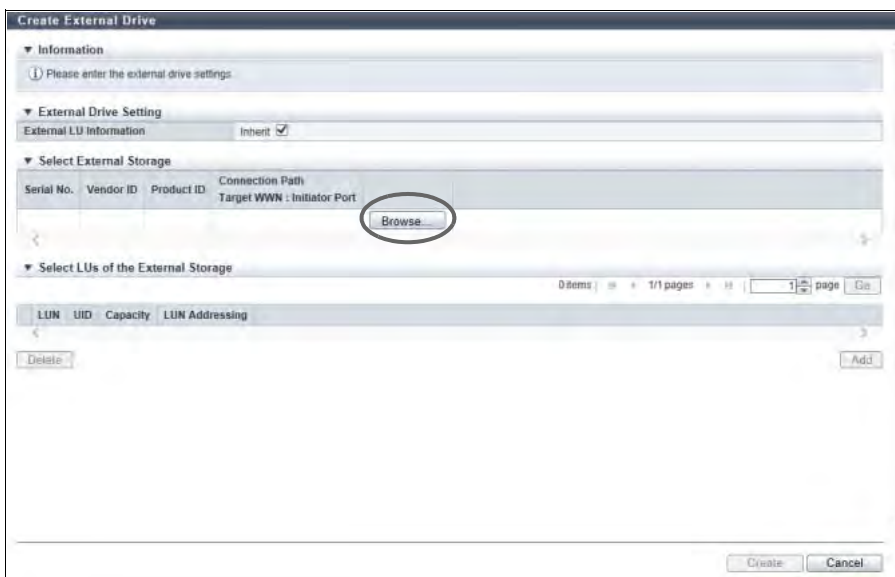
→ The [Select External Storage] screen appears.

3 Select the external storage system for the migration source and click the [OK] button.
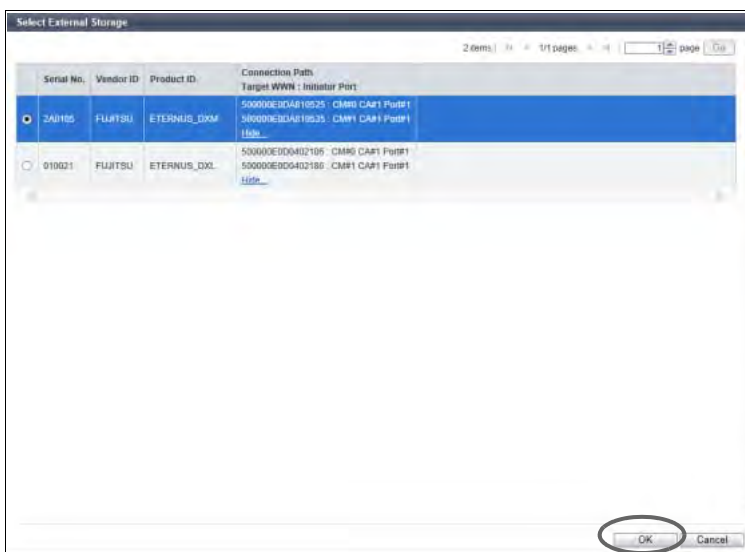
→ Returns to the original screen. The information for the selected external storage system is displayed.

4 If the "Inherit" checkbox is selected, add volumes in the external storage system that transfer the External LU Information to the local storage system.

(1) Click the [Add] button on the bottom right of the "Select LUs of the External Storage" field.
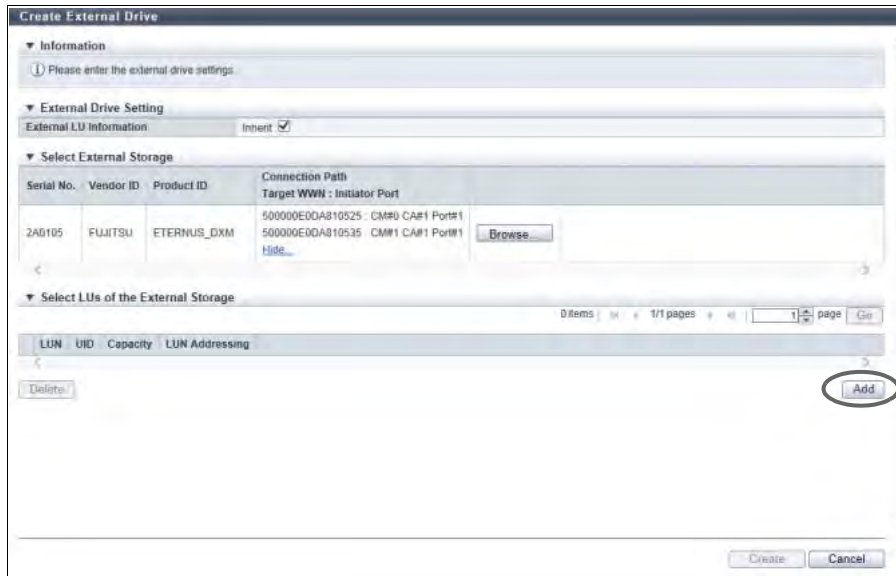
→ The [Select LUs of the External Storage] screen appears.

(2) Select the volume that transfers the External LU Information to the local storage system (multiple selections can be made) and click the [OK] button.

> 🔵 **N o t e**
>
> Select the checkbox to the left of "LUN" in the [Select LUs of the External Storage] screen to select all the displayed volumes.
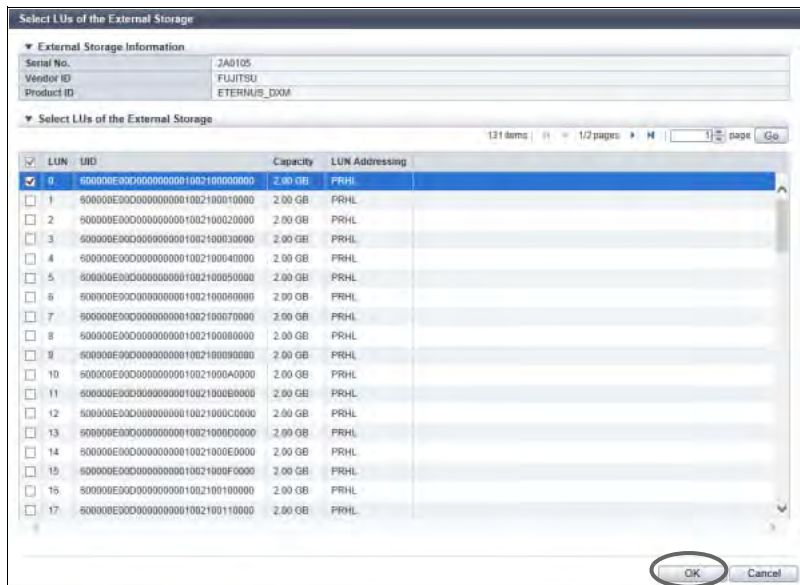
→ Returns to the original screen. The information of the selected volumes is displayed.

(3) Repeat Step (1) and Step (2) when adding several volumes.

> **● N o t e**
>
> Up to 512 volumes are displayed in the "Select LUs of the External Storage" field.

> ▷ **Caution**
>
> If an error screen appears under the following conditions, check the parameter settings.
> • The External LU Information failed to be inherited
> • The created External Drive is not in the normal state
> • The number of External Drives that can be created for each model has exceeded the maximum number

5   Click the [Create] button.
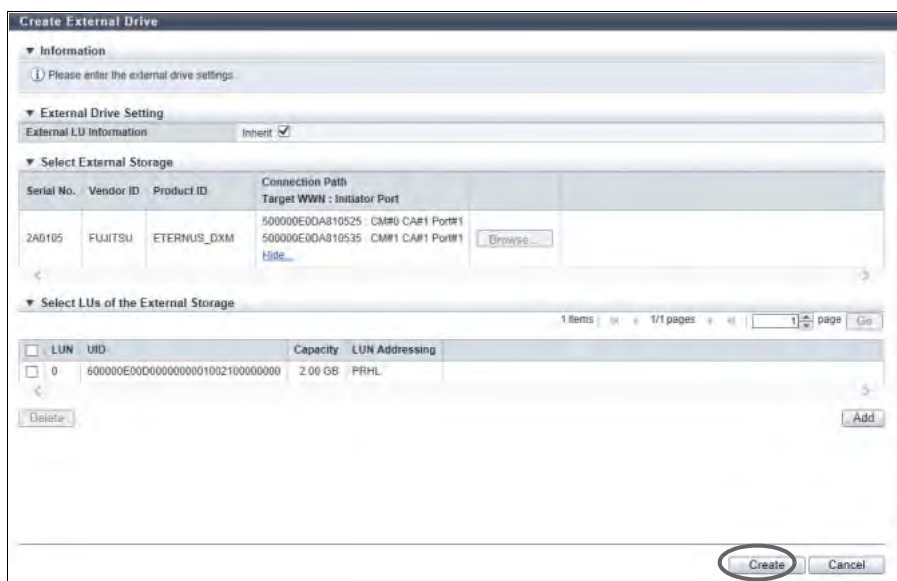
6   A confirmation screen appears. Click the [OK] button.
→ External Drive creation starts.

7   Click the [Done] button to return to the [External Drives] screen.

End of procedure

Delete External Drive

This function deletes the registered External Drives.
This function is available only if the Non-disruptive Storage Migration License has been registered.

> ▷ **Caution**
>
> The External Drives that configure the External RAID Groups cannot be deleted. Delete the External RAID Groups before starting this function. Refer to "Delete External RAID Group" (page 533) for details.

> **N o t e**
>
> - External Drives are displayed in the [External Drives] screen. Refer to <u>"External Drives" (page 668)</u> for details.
> - The External Drives that configure the External RAID Groups can be checked in the "Status" field of the [External Drives] screen. External Drives in the " ✓ Available" or " ◻ Available" state are used for the External RAID Groups. External Drives in the " ◻ Present" state are not used (can be deleted). Refer to <u>"External Drives" (page 668)</u> for details.
> - Refer to the [External RAID Group] screen ([External Drives] tab) to check which External RAID Group is using the relevant External Drive. Refer to <u>"External RAID Group Detail (External Drives)" (page 893)</u> for details.

The procedure to delete the External Drive is as follows:

Procedure

1 Select the External Drive that is to be deleted (multiple selections can be made) and click [Delete] in [Action].

> ▶ **Caution**
>
> If the External Drives that configure the External RAID Group are selected, an error screen appears. Check the parameter settings.

2 A confirmation screen appears. Click the [OK] button.
    → The External Drive deletion starts.

3 Click the [Done] button to return to the [External Drives] screen.

End of procedure

Remote Support Management (REMCS)

This section describes remote support management (by REMCS).
Remote support management (by REMCS) provides the following functions:

- Display Communication Log
- Setup Remote Support
- Update Customer Information
- Update Communication Environment Information
- Setup Log Sending Parameters
- Stop/Restart Remote Support

Display Communication Log

This function displays the communication log between the ETERNUS DX/AF and REMCS center using the Remote Support function.
When the Remote Support function cannot be operated properly, for example, cannot be connected to the REMCS center, use this log to identify the cause of the problem.
The communication log includes requests from the ETERNUS DX/AF to the server, and responses from the server to the ETERNUS DX/AF. Only the communication log of the last executed event is displayed.

> ▷ **Caution**

If the settings in "Setup Remote Support" (page 198) has not been completed in advance, this function cannot be used.

The procedure to display communication log is as follows:

Procedure

1 Click [Display Communication Log] in [Action].

2 Check the displayed "Event Type" and the "Communication Log".
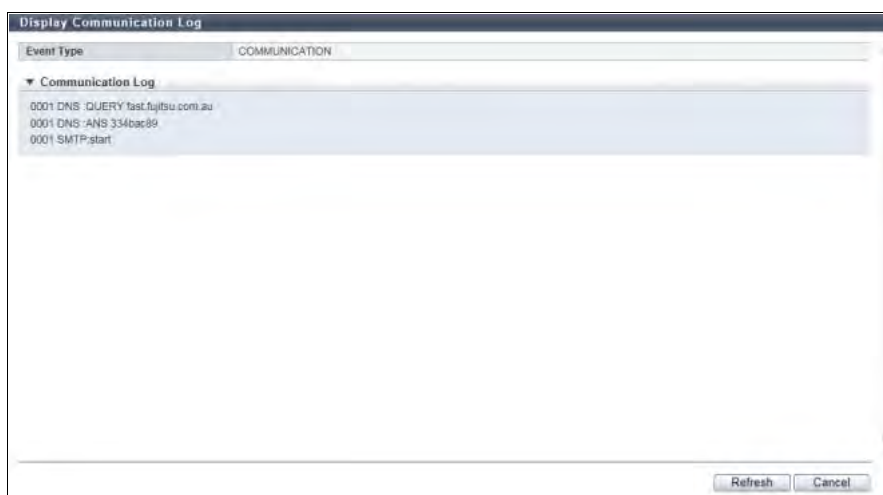
> 🔵 **N o t e**

Click the [Refresh] button to update to the latest screen.

3   Click the [Cancel] button to return to the screen when starting this function in Step 1.

<div align="right">

End of procedure

</div>

Setup Remote Support

This function registers the customer information and communication environment information required to receive Remote Support from the REMote Customer Support system (REMCS) center.
"REMCS" is a unique remote maintenance system offered by Fujitsu. REMCS provides maintenance functions as follows:

- Failure Notice
  This function reports various failures that occur in the ETERNUS DX/AF to the REMCS center. The maintenance engineer is notified of a failure immediately.

- Information Transfer
  This function sends information such as logs and configuration information to be used when checking a failure. It reduces the time required to collect information that is to be transferred to the REMCS center.

- Firmware Download
  The latest firmware in the REMCS center is automatically registered in the ETERNUS DX/AF. This function ensures that the latest firmware is registered in the ETERNUS DX/AF, and prevents known errors from occurring. Firmware can also be registered manually.

▷ **Caution**

- REMCS cannot be used when the AIS Connect function is being used. Disable the AIS Connect function, and then set the remote support (REMCS) parameters. Refer to "Setup AIS Connect Environment" (page 209) for details.
- Use the IPv4 addresses for the IP addresses of the proxy server, the SMTP server, the POP server, and the HTTP server. IPv6 addresses cannot be used.

🔵 **N o t e**

- When changing the registered information, use the procedure in "Update Customer Information" (page 200) and the "Update Communication Environment Information" (page 202).
- The information files (customer information file and communication environment information file) created by using REMCS Environment Setup Assist Tool (REMCS ESAT) can be imported to the storage system, to simplify the input operation required to be set for each storage system.
  - Only the common device information can be imported from the information file. The individual device information is required to be specified after importing the information file.
  - Just importing the information file will not automatically update the information in the ETERNUS DX/AF. After specifying all the necessary information, click the [Set] button.

For details on the parameters for this function, refer to "A. Setup Remote Support" (page 1054).
For the factory default settings for this function, refer to "B. Setup Remote Support" (page 1264).

The procedure to specify the Remote Support settings is as follows:

Procedure

1   Click [Setup Remote Support] in [Action].

2 Specify the parameters.
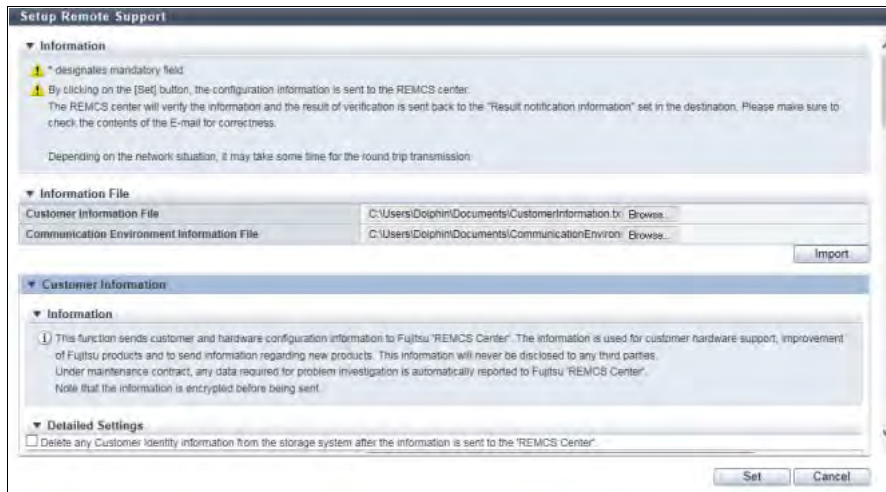
The main setting items are as follows.

● **Information File**

- Customer Information File
- Communication Environment Information File

● **Customer Information**

> 🔵 **N o t e**
>
> Refer to <u>Step 2</u> in the <u>"Update Customer Information" (page 200)</u> for setting items.

● **Communication Environment Information**

> 🔵 **N o t e**
>
> Refer to <u>Step 2</u> in the <u>"Update Communication Environment Information" (page 202)</u> for setting items.

● **Detailed Configuration Information**

- Data Transmission Method
- Specify Storage System Name for HELO/EHLO Announcement when Sending E-Mail
- Use S/MIME

● **Result notification information**

- Administrator
- Connection check operator
- Connection check operator E-Mail Address

> **▷ Caution**
>
> If an error screen appears under the following conditions, check the parameter settings.
> - The IP address of the Proxy/SMTP/POP server is the same as the broadcast address of the MNT port or the RMT port that is specified for the "LAN Port used for Remote Support"
> - The IP address of the Proxy server/SMTP server/POP server is the same as the local host address

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
→ Setting of the remote support starts.

5 Click the [Done] button to return to the screen when starting this function in <u>Step 1</u>.

> **▷ Caution**
>
> After completing the setting, the REMCS center sends the setting confirmation result to the "Administrator E-Mail Address" or the "Connection check operator E-Mail Address". Make sure to confirm the setting results.

End of procedure

Update Customer Information

This function updates the customer information that is registered for the REMCS center.

> **▷ Caution**
>
> - If the settings in <u>"Setup Remote Support" (page 198)</u> has not been completed in advance, this function cannot be used.
> - When Remote Support is "Stopped", customer information cannot be updated.

> **◯ N o t e**
>
> - Customer information saved in the ETERNUS DX/AF (*1) can be deleted after transmitting the information to the REMCS center. Select the "Delete any Customer Identity information from the storage system after the information is sent to the 'REMCS Center'. " checkbox to delete the information. Note that selecting the check-box requires entering customer information whenever updating the information.
>   - *1:   Customer Identity information means "Administrator Name", "Administrator E-Mail Address ", "Phone Number", "FAX Number", and "Connection check operator E-Mail Address".
> - The Remote Support setting information file (customer information file) created by using REMCS ESAT can be imported to the ETERNUS DX/AF, to simplify the input operation required to be set for each storage system.

For details on the parameters for this function, refer to <u>"A. Update Customer Information" (page 1058)</u>.

The procedure to update customer information is as follows:

Procedure

1 Click [Update Customer Info] in [Action].

2   Set the customer information again.

The main setting items are as follows.

● **Information File**

• Customer Information File

> ▷ **Caution**

If the wrong information file is selected and the [Import] button is clicked, an error screen appears.
Check the parameter settings.

● **Customer Information**

• Detailed Settings
    - Checkbox
    - Company Name
    - Department/Division
    - Address
    - Building Name
    - Administrator Name
    - Administrator E-Mail Address
    - Postal Code (Zip Code)
    - Phone Number
    - FAX Number
    - Storage System Unique Name
    - Country of Installation (ISO3166 A2)* Example: JP, US, DE, etc.

● **Installation Location**

• Address

• Building Name

● **Information filled by Field Engineers**

• Installation Date

• Field Engineer E-Mail Address

• Customer Code

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
→ The customer information is updated.

5 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

Update Communication Environment Information

This function updates the customer information that is registered for the REMCS center.

> **Caution**

- If the settings in "Setup Remote Support" (page 198) has not been completed in advance, this function cannot be used.
- Use the IPv4 addresses for the IP addresses of the proxy server, the SMTP server, the POP server, and the HTTP server. IPv6 addresses cannot be used.

● N o t e

The Remote Support setting information file (customer information file) created by using REMCS ESAT can be imported to the ETERNUS DX/AF, to simplify the input operation required to be set for each storage system.

For details on the parameters for this function, refer to "A. Update Communication Environment Information" (page 1060).

The procedure to update communication environment information is as follows:

Procedure

1 Click [Update Connection Info] in [Action].

2 Specify the parameters.

The main setting items are as follows.

● **Information File**

  • Communication Environment Information File

  ▷ **Caution**

  If the wrong information file is selected and the [Import] button is clicked, an error screen appears. Check the parameter settings.

● **Communication Environment Information**

  • Connection
  • Service
  • Proxy Server
  • SMTP Server
  • SMTP Authentication Information
  • REMCS Center

● **Detailed Configuration Information**

  ◯ **N o t e**

  Refer to Step 2 in "Setup Remote Support" (page 198) for setting items.

● **Result notification information**

  ◯ **N o t e**

  Refer to Step 2 in "Setup Remote Support" (page 198) for setting items.

● **Time Information**

  ◯ **N o t e**

  Refer to Step 2 in "Setup Remote Support" (page 198) for setting items.

▷ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
  • When "MNT" is specified for the "LAN Port used for Remote Support" and when the IP Address of the Proxy server/SMTP server/POP server is the same as the broadcast address of the MNT port
  • When "RMT" is specified for the "LAN Port used for Remote Support" and the IP Address of the Proxy server/SMTP server/POP server is the same as the broadcast address of the RMT port
  • The IP address of the Proxy server/SMTP server/POP server is the same as the local host address

3 Click the [Set] button.

4   A confirmation screen appears. Click the [OK] button.

→ Changing of the communication environment information starts.

5   Click the [Done] button to return to the screen when starting this function in Step 1.

▷ **Caution**

After completing the setting, the REMCS center sends the setting confirmation result to the "Administrator E-Mail Address" or the "Connection check operator E-Mail Address". Make sure to confirm the setting results.

End of procedure

Setup Log Sending Parameters

This function transfers the internal log of the ETERNUS DX/AF to the REMCS center.
There are two log sending methods: "Automatic" and "Manual".

- Configure Automatic Log Transmission
  The ETERNUS DX/AF sends log periodically or when an event occurs.
- Immediately Send Log Manually
  The log is sent manually.

▷ **Caution**

This function cannot be used under the following conditions:
- When the procedure in "Setup Remote Support" (page 198) is not performed.
- When a problem is detected in the Remote Support settings
- When the "Receiver E-Mail Address" (REMCS center) is not specified for the Remote Support
- The Remote Support is stopped

For details on the parameters for this function, refer to "A. Setup Log Sending Parameters" (page 1065).
For the factory default settings for this function, refer to "B. Setup Log Sending Parameters" (page 1265).

The procedure to send log is as follows:

■ Configure Automatic Log Transmission

The ETERNUS DX/AF sends log periodically or when an event occurs.

Procedure

1   Click [Setup Log Sending Parameters] in [Action].

2 Specify the parameters.
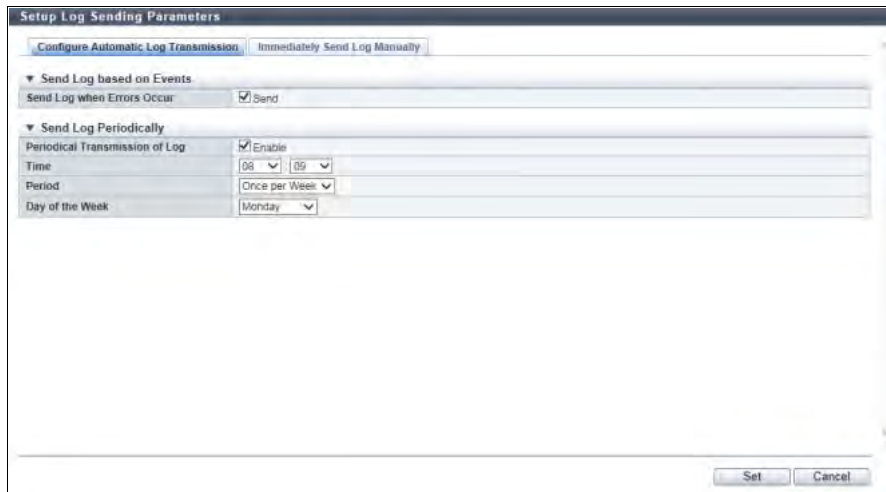
The main setting items are as follows.

● **Send Log based on Events**

• Send Log when Errors Occur

● **Send Log Periodically**

• Periodical Transmission of Log

• Time

• Period

• Day of the Week

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
→ The parameter settings of log transmission (Automatic Log Transmission) are updated in the storage system.

5 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

■ **Immediately Send Log Manually**

In this screen, send log manually and immediately.

Procedure

1 Click [Setup Log Sending Parameters] in [Action].

2 Click the [Immediately Send Log Manually] tab to change the screen.
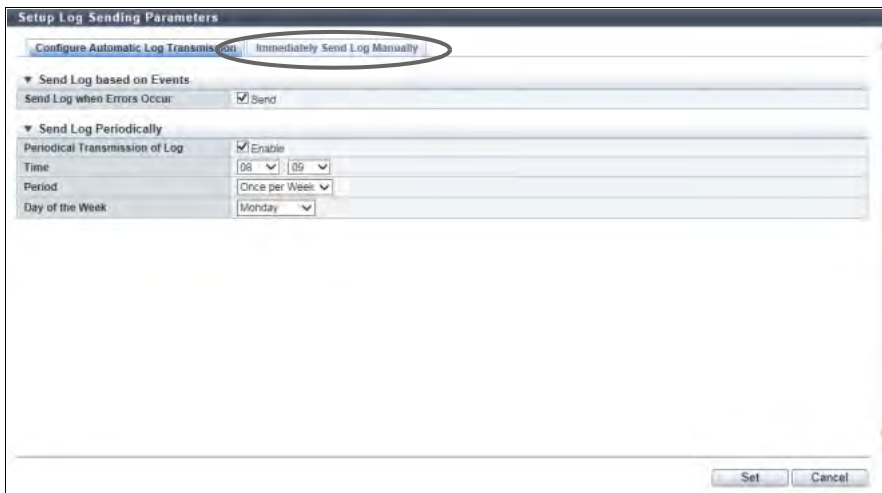
3 Specify the parameters.
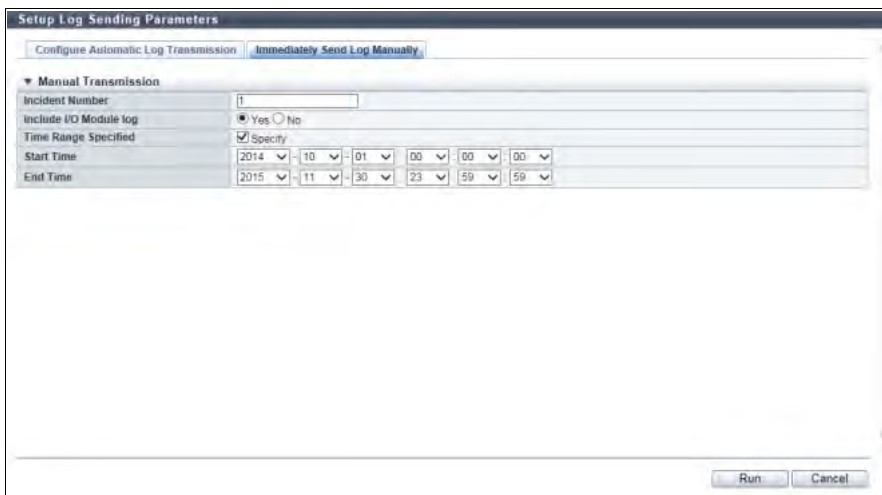
The main setting items are as follows.

● **Manual Transmission**

- Incident Number
- Include I/O Module log
- Time Range Specified
- Start Time
- End Time

4 Click the [Run] button.

5 A confirmation screen appears. Click the [OK] button.
→ Log transmission (Immediately Send Log Manually) is executed.

6 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

Stop/Restart Remote Support

This function temporarily stops the Remote Support function and starts again.
This function is used when the ETERNUS DX/AF is stopped for a prolonged period such as for relocation.
This function switches the support status from "Operating" to "Stopped" or from "Stopped" to "Operating". In "Stopped", all the Remote Support functions, such as automatic notification of the ETERNUS DX/AF errors to the REMCS center, are stopped.

> **Caution**
>
> - REMCS cannot be used when the AIS Connect function is being used. Disable the AIS Connect function, and then restart the remote support (REMCS). Refer to "Setup AIS Connect Environment" (page 209) for details.
> - If the settings in "Setup Remote Support" (page 198) has not been completed in advance, this function cannot be used.
> - This function is not available when the ETERNUS DX/AF is in "Maintenance Mode". The "Maintenance Mode" indicates that "Maintenance in Progress" is displayed as the Remote Support status.
> - The event of temporary stopping or restarting of the Remote Support function is transferred from the ETERNUS DX/AF to the REMCS center.

■ Stopping Remote Support

This function temporarily stops the Remote Support. The Remote Support can be stopped only when it is "Operating". The procedure to stop Remote Support is as follows:

Procedure

1 Click [Stop/Restart Remote Support] in [Action].
   → The current Remote Support status is displayed.

2 Click the [Stop] button.
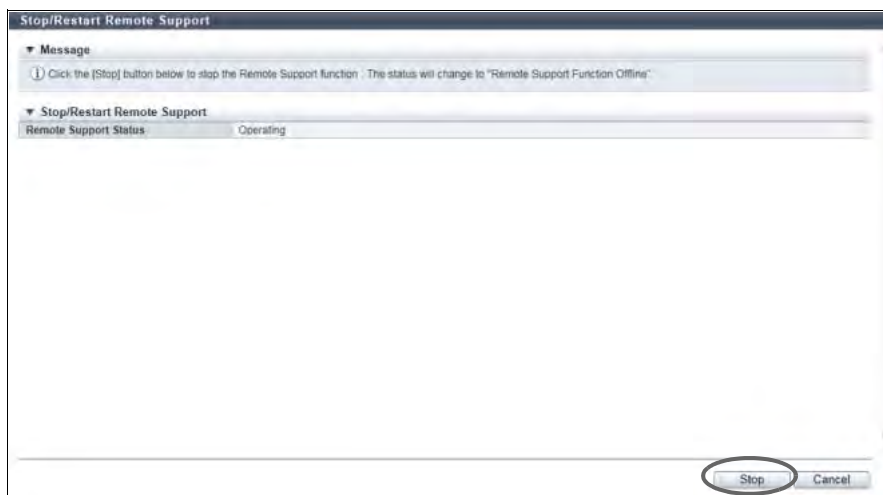
3 A confirmation screen appears. Click the [OK] button.
   → The Remote Support is stopped.

4 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

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■ Restarting Remote Support

This function restarts the Remote Support. The Remote Support can be restarted only when it is "Stopped". The procedure to restart Remote Support is as follows:

Procedure

1 Click [Stop/Restart Remote Support] in [Action].
→ The current Remote Support status is displayed.

2 Click the [Restart] button.
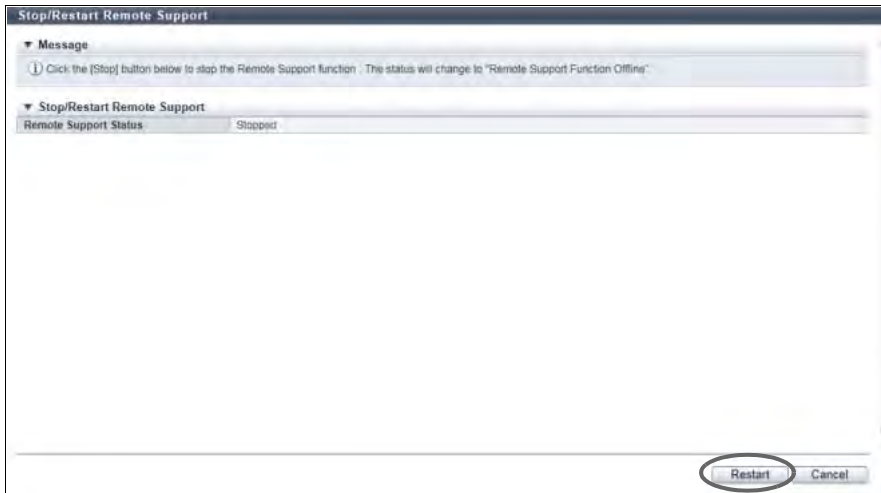
3 A confirmation screen appears. Click the [OK] button.
→ The Remote Support is restarted.

4 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

Remote Support Management (AIS Connect)

This section describes remote support management (by AIS Connect).
Remote support management (by AIS Connect) provides the following functions:

- Setup AIS Connect Environment
- Setup Remote Session Permission
- Send Log
- Test Server Connectivity
- Send AIS Connect Test Event
- Import Root Certificate

Setup AIS Connect Environment

This function sets up the basic information for AIS Connect.

> ▷ **Caution**

- AIS Connect is not available when REMCS is being used. Suspend REMCS and then enable AIS Connect. Refer to "Stop/Restart Remote Support" (page 207) for details (for regions other than EMEA).
- Before using AIS Connect, make sure to read the terms and conditions regarding the handling of personal information with extreme caution. To agree with the terms and conditions, click the [I agree] button. Agreement is required only once before setting "Country of Installation (Country Code : Country Name)".
- Note that setting parameters for AIS Connect is applied only when "Enable" is selected for "AIS Connect".

⬤ **N o t e**

Even if the "AIS Connect" setting is changed to "Disable", the basic AIS Connect information in the ETERNUS DX/AF is retained.

For details on the parameters for this function, refer to "A. Setup AIS Connect Environment" (page 1067).
For the factory default settings for this function, refer to "B. Setup AIS Connect Environment" (page 1265).

The procedure to set the AIS Connect information is as follows:

Procedure

1 Click [Setup AIS Connect Environment] in [Action].

2 Check the terms and conditions regarding the handling of personal information.

⬤ **N o t e**

- The terms and conditions regarding the handling of personal information are displayed only when "Country of Installation (Country Code : Country Name)" is not specified.
- To print the terms and conditions regarding the handling of personal information, click the [Print] button.

■ When the [I agree] button is clicked

→ The [Setup AIS Connect Environment] screen appears. Proceed to Step 3.

■ When the [I decline] button is clicked

→ Returns to the screen when starting this function in Step 1.

3 Specify the parameters.
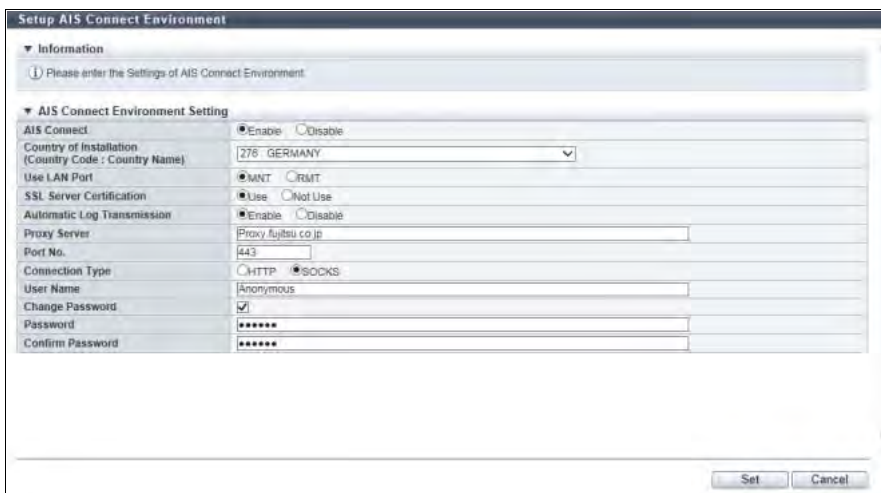
The main setting items are as follows.

● AIS Connect Environment Setting

- AIS Connect
- Country of Installation (Country Code : Country Name)
- Use LAN Port
- SSL Server Certification
- Automatic Log Transmission
- Proxy Server
- Port No.
- Connection Type
- User Name

- Change Password
- Password
- Confirm Password

▷ **Caution**

- If an error screen appears under the following conditions (when "Enable" is selected for the AIS Connect function and a proxy server is specified), check the parameter settings:
  - The specified "Proxy Server" does not satisfy the input conditions
  - The same IP address is specified for "Proxy Server" and the MNT port or the RMT port
  - The IP address for "Proxy Server" and the network address for the MNT port or the RMT port are the same
  - The IP address for "Proxy Server" and the broadcast address for the MNT port or the RMT port are the same
  - The same IP address is specified for "Proxy Server" and "AIS Connect Server"
- When "Enable" is selected for "AIS Connect" and "Country of Installation (Country Code : Country Name)" is not specified, an error screen appears. If this occurs, check the parameter settings.

4 Click the [Set] button.

5 A confirmation screen appears. Click the [OK] button.
   → AIS Connect setting starts.

6 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

Setup Remote Session Permission

This function performs permission settings for remote sessions with the AIS Connect function. If a remote session is permitted, remotely controlling the ETERNUS DX/AF from a remote server (AIS Connect server) becomes available.

▷ **Caution**

- Settings can be changed when "AIS Connect" is enabled. Refer to "Setup AIS Connect Environment" (page 209) for details.
- The permission setting of a remote session is released if one of the following conditions applies:
  - When a remote session is not detected before the timeout period that is specified for the timeout setting
  - When this function forbids remote sessions
  - When "AIS Connect" is disabled

◯ **N o t e**

- The permission settings are retained even if the ETERNUS DX/AF is rebooted or after recovery from a power failure. Note that the timer that monitors remote session connection is reset to "0"in this case.
- If the setting of this function is changed to forbid while a remote session is being performed, operations for this remote session are permitted until the user logs out. However, once this remote session is logged out from, this remote session cannot be logged into while the remote session is forbid.
- When "AIS Connect" is disabled, all remote sessions that are currently being performed are immediately disconnected.

For details on the parameters for this function, refer to "A. Setup Remote Session Permission" (page 1069).
For the factory default settings for this function, refer to "B. Setup Remote Session Permission" (page 1265).

The procedure to set the remote support permission is as follows:

> **Procedure**

1   Click [Setup Remote Session Permission] in [Action].

2   Specify the parameters.
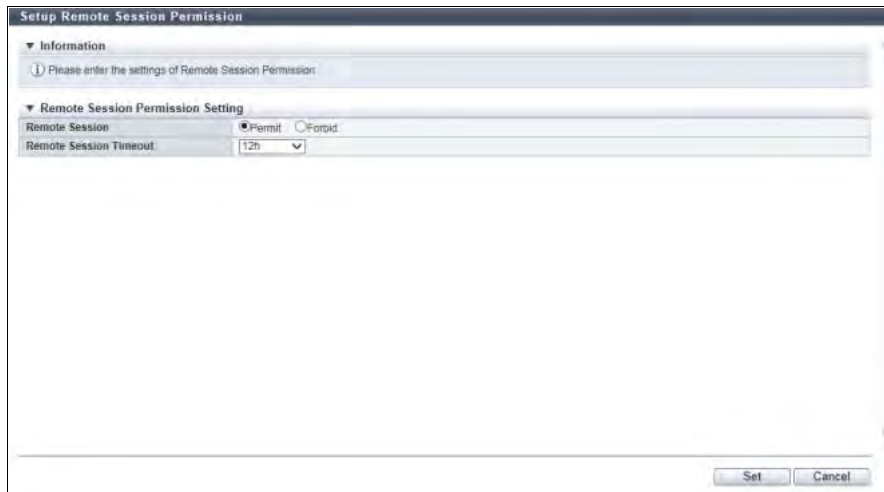
The main setting items are as follows.

● **Remote Session Permission Setting**

- • Remote Session
- • Remote Session Timeout

3   Click the [Set] button.

4   A confirmation screen appears. Click the [OK] button.
   → The permission settings for remote session are applied.

5   Click the [Done] button to return to the screen when starting this function in Step 1.

> **End of procedure**

Send Log

This function manually sends a storage system log to the remote server (AIS Connect server) when the AIS Connect function is in operation.

▷ **Caution**

- • Sending logs is only available when "AIS Connect" is enabled. Refer to "Setup AIS Connect Environment" (page 209) for details.
- • Check the connection to the AIS Connect server in advance. Refer to "Test Server Connectivity" (page 213) for details. If a communication error occurs and a connection to the AIS Connect server cannot be established, logs cannot be sent. A log that fails to be sent is not resent.
- • If a send log request is already performed once log collection is complete, send log requests are not performed.

● N o t e

This function collects logs (including I/O Module logs) at the time when performing the [Send Log] function. Log files are divided into 640MB increments and sent to the AIS Connect server.

The procedure to send log is as follows:

Procedure

1 Click [Send Log] in [Action].

2 A confirmation screen appears. Click the [OK] button.
    → Sending log starts.

3 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

Test Server Connectivity

This function checks the connection status between the ETERNUS DX/AF and a remote server (AIS Connect server).

▷ Caution

Checking the connection status is only available when "AIS Connect" is enabled. Refer to "Setup AIS Connect Environment" (page 209) for details.

● N o t e

This function checks the connection status of the AIS Connect server by using the AIS Connect information in the ETERNUS DX/AF. After performing the procedure in "Setup AIS Connect Environment" (page 209), use the [Test Server Connectivity] function to check the connection status.

The procedure to check the connection status between the ETERNUS DX/AF and the AIS Connect server is as follows:

Procedure

1 Click [Test Server Connectivity] in [Action].

2 A confirmation screen appears. Click the [OK] button.
    → Checking of the server connection status starts.

3 Click the [Done] button to return to the screen when starting this function in Step 1.

● N o t e

The check result of the server connection status is displayed in the [Test Server Connectivity Result] screen. If server connection fails, the cause of the error is displayed.

End of procedure

Send AIS Connect Test Event

This function sends a test event to the remote server (AIS Connect server).

▷ **Caution**

- Sending a test event is only available when "AIS Connect" is enabled. Refer to "Setup AIS Connect Environment" (page 209) for details.
- The [Send AIS Connect Test Event] function only sends an event. Note that this function cannot be used to check the network connection status between the ETERNUS DX/AF and the AIS Connect server. Use the [Test Server Connectivity] function to check the connection status. After checking the connection status, use the [Send AIS Connect Test Event] function to send a test event. Check the AIS Connect server to confirm that the event is successfully received.

The procedure to send a test event to the AIS Connect server is as follows:

Procedure

1 Click [Send AIS Connect Test Event] in [Action].

2 A confirmation screen appears. Click the [OK] button.
   → Sending of the AIS Connect test event starts.

3 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

Import Root Certificate

This function updates the root certificate that is used for SSL communication with the AIS Connect server.
A root certificate file includes multiple certificates. The maximum file size of a root certificate is 12288 byte.

▷ **Caution**

- A default root certificate is already registered in the ETERNUS DX/AF. Check the expiration date of the default root certificate from the [Root Certificate] screen. The root certificate must be updated before the expiration date. This function overwrites the root certificate. Only the latest root certificate is saved in the ETERNUS DX/AF.
- The root certificate cannot be updated when both the "AIS Connect" setting and the "SSL Server Certification" setting are enabled. To update the root certificate while the AIS Connect function is being used, temporarily disable the "AIS Connect" setting and then update the certificate. The current settings for "AIS Connect" and "SSL Server Certification" can be checked from the [AIS Connect] screen. Refer to "AIS Connect" (page 648) for details.

⬤ **N o t e**

- The root certificate is only used for authentication with the AIS Connect server.
- The expiration date of the updated root certificate can be checked from the [Root Certificate] screen. Refer to "Root Certificate" (page 650) for details.

For details on the parameters for this function, refer to "A. Import Root Certificate" (page 1070).

The procedure to updates the root certificate is as follows:

Procedure

1   Click [Import Root Certificate] in [Action].

2   Specify the root certificate file.
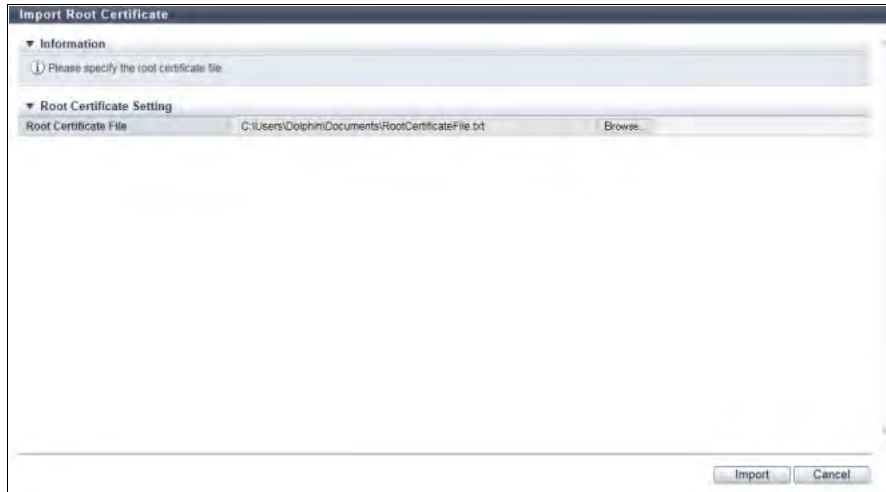
The main setting item is as follows.

● **Root Certificate Setting**

    • Root Certificate File

⊳ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
    • When the imported file is not "root certificate file"
    • When the imported file size exceeds 12288 bytes
    • When both the "AIS Connect" setting and "SSL Server Certification" setting are enabled

3   Click the [Import] button.

4   A confirmation screen appears. Click the [OK] button.
    → Updating of the root certificate starts.

5   Click the [Done] button to return to the [Root Certificate] screen.

End of procedure

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Firmware Management

This section describes audit firmware management.
The following functions are available with firmware management:
- Apply Controller Firmware
- Delete Controller Firmware Schedule

Apply Controller Firmware

This function registers and applies the controller firmware.
The applicable specifications are as follows:
- "Start/End Maintenance" operations are not required.
- Registration of the controller firmware is not required.
- Users can select whether to apply the controller firmware immediately or on a specific date.
- If the specific date option is selected, the date and time to apply the controller firmware can be selected.
- An online update or an offline update cannot be selected. If both of these update modes can be performed, an online update is performed.
- When an offline update is performed, the ETERNUS DX/AF is automatically rebooted.

▷ **Caution**

- If the current controller firmware is not registered in the BUD, this function cannot be used.
- Application of the controller firmware in the online mode may not be possible if the storage system status does not allow the firmware to be applied. Check the storage system status or contact a maintenance engineer.
- The ETERNUS DX/AF may be rebooted after the controller firmware is applied. Access from hosts is not possible while rebooting is in progress. Make sure to stop any access from hosts before applying controller firmware.
- If one of the following events occurs while the controller firmware application is being reserved or during in the specified application date, the reservation schedule is canceled automatically.
  - The ETERNUS DX/AF is rebooted
  - A power failure occurs
  - A system setting or a maintenance operation is performed on the specified application date

  Note that no message appears even if the reservation schedule for applying the controller firmware is canceled.
  If this occurs, the message that indicates that the controller firmware application has been reserved disappears from the system message field in the [Overview] screen and from the information field in the [Firmware Maintenance] screen. Refer to "Overview" (page 24) and "Firmware Maintenance" (page 661) for details.
- This function cannot be used under the following conditions:
  - The controller firmware is being registered
  - The controller firmware is being applied
  - The disk firmware is being registered
  - The disk firmware is being applied
  - Under maintenance works (firmware maintenance or hardware maintenance)
  - Encryption is being performed (online update is not available)
  - RAID Group Expansion (LDE) is being performed (online update is not available)
  - A RAID group diagnosis or a disk diagnosis is being performed (online update is not available)
  - Storage Migration is being performed (online update is not available)
  - Pinned data exists in the ETERNUS DX/AF (online update is not available)
  - The status of the batteries (for the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, the ETERNUS AF250 S2/AF650 S2, and the ETERNUS AF650) is not "Full Charge" (online update is not available)

- The status of the SCUs (the condenser for the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250, and the ETERNUS DX200F) is not "✅ Normal" (online update is not available)
- The system message "Currently Network Configuration is set to factory default." is displayed in the system message field (online update is not available) (*1)
  *1: The network environment settings must be performed. Refer to "Setup Network Environment" (page 114).
- REC sessions in the following conditions exist (online update is not available)
  - The blocked copy path is being used and the session status of this path is not "✅ Suspend" or "❌ Error Suspend"
  - The mirror status of the REC buffer that is being used is "Recovering" and the session status is not "✅ Suspend" or "❌ Error Suspend"
- REC sessions in which status is not "✅ Suspend" or "❌ Error Suspend" exist (offline update is not available)

• A controller firmware that is older than the current one can be applied. An older controller firmware is only applied to restore the controller firmware back to the previous version after applying the new one. Do not apply an older controller firmware for normal operation. Refer to "Required conditions when applying an older controller firmware" (page 223) for details.

◯ **N o t e**

If the application date is specified, the application schedule for the controller firmware can be deleted. Refer to "Delete Controller Firmware Schedule" (page 223) for details.

For details on the parameters for this function, refer to "A. Apply Controller Firmware" (page 1070).
For the factory default settings for this function, refer to "B. Apply Controller Firmware" (page 1266).

The procedure to apply controller firmware is as follows:

Procedure

1 Click [Apply Firmware] in [Action].

2 Select the controller firmware archive that is to be applied and the application date.
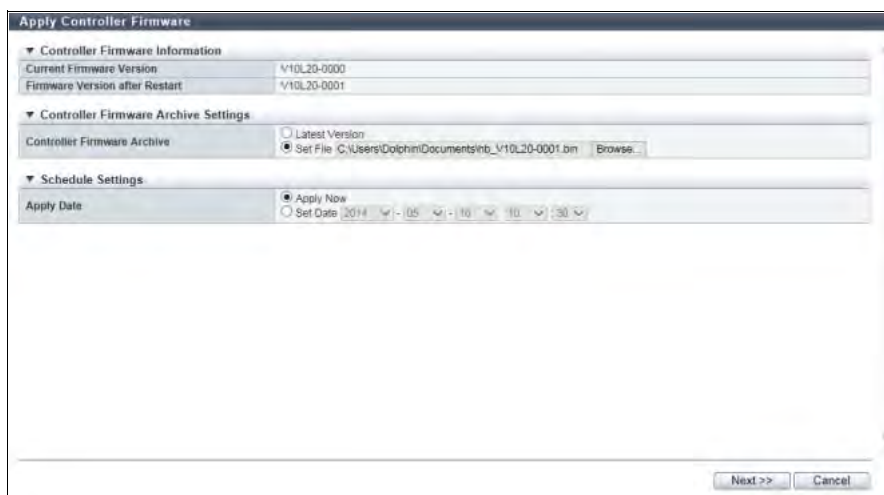
The main setting items are as follows.

● **Controller Firmware Archive Settings**

• Controller Firmware Archive

● **Schedule Settings**

   • Apply Date

3   Click the [Next >>] button.

4   A confirmation screen appears. Click the [OK] button.
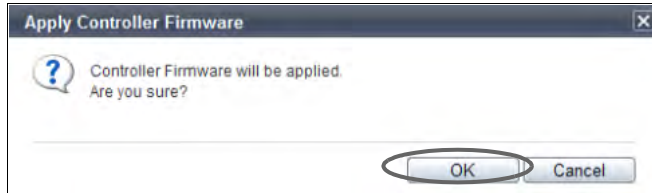
The screen that is displayed varies depending on the current controller firmware and the controller firmware that is to be applied.

■ When applying a controller firmware that is newer than the current controller firmware

The screen that is displayed varies depending on the selected apply date.
   • When "Apply Now" is selected
      → The [Apply (Immediate Apply)] screen appears. Proceed to Step 6.
   • When "Set Date" is selected
      → The [Apply (Specific Date)] screen appears. Proceed to Step 9.

■ When applying a controller firmware that is older than the current controller firmware

   → A confirmation screen to apply the older controller firmware appears.

5   Click the [OK] button.
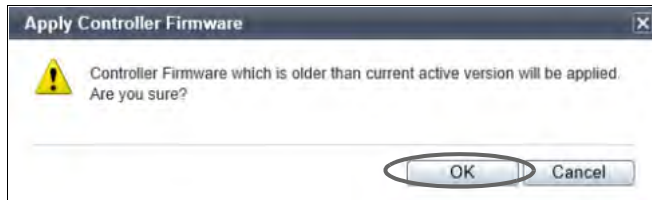
The screen that is displayed varies depending on the selected apply date.

■ When "Apply Now" is selected

   → The [Apply (Immediate Apply)] screen appears. Proceed to Step 6.

■ When "Set Date" is selected

   → The [Apply (Specific Date)] screen appears. Proceed to Step 9.

6   Check the controller firmware application information and the application mode.

■ When the application mode is "Update"
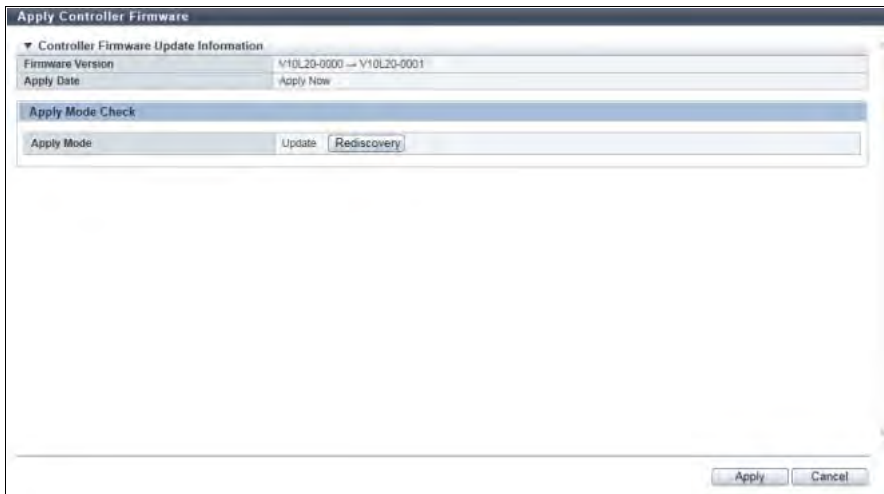
■ When the application mode is "Update" (for applying the older controller firmware)

■ When the application mode is "Update & Reboot"

■ When the application mode is "Update & Reboot" (for applying the older controller firmware)

The main setting items are as follows.

● **Apply Mode Check**

• Apply Mode

7 Click the [Apply] button.

▷ **Caution**

"Update" or "Update & Reboot" is displayed as the application mode. Which one is displayed depends on the storage system status. If "Update & Reboot" is displayed and the [Apply] button is clicked, the ETERNUS DX/AF automatically reboots after the controller firmware is applied.

🔵 **N o t e**

Click the [Rediscovery] button to display the latest information, the application mode, and the status check result.

8 A confirmation screen appears. Click the [OK] button.

▷ **Caution**

Never turn off the ETERNUS DX/AF while controller firmware is being applied. Wait until the application of the controller firmware is complete.

■ When the application mode is "Update"
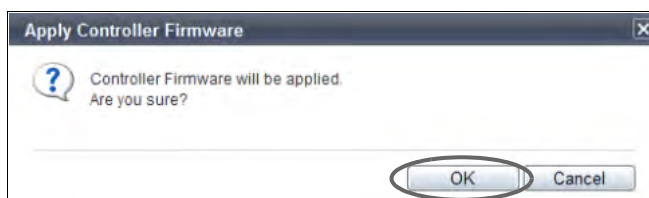
■ When the application mode is "Update & Reboot"

→ Application of the controller firmware starts.

9   Click the [Done] button to return to the [Firmware Maintenance] screen.

■ When "Apply Now" is selected

• When the application mode is "Update"
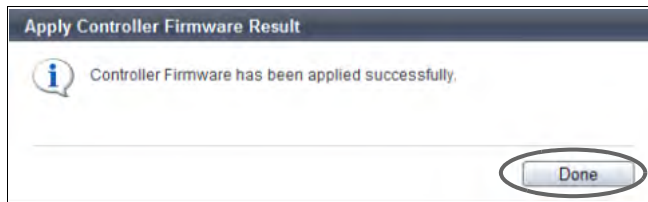
• When the application mode is "Update & Reboot"

■ When "Set Date" is selected

• When the application mode is "Update"
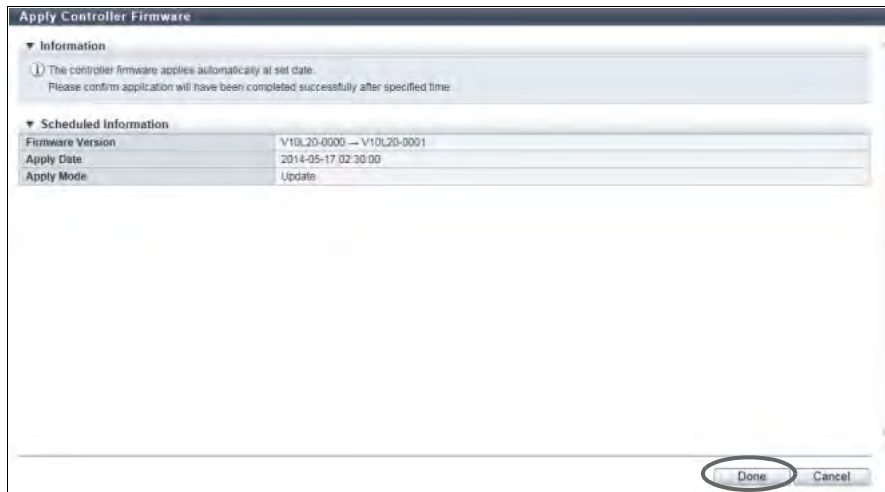
• When the application mode is "Update" (for applying the older controller firmware)

• When the application mode is "Update & Reboot"
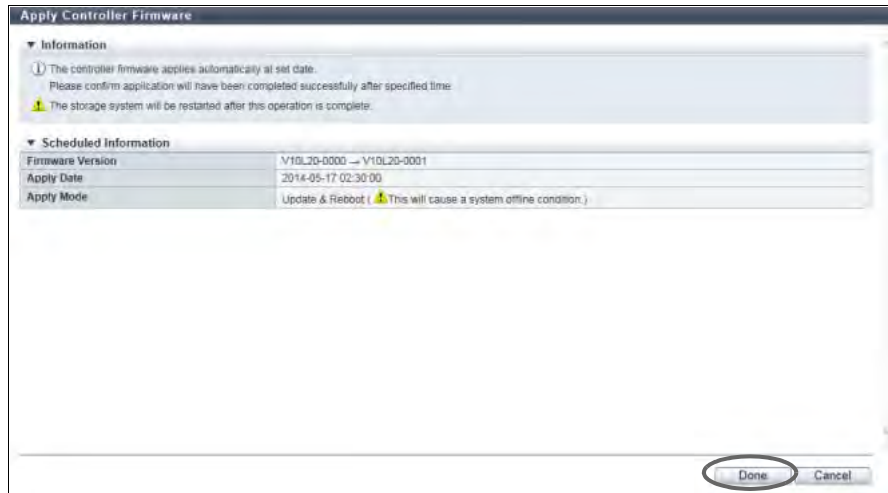
• When the application mode is "Update & Reboot" (for applying the older controller firmware)
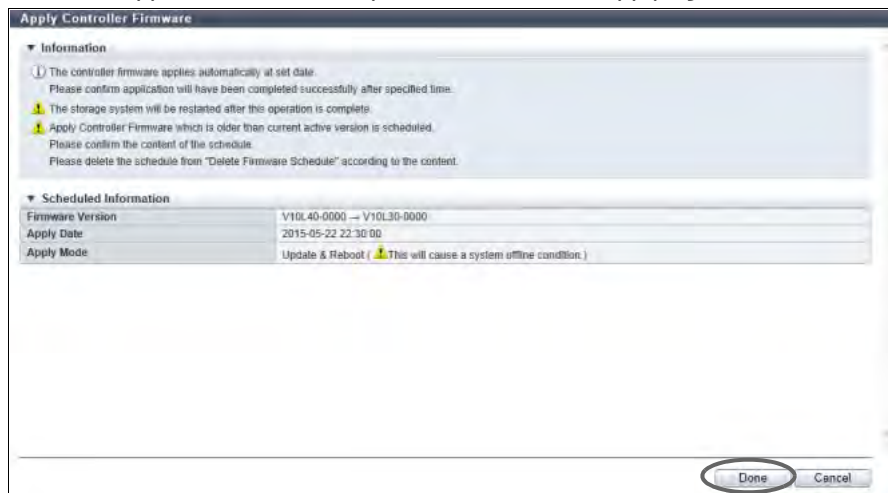
End of procedure

Required conditions when applying an older controller firmware

- The following conditions must be satisfied when applying an older controller firmware.
  - To apply the older controller firmware, the current controller firmware for the ETERNUS DX/AF must be V10L4x or later.
  - The functions that were provided by the newer controller firmware must not be used.
    If these functions are used, delete all the related data.
  - The controller firmware that is to be applied must be one of the following versions (online update is available).
    - The dedicated controller firmware for SAN must be V10L30-0000 or later
    - The unified firmware (*1) must be V10L33-0000 or later
      - *1: Controller firmware with built-in Unified Storage functions.
  - For SAN systems, firmware downgrades are supported only for SAN dedicated controller firmware.
  - For Unified Storage systems, firmware downgrades are supported only for the unified firmware.
- Application of an older controller firmware may not be possible depending on the customer's environment that does not allow the controller firmware to be applied.

Delete Controller Firmware Schedule

This function deletes the application schedule for the controller firmware.

▷ **Caution**

If any of the following conditions occur, the reservation for deleting the schedule is automatically canceled.
- The application schedule for the controller firmware is reserved
  - Rebooting of the ETERNUS DX/AF
  - Power failure or power recovery
  - Machine down recovery
  - The system time in the ETERNUS DX/AF is changed to a time that is later than the reserved time
- Start time to apply the controller firmware
  - Other users perform system settings
  - Pinned data exists in the ETERNUS DX/AF
- The start time to apply controller firmware (when the application mode is "Update")
  - The storage system is not in normal status
  - The battery status is not "Full Charge"
  - REC sessions with the following conditions appear
    - A blocked copy path is being used and the session status is not "Suspend" or "Error Suspend"
    - The mirror status of the REC buffer that is being used is "Recovering" and the session status is not " Suspend" or " Error Suspend"
  - A storage migration path exists
  - RAID Group Expansion (LDE) is being used
  - A volume is being encrypted

🔵 **N o t e**

- When the application schedule for the controller firmware is specified, the start time is displayed in the information field. Refer to "Firmware Maintenance" (page 661) for details.
- When controller firmware is applied, the application schedule can be set. Refer to "Apply Controller Firmware" (page 216) for details.

The procedure to delete the application schedule for controller firmware is as follows:

Procedure

1 Click [Delete Firmware Schedule] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ Deletion of the application schedule for the controller firmware starts.

3 Click the [Done] button to return to the [Firmware Maintenance] screen.

End of procedure

2. Component Management

This chapter describes component management.

When using functions in the Action area, select the desired function from the Action area that is displayed in the status display screen.
The functions in the Action area for Component can be performed from the following display functions:

Functions in the Action area for Component	Display function
Assign Global Hot Spare	• Drives
Release Global Hot Spare	
Assign Dedicated Hot Spare	
Release Dedicated Hot Spare	
Turn on Locator Beacon/Turn off Locator Beacon	• Controller Enclosure
Add Drive Enclosure	• Drive Enclosure
Add Channel Adapter Port	• Channel Adapter
NAS Recovery Management	–
Force Enable Module	• Controller Module
Recover NAS System Volume	
Export Performance Information	• Controller Module (Performance)
	• Channel Adapter Ports (Performance)
	• Drives (Performance)
Clear Drive Error Statistics (All Drives)	• Drive Error Statistics
Clear Drive Error Statistics (Selected Drive)	

Assign Global Hot Spare

This function registers a drive as a Global Hot Spare.
A Global Hot Spare is a spare drive (hot spare) that is registered in the RAID group instead of the failed drive when a drive failure occurs. A Global Hot Spare, unlike a Dedicated Hot Spare, can be used by all of the RAID groups.
If a drive fails, data copy (rebuild) to a Global Hot Spare starts automatically. The processes to be performed when a drive fails vary depending on whether the copybackless function is enabled or disabled. Refer to "Behavior of the ETERNUS DX/AF depending on the status of the Copybackless function" (page 226) for details.

Requirements for hot spares

- Drives must satisfy the following conditions.
    - The drive status is " Present"
    - The drives are not registered in any RAID group, TPP, FTRP, REC Disk Buffer, or EXCP
- Make sure to register a hot spare with the same or a larger capacity than the data drives. If the hot spare capacity is smaller than the data drive, the drive does not work as the hot spare.
- When a mix of Online disks, Nearline disks, SSDs, Online SEDs, Nearline SEDs, and SSD SEDs is installed together in the ETERNUS DX/AF, a hot spare of each type is required. Register the hot spare with the same capacity as the maximum capacity drive for each type.
- When multiple types of SSDs (SSD-M/SSD-L/SSD-M SED/SSD-L SED) are installed together in the ETERNUS DX/AF, a hot spare for each type is required. Register the hot spare with the same capacity as the maximum capacity SSD for each type.
- Hot spares can be registered in any slots of the CEs (*1) and the DEs.
    - *1: Hot spares can be registered in CEs for the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/ DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F.

> ▷ **Caution**

To use hot spares on a priority basis, make sure to register the Dedicated Hot Spare for a RAID group that contains important data. Refer to "Assign Dedicated Hot Spare" (page 229) for details.

> ● **N o t e**

- If the Dedicated Hot Spare is registered for a RAID group to which a failed drive belongs, the Dedicated Hot Spare is used before the Global Hot Spare. If there is no unused Dedicated Hot Spare and the drive fails, the Global Hot Spare is used.
- Depending on the hot spare usage status, a hot spare with a different capacity and type from the failed drive may be used.

Behavior of the ETERNUS DX/AF depending on the status of the Copybackless function

If the Copybackless function (*1) is enabled, the hot spare is registered in the RAID group after rebuilding and is used as a data drive. The failed drive in the RAID group is changed to a hot spare after the rebuilding is complete. If the failed drive is replaced with a normal drive, the replacement drive can be used as a hot spare.
If the Copybackless function is disabled and the failed drive is replaced with a normal drive, the data is copied back to the replacement drive. The hot spare that is used instead of the failed drive then returns as a spare drive.
To use the Copybackless function, the rebuild destination hot spare must satisfy some conditions. Refer to "Setup Subsystem Parameters" (page 65) for details.

*1: "Copybackless" is a function that mounts a hot spare in the RAID group instead of the failed drive. The replaced drive is then used as a hot spare. This function makes Copyback unnecessary.

The procedure to register a Global Hot Spare is as follows:

Procedure

1 Select a drive that is to be used as a Global Hot Spare (multiple selections can be made) and click [Assign Global HS] in [Action].

2 A confirmation screen appears. Click the [OK] button.
   → Registration of the Global Hot Spare starts.

3 Click the [Done] button to return to the [Drives] screen.

End of procedure

Release Global Hot Spare

This function releases a drive from being a Global Hot Spare.
A drive that is released from being a Global Hot Spare can be used as a data drive or Dedicated Hot Spare for a different RAID group.

▷ **Caution**

This function cannot be used when the drive is already used as a hot spare.

The procedure to release a Global Hot Spare is as follows:

Procedure

1 Select a drive (multiple selections can be made) that is to be released from being a Global Hot Spare and click [Release Global HS] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ Releasing of the Global Hot Spare starts.

3 Click the [Done] button to return to the [Drives] screen.

End of procedure

Assign Dedicated Hot Spare

This function registers a drive as a Dedicated Hot Spare for a RAID group.
A Dedicated Hot Spare is a spare drive (hot spare) that is registered in the RAID group instead of the failed drive when a drive failure occurs. A Dedicated Hot Spare, unlike a Global Hot Spare, is used only for the specific RAID group.
If a drive fails, data copy (rebuild) to a Dedicated Hot Spare starts automatically.
Refer to "Requirements for hot spares" (page 226) for details about drives to be used as hot spares.

▷ **Caution**

- Only one RAID group can be registered for each Dedicated Hot Spare. A Dedicated Hot Spare cannot be registered to multiple RAID groups.
- The Dedicated Hot Spares cannot be registered in the following RAID groups.
  - RAID groups that belong to TPPs
  - RAID groups that belong to Flexible Tier Sub Pools (FTSPs)
  - RAID groups that are registered as REC Disk Buffers
  - RAID groups that are registered as EXCPs

N o t e

- When the failed drive and the Dedicated Hot Spare are switched, a Dedicated Hot Spare with the same capacity as the failed drive is used on a priority basis. If there is no Dedicated Hot Spare with the same capacity, a Dedicated Hot Spare with a larger capacity than the failed drive is used.
- If the Dedicated Hot Spare is registered for a RAID group to which a failed drive belongs, the Dedicated Hot Spare is used before the Global Hot Spare. If there is no unused Dedicated Hot Spare and the drive fails, the Global Hot Spare is used.
- The behavior of the ETERNUS DX/AF varies depending on whether the Copybackless function is enabled or disabled. Refer to "Behavior of the ETERNUS DX/AF depending on the status of the Copybackless function" (page 226) for details.

The procedure to register a Dedicated Hot Spare is as follows:

Procedure

1 Select a drive (multiple selections can be made) that is to be used as a Dedicated Hot Spare and click [Assign Dedicated HS] in [Action].

N o t e

Select the same type of drives that configure the target RAID group. If multiple types of drives are selected, the [Assign Dedicated HS] is not available.
When SSDs are used to configure the target RAID group, the type of SSD can be checked from the [RAID Group Detail] screen. Refer to "RAID Group Detail (Drives)" (page 888) for details.

2   Select which RAID group to use the selected drive as a Dedicated Hot Spare for and click the [Assign] button.
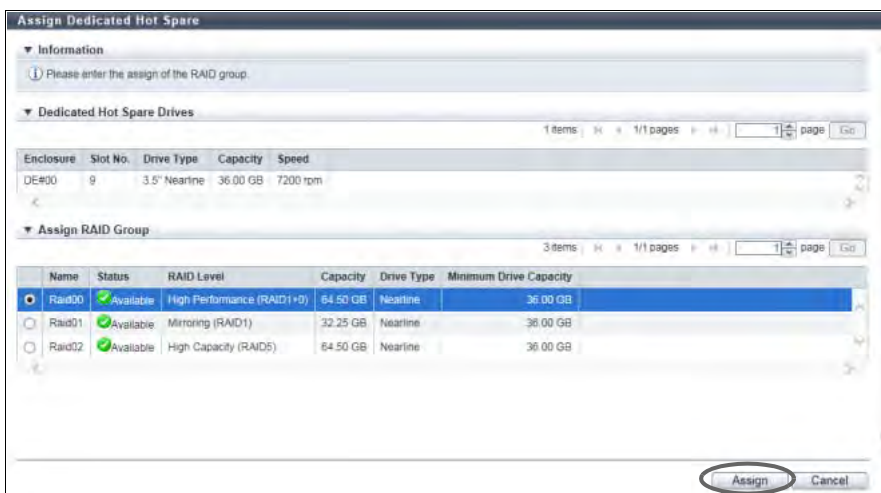
⬤ **N o t e**

For "Drive Type" in the "Assign RAID Group" field, the drive type registered in the RAID group is displayed. If multiple drive types are used in the ETERNUS DX/AF, the drive type is displayed as described below.

- If only "Online" type drives are used or if both "Online" and "Nearline" type drives are used, "Online" is displayed.
- If only "Online SED" type drives are used or if both "Online SED" and "Nearline SED" type drives are used, "Online SED" is displayed.
- "SSD" is displayed regardless of the actual SSD type (SSD-M/SSD-L/SSD).
- "SSD SED" is displayed regardless of the actual SSD type (SSD-M SED/SSD-L SED).

3   A confirmation screen appears. Click the [OK] button.

→   Registration of the Dedicated Hot Spare starts.

4   Click the [Done] button to return to the [Drives] screen.

                                                                                    End of procedure

Release Dedicated Hot Spare

This function releases a drive from being a Dedicated Hot Spare.
A drive that is released from being a Dedicated Hot Spare can be used as a data drive, Global Hot Spare, or Dedicated Hot Spare for a different RAID group.

▷ **Caution**

This function cannot be used when the drive is already used as a hot spare.

The procedure to release a Dedicated Hot Spare is as follows:

Procedure

1	Select a drive (multiple selections can be made) that is to be released from being a Dedicated Hot Spare and click [Release Dedicated HS] in [Action].

2	A confirmation screen appears. Click the [OK] button.
	→	Releasing of the Dedicated Hot Spare starts.

3	Click the [Done] button to return to the [Drives] screen.

End of procedure

Turn on Locator Beacon/Turn off Locator Beacon

This function blinks or turns off the locator beacon of CE, CM, DE, or Frontend Enclosure (FE) (for the ETERNUS DX8700 S3/DX8900 S3) to identify the component that requires maintenance.
In regards to the CE, DE, or FE, when instructing the LEDs to turn on/turn off, the following "IDENTIFY LED" lamps will blink/turn off.

Controlled LEDs

Designated target component		LED controlled target component
CE		The front cover of the CE
		The CM in the rear of the CE (CM#0, CM#1)
DE	2.5" DE 3.5" DE	The front cover of the DE
		The IOM in the rear of the DE (IOM#0, IOM#1)
	3.5" high density DE	The front cover of the DE
		The IOM in the rear of the DE (IOM#0, IOM#1)
		The FEM in the rear of the DE (FEM#0, FEM#1)
FE		The front cover of the FE
		The FRT in the rear of the FE (FRT#0 - FRT#3)

> **◉ N o t e**
>
> - When the LEDs in the CE are instructed to turn on/off, the LEDs on the front cover of the CE and the LEDs for the CM on the rear of the CE are blinked/turned off. Note that the option to turn on/off the LEDs for a specific component is not available. Instructing the CE LEDs to turn on/off is performed by using the [Controller Enclosure Detail] screen. Refer to "Controller Enclosure Detail" (page 710) for details.
> - When the LEDs in the DE are instructed to turn on/off, the LEDs on the front cover of the DE, the IOM LEDs on the rear of the DE, and the FEMs on the rear of the DE (high density DE only) are blinked/turned off. Note that the option to turn on/off the LEDs for a specific component is not available. Instructing the DE LEDs to turn on/off is performed by using the [Drive Enclosure Detail] screen. Refer to "Drive Enclosure Detail" (page 738) for details.
> - When the LEDs in the FE are instructed to turn on/off, the LEDs on the front cover of the FE and the LEDs for the FRT on the rear of the FE are blinked/turned off. Note that the option to turn on/off the LEDs for a specific component is not available. Instructing the FE LEDs to turn on/off is performed by using the [Frontend Enclosure] screen. Refer to "Frontend Enclosure" (page 696) for details.
> - Turning the LED of the drive on or off is instructed from ETERNUS CLI. Refer to "set led" in the "ETERNUS CLI User's Guide" for details.

■ Turning on the LED

The procedure to turn on an LED is as follows:

Procedure

1 Click [Turn on locator beacon] in [Action].

> **▶ Caution**
>
> If the LED is already turned on, [Turn on locator beacon] cannot be selected.

2   A confirmation screen appears. Click the [OK] button.
→ The locator beacon is turned on.

3   Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

■ Turning off the LED

The procedure to turn off an LED is as follows:

Procedure

1   Click [Turn off locator beacon] in [Action].

▶ **Caution**

If the LED is already turned off, [Turn off locator beacon] cannot be selected.

2   A confirmation screen appears. Click the [OK] button.
→ The locator beacon is turned off.

3   Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

Add Drive Enclosure

When hot expansion is performed, DEs are added without stopping the ETERNUS DX/AF.
Use ETERNUS Web GUI to install any DEs that are added.

> ▷ **Caution**
>
> - When logged in using a user account with the "Admin" default role, this function is available with the ETER-NUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, and the ETERNUS AF250. To use this function with the other models, a user account with the "Maintainer" default role (or "Maintenance Operation" policy) is required.
> - When DE hot expansion is performed, multiple DEs can be added with a single operation.
> - 2.5" DEs, 3.5" DEs, and 3.5" high density DEs can be added to the same ETERNUS DX. Note that 3.5" high den-sity DEs cannot be added to the ETERNUS DX60 S4/DX60 S3.
> - For the ETERNUS AF250 S2/AF250, only 2.5" DEs can be added. Note that 3.5" DEs and 3.5" high density DEs cannot be added.
> - Be sure to use authorized expansion parts. If parts other than the expansion parts are used, operation is not guaranteed.
> - This function cannot be used under the following conditions:
>   - The general status of the ETERNUS DX/AF is not "Normal"
>   - The maximum number of DEs for each model is already installed (and the status of the following DEs is "✅ Normal")
>   - For the ETERNUS DX60 S4/DX60 S3, DE#03
>   - For the ETERNUS DX100 S4/DX100 S3, DE#05
>   - For the ETERNUS DX200 S4/DX200 S3, DE#0A
>   - For the ETERNUS AF250 S2/AF250, DE#01

> 🔵 **N o t e**
>
> DEs can be added regardless of whether drives are installed or not.

For details on the parameters for this function, refer to .

The procedure to expand a DE is as follows:

Procedure

1 Click [Add Drive Enclosure] in [Action].
→ The start screen appears.

2   Specify the parameters.
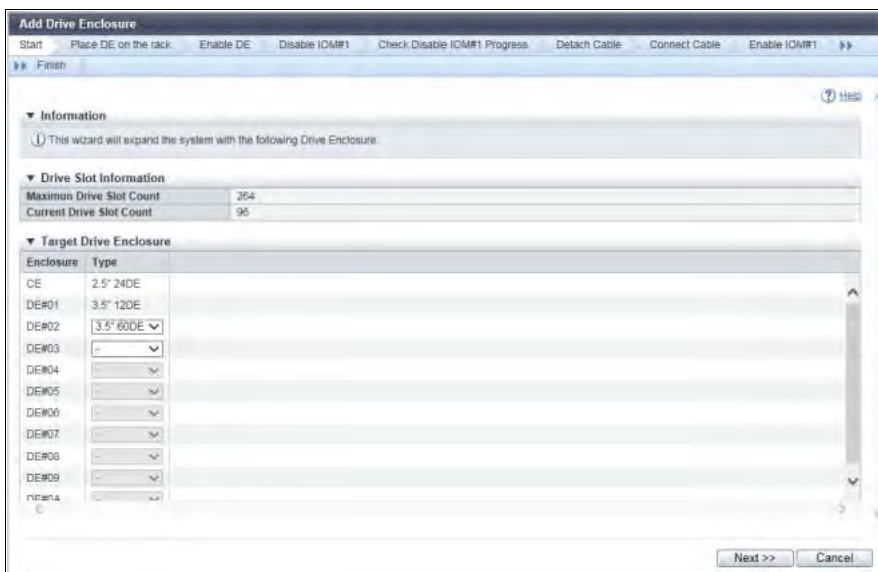
The main setting item is as follows.

● **Target Drive Enclosure**

  • Type

3   Click the [Next >>] button.
     →   The [Place DE on the rack] screen appears.

4   Add the DE according to the installation procedure and click the [Next >>] button.

     →   The [Enable DE] screen appears.

5   After the DEs are activated, isolate IOM#1.
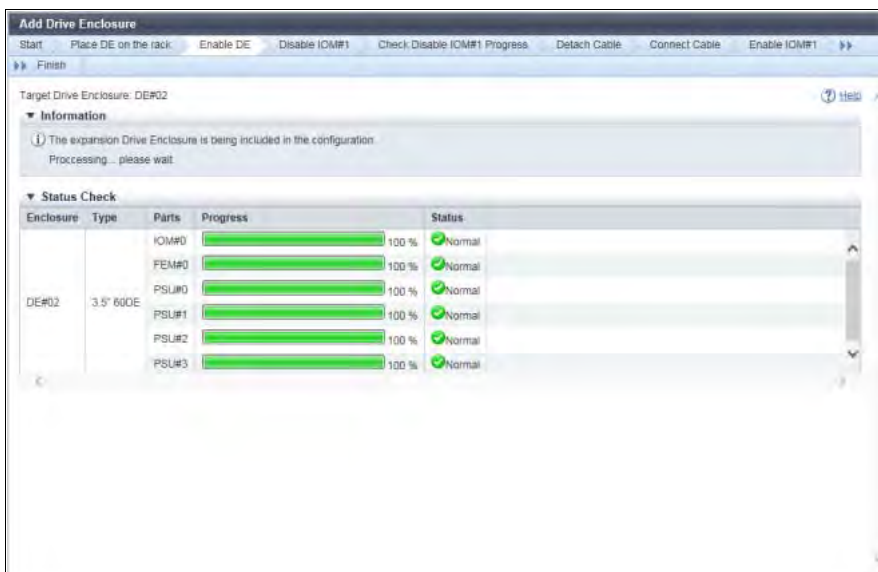
→   The [Disable IOM#1] screen appears.

6   Check the status of the target components and then click the [Next >>] button.
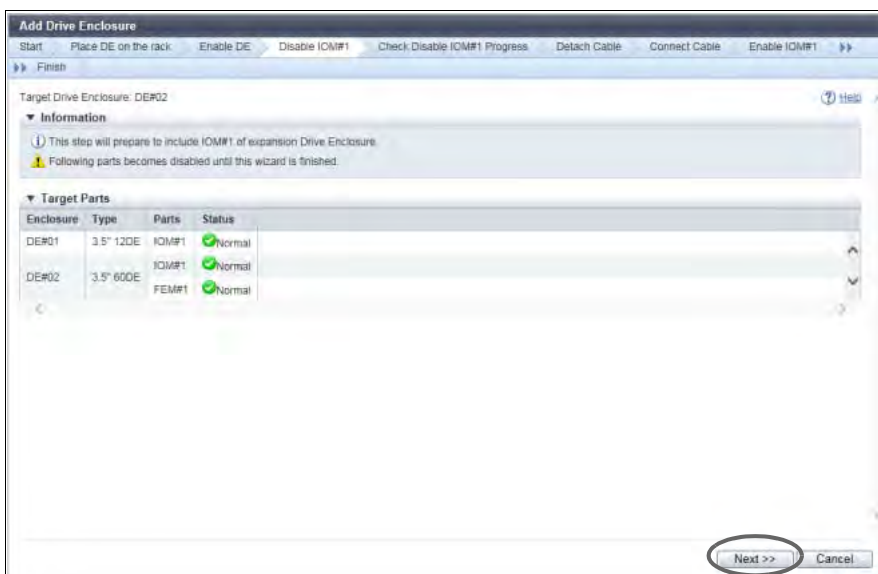
→   The [Check Disable IOM#1 Progress] screen appears.

7 After IOM#1 is isolated, disconnect the SAS cables.
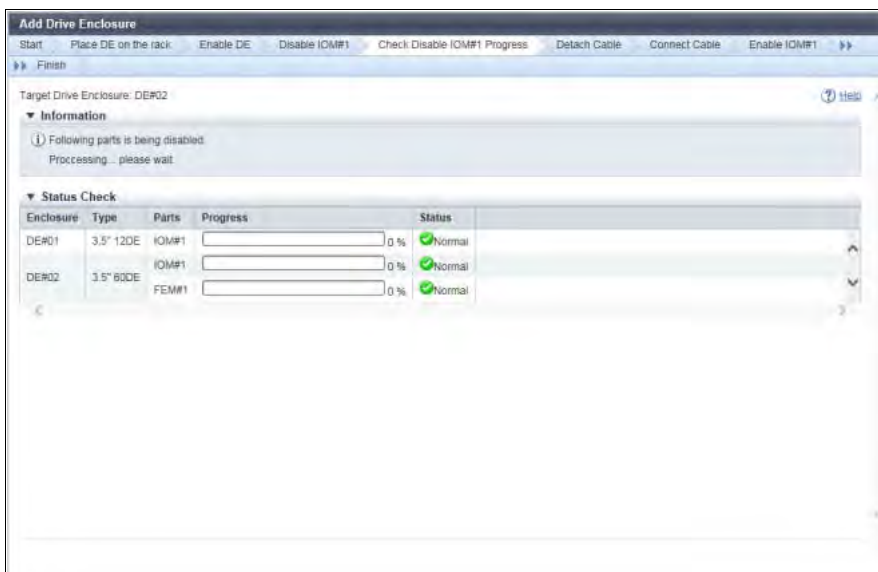
→ The [Detach Cable] screen appears.

8 Disconnect the SAS cables by following the disconnection procedure and then click the [Next >>] button.

→ The [Connect Cable] screen appears.

9 Connect the SAS cables by following the connection procedure and then click the [Next >>] button.
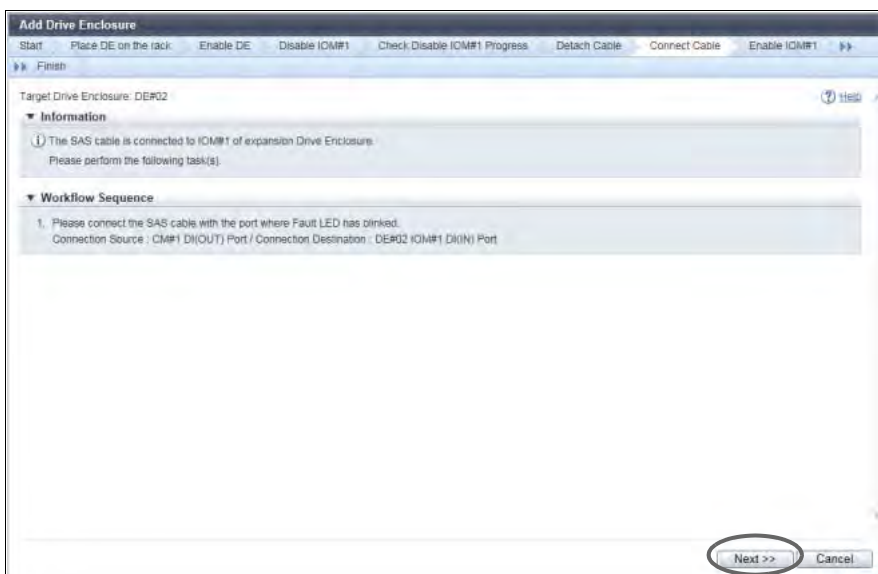
→ The [Enable IOM#1] screen appears.

10 Activate the IOM#1 according to the installation procedure and click the [Next >>] button.
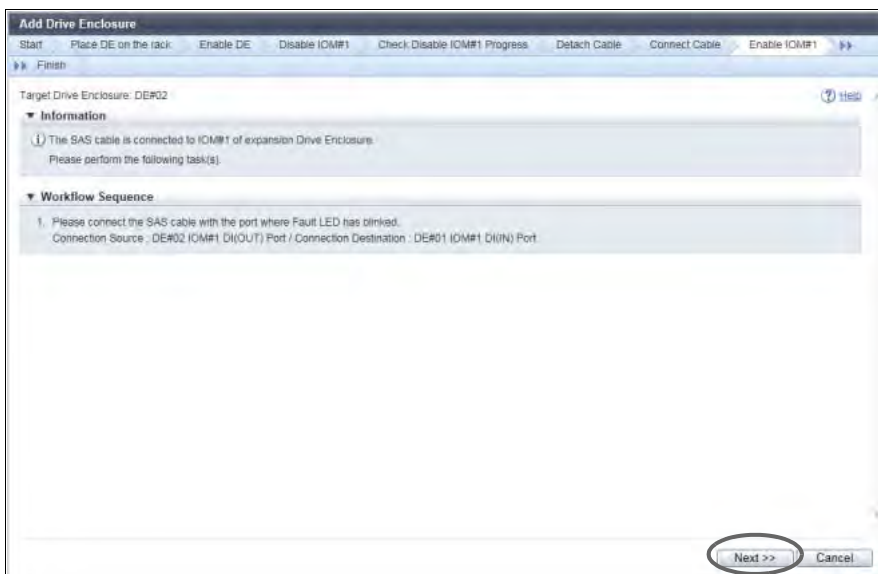
→ The [Finish] screen appears.

11 Click the [Done] button to return to the [Drive Enclosure] screen.

End of procedure

Add Channel Adapter Port

This function enables a CA port to be added without stopping the ETERNUS DX100 S3.

> ▷ **Caution**
>
> - CA ports can be added for FC, iSCSI, SAS, FCoE, or NAS host interfaces.
> - This function cannot be used under the following conditions:
>   - The general status of the ETERNUS DX100 S3 is not "Normal"
>   - The minimum port type CA (*1) is not installed in the ETERNUS DX100 S3
>   - *1: CAs with the minimum number of ports that can be installed in the ETERNUS DX60 S4/DX100 S4 and the ETERNUS DX60 S3/DX100 S3. 1-port types and 2-port types are available.

> ⬤ **N o t e**
>
> - This function is available when the ETERNUS DX60 S4/DX100 S4 and the ETERNUS DX60 S3/DX100 S3 has a minimum port type CA. Input the license key for each host interface with the minimum port type, and then add the port.
> - The following examples explain how the minimum port type CAs are displayed. Refer to <u>"Channel Adapter" (page 685)</u> and <u>"Channel Adapter Detail" (page 722)</u> for details.
>   - For 1-port type
>   "2port" is displayed as the port type in the [Channel Adapter] screen. However, only one port is displayed in the [Internal Parts] tab of the [Channel Adapter Detail] screen.
>   - For 2-port type
>   "4port" is displayed as the port type in the [Channel Adapter] screen. However, only two ports are displayed in the [Internal Parts] tab of the [Channel Adapter Detail] screen.

For details on the parameters for this function, refer to <u>"A. Add Channel Adapter Port" (page 1072)</u>.

The procedure to add a CA port is as follows:

Procedure

1 Click [Add Channel Adapter Port] in [Action].
→ The [Start] screen appears.

2 Click the [Next >>] button.
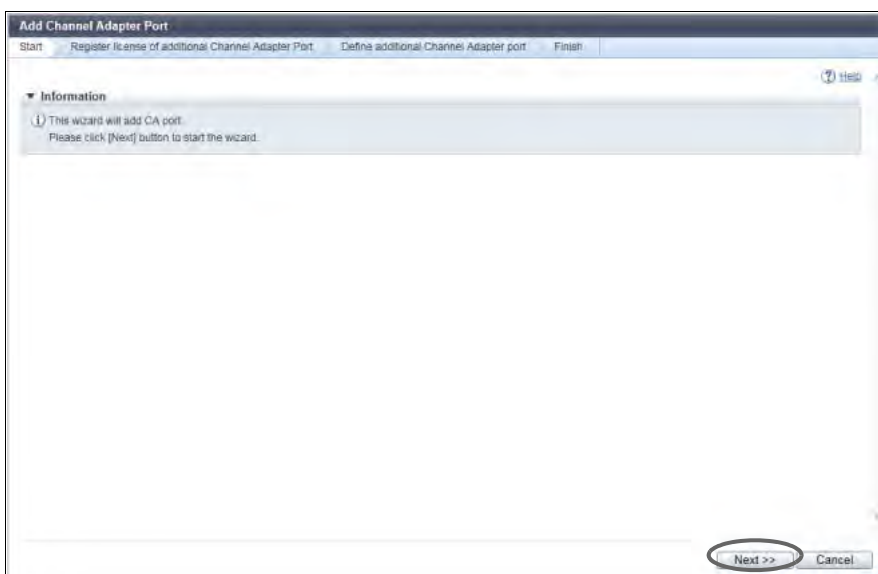
The displayed screen may vary depending on whether the installation of license key is required or not.

■ When the license key is not registered

→ The [Register license of additional Channel Adapter Port] screen appears. Proceed to Step 3.

■ When the license key is already registered

→ The [Define additional Channel Adapter port] screen appears. Proceed to Step 5.

3 Input the license key.
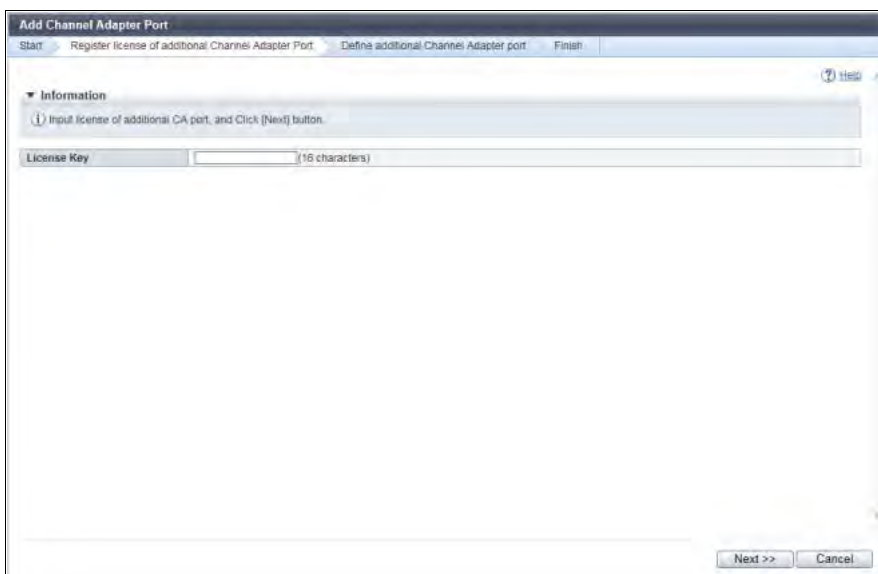
The main setting item is as follows.

● **License Key**

• License Key

4 Click the [Next >>] button.

→ The [Register license of additional Channel Adapter Port] screen appears. The [Define additional Channel Adapter port] screen appears after the registration of the license key is complete.

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5   Add the CA port according to the displayed procedure and click the [Next >>] button.
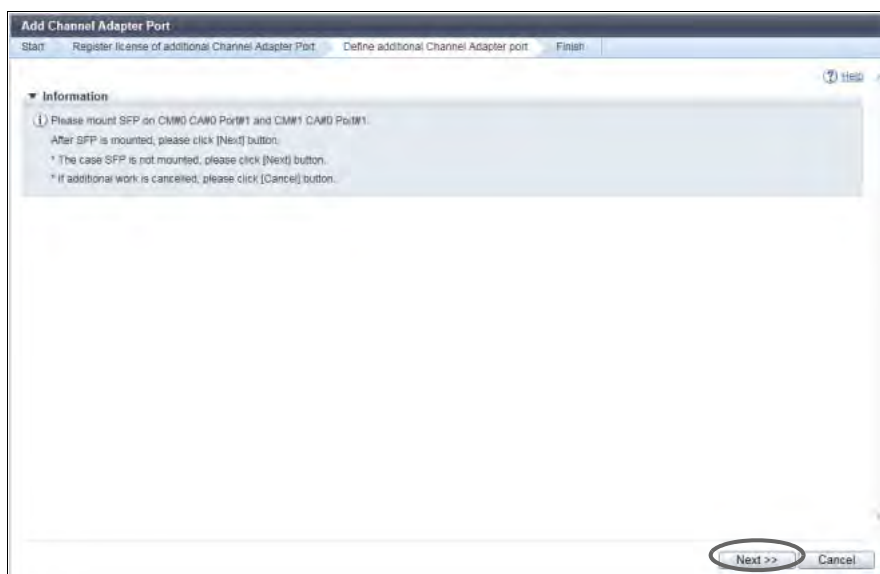
The operations and displayed screen vary depending on the host interface type that is used.

■   For FC, FCoE, 10G iSCSI, or 10G-NAS host interface:

→   The installation of SFP starts and the [Check SFP Installation] screen appears. After the installation of the SFP is complete (when the CA includes an SFP), the installation of the CA port starts and the [Status Check] screen appears. After the installation of the CA port is complete, the [Finish] screen appears.

■   For 1G iSCSI, SAS, or 1G-NAS host interface:

→   The CA port installation starts and the [Status Check] screen appears. After the installation is complete, the [Finish] screen appears.

6   Click the [Done] button to return to the [Channel Adapter] screen.

End of procedure

NAS Recovery Management

This section describes NAS recovery management.

NAS recovery management provides the following functions:

- Force Enable Module
- Recover NAS System Volume

Force Enable Module

This function forces the component to be enabled without replacing it (called "force enable" hereinafter).

▷ **Caution**

- Perform the force enable of the NAS Engine by following the instructions given by a maintenance engineer.
- Force enable can be performed only on one component at a time.
- This function cannot be used when a component whose state is other than "❌ Error" is selected.

🔵 **N o t e**

This function is available for "NAS-CA" and "NAS Engine".

The procedure to perform force enable is as follows:

Procedure

1 Select the component to perform the force enable on, and click [Force Enable] in [Action].

2 A confirmation screen appears. Click the [OK] button.
  → The force enable starts.

3 Click the [Done] button to return to the screen when the target component was selected in Step 1.

End of procedure

Recover NAS System Volume

This function recovers the NAS system volumes (RootFS) that are used by the target NAS Engine and forcibly enables the NAS Engine.
A "RootFS" is a volume that stores the root file system of the NAS Engine in each CM. If a malfunction occurs in the NAS Engine due to an inconsistency between the both RootFSs, use this function to recover the RootFS and forcibly enable the NAS Engine again.
This function is displayed in a Unified Storage environment.

▷ **Caution**

- Execute this function according to the instructions given by a maintenance engineer.
- This function is available when the following target NAS system volumes exist.
  - The target NAS system volume in CM#0 is $SYSVOL2
  - The target NAS system volume in CM#1 is $SYSVOL3

The procedure to recover the NAS system volume is as follows:

Procedure

1 Select the NAS Engine that is to be recovered and click [Recover NAS System Volume] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ Recovery of the NAS system volumes starts.

3 Click the [Done] button to return to the [Controller Module] screen.

End of procedure

Export Performance Information

This function exports the following performance information in a single operation and saves it as a text file.
- Performance (Host I/O)
- Performance (Advanced Copy)
- Performance (CA)
- Performance (CM)
- Performance (Drive)
- Performance (PCIe Flash Module)

Refer to for details.

Clear Drive Error Statistics (All Drives)

This function deletes the error information from all of the drives.

⬤ **N o t e**

This function can be performed without selecting the drive to delete error information or without the error information that is to be deleted.

The procedure to delete error information from all the drives is as follows:

Procedure

1 Click [Clear All Error] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ Deletion of the error information from all the drives starts.

3 Click the [Done] button to return to the [Drive Error Statistics] screen.

End of procedure

Clear Drive Error Statistics (Selected Drive)

This function deletes the error information from the selected drive.

⬤ **N o t e**

This function can only be performed when an error occurs in a drive.

The procedure to delete error information from the selected drive is as follows:

Procedure

1 Select the drive to delete error information from (multiple selections can be made) and click [Clear Error] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ Deletion of the error information from the selected drive starts.

3 Click the [Done] button to return to the [Drive Error Statistics] screen.

End of procedure

3. Volume Management

This chapter describes volume management.

When using functions in the Action area, select the desired function from the Action area that is displayed in the status display screen.
The functions in the Action area for Volume can be performed from the following display functions:

Functions in the Action area for Volume	Display function
Create Volume	• Volume (Basic Information)
Delete Volume	
Rename Volume	
Format Volume	
Expand Volume	
Encrypt Volume	
TPV Management	–
Expand Thin Provisioning Volume	• Volume (Basic Information)
Modify Thin Provisioning Volume Threshold	
Optimize TPV/FTV Capacity	
Cancel Optimizing TPV/FTV Capacity	
Start Balancing Thin Provisioning Volume	• Balancing Thin Provisioning Volume
Stop Balancing Thin Provisioning Volume	
Reconfigure NAS Volume	• Volume (Basic Information)
Set Allocation	
SDV/SDPV Management	–
Delete Snap Data Pool Volume	• Volume (Basic Information)
Force Delete Snap Data Pool Volume	
Initialize Snap Data Volume	
Start RAID Migration	
Stop RAID Migration	
Stop External Volume Data Synchronization	
Forbid Advanced Copy	
Permit Advanced Copy	
Release Reservation	• Reservation
Modify Cache Parameters	• Performance Information (Host I/O)
Export Cache Parameters	
Export Performance Information	
Set ALUA	
Set Volume QoS	• Performance Information (QoS)
Snapshot Management for NAS Volumes	–
Set Snapshot	• Snapshot
Delete Snapshot	
Start Snapshot	
Stop Snapshot	
Delete External LU Information	• Volume (Basic Information)

Create Volume

This function creates new volumes.
The following types of volumes can be created.

- Standard
The most commonly used volumes that are created in RAID groups or External RAID Groups.

- Wide Striping Volume (WSV)
Volumes that are configured by multiple RAID group areas that are concatenated with striping to improve performance.

- Thin Provisioning Volume (TPV)
Volumes that are created in Thin Provisioning Pools. TPVs can also be used as the copy destination for SnapOPC or SnapOPC+.

- Snap Data Volume (SDV)
Copy destination volumes for SnapOPC or SnapOPC+ that are created in RAID groups.

- Snap Data Pool Volume (SDPV)
Volumes used as expansion areas for SDV that are created in RAID groups.

- NAS Volume
Volumes used for NAS system operation (hereinafter referred to as "NAS user volume") in the Unified Storage environment that are created in TPPs.

- Deduplication/Compression Volume
Volumes that have Deduplication, Compression, or both enabled. The volumes are created in TPPs that have the same Deduplication/Compression setting.

> ▷ **Caution**

- The ETERNUS DX60 S4/DX60 S3 do not support the encryption function.
- Volumes are formatted automatically when they are created in RAID groups or TPPs. If the error message "An internal resource is insufficient." appears after volumes are created, a format of volumes may have failed. Check the "Status" of the created volumes in the [Volume] screen. Refer to <u>"Volume (Basic Information)" (page 775)</u> for details. Volumes in the " 🟠 Readying" state have not been formatted. Wait until the currently running format processes are complete and reformat the relevant volumes. Refer to <u>"Format Volume" (page 272)</u> for details.
- The maximum number of volumes that can be created is reduced in the following conditions:
  - When TPPs exist in the ETERNUS DX/AF
  - When concatenated volumes exist in the ETERNUS DX/AF
  - When REC Disk Buffers exist in the ETERNUS DX/AF
  - When EXCPs exist in the ETERNUS DX
  - When volumes undergoing RAID migration exist
  - When volumes undergoing balancing TPV exist
  - When the Automated Storage Tiering feature is enabled
  - When Deduplication, Compression, or both are enabled for the TPP

> **🔵 N o t e**
>
> - Volumes are formatted automatically when they are created in RAID groups or TPPs. Standard, WSV, TPV, and SDV can be accessed from the host when host affinity is set after volume creation. NAS user volumes can be accessed from the host when NAS interface is set and shared folder is created after volume creation.
> - External Volumes are not formatted after a volume creation. They inherit the External LU Information of the External RAID Group (or the External Drive).
> - When a volume is created manually (*1), the volume number can be specified. Note that volumes have to be created one at a time. Multiple volumes cannot be created when specifying the volume number for a new volume.
>
> *1:　Volumes can be created manually for WSVs or when drives are selected manually for Standard type volumes, SDVs, SDPVs, TPVs, NAS volumes, or Deduplication/Compression Volumes.
> 　　　Refer to the following sections for details:
>   - "Manually selecting destinations to create Standard type volumes, SDVs, or SDPVs" (page 250)
>   - "Manually selecting destinations to create TPVs" (page 253)
>   - "Manually selecting destinations to create NAS user volumes" (page 261)
>   - "Manually selecting destinations to create Deduplication/Compression Volumes" (page 265)
>   - "Creating WSVs" (page 255)
>
> - When "Automatic" is selected to create a volume or when "Manual" is selected but a volume number is not specified, the volume number is allocated when a volume is created from the smallest unused decimal number in ascending order.
> - When "Manual" is selected, create the specified number of volumes by using the maximum free space that is available in the RAID group. In this case, inputting the volume capacity is not required. "Standard", "WSV", and "SDPV" type volumes are created by using the maximum free space.
> - This function cannot be used to create an ODX Buffer volume. Refer to "Create ODX Buffer Volume" (page 629) for details.
> - The EXC set state of the ETERNUS DX, and the set states of EXC and EXCP for each volume do not cooperate. Regardless of the set state of the EXC for the ETERNUS DX, the default state of EXC and EXCP for each volume is "Enable". Note that External Volumes do not use EXC or EXCP. Refer to "Setup Extreme Cache" (page 74) for details about the EXC setting for the ETERNUS DX.
> - The secondary cache (EXC or EXCP) that is being used in the ETERNUS DX can be checked. Refer to "System Settings" (page 672) for details.
> - Enabling or disabling EXC for each volume can be performed with ETERNUS CLI or ETERNUS SF Storage Cruiser.
> - Enabling or disabling EXCP can be performed with ETERNUS Web GUI. Refer to "Modify Cache Parameters" (page 315) for details.
> - In the following sections, "volumes" include "External Volumes" if differentiation is not specifically required. Refer to "External Volume specification" (page 781) for details.
> - In the controller firmware versions earlier than V10L32, "Online SED" is displayed as "SED".

Creating Standard Type Volumes, SDVs, or SDPVs

This function creates Standard type volumes, SDVs, or SDPVs. Detailed information on creating Standard type volumes, SDVs, or SDPVs is provided below.

- When creating volumes in the RAID group
    - There are two methods to select a RAID group; "Automatic" and "Manual".
    - Up to 128 volumes can be created in a RAID group. Note that "The maximum number of volumes that can be created for each model" (page 1079) is applied to the total number of volumes in RAID groups, External RAID Groups, and Pools (TPPs and FTRPs).
    - For "RAID6-FR" type RAID groups, only "Standard" volumes can be created.
    - To create an SDV or SDPV, the Advanced Copy license is required.
    - The following shows the conditions for creating SDPVs.
        - The volume capacity must be 2TB or less
        - The volume capacity must be a multiple of Snap Data Pool Element (SDPE) capacity (1GB/2GB/4GB) (*1)
        - *1:   The current SDPE capacity can be checked in the [Snap Data Pool] screen under the [Advanced Copy] navigation.
    - Creating SDPVs in RAID groups with the same RAID level, drive type, and number of drives is recommended.
- When creating volumes in the External RAID Group
    - Select the "Enable" checkbox in the "Use External Drive" field.
    - The only available selection method for External RAID Groups is "Manual".
    - For External RAID Groups, only "Standard" volumes can be created. For the created External Volumes, "Usage" and "Usage Details" are "Migration".
    - The number of volumes cannot be specified when creating External Volumes in the External RAID Group. One External Volume is created in one External RAID Group.
- For details on the setting items according to each volume type, refer to "Setting items for each volume type when selecting "Automatic"" (page 1088) or "Setting items for each volume type when selecting "Manual"" (page 1089).

For general notes and remarks regarding the creation of volumes, refer to "Caution" and "Note" in "Create Volume" (page 246).

For details on the parameters for this function, refer to "A. Create Volume" (page 1073).
For the factory default settings for this function, refer to "B. Create Volume" (page 1267).

■ Automatically selecting destinations to create Standard type volumes, SDVs, or SDPVs

Procedure

1   Click [Create] in [Action].

2　Select "Standard", "Snap Data Volume", or "Snap Data Pool Volume" for "Type" and select "Automatic" for "RAID Group / TPP Selection".
Specify the detailed information of new volumes.

The main setting items are as follows.

● **New Volume**

- Name
- Capacity
- Capacity of source volume ⓘ only SDV
- Data Integrity

● **Automatic Setting**

- Drive Type
- RAID Level
- Key Group
- Number of Volumes
- Start of Suffix
- Digits of Suffix

3　Click the [Create] button.

4　A confirmation screen appears. Click the [OK] button.
→　Volume creation starts.

5　Click the [Done] button to return to the [Volume] screen.

End of procedure

■ **Manually selecting destinations to create Standard type volumes, SDVs, or SDPVs**

Procedure

1 Click [Create] in [Action].

2 Select "Standard", "Snap Data Volume", or "Snap Data Pool Volume" for "Type" and select "Manual" for "RAID Group / TPP Selection".
Specify the detailed information of new volumes and select the RAID group or External RAID Group in which the volumes are to be created.

■ When volumes are created in a RAID group
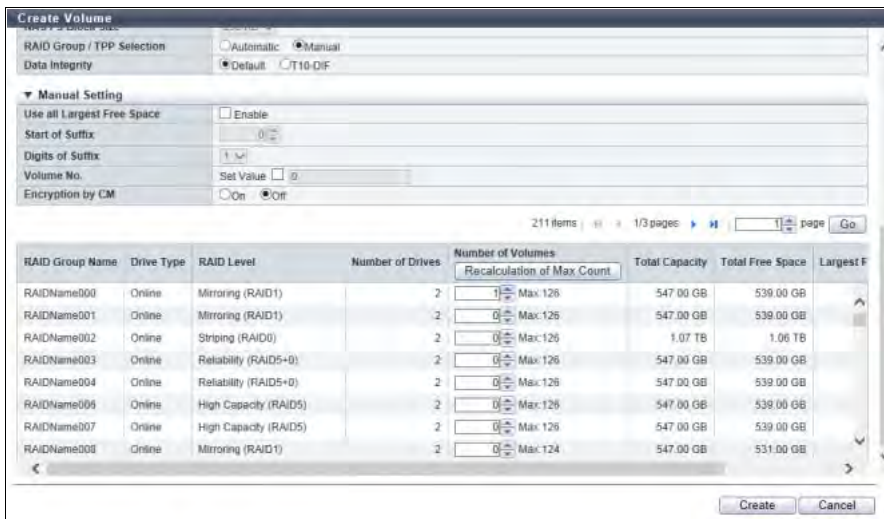
■ When volumes are created in an External RAID Group
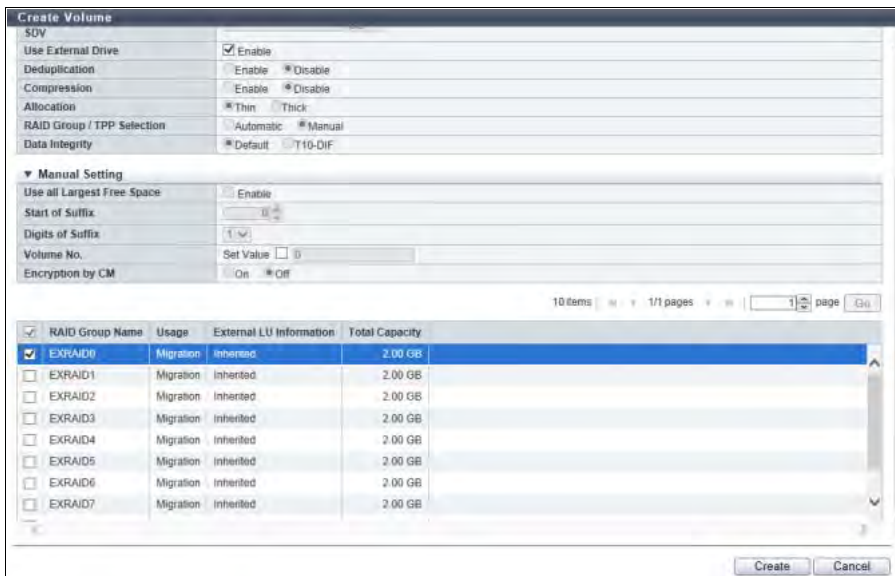
The main setting items are as follows.

● **New Volume**

• Name

• Capacity

• Capacity of source volume ⓘ only SDV

● Use External Drive
● Data Integrity

● Manual Setting

● Use all Largest Free Space
● Start of Suffix
● Digits of Suffix
● Volume No.
● Number of Volumes (*1)
● Checkbox to select an External RAID Group
  *1: Specify the value of volumes in the "Number of Volumes" field for the RAID group in which the volumes are to be created.

> **N o t e**
>
> ● When specifying the volume number, select the "Set Value" checkbox and input the volume number.
> ● When using the maximum free space in the RAID group to create volumes without specifying the capacity, select the "Enable" checkbox for "Use all Largest Free Space", and then input the number of volumes. This setting is available for "Standard" and "SDPV" type volumes.
> ● For the "Drive Type" field, the type of drive that configures the RAID group is displayed.
>   If multiple drive types are used in the RAID group, the drive type is displayed as described below.
>   - If only "Online" type drives are used or if both "Online" and "Nearline" type drives are used, "Online" is displayed.
>   - If only "Online SED" type drives are used or if both "Online SED" and "Nearline SED" type drives are used, "Online SED" is displayed.
>   - "SSD" is displayed regardless of the actual SSD type (SSD-M/SSD-L/SSD).
>   - "SSD SED" is displayed regardless of the actual SSD type (SSD-M SED/SSD-L SED).
> ● The External RAID Group list is displayed only when all of the conditions described below are satisfied. Select External RAID Groups for creating the volume.
>   - "Standard" is selected for "Type"
>   - The "Enable" checkbox in the "Use External Drive" field is selected
> ● Select the checkbox to the left of "RAID Group Name" to select all External RAID Groups.

> ▷ **Caution**
>
> If an error screen appears under the following conditions, check the parameter settings.
> ● Logical Device Expansion (LDE) is being performed in the target RAID group
> ● The RAID group or the External RAID Group is blocked
> ● The status of the RAID group is "❌ Broken"
> ● The status of the External RAID Group is other than "✅ Available"
> ● No External RAID Groups are selected (when "Use External Drive" is enabled)

3 Click the [Create] button.

4 A confirmation screen appears. Click the [OK] button.
  → Volume creation starts.

5 Click the [Done] button to return to the [Volume] screen.

End of procedure

Creating TPVs

This function creates TPVs. Detailed information on creating TPVs is provided below.

- Volumes are created in TPPs.
- There are two methods to select a TPP; "Automatic" and "Manual".
- When a TPP is created, a control volume is created for each RAID group that configures a TPP. Therefore, the maximum number of volumes that can be created in a TPP is calculated by using the following formula.

> Number of volumes that can be created in a TPP =
> Maximum number of volumes - Number of RAID groups that configure the relevant TPP

  Note that "The maximum number of volumes that can be created for each model" (page 1079) is applied to the total number of volumes in RAID groups, External RAID Groups, and Pools (TPPs and FTRPs).

- When creating TPVs, "Enable" the Thin Provisioning function. Refer to "Set Thin Provisioning" (page 536) for details.
- The maximum total capacity of TPVs that can be created in the ETERNUS DX/AF depends on the maximum pool capacity that is specified with the [Set Thin Provisioning] function. The currently specified maximum pool capacity is displayed in the [Settings] screen under the [Thin Provisioning] navigation. Refer to "Settings (Thin Provisioning)" (page 922) for details.
- For details on the setting items according to each volume type, refer to "Setting items for each volume type when selecting "Automatic"" (page 1088) or "Setting items for each volume type when selecting "Manual"" (page 1089).

▷ **Caution**

If the "Provisioned Capacity" (or the total logical capacity) of the created volumes in the TPP exceeds the total capacity of the creation destination TPP (or if the "Provisioned Rate" (or the capacity rate) exceeds "100 %"), a warning message appears in the result screen. Check the TPP used state and add drives to expand the TPP capacity as required. Check the [Thin Provisioning Pool Detail] screen for "Provisioned Rate". Refer to "Thin Provisioning Pool Detail (Basic)" (page 899) for details.

For general notes and remarks regarding the creation of volumes, refer to "Caution" and "Note" in "Create Volume" (page 246).

For details on the parameters for this function, refer to "A. Create Volume" (page 1073).
For the factory default settings for this function, refer to "B. Create Volume" (page 1267).

■ Automatically selecting destinations to create TPVs

Procedure

1 Click [Create] in [Action].

2   Select "Thin Provisioning Volume" for "Type" and "Automatic" for "RAID Group / TPP Selection".
        Specify the detailed information of new volumes.

The main setting items are as follows.

● **New Volume**

- Name
- Capacity
- Allocation

● **Automatic Setting**

- Drive Type
- RAID Level
- Number of Volumes
- Start of Suffix
- Digits of Suffix

3   Click the [Create] button.

4   A confirmation screen appears. Click the [OK] button.
        → Volume creation starts.

5   Click the [Done] button to return to the [Volume] screen.

                                                        End of procedure

■ **Manually selecting destinations to create TPVs**

Procedure

1   Click [Create] in [Action].

2   Select "Thin Provisioning Volume" for "Type" and "Manual" for "RAID Group / TPP Selection".
Specify the detailed information of new volumes and select the TPP in which the volumes are to
be created.
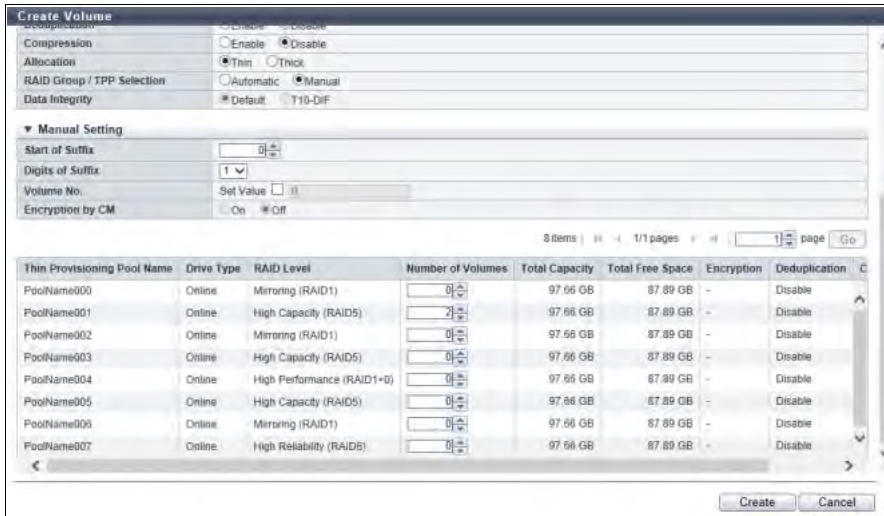
The main setting items are as follows.

● **New Volume**

• Name
• Capacity
• Allocation

● **Manual Setting**

• Start of Suffix
• Digits of Suffix
• Volume No.
• Number of Volumes (*1)
  *1:   Specify the value in the "Number of Volumes" field for the TPP in which the volumes are to be created.

> 🔵 **N o t e**

• When specifying the "Volume No.", select the "Set Value" checkbox and input the number.
• For the "Drive Type" field, the type of drive that configures the TPP is displayed.
  If multiple drive types are used in the TPP, the drive type is displayed as described below.
  - If only "Online" type drives are used or if both "Online" and "Nearline" type drives are used, "Online"
    is displayed.
  - If only "Online SED" type drives are used or if both "Online SED" and "Nearline SED" type drives are
    used, "Online SED" is displayed.
  - "SSD" is displayed regardless of the actual SSD type (SSD-M/SSD-L/SSD).
  - "SSD SED" is displayed regardless of the actual SSD type (SSD-M SED/SSD-L SED).

> ▶ **Caution**

• The "Encryption by CM" setting cannot be changed.
• If an error screen appears under the following conditions, check the parameter settings.
  - RAID groups that configure a TPP are blocked
  - The status of RAID groups that configure a TPP is "⊗ Broken"

3 Click the [Create] button.

4 A confirmation screen appears. Click the [OK] button.
→ Volume creation starts.

5 Click the [Done] button to return to the [Volume] screen.

End of procedure

Creating WSVs

This function creates WSVs.
WSVs are created by concatenating volumes that are the same size in multiple RAID groups. Input the volume information for WSVs and the selection information for RAID groups, and specify the RAID groups that are to be concatenated.

▷ **Caution**

RAID group capacity expansion for RAID groups which configure WSVs is not available (LDE cannot be performed).

Detailed information on creating WSVs is provided below.

- The only available selection method for RAID groups is "Manual".
- The conditions for RAID groups to configure WSVs are as follows:
  - The RAID level (High Performance (RAID1+0)/High Capacity (RAID5)/High Reliability (RAID6)/Reliability (RAID5+0)/Mirroring (RAID1)/Striping (RAID0)) must be the same
  - The number of member drives in the RAID group must be the same
  - The Stripe Depth value must be the same
  - The drive type (Online/Nearline/SSD/Online SED/Nearline SED/SSD SED) must be the same
    (Since the access performance of WSVs is reduced, selecting the same drive type for the "Drive Type" in the "Select RAID Group Information" field is recommended. Selecting "Online/Nearline" and "Online SED/Nearline SED" is not recommended.)
  - The SSD type (SSD-M/SSD-L/SSD/SSD-M SED/SSD-L SED) must be the same
    (Since the access performance of WSVs is reduced, using the same SSD type is recommended. The SSD type that configures a RAID group can be checked in the [RAID Group Detail] screen ([Drive] tab).)
  - The disk speed must be the same
    (RAID groups configured with different speed drives can be selected. Note that this reduces the access performance for WSVs. It is recommended to select the same speed disks. The speed of the drives that configure a RAID group can be checked in the [RAID Group Detail] screen ([Drive] tab).)
  - The sector format (Advanced Format (AF) compliant/non-AF-compliant) must be the same
    (Selecting RAID groups that are configured with drives of the same sector format is recommended.)
  - The key group setting state must be the same
    (If the drive type is "Online SED", "Nearline SED", "SSD SED", or "Online SED/Nearline SED", RAID groups can be selected regardless of the key group setting (enabled or disabled). However, selecting the same key group setting state is recommended. The key group setting state can be checked with the "Encryption" field in the [Select RAID Groups] screen.)
  - The sequential unused area must be the same size or bigger than the capacity of the volumes that are to be concatenated
- The number of concatenated RAID groups is from 2 to 64.
- The WSV capacity is from 24MB to 128TB.
- To expand the WSV capacity, use the RAID migration function instead of the LUN concatenation function. Refer to "Start RAID Migration" (page 296) for details.
- For details on the setting items according to each volume type, refer to "Setting items for each volume type when selecting "Manual"" (page 1089).

For general notes and remarks regarding the creation of volumes, refer to "Caution" and "Note" in "Create Volume" (page 246).

For details on the parameters for this function, refer to "A. Create Volume" (page 1073).
For the factory default settings for this function, refer to "B. Create Volume" (page 1267).

The procedure to create WSVs is as follows:

Procedure

1	Click [Create] in [Action].

2	Select "Wide Striping Volume" for "Type".
	Specify the detailed information of new volumes and selection information for RAID groups.

The main setting items are as follows.

● **New Volume**

• Name
• Capacity

● **Volume Information**

• Use all Largest Free Space
• Number of Volumes
• Start of Suffix (When "Automatic" is selected for "Concatenation Order")
• Digits of Suffix (When "Automatic" is selected for "Concatenation Order")
• Volume No.

● **Select RAID Group Information**

• Drive Type
• RAID Level
• Number of Member Drives

> **N o t e**
>
> - When specifying the volume number, select the "Set Value" checkbox and input the volume number.
> - When using the maximum free space in the selected RAID group to create WSVs without specifying the capacity, select the "Enable" checkbox for "Use all Largest Free Space", and then input the number of WSVs.

3 Click the [Select RAID Groups] button.
→ The [Select RAID Groups] screen appears.

4 Select the RAID group that is to be concatenated (multiple selections can be made).
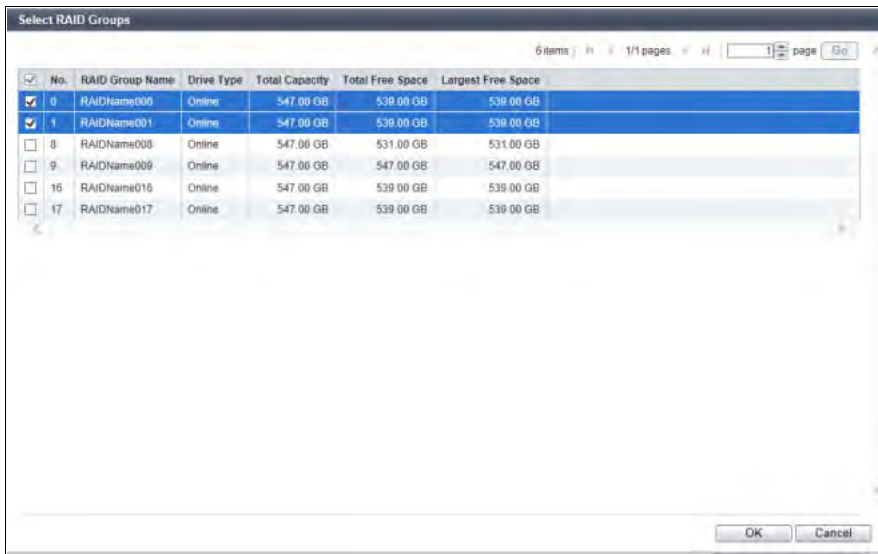
The main setting item is as follows.

● Select RAID Groups

- Checkbox to select RAID groups

> **N o t e**
>
> For the "Drive Type" field, the type of drive that configures the RAID group is displayed.
> If multiple drive types are used in the RAID group, the drive type is displayed as described below.
> - If only "Online" type drives are used or if both "Online" and "Nearline" type drives are used, "Online" is displayed.
> - If only "Online SED" type drives are used or if both "Online SED" and "Nearline SED" type drives are used, "Online SED" is displayed.
> - "SSD" is displayed regardless of the actual SSD type (SSD-M/SSD-L/SSD).
> - "SSD SED" is displayed regardless of the actual SSD type (SSD-M SED/SSD-L SED).

5   Click the [OK] button.
→   The display returns to the initial screen.

▷ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
- The "Number of Concatenation RAID Groups" field is left blank, "1" is specified, or a value that is "65" or more is specified
- The maximum free space in the selected RAID group is smaller than the volume size that is to be concatenated
- LDE is being performed in the target RAID group
- The RAID group is blocked
- The status of the RAID group is "❌ Broken"

🔵 **N o t e**

To change the concatenation order of the RAID groups, select "Manual" for "Concatenation Order" in the Volume Information field. Click the [Concatenation Order] link to display the [Setting Concatenation Order] screen. The concatenation order of the RAID groups can be changed in the [Setting Concatenation Order] screen.

6   After selecting RAID groups is complete, click the [Create] button.

7   A confirmation screen appears. Click the [OK] button.
→   Volume creation starts.

8   Click the [Done] button to return to the [Volume] screen.

End of procedure

Creating NAS User Volumes

This function creates NAS user volumes. Detailed information on creating NAS user volumes is provided below.

- NAS user volumes can only be created in a Unified Storage environment using the following models:
  - ETERNUS DX100 S4/DX200 S4
  - ETERNUS DX500 S4/DX600 S4
  - ETERNUS DX100 S3/DX200 S3
  - ETERNUS DX500 S3/DX600 S3

- Volumes are created in TPP.
- There are two methods to select a TPP; "Automatic" and "Manual".
- The NAS user volumes (TPVs for the NAS environment) and TPVs for the SAN environment can be created in the same TPP.
- There are two types of NAS volumes; NAS user volumes and NAS backup volumes. The NAS backup volume cannot be created with ETERNUS Web GUI. To create a NAS backup volume, use ETERNUS CLI or ETERNUS SF Storage Cruiser. The number of NAS backup volumes that can be created for each model is the same as NAS user volumes.
- The maximum number and the capacity of NAS user volumes for each model are described below. The total capacity of NAS user volumes (TPVs for the NAS environment), NAS backup volumes, and NAS system volumes (17GB) must not exceed the maximum pool capacity that is specified for the ETERNUS DX. Refer to "Settings (Thin Provisioning)" (page 922) for details.

Model	The maximum number of NAS user volumes	The NAS user volume capacity (*1)
ETERNUS DX100 S4	2 (*2)	400 GB - 128 TB (*4) The smallest volume capacity that is available for the user is 100 GB. When the first volume is created, an additional "17 GB" is used for the system volume.
ETERNUS DX200 S4	4 (*2)	
ETERNUS DX500 S4	4	
ETERNUS DX600 S4	8	
ETERNUS DX100 S3	1 (*3) 2 (*2)	
ETERNUS DX200 S3	2 (*3) 4 (*2)	
ETERNUS DX500 S3	4	
ETERNUS DX600 S3	8	

*1:   300GB of the created volume is used as the system area. The capacity that can be used is "specified capacity - 300GB".
*2:   The maximum number of NAS user volumes when "Memory Extension" described below is installed.

- ETERNUS DX100 S4/DX100 S3
  16GB/CM (the controller firmware version is V10L53 or later)
- ETERNUS DX200 S4/DX200 S3
  32GB/CM (the controller firmware version is V10L33 or later)

*3:   The maximum number of NAS user volumes when "Memory Extension" described below is installed.

- ETERNUS DX100 S3
  8GB/CM
- ETERNUS DX200 S3
  16GB/CM

*4:   The maximum NAS user volume capacity and the maximum file size vary depending on the specified "NAS FS Block Size" when creating volumes. The new volume capacity must not be more than the maximum NAS user volume capacity.

Maximum NAS user volume capacity and the maximum file size of each "NAS FS Block Size"

	NAS FS Block Size		
	8KB	32KB	256KB
Maximum NAS user volume capacity	32TB	128TB	128TB
Maximum file size (*5)	1TB	4TB	32TB

*5:   The file size indicates the size of the user data that is created in the shared folder.

- When the NAS user volume is created, three system volumes are automatically created per storage system in the same TPP. The following NAS system volumes are created:

Volume name	Usage	Usage Details	Capacity
$SYSVOL1	System	NAS FS Management	1GB
$SYSVOL2		NAS CM#0 System	8GB
$SYSVOL3		NAS CM#1 System	8GB

- Only one NAS user volume can be created at a time.
- NAS volumes are displayed as "TPV" in the volume list screen. TPVs for SAN and the NAS volumes (TPVs for NAS) can be identified by "Usage" and "Usage Details". Refer to "Volume (Basic Information)" (page 775) for details.
- The NAS expanded system volumes for storing the NAS monitoring logs cannot be created from ETERNUS Web GUI. Execute the "create volume" CLI command. NAS expanded system volumes can be checked in "Usage" and "Usage Details". Refer to "Volume Detail (Basic)" (page 802) for details.
- For details on the setting items according to each volume type, refer to "Setting items for each volume type when selecting "Automatic"" (page 1088) or "Setting items for each volume type when selecting "Manual"" (page 1089).

> **Caution**

- When the NAS user volume creation is not completed successfully, perform the following actions.

    Procedures for when the NAS user volume creation is not completed successfully

    (1) Confirm that the general status (detail) of the ETERNUS DX and the status of the NAS Engine are both " ✅ Normal". If the status is not " ✅ Normal", the ETERNUS DX/AF requires maintenance.

    The ETERNUS DX general status (detail) can be checked in the [Storage] screen. Refer to "Storage (Basic Information)" (page 676) for details.
    The NAS Engine status can be checked in the [Internal Parts] tab of the [Controller Module Detail] screen. Refer to "Controller Module Detail" (page 718) for details.

    (2) If the NAS user volume was created, delete the relevant volume. If the NAS user volume cannot be deleted, the ETERNUS DX requires maintenance.

    For the NAS user volume, "File" is displayed as the usage in the volume list screen ("NAS Data" is displayed as the detailed usage of the volume detailed information screen). Refer to "Volume (Basic Information)" (page 775) and "Volume Detail (Basic)" (page 802) for details.

    (3) Create the NAS user volume again. Confirm that the volume creation was successfully completed.
- If the "Provisioned Capacity" (or the total logical capacity) of the created volumes in the TPP exceeds the total capacity of the creation destination TPP (or if the "Provisioned Rate" (or the capacity rate) exceeds "100 %"), a warning message appears in the result screen. Check the TPP used state and add drives to expand the TPP capacity as required. Check the [Thin Provisioning Pool Detail] screen for "Provisioned Rate". Refer to "Thin Provisioning Pool Detail (Basic)" (page 899) for details.

For general notes and remarks regarding the creation of volumes, refer to "Caution" and "Note" in "Create Volume" (page 246).

For details on the parameters for this function, refer to "A. Create Volume" (page 1073).
For the factory default settings for this function, refer to "B. Create Volume" (page 1267).

■ Automatically selecting destinations to create NAS user volumes

Procedure

1 Click [Create] in [Action].

2 Select "NAS Volume" for "Type" and "Automatic" for "RAID Group / TPP Selection".
Specify the detailed information of new volumes.

The main setting items are as follows.

● **New Volume**

- Name
- Capacity
- Allocation
- NAS FS Block Size

● **Automatic Setting**

- Drive Type
- RAID Level

3 Click the [Create] button.

4 A confirmation screen appears. Click the [OK] button.
→ Volume creation starts.

5 Click the [Done] button to return to the [Volume] screen.

> ▷ **Caution**

If the NAS user volume creation fails, refer to "Procedures for when the NAS user volume creation is not completed successfully" (page 260).

End of procedure

■ **Manually selecting destinations to create NAS user volumes**

Procedure

1 Click [Create] in [Action].

2 Select "NAS Volume" for "Type" and "Manual" for "RAID Group / TPP Selection".
Specify the detailed information of new volumes and select the TPP in which the volumes are to
be created.
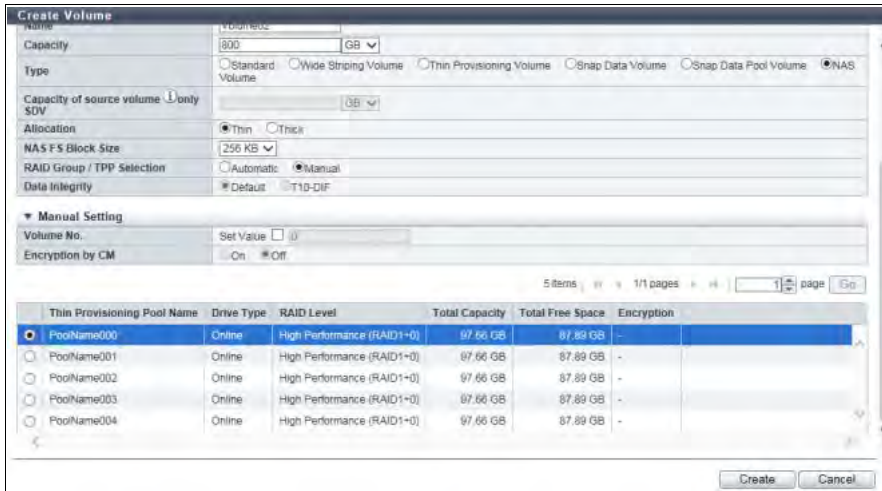
The main setting items are as follows.

● **New Volume**

• Name
• Capacity
• Allocation
• NAS FS Block Size

● **Manual Setting**

• Volume No.
• Radio button to select a TPP

🔵 **N o t e**

• When specifying the volume number, select the "Set Value" checkbox and input the volume number.
• For the "Drive Type" field, the type of drive that configures the TPP is displayed.
  If multiple drive types are used in the TPP, the drive type is displayed as described below.
  - If only "Online" type drives are used or if both "Online" and "Nearline" type drives are used, "Online"
    is displayed.
  - If only "Online SED" type drives are used or if both "Online SED" and "Nearline SED" type drives are
    used, "Online SED" is displayed.
  - "SSD" is displayed regardless of the actual SSD type (SSD-M/SSD-L/SSD).
  - "SSD SED" is displayed regardless of the actual SSD type (SSD-M SED/SSD-L SED).

▶ **Caution**

• The "Encryption by CM" setting cannot be changed.
• If an error screen appears under the following conditions, check the parameter settings.
  - RAID groups that configure a TPP are blocked
  - The status of RAID groups that configure a TPP is "❌ Broken"

3 Click the [Create] button.

4 A confirmation screen appears. Click the [OK] button.
→ Volume creation starts.

5 Click the [Done] button to return to the [Volume] screen.

▷ **Caution**

If the NAS user volume creation fails, refer to "Procedures for when the NAS user volume creation is not completed successfully" (page 260).

End of procedure

Creating Deduplication/Compression Volumes

This function creates Deduplication/Compression Volumes. Detailed information on creating Deduplication/Compression Volumes is provided below.

- Deduplication/Compression Volumes can be created if all of the following conditions are satisfied.
  - The ETERNUS DX200 S4, the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX200 S3, the ETERNUS DX500 S3/DX600 S3, the ETERNUS AF250 S2/AF650 S2, or the ETERNUS AF250/AF650 is used
  - The Thin Provisioning function is enabled
  - The Thin Provisioning Pool capacity is not in a depleted state
  - Deduplication/Compression for the ETERNUS DX/AF is enabled
  - The Deduplication, Compression, or both (hereinafter referred to as "Deduplication/Compression setting of the TPP") are enabled for the TPP where the Deduplication/Compression Volumes are to be created
  - The DEDUP_SYS Volume status in the TPP where the Deduplication/Compression Volumes are to be created is not "🟡 Readying", "❌ Not Ready", "❌ Broken", or "❌ Data Lost".
- Deduplication/Compression Volumes are TPVs for SAN that have Deduplication, Compression, or both enabled. The volumes are created in TPPs that have the same Deduplication/Compression setting.
- There are two methods to select a TPP; "Automatic" and "Manual".
- Deduplication, Compression, or both for data are performed synchronously with the host I/O.
- For the Deduplication/Compression Volume, a physical capacity as large as the chunk size is used for each volume regardless of the host I/O when the volume is created. Make sure to check the free space in the TPP before creating the volume.
- The total logical capacity of the Deduplication/Compression Volumes that can be created by customers is limited to the logical capacity of the DEDUP_SYS Volume in the TPP (*1).
  - *1: If the efficiency of the Deduplication/Compression function cannot be estimated, setting the total logical capacity of the Deduplication/Compression Volumes smaller than the logical capacity of the DEDUP_SYS Volume is recommended.
    If the efficiency of the Deduplication/Compression function can be estimated, the total logical capacity of the Deduplication/Compression Volumes in a TPP varies depending on the number of RAID groups created in that TPP.
    - If the TPP is configured with two or more RAID groups, the maximum logical volume capacity of the Deduplication/Compression Volumes must be equal to or less than ten times the logical capacity of the DEDUP_SYS Volume in the relevant TPP.
    - If the TPP is configured with one RAID group, the maximum logical volume capacity of the Deduplication/Compression Volumes must be equal to or less than five times the logical capacity of the DEDUP_SYS Volume in the relevant TPP.
- If the Deduplication/Compression setting for TPPs is enabled, the following volumes can be created in the same TPP.
  - Deduplication/Compression target volumes
    Volumes that have the same Deduplication/Compression setting as the TPP
  - Non-Deduplication/Compression target volumes
    TPVs that have Deduplication and Compression disabled

If both volumes exist, the performance of the non-Deduplication/Compression target volumes (TPVs) may be reduced. To reduce performance degradation of non-Deduplication/Compression target volumes (TPVs), do not create these volumes in the same TPP.

- If Deduplication/Compression Volumes larger than the logical capacity of the DEDUP_SYS Volume are deleted or formatted repeatedly, creation of the Deduplication/Compression Volume may fail due to a temporary capacity shortage. If this error occurs, wait a few minutes before starting this function.

- Non-Deduplication/Compression target volumes (TPVs) can be changed to Deduplication/Compression target volumes (Deduplication/Compression Volumes). Also, Deduplication/Compression target volumes (Deduplication/Compression Volumes) can be changed to non-Deduplication/Compression target volumes. Refer to "Start RAID Migration" (page 296) for details.

- "Provisioned Capacity" for TPVs that are created in the ETERNUS DX/AF does not include the Deduplication/Compression Volume capacity. Refer to "Thin Provisioning Pool Detail (Basic)" (page 899) for details.

- "Data Reduction Rate" for TPPs where the Deduplication/Compression Volumes are created can be checked. Refer to "Thin Provisioning Pool (Basic Information)" (page 896) for details.

- For details on the setting items according to each volume type, refer to "Setting items for each volume type when selecting "Automatic"" (page 1088) or "Setting items for each volume type when selecting "Manual"" (page 1089).

For general notes and remarks regarding the creation of volumes, refer to "Caution" and "Note" in "Create Volume" (page 246).

For details on the parameters for this function, refer to "A. Create Volume" (page 1073).
For the factory default settings for this function, refer to "B. Create Volume" (page 1267).

■ Automatically selecting destinations to create Deduplication/Compression Volumes

Procedure

1 Click [Create] in [Action].

2 Select the following items to specify the detailed information of new volumes.
- "Thin Provisioning Volume" for "Type"
- "Enable" for "Deduplication", "Compression", or both
- "Automatic" for "RAID Group / TPP Selection"

The main setting items are as follows.

● **New Volume**

- Name
- Capacity

● **Automatic Setting**

- Drive Type
- RAID Level
- Number of Volumes
- Start of Suffix
- Digits of Suffix

▷ **Caution**

If an error screen appears under the following conditions, check the parameter settings.

- The Deduplication status of the TPP where volumes are to be created is "Disable", "Error", or a "-" (hyphen)
- The Compression status of the TPP where volumes are to be created is "Disable", "Error", or a "-" (hyphen)

3   Click the [Create] button.

4   A confirmation screen appears. Click the [OK] button.
→ Volume creation starts.

5   Click the [Done] button to return to the [Volume] screen.

End of procedure

■ **Manually selecting destinations to create Deduplication/Compression Volumes**

Procedure

1   Click [Create] in [Action].

2 Select the following items to specify the detailed information of new volumes and select the TPP in which the volumes are to be created.
- "Thin Provisioning Volume" for "Type"
- "Enable" for "Deduplication", "Compression", or both
- "Manual" for "RAID Group / TPP Selection"

The main setting items are as follows.

● **New Volume**

- Name
- Capacity

● **Manual Setting**

- Start of Suffix
- Digits of Suffix
- Volume No.
- Number of Volumes (*1)
  - *1:   Specify the value in the "Number of Volumes" field for the TPP in which the volumes are to be created.

🔵 **N o t e**

When specifying the volume number, select the "Set Value" checkbox and input the volume number.

▶ **Caution**

- The "Encryption by CM" setting cannot be changed.
- If an error screen appears under the following conditions, check the parameter settings.
  - The Deduplication status of the selected TPP is "Disable", "Error", or a "-" (hyphen)
  - The Compression status of the selected TPP is "Disable", "Error", or a "-" (hyphen)
  - RAID groups that configure a TPP are blocked
  - The status of RAID groups that configure a TPP is " ❌ Broken"

3 Click the [Create] button.

4 A confirmation screen appears. Click the [OK] button.
→ Volume creation starts.

5 Click the [Done] button to return to the [Volume] screen.

End of procedure

Delete Volume

This function deletes volumes.
Standard type volumes, WSVs, TPVs, and SDVs can be deleted.

> ▷ **Caution**
>
> - When a volume is deleted, access to data in the target volume is not allowed.
> - When NAS user volumes are deleted, Quota information is also deleted.
> - This function cannot be used if the control information for Thin Provisioning is being re-configured in the ETERNUS DX8700 S3/DX8900 S3 while TPVs are being deleted. (*1)
>   - *1: If the system message indicates a re-configuration, the control information for Thin Provisioning is being synchronized in each CM. Wait at least five minutes before performing this function again.
> - If NAS volumes (NAS user volumes or NAS backup volumes) are deleted while a meta cache redistribution is being performed, the process for this function may be delayed for a maximum of two minutes.
> - The following volumes cannot be deleted:
>   - Volumes that are registered in a LUN group
>   - Volumes that are mapped with applications other than ETERNUS Web GUI
>   - Volumes (migration source volumes or migration destination volumes) undergoing RAID migration
>   - A copy source volume or a copy destination volume of the Advanced Copy that is being executed
>   - Volumes undergoing TPV balancing (work volumes and target TPVs for balancing)
>   - Volumes undergoing FTRP balancing (work volumes)
>   - Volumes with a Storage Migration path
>   - ODX Buffer volumes undergoing ODX
>   - NAS user volumes that contain shared folders
>   - NAS user volumes with snapshot settings
>   - Snapshot destination SDV
>   - Volumes used for the Storage Cluster function
>   - Deduplication/Compression Volumes in the TPP that includes the DEDUP_SYS Volume in the "🟡 Readying", "❌ Not Ready", "❌ Broken", or "❌ Data Lost" state
> - By repeating creation and deletion of volumes, free space may be dispersed in the RAID group.
> - Up to 128 volumes can be deleted at once.

> 🔵 **N o t e**
>
> - When deleting SDPVs, refer to "Delete Snap Data Pool Volume" (page 293) or "Force Delete Snap Data Pool Volume" (page 294).
> - This function can be used to delete an ODX Buffer volume.
> - This function can be used to delete an External Volume that is created in the External RAID Group. If External Volumes are deleted, the External LU Information that is inherited from the external storage system is also deleted.
> - If External Volumes are deleted, delete the following items. Refer to "Delete External RAID Group" (page 533) and "Delete External Drive" (page 195) for details.
>   - External RAID Group that was used to create the External Volume
>   - External Drive that was used to create the External RAID Group
> - This function can delete NAS user volumes, NAS backup volumes, and snapshot destination SDVs. The NAS system volumes must be deleted by ETERNUS CLI.
> - When the Deduplication/Compression setting for the TPP is disabled, Deduplication/Compression System Volumes in the relevant TPP are automatically deleted. Refer to "Set Deduplication/Compression" (page 557) for details.
> - Use the [Volume List] screen to check whether the volume is used for the Storage Cluster function. Refer to "Volume (Basic Information)" (page 775) for details.

- When volumes are registered in LUN groups, or a message "The specified volumes have already been mapped. They cannot be deleted." is displayed, use the following procedure to delete the volumes from LUN groups.

    (1) Check all the LUN groups in which volumes are registered in the [LUN Group] screen under the [Volume] navigation.

    (2) Select a LUN group in which the volume is registered in the [LUN Group] screen under the [Connectivity] navigation, and then click [Modify LUN Group] in [Action].

    (3) Delete "allocation information of host LUN and volume number" in the [Modify LUN Group] screen.

    (4) When a volume is registered in multiple LUN groups, repeat Step (2) and Step (3).
    (LUN groups in which a volume is registered can be checked with the [LUN Group] field in the [Modify LUN Group] screen in Step (3).)

    (5) If the location information of the port ("CE#x CM#y CA#z Port#w" or "CM#y CA#z Port#w") is displayed in the [LUN Group] field in Step (1) or Step (3), the volume is mapped with applications other than ETER-NUS Web GUI. Use the relevant application to delete the volume from the port mapping information.

    (6) Confirm that "LUN Group Count" is "0" in the [LUN Group] field under the [Volume] navigation.

    (7) Use this function to delete volumes.

    It is not necessary to delete a host affinity when deleting volumes with the host affinity setting from a LUN group. If all of the volumes in a LUN group are not needed, delete the host affinity, and then click the [Delete LUN Group] button to delete the LUN group with volumes in Step (2).

The procedure to delete a volume is as follows:

Procedure

1   Select the volume to be deleted (multiple selections can be made) and click [Delete] in [Action].

> ▶ **Caution**

[Delete] cannot be clicked under the following conditions:
- The type of the selected volume is "FTV"
- NAS system volumes are selected
- The Deduplication/Compression System Volumes are selected

2   A confirmation screen appears. Click the [OK] button.
→ Deletion of a volume starts.

> ⬤ **N o t e**

When a TPV is deleted, the physical allocating capacity of the relevant TPV is formatted. The physical allocating capacity is released after formatting is complete.

3   Click the [Done] button to return to the [Volume] screen.

End of procedure

Rename Volume

This function changes the volume name.

> **Caution**
>
> For the ETERNUS DX8700 S3/DX8900 S3, up to 1024 volumes can be renamed at a time. Note that this limitation does not apply to other models.

For details on the parameters for this function, refer to .
For the factory default settings for this function, refer to .

The procedure to rename a volume is as follows:

Procedure

1 Select the volume that is to be renamed (multiple selections can be made) and click [Rename] in [Action].

> **Caution**
>
> [Rename] cannot be clicked under the following conditions:
> - The usage of the selected volume is "System"
> - For the ETERNUS DX8700 S3/DX8900 S3, the number of selected volumes exceeds 1024

2 Specify the parameters.
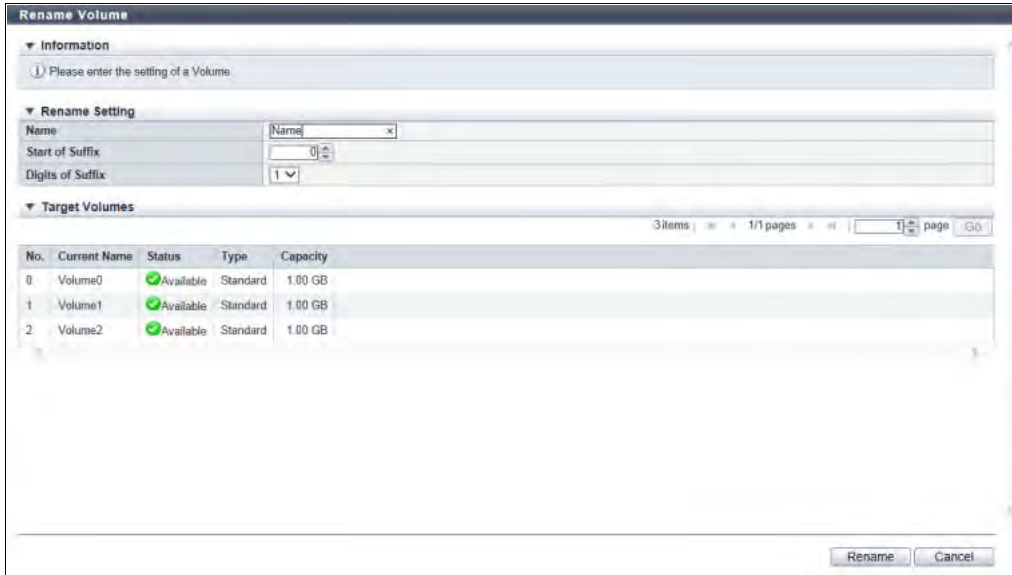
The main setting items are as follows.

● **Rename Setting**

- Name
- Start of Suffix
- Digits of Suffix

3 Click the [Rename] button.

4 A confirmation screen appears. Click the [OK] button.
→ Renaming of the volume starts.

5 Click the [Done] button to return to the [Volume] screen.

End of procedure

Format Volume

This function formats the selected volume. The data stored in the volume will be deleted by formatting.
Standard type volumes, WSVs, SDVs, SDPVs, TPVs, and FTVs can be formatted.

▷ **Caution**

- When formatting a TPV where the allocation method is "Thin", the physical allocation area that is used by the target TPV is released.
- When formatting a TPV where the allocation method is "Thick", the physical allocation area that is used by the target TPV is not released. The physical allocation area that is used by the target TPV is released when the TPV is deleted.
- This function cannot be used under the following conditions:
  - A RAID group diagnosis is being performed in the ETERNUS DX/AF
  - A disk diagnosis is being performed in the ETERNUS DX
  - Pinned data exists in the ETERNUS DX/AF
  - The control information for Thin Provisioning is being re-configured in the ETERNUS DX8700 S3/DX8900 S3 while TPVs or FTVs are being formatted. (*1)
  - *1: If the system message indicates a re-configuration, the control information for Thin Provisioning is being synchronized in each CM. Wait at least five minutes before performing this function again.
- The following volumes cannot be formatted:
  - Volumes for which "Status" is "❌ Broken", "❌ Data Lost", or "❌ Not Ready"
  - Volumes undergoing RAID migration
  - A copy source volume or a copy destination volume of an Advanced Copy (local/remote) that is being performed
  - Volumes registered in a RAID group undergoing LDE
  - ODX Buffer volumes undergoing ODX
  - NAS user volumes that contain shared folders
  - Volumes used for the Storage Cluster function
  - Deduplication/Compression Volumes in the TPP that includes the DEDUP_SYS Volume in the "🟡 Readying", "❌ Not Ready", "❌ Broken", or "❌ Data Lost" state
  - DEDUP_SYS Volume that belongs to the TPP where Advanced Copy or RAID Migration is being performed for the created Deduplication/Compression Volumes
  - Deduplication/Compression Volumes and DEDUP_SYS Volume that belong to the TPP where the capacity is insufficient
- Do not format the volumes with Storage Migration paths.
- For the ETERNUS DX8700 S3/DX8900 S3, up to 1024 volumes can be formatted at a time. Note that this limitation does not apply to other models.
- If a DEDUP_SYS Volume format is stopped due to a hardware error or drive error, restart the volume format.
- If Deduplication/Compression Volumes larger than the logical capacity of the DEDUP_SYS Volume are deleted or formatted repeatedly, creation of the Deduplication/Compression Volume may fail due to a temporary capacity shortage.
- If Deduplication/Compression Volumes belonging to a TPP with an insufficient capacity are formatted, an error occurs. In this case, the data and the used physical allocation area are released, but the target Deduplication/Compression Volumes cannot be used normally. Expand the TPP capacity and try again.
- If the error message "An internal resource is insufficient." appears after volumes are formatted, a format of volumes may have failed. Check the "Status" of the formatted volumes in the [Volume] screen. Refer to <u>"Volume (Basic Information)" (page 775)</u> for details. Volumes in the "🟡 Readying" state have not been formatted. Wait until the currently running format processes are complete and reformat the relevant volumes.

⬤ **N o t e**

- Formatting newly created volumes is not required since these volumes are formatted automatically.
- To format NAS system volumes and DEDUP_SYS Volumes, "Maintenance Operation" policy is required. Note that when the DEDUP_SYS Volumes are formatted, the DEDUP_MAP Volumes are also formatted.
- The allocation method for the volume can be checked in the [Volume List] screen. Refer to <u>"Volume (Basic Information)" (page 775)</u> for details.

The procedure to format a volume is as follows:

Procedure

1   Select the volume to be formatted (multiple selections can be made) and click [Format] in [Action].

▶ **Caution**

- [Format] cannot be clicked under the following conditions:
    - The selected volume is used for the Virtual Volume function
    - The usage of the selected FTV is "System"
    - NAS expanded system volumes are selected
    - The DEDUP_MAP Volume is selected
    - External Volumes (or volumes whose "Usage" is "Migration") are selected
    - For the ETERNUS DX8700 S3/DX8900 S3, the number of selected volumes exceeds 1024
- If the format target TPV fulfills all of the following conditions, an error screen appears. Check the parameter settings.
    - Allocation method is "Thick"
    - The volume status is "🟠 Readying"
    - The free space in the TPP to which the TPV belongs is insufficient

2   A confirmation screen appears. Click the [OK] button.
      → Formatting of a volume starts.

3   Click the [Done] button to return to the [Volume] screen.

End of procedure

Expand Volume

This function concatenates a new volume to the selected volume by using the LUN Concatenation function to expand the volume capacity that can be used from the server.
Volume expansion provides the following features:

- Volume capacity can be expanded by using the free space in an existing RAID group.
- Free space that is 1GB or larger can be concatenated.
- A volume with a maximum capacity of 128TB can be created (the maximum capacity of an ODX Buffer volume is 1TB)
- Concatenation can be performed among multiple RAID groups.
- Any RAID level can be applied for a concatenation source volume and a concatenation destination volume. Concatenation can be performed regardless of the RAID level for the concatenation source volume and the concatenation destination volume.
- Data can be accessed from the host in the same way regardless of the concatenation status (before, during, or after concatenation).
- When the number of volumes in a concatenated volume is 15 or less, volumes can be added to the existing concatenated volume.

Requirements for concatenating a volume

- The "Type" is "Standard"
- The volume capacity is 1GB or larger
- When the concatenation source volume is a concatenated volume, the volume must satisfy the following requirements:
  - The number of volumes in the concatenated volume must be 15 or less
  - The capacity of the concatenated volume must be less than 128TB
    (If the concatenated volume is configured with an ODX Buffer volume, the volume must be less than 1TB)
- The "Status" is not "❌ Broken", "❌ Data Lost", "❌ Not Ready", or "🟡 Readying"
- RAID migration is not being performed (the target volume is not used as a migration source or a migration destination)
- There are no Advanced Copy sessions (local or remote) for which the copy range is "Totally" (*1)
- LDE is not being performed for the RAID group to which the target volume belongs
- Encryption is not being performed for the target volume
- A Storage Migration path is not created in the target volume
- "Cache Page Capacity" must not be limited (*2)
- Volumes are not used for the Storage Cluster function
- Data protection by "T10-DIF (Data Integrity Field)" is not enabled
- The volume is not an External Volume
  - *1:   "Totally" is specified for the copy range in the following conditions:
    - When performing a LUN to LUN copy session with the ETERNUS SF AdvancedCopy Manager Copy Control Module (CCM)
    - When performing a copy session with ETERNUS SF AdvancedCopy Manager Adapter for VMware Site Recovery Manager
    - When performing a copy session with ETERNUS VSS Hardware Provider
    - When performing a SnapOPC+ session that is specified with ETERNUS Web GUI or ETERNUS CLI
  - *2:   A "-" (hyphen) is specified for "Cache Page Capacity" by using the procedure in <u>"Modify Cache Parameters" (page 315)</u>. Note that "-" (hyphen) is the default value.

Requirements to obtain free space from RAID groups

- The "Status" is not "❌ Broken"
- The RAID group is not blocked
- LDE is not being performed in the target RAID group

- The RAID group is not an External RAID Group
- The RAID group must satisfy the following requirements:
  - The RAID group must contain Standard type volumes, WSVs, SDVs, or SDPVs
    If this is not the case, the RAID group must not contain any volumes
  - The RAID group must not belong to a TPP
  - The RAID group must not belong to an FTRP
  - The RAID group must not be registered as an REC Disk Buffer
  - The RAID group must not be registered as an EXCP
- The number of volumes registered in the target RAID group is 127 or less
- The free space for the RAID group is 1GB or larger
- The drive type for configuring the RAID group where the concatenation source volume belongs and the drive type for configuring the concatenation destination RAID group must be the following combination of drive types

		Concatenation destination drive type					
		Online	Nearline	SSD	Online SED	Nearline SED	SSD SED
Concatenation source drive type	Online	OK	Not recommended	NG	NG	NG	NG
	Nearline	Not recommended	OK	NG	NG	NG	NG
	SSD	NG	NG	OK	NG	NG	NG
	Online SED (*1)	NG	NG	NG	OK	Not recommended	NG
	Nearline SED	NG	NG	NG	Not recommended	OK	NG
	SSD SED	NG	NG	NG	NG	NG	OK

OK: Concatenation is available, Not recommended: Concatenation is available, but not a recommended configuration, NG: Concatenation is not available

*1:   In the controller firmware versions earlier than V10L32, "Online SED" is displayed as "SED".

Recommended conditions to obtain free space from RAID groups

- Set the same values for the following items to RAID groups where the concatenation source volume belongs and to RAID groups that will be concatenated.
  - RAID level
  - Drive speed
  - Drive type (Online/Nearline)
  - Drive type (Online SED/Nearline SED)
  - SSD type (SSD-M/SSD-L/SSD/SSD-M SED/SSD-L SED)
  - Drive sector format (AF-compliant/non-AF-compliant)
  - Key group setting status (SED (Enabled Key Group)/SED (Disabled Key Group))
  The speed of the drive and SSD type that configures RAID groups can be checked in the [RAID Group Detail] screen ([Drive] tab).

> ▶ **Caution**

- Backing up the data before performing volume expansion is recommended.
- This function cannot be used under the following conditions:
  - The maximum number of volumes is already registered in the ETERNUS DX/AF
  - The hot controller firmware upgrade is being performed in the ETERNUS DX/AF
  - A RAID group diagnosis is being performed in the ETERNUS DX/AF
  - A disk diagnosis is being performed in the ETERNUS DX
- Expanded volume capacity must be recognized by server.

> **N o t e**
>
> - The encryption status of volumes after concatenation is the same as the concatenation source volume.
> - Concatenated volumes are formatted automatically. Refer to the [Volume Detail] screen for format progress. Refer to "Volume Detail (Basic)" (page 802) for details.
> - To expand the TPV capacity, refer to "Expand Thin Provisioning Volume" (page 281).
> - Volume expansion (LUN concatenation) can be performed even when the concatenation source volume is being formatted.

For details on the parameters for this function, refer to "A. Expand Volume" (page 1094).

The procedure to expand volume capacity is as follows:

Procedure

1 Select the volume to be expanded and click [Expand Volume] in [Action].

> **▷ Caution**
>
> [Expand Volume] cannot be clicked when External Volumes (or volumes whose "Usage" is "Migration") are selected.

2 Click the [Add] button.

→ The [Add Capacity] screen is displayed.

3   Select the RAID group to obtain the free space from, and specify the capacity to be concatenated.
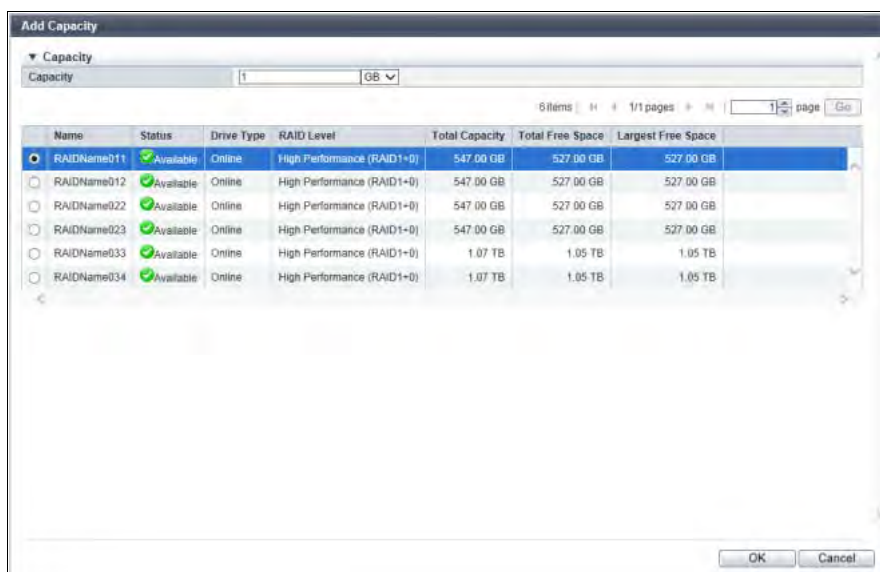
The main setting items are as follows.

● **Capacity**

• Capacity
• Select RAID Group

> **N o t e**
>
> For the "Drive Type" field, the type of drive that configures the RAID group is displayed.
> If multiple drive types are used in the RAID group, the drive type is displayed as described below.
>
> • If only "Online" type drives are used or if both "Online" and "Nearline" type drives are used, "Online" is displayed.
> • If only "Online SED" type drives are used or if both "Online SED" and "Nearline SED" type drives are used, "Online SED" is displayed.
> • "SSD" is displayed regardless of the actual SSD type (SSD-M/SSD-L/SSD).

4   Click the [OK] button.
→   Returns to the [Expand Volume] screen.

5 Repeat Step 2 through Step 4 to select RAID groups and specify the capacity. After completing these settings, click the [Expand] button.

6 A confirmation screen appears. Click the [OK] button.
→ Expansion of a volume starts.

7 Click the [Done] button to return to the [Volume] screen.

End of procedure

Encrypt Volume

This function encrypts existing volumes.
"Standard", "WSV", and "SDV" type volumes can be encrypted.

> ⏵ **Caution**
>
> - When using this function, enable the encryption mode. Refer to "Setup Encryption Mode" (page 68) for details.
> - This function is used to prevent data leakage due to removal of drives, and cannot prevent data leakage caused by server access.
> - Encrypted volumes cannot be changed to non-encrypted volumes.
> - Canceling volume encryption is not possible.
> - This function cannot be used under the following conditions:
>   - A RAID group diagnosis is being performed
>   - A disk diagnosis is being performed
>   - The hot controller firmware upgrade is being performed
>   - The disk firmware is being applied
>   - The status of the ETERNUS DX/AF is other than "Normal"
> - The following volumes cannot be encrypted:
>   - Volumes without "✅ Available" state
>   - Volumes undergoing RAID migration
>   - Volumes undergoing encryption
>   - Volumes undergoing formatting or LUN Concatenation
>   - Volumes registered in a RAID group undergoing LDE
>   - Volumes in which the drives that configure the RAID group are undergoing rebuild, copyback, or redundant copy
>   - Volumes in which the drives that configure the RAID group are "Online SEDs", "Nearline SEDs", or "SSD SEDs"
>   - Volumes that belong to a RAID group where the RAID level is "RAID6-FR"
>   - Volumes with Storage Migration paths
>   - Volumes used for the Storage Cluster function
> - The following performance may be reduced for encrypted volumes compared with non-encrypted volumes:
>   - Access to the encrypted volumes
>   - Copy transfer of encrypted volumes
> - Up to 64 volumes can be encrypted at the same time. Note that if concatenated volumes are selected, the maximum number of volumes that can be encrypted is less than 64.

> 🔵 **N o t e**
>
> TPVs cannot be encrypted with this function. TPVs that are created in an encrypted TPP are encrypted.

The procedure to encrypt a volume is as follows:

Procedure

1   Select the volume to be encrypted (multiple selections can be made) and click [Encrypt Volume] in [Action].

> **▶ Caution**
>
> [Encrypt Volume] cannot be clicked under the following conditions:
> - External Volumes (or volumes whose "Usage" is "Migration") are selected
> - Volumes which belong to a RAID group for which the Stripe Depth value is changed (*1) are selected
>
> *1:   A RAID group for which the Stripe Depth value is 128KB or more in the [RAID Group Detail] screen of [RAID Group (Basic Information)]. Note that the Stripe Depth value for RAID1 cannot be changed. Refer to "Advanced Setting" (page 1194) in "Create RAID Group" (page 1187) for details.

2   A confirmation screen appears. Click the [OK] button.
→ Encryption of the volume starts.

3   Click the [Done] button to return to the [Volume] screen.

End of procedure

TPV Management

This section describes TPV management.

TPV management provides the following functions:

- Expand Thin Provisioning Volume
- Modify Thin Provisioning Volume Threshold
- Optimize TPV/FTV Capacity
- Cancel Optimizing TPV/FTV Capacity
- Start Balancing Thin Provisioning Volume
- Stop Balancing Thin Provisioning Volume
- Reconfigure NAS Volume
- Set Allocation

Expand Thin Provisioning Volume

This function expands the capacity of a Thin Provisioning Volume.

Requirements for expanding a TPV

- TPVs that are to be expanded must be one of the following volumes:
  - TPVs for SAN
  - ODX Buffer volumes (TPV)
  - NAS user volumes
  - Deduplication/Compression Volumes
  - DEDUP_SYS Volumes
- The capacity is not 128TB or more
  - For ODX Buffer volumes, the capacity must not be more than 1TB
  - For NAS user volumes, the capacity must not be more than the maximum volume capacity of each "NAS FS Block Size". (Refer to "The maximum NAS user volume capacity and the maximum file size of each "NAS FS Block Size"" (page 282) for details.)
- There are no Advanced Copy sessions for which the copy range is "Totally" (*1)
  - *1:   "Totally" is specified for the copy range in the following conditions:
    - When performing a LUN to LUN copy session with the ETERNUS SF AdvancedCopy Manager Copy Control Module (CCM)
    - When performing a copy session with ETERNUS SF AdvancedCopy Manager Adapter for VMware Site Recovery Manager
    - When performing a copy session with ETERNUS VSS Hardware Provider
    - When performing a SnapOPC+ session that is specified with ETERNUS Web GUI or ETERNUS CLI
- Balancing is not being performed in the TPV
- RAID migration is not being performed in the TPV
- A Storage Migration path is not created in the TPV
- Not used for the Storage Cluster function
- Copy sessions are not set for NAS user volumes
- Snapshots are not set for NAS user volumes
- For DEDUP_SYS Volumes, the volumes must not be in the " Readying", " Not Available", " Not Ready", " Broken", or " Data Lost" state
- For Deduplication/Compression Volumes, the volumes must belong to a TPP that does not include a DEDUP_SYS Volume in the " Readying", " Not Available", " Not Ready", " Broken", or " Data Lost" state

> **▷ Caution**
>
> - This function cannot be performed when there is no TPV in the ETERNUS DX/AF.
> - The total capacity of TPVs in a TPP must be smaller than the total capacity that can be used to expand the TPP. The value of "total capacity that can be used to expand the TPP" is displayed in the "Total Capacity after expand" field of the [Expand Thin Provisioning Pool] screen. Refer to "Expand Thin Provisioning Pool" (page 549) for details.
> - This function cannot be performed when there is no free space for expansion in the ETERNUS DX/AF.
> - Expanded TPV capacity must be recognized by the server.
> - When the file system format for the NAS user volume does not support a capacity expansion, a message appears. Convert the file system format and perform this function again. Refer to "Reconfigure NAS Volume" (page 289) for details.
> - If the NAS user volume capacity is expanded while an automatic meta cache redistribution is being performed, the process may be delayed for a maximum of five minutes. If the redistribution process is not complete within five minutes, an error occurs for this function.
> - If the total logical capacity of the Deduplication/Compression target volumes (Deduplication/Compression Volumes) that are to be created in the same TPP is 8TB or larger, the logical capacity of the DEDUP_SYS Volume in the relevant TPP must be expanded.
> - If the efficiency of the Deduplication/Compression function cannot be estimated, setting the total logical capacity of the Deduplication/Compression Volumes smaller than the logical capacity of the DEDUP_SYS Volume is recommended. Use this function to expand the logical capacity of the DEDUP_SYS Volume before starting the Deduplication/Compression process (or before creating Deduplication/Compression Volumes).
> - To expand DEDUP_SYS Volumes, stop or suspend the Advanced Copy session for all the Deduplication/Compression Volumes in the TPP to which the target DEDUP_SYS Volume belongs.

> **● N o t e**
>
> - The maximum total capacity of TPVs depends on the maximum pool capacity that is specified with the [Set Thin Provisioning] function. The currently specified maximum pool capacity is displayed in the [Settings] screen under the [Thin Provisioning] navigation. Refer to "Settings (Thin Provisioning)" (page 922) for details. Note that the total logical capacity of TPVs does not include the Deduplication/Compression Volume capacity.
> - The allocation method for the TPV can be checked in the [Volume List] screen. Refer to "Volume (Basic Information)" (page 775) for details.
> - The "NAS FS Block Size" for the NAS user volume can be checked in the [Volume Detail] screen. Refer to "Volume Detail (Basic)" (page 802) for details.

The maximum NAS user volume capacity and the maximum file size of each "NAS FS Block Size"

	NAS FS Version (*1)	NAS FS Block Size			Remarks
		8KB	32KB	256KB	
Maximum NAS user volume capacity	1 or 2	–	–	128TB	NAS FS block size is fixed to "256KB".
	3	4TB	16TB	–	For a NAS user volume created with a "256KB" NAS FS block size, NAS FS version is "2".
	4 or 5	32TB	128TB	128TB	
Maximum file size (*2)	1 or 2	–	–	32TB	NAS FS block size is fixed to "256KB".
	3, 4, or 5	1TB	4TB	32TB	

*1:   NAS file system (NAS user volume) version. For the details, refer to "Volume Detail (Basic)" (page 802).

*2:   The file size indicates the size of the user data that is created in the shared folder.

For details on the parameters for this function, refer to "A. Expand Thin Provisioning Volume" (page 1095).

The procedure to expand Thin Provisioning Volume capacity is as follows:

Procedure

1 Select the TPV to be expanded and click [Expand TPV] in [Action].

> ▷ **Caution**
>
> If NAS system volumes, NAS backup volumes, or DEDUP_MAP Volumes are selected, [Expand TPV] cannot be clicked.

2 Input the TPV capacity after expansion.

The main setting item is as follows.

● **Volume Setting**

• Volume Capacity after expand

3 Click the [Expand] button.

> ▷ **Caution**
>
> When expanding the TPV where the allocation method is "Thick" and the free space in the TPP is insufficient, an error screen appears. Check the parameter settings.

4 A confirmation screen appears. Click the [OK] button.
→ Expansion of a TPV starts.

5 Click the [Done] button to return to the [Volume] screen.

> ▷ **Caution**
>
> If the "Provisioned Capacity" (or the total logical capacity) of the volumes that exist within the TPP exceeds the total capacity of the TPP (or if the "Provisioned Rate" (or the capacity rate) exceeds "100 %") after the volume capacity expansion, a warning message appears in the result screen. Check the TPP used state and add drives to expand the TPP capacity as required. Check the [Thin Provisioning Pool Detail] screen for "Provisioned Rate". Refer to "Thin Provisioning Pool Detail (Basic)" (page 899) for details.

End of procedure

Modify Thin Provisioning Volume Threshold

This function changes the threshold for monitoring the usage ratio of TPV. The usage ratio is the ratio of used capacity (physically allocated capacity) to the logical TPV capacity.

🔵 **N o t e**

- This function changes the threshold of a TPV that is created by using the "Create Volume" (page 246).
- The same threshold can be applied for multiple TPVs in a single operation.

For details on the parameters for this function, refer to "A. Modify Thin Provisioning Volume Threshold" (page 1095).
For the factory default settings for this function, refer to "B. Modify Thin Provisioning Volume Threshold" (page 1268).

The procedure to change the threshold of Thin Provisioning Volume is as follows:

Procedure

1 Select the TPV for which the threshold is to be changed (multiple selections can be made) and click [Modify TPV Threshold] in [Action].

▷ **Caution**

If NAS expanded system volumes, Deduplication/Compression Volumes, or Deduplication/Compression System Volumes are selected, [Modify TPV Threshold] cannot be clicked.

2 Specify the new threshold.
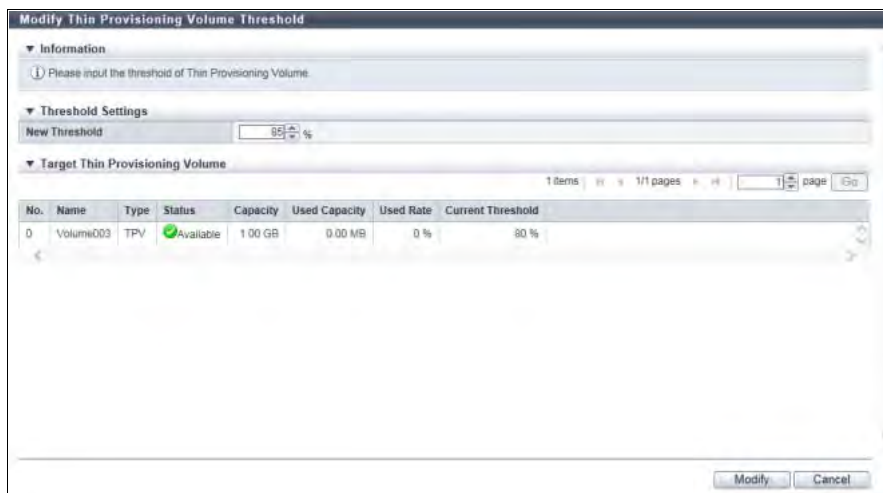
The main setting item is as follows.

● **Threshold Setting**

- New Threshold

3 Click the [Modify] button.

4 A confirmation screen appears. Click the [OK] button.
  → Setting of the TPV threshold starts.

5   Click the [Done] button to return to the [Volume] screen.

End of procedure

Optimize TPV/FTV Capacity

The optimizing capacity (Zero Reclamation) function releases the physical area when data in the block (*1) that is allocated to a TPV or an FTV is filled with zeros.
This function optimizes TPV or FTV capacity.
*1:   Volume allocation unit

Volume requirements for optimizing TPV/FTV capacity:

- Volumes for which "Type" is "TPV" or "FTV"
- Volumes without "🔄 Readying" state, "❌ Not Ready" state, or "❌ Broken" state
- Volumes that are not undergoing TPV/FTV capacity optimization or volumes that are not reserved for optimization
- Volumes that are not ODX Buffer volumes
- Volumes that are not undergoing RAID migration
- Volumes that are not undergoing TPV balancing
- FTVs that are not undergoing FTRP balancing
- Volumes where the allocation method is not "Thick"

▷ **Caution**

- This function cannot be performed when the storage system status is "Not Ready".
- Do not execute capacity optimization for NAS user volumes, NAS backup volumes, and NAS system volumes.

⬤ **N o t e**

- The Thin Provisioning function and the Flexible Tier (Automated Storage Tiering) function can be effectively used by using the Optimize TPV/FTV Capacity function when system configurations or system environment modifications are performed. Examples of when to use the Optimize TPV/FTV Capacity function are as follows:
    - After the initialization of the OS or the file system (such as writing 0 data to all the volumes) is complete
    - After RAID migration from "Standard" to "TPV" is complete
    - After RAID migration from "Standard" to "FTV" is complete
- The progress of the optimizing can be checked with "Optimizing Capacity Progress" on the [Volume Detail] screen (Basic). Refer to "Volume Detail (Basic)" (page 802) for details.
- The optimizing capacity can be reserved for the source volume of the RAID migration. Refer to "Start RAID Migration" (page 296) for details.

The procedure to start optimizing TPV/FTV capacity is as follows:

Procedure

1   Select which volumes to start optimization for (multiple selections can be made), and click [Optimize TPV/FTV Capacity] in [Action].

> **▷ Caution**
>
> • [Optimize TPV/FTV Capacity] cannot be clicked under the following conditions.
>   - Even if the selected volume type is "FTV", the usage is "System"
>   - NAS expanded system volumes are selected
>   - The Deduplication/Compression Volumes are selected
> • If the controller firmware is being applied, an error screen appears.

2   A confirmation screen appears. Click the [OK] button.
        → The optimization of the TPV capacity or the FTV capacity starts.

3   Click the [Done] button to return to the [Volume] screen.

End of procedure

Cancel Optimizing TPV/FTV Capacity

This function stops optimizing TPV/FTV capacity.

> **▷ Caution**
>
> • TPV/FTV capacity optimization cannot be suspended and restarted (restarting capacity optimization from where it was stopped). If TPV/FTV capacity optimization is stopped and then started again, the TPV/FTV capacity optimization process starts from the first volume at the top again.
> • This function cannot release the volumes that are reserved for TPV/FTV capacity optimization. The reservation status of TPV/FTV capacity optimization is released only when RAID migration is stopped.
> • This function cannot be performed when the storage system status is "Not Ready".

> **◯ N o t e**
>
> The progress of TPV/FTV capacity optimization can be checked with "Process" on the [Volume] screen. Refer to for details.

The procedure to stop TPV/FTV capacity optimization is as follows:

Procedure

1   Select the volume to stop optimization (multiple selections can be made), and click [Cancel Optimizing TPV/FTV Capacity] in [Action].

2   A confirmation screen appears. Click the [OK] button.
        → Optimization of the TPV capacity or the FTV capacity stops.

3   Click the [Done] button to return to the [Volume] screen.

End of procedure

Start Balancing Thin Provisioning Volume

This function relocates the physical allocating area of the TPV to make the physical area of TPV is allocated equally among the RAID Groups that configure the TPP.
When multiple TPVs in the same TPP are accessed, the physical area is allocated by using the RAID groups of the TPP one by one in the access order. Therefore the physical area of TPVs may be unequally allocated among the RAID groups. This phenomenon also occurs when expanding the capacity of a TPP. In this case, the physical area is allocated unevenly among the newly added and existing RAID groups. This function is to solve the unequal allocation among RAID groups, and balance the physical allocating area in each RAID group. I/O load is dispersed among the RAID groups in the TPP and access performance may be improved.

Requirements for a TPV to be balanced:

- The "Type" is "TPV"
- The "Status" is " Available"
- RAID migration is not being performed (the target volume is not used as a migration source or a migration destination)
- An Advanced Copy is not being performed (the target volume is not being used as a copy source or a copy destination)
- A Remote Advanced Copy is not being performed (the target volume is not being used as a copy source or a copy destination)
- ODX is not being performed
- TPV balancing is not being performed
- Capacity optimization for TPV is not being performed
- Not used as Deduplication/Compression Volumes
- Not used as Deduplication/Compression System Volumes

Requirements for a TPP in which the target TPV is registered:

- The "Status" is " Available"
- The free space in the TPP is the same or larger than the capacity of the TPV that is to be balanced
- When the allocation mode for the TPV is "Thick", the free physical capacity for allocating the whole area exists

> **⯈ Caution**

- The TPV balancing cannot be performed in the following conditions:
    - When the maximum number of volumes is already registered in the ETERNUS DX/AF
    - When the total number of TPV balancing, RAID migration, and FTV balancing (*1) processes that are performed at the same time is 32
    - When the total capacity for the TPV balancing, RAID migration, and FTV balancing (*1) processes that are performed at the same time is 128TB
    - When the TPP capacity that can be registered in the ETERNUS DX/AF is insufficient
    - The control information for Thin Provisioning is being re-configured in the ETERNUS DX8700 S3/DX8900 S3 (*2)
    - The sum of the total logical capacity for all the volumes in the pool and the capacity of the work volume exceeds the maximum pool capacity (*3)
    - *1: When the FTRP balancing is performed, the FTV balancing process starts in the FTSP. Refer to "Start Balancing Flexible Tier Pool" (page 567) for details.
    - *2: If the system message indicates a re-configuration, the control information for Thin Provisioning is being synchronized in each CM. Wait at least five minutes before performing this function again. If a work volume that has failed to be deleted is displayed in the volume list, delete the relevant volume.
    - *3: When a TPV balancing is performed, an area for a work volume (or the migration destination TPV with the same capacity as the migration source) is temporarily acquired in the TPP to which the target TPV belongs. Therefore, if the sum of the work volume capacity and the total logical capacity of the volumes (TPVs and FTVs) in all the existing pools (TPPs and FTRPs) exceeds the maximum pool capacity, a work volume cannot be created, and this function becomes unavailable.
- This function balances the physical allocating area of the TPV among RAID groups of the TPP to which the TPV belongs. It is not able to balance TPV by RAID migration of the TPV to other TPPs.

> **◉ N o t e**

- TPV balancing can be performed during the workload I/O.
- To check the balancing progress of a TPV, refer to "Balancing Thin Provisioning Volume" (page 797).
- The allocation method for the TPV can be checked in the [Volume List] screen. Refer to "Volume (Basic Information)" (page 775).

The procedure to start balancing TPVs is as follows:

Procedure

1 Select the TPV to be balanced and click [Start Balancing] in [Action].

> **⯈ Caution**
>
> [Start Balancing] cannot be clicked if NAS expanded system volumes are selected.

2 A confirmation screen appears. Click the [OK] button.
→ TPV balancing starts.

3 Click the [Done] button to return to the [Balancing Thin Provisioning Volume] screen.

End of procedure

Stop Balancing Thin Provisioning Volume

This function stops TPV balancing

> ▷ **Caution**
>
> - This function cannot be used when the TPV balancing is not being performed.
> - This function cannot be used when the specified TPV balancing is already complete.

> ⬤ **N o t e**
>
> When TPV balancing is stopped, data in volumes that are not balanced yet can be accessed normally.

The procedure to stop balancing of the Thin Provisioning Volume is as follows:

Procedure

1 Select the volume for which balancing is to be stopped and click [Stop Balancing] in [Action].

2 A confirmation screen appears. Click the [OK] button.
   → TPV balancing stops.

3 Click the [Done] button to return to the [Balancing Thin Provisioning Volume] screen.

End of procedure

Reconfigure NAS Volume

This function reconfigures the file system format for the NAS user volume to support volume expansion.
This function is used in a Unified Storage environment.

> ▷ **Caution**
>
> - Some NAS user volumes require a reconfiguration of the file system format to be compatible with volume expansion. For volumes that must be reconfigured, a message appears and volume expansion is not possible. Volume expansion can be performed for volumes that do not require a reconfiguration and volumes that have already been reconfigured. Refer to "Expand Thin Provisioning Volume" (page 281) for details.
> - Perform the following operations before reconfiguring the NAS user volume.
>   - Perform a CIFS unmount and an NFS unmount from the client. In addition, if the controller firmware version is V10L31 or earlier, stop the operation for all file systems because the file lock state is released. A file system format conversion process takes a maximum of 15 minutes. Wait until the complete screen is displayed.
>   - Backup data in the NAS user volume to a different area in advance (if reconfiguration fails, data cannot be recovered from the original NAS user volume). Data can be recovered from the backed up data.

N o t e

- This function converts the file system format of the NAS user volume. Conversion targets are volumes of which the "Usage Details" are "NAS Data". Refer to "Volume Detail (Basic)" (page 802) for details.
- If the following conditions are all satisfied, the maximum NAS user volume capacity can be expanded by converting the file system format with this function. The version and the block size of the NAS file system (or the NAS user volume) are displayed in the [Volume Detail] screen. Refer to "Volume Detail (Basic)" (page 802) for details.
  - NAS file system version is "3"
  - The block size of the NAS file system is "8KB" or "32KB"

The procedure to reconfigure the file system format for NAS user volume is as follows:

Procedure

1 Select the NAS user volume (TPV) that is to be reconfigured and click [Reconfigure NAS Volume] in [Action].

▷ **Caution**

If the NAS user volume has been accessed, an error screen appears. Check the parameter settings.

N o t e

A confirmation message that indicates the NAS file system version is updated to "5" is displayed.

2 A confirmation screen appears. Click the [OK] button.
→ Reconfiguration of the NAS volume starts.

3 Click the [Done] button to return to the [Volume] screen.

End of procedure

Set Allocation

This function changes the allocation method for the existing TPVs and FTVs.
There are two allocation modes. The default setting is "Thin".

- Thin
  Physical area is allocated to the target area of the volume when a write I/O is received.
  This method virtualizes and allocates the storage capacity to reduce the physical capacity of the storage.
- Thick
  Physical area is allocated to the whole area of the volume when volumes are created.
  This method is used for volumes such as those allocated for the system area to prevent system halts due to pool exhaustion during operations.

> **▷ Caution**
>
> - This function is available for "TPV" or "FTV" type volumes. Note that this function cannot be used for "TPV" type volumes that are used as Deduplication/Compression Volumes and Deduplication/Compression System Volumes.
> - If the allocation method is changed from "Thick" to "Thin", optimize the capacity. If a capacity optimization is not performed, the used capacity (the physical capacity that is allocated to volumes in the entire TPP) is not reduced. Refer to [Optimize TPV/FTV Capacity] for details.
> - This function cannot be used if the allocation method is changed from "Thin" to "Thick" when the free space in the TPP or FTRP has been insufficient.
> - This function cannot be used when the capacity releasing from the server is being performed.
> - This function cannot be used if one of the following conditions is true for the selected volume:
>   - A capacity optimization is being performed or a capacity optimization is being reserved when the allocation method is changed to "Thick"
>   - RAID migration is being performed
>   - TPV balancing is being performed
>   - FTRP balancing is being performed
>   - The selected volume belongs to a TPP with a "❌ Broken" state
>   - The selected volume belongs to an FTRP with a "❌ Broken" state
>   - The selected volume is a work volume that is created during a RAID migration

> **◯ Note**
>
> - The volume allocation method can be selected when creating a "TPV" or a "NAS Volume". The default value is "Thin". Refer to "Create Volume" (page 246) for details.
> - For "TPV" type ODX Buffer volumes, the volume allocation method can be selected during volume creation. Refer to "Create ODX Buffer Volume" (page 629) for details.
> - For "FTV" type volumes and for "FTV" type ODX Buffer volumes, the volume allocation method is specified during volume creation with ETERNUS CLI or ETERNUS SF Storage Cruiser.
> - The volume allocation method can also be changed when performing a RAID migration. Refer to "Start RAID Migration" (page 296) for details.

For details on the parameters for this function, refer to "A. Set Allocation" (page 1096).
For the factory default settings for this function, refer to "B. Set Allocation" (page 1268).

The procedure to change the allocation method is as follows:

Procedure

1 Select which volume to change the allocation method for (multiple selections can be made) and click [Set Allocation] in [Action].

> **▷ Caution**
>
> [Set Allocation] cannot be clicked in the following conditions.
> - Even if the selected volume type is "FTV", the usage is "System"
> - NAS expanded system volumes are selected
> - The Deduplication/Compression Volumes are selected
> - The Deduplication/Compression System Volumes are selected

2   Select the allocation method.
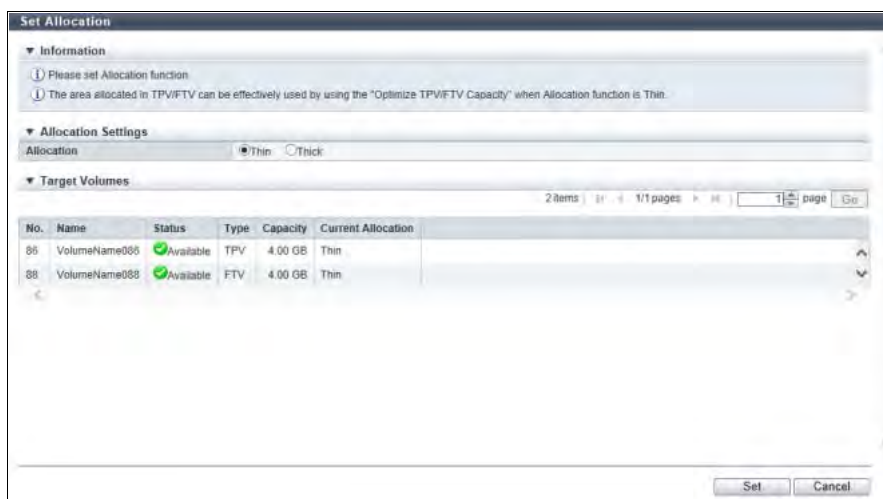
The main setting item is as follows.

● **Allocation Settings**

   • Allocation

3   Click the [Set] button.

4   A confirmation screen appears. Click the [OK] button.
→ Setting of the allocation method starts.

5   Click the [Done] button to return to the [Volume List] screen.

End of procedure

SDV/SDPV Management

This section describes SDV/SDPV management.

SDV/SDPV management provides the following functions:

- Delete Snap Data Pool Volume
- Force Delete Snap Data Pool Volume
- Initialize Snap Data Volume

Delete Snap Data Pool Volume

An SDPV is a logical volume that is created in the SDP.
This function deletes an SDPV to reduce SDP capacity.

▷ **Caution**

Registering a license for the Advanced Copy function or the Unified Storage environment is required to use this function.

⬤ **N o t e**

If the target SDPV is currently being used, it will be deleted after the SDPV is released.

The procedure to delete an SDPV is as follows:

Procedure

1   Select the SDPV to be deleted (multiple selections can be made) and click [Delete SDPV] in [Action].

2   A confirmation screen appears. Click the [OK] button.

⬤ **N o t e**

If the SDPV is currently being used, the target SDPV status is changed to "Reserved Deletion". The "Reserved Deletion" state can be checked in the [Volume Detail] screen. Refer to "Volume Detail (Basic)" (page 802).

→ Deletion of SDPV starts.

3   Click the [Done] button to return to the [Volume] screen.

End of procedure

Force Delete Snap Data Pool Volume

An SDPV is a logical volume that is created in the SDP.
This function forcibly deletes an SDPV regardless of whether it being used or not to reduce SDP capacity.

▷ **Caution**

- Registering a license for the Advanced Copy function or the Unified Storage environment is required to use this function.
- If the currently used SDPV is deleted, an error occurs for the SnapOPC session or the SnapOPC+ session that is using the relevant SDPV.

● **N o t e**

An SDPV that is in the "Reserved Deletion" state can be deleted.

The procedure to forcibly delete an SDPV is as follows:

Procedure

1 Select the SDPV to be deleted (multiple selections can be made) and click [Force Delete SDPV] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ Deletion of SDPV starts.

3 Click the [Done] button to return to the [Volume] screen.

End of procedure

Initialize Snap Data Volume

This function initializes an SDV.
An SDV is a copy destination volume for SnapOPC and SnapOPC+ that includes a data area and a copy control information area. SDV initialization is performed when the capacity that can be used for the data area is insufficient due to a large amount of writing being requested from the host to an SDV for any reason (such as an operation mistake). SDV initialization is also performed when no more writing is allowed due to a notification being reported to the host for a writing request that exceeds the SDV capacity.

▷ **Caution**

- After initializing an SDV, any data that is stored in the SDV cannot be accessed. Make sure to backup the required data.
- This function cannot be used under the following conditions:
  - The target volume status is not "✅ Available"
  - Advanced Copy is being performed in the target volume
  - Snapshot is set for the target volume

● **N o t e**

When an SDV is initialized, the area that is allocated from the SDPV to the SDV is released.

The procedure to initialize an SDV is as follows:

Procedure

1   Select the SDV to be initialized (multiple selections can be made) and click [Initialize SDV] in [Action].

2   A confirmation screen appears. Click the [OK] button.
→ Initialization of the SDV starts.

3   Click the [Done] button to return to the [Volume] screen.

End of procedure

Start RAID Migration

RAID migration (hereinafter also referred to as migration) moves an existing volume in a RAID group, TPP, or FTRP to a free space in another RAID group, TPP, or FTRP. After migration is complete, the migration source volume is automatically deleted. This function can also be used to change the number of concatenations for WSV.
Migration provides the following features:

- Load balancing of host access.
- Volume types can be changed during a volume migration.
  (Except for volumes that are used for the Storage Cluster function.)
- Volume capacity expansion is available when migrating volumes.
  (Only when the volume type is "Standard" or "WSV". Except for volumes that are used for the Storage Cluster function.)
- The RAID level of the volume can be changed.
- The number of concatenations for WSVs can be increased or reduced.
- The Wide Stripe Size for WSVs can be changed.
- Deduplication or Compression can be changed (enabled or disabled).
- Data migration can be performed for the External Volumes (Non-disruptive Storage Migration).
- Because creation and format of new volumes and host interface establishment are automatically performed, users are allowed to access the data anytime without being affected by the migration.

Migration type

The combinations of volume types that can be migrated are shown below.
For ODX Buffer volumes, the available combinations are dependent on the volume type.

Migration source volume	Migration destination volume					
	Standard	Standard (LUN Concatenation)	Standard (External) (*1)	WSV	TPV	FTV
Standard	Available	N/A	N/A	Available	Available (*2)	Available (*2)
Standard (LUN Concatenation)	Available	N/A	N/A	Available	Available (*2)	Available (*2)
Standard (External) (*1)	Available	N/A	N/A	Available	Available (*2)	Available (*2)
WSV	Available	N/A	N/A	Available	Available (*2)	Available (*2)
TPV (*3)	Available (*4)	N/A	N/A	Available (*4)	Available	Available
FTV (*5)	Available (*4)	N/A	N/A	Available (*4)	Available	Available

Available: Migration is available,
N/A: Migration is not available

*1: This indicates the External Volumes. It is referred to as "Standard (External)" in this section. As a "Standard" volume, it can be migrated to "Standard", "WSV", "TPV", or "FTV" type volumes. However, this volume cannot be used as a migration destination.

*2: When migration from "Standard" or "WSV" to "TPV" or "FTV" is performed, 100% of the logical capacity of the "Standard" or "WSV" is allocated as the physical capacity for the "TPV" or "FTV". When "Start Optimizing TPV/FTV Capacity after migration" is enabled, the physical area that is filled with zeros can be released after the migration is complete.

*3: Only "TPV" can be selected as the migration destination when the migration source TPV is a NAS user volume, a NAS backup volume, or a NAS system volume.

*4: When migration from "TPV" or "FTV" to "Standard" or "WSV" is performed, 100% of the logical capacity of the "TPV" or "FTV" is allocated as the logical capacity for "Standard" or "WSV".

*5: If the migration source FTV usage is "System", only "FTV" can be selected as the migration destination. (A migration is not allowed for Virtual Volumes (VVOLs). However, "$VVOL_META" can be migrated. "$VVOL_META" is a system volume that is used for storing the management information (metadata) of the Virtual Volume function.)

Combinations of volume types for which capacity expansion is available

The combinations of volume types for which capacity expansion can be performed are shown below.
For ODX Buffer volumes, the available combinations are dependent on the volume type.

Migration source volume	Migration destination volume					
	Standard	Standard (LUN Concatenation)	Standard (External)	WSV	TPV	FTV
Standard	Available (*1)	–	N/A	Available	N/A	N/A
Standard (LUN Concatenation)	Available	–	N/A	Available	N/A	N/A
Standard (External)	Available (Not recommended) (*2)	–	N/A	Available (Not recommended) (*2)	N/A	N/A
WSV	Available	–	N/A	Available	N/A	N/A
TPV	N/A	–	N/A	N/A	N/A	N/A
FTV	N/A	–	N/A	N/A	N/A	N/A

Available: Capacity expansion is available
Available (Not recommended): Capacity expansion is available, but not recommended
N/A: Capacity expansion is not available
–: Migration is not available

*1:   The capacity of the ODX Buffer volume can be expanded to 1TB.

*2:   For migrations where the migration source volume is an External Volume (Standard (External)), setting the same capacity as the migration source volume for the migration destination volume is recommended.

Combinations of the Deduplication and Compression settings for which migration is available

The combinations of migration source volumes and migration destination volumes when "Deduplication" and "Compression" are enabled or disabled for the migration destination volume are shown below.
For "ODX Buffer Volumes", the available combinations are dependent on the volume type.

Migration source volume	Deduplication or Compression settings for migration destination volume		Migration destination (*1)					
	Deduplication	Compression	RAID Group	TPP				FTRP
				Only Deduplication is enabled	Only Compression is enabled	Deduplication and Compression are enabled	Deduplication and Compression are disabled	
• Standard • Standard(LUN Concatenation) • Standard (External) • WSV • TPV (Only Deduplication is enabled) • TPV (Only Compression is enabled) • TPV (Deduplication and Compression are enabled) • TPV (Deduplication and Compression are disabled) • FTV	Enable	Enable	N/A	N/A	N/A	Available	N/A	N/A
	Enable	Disable	N/A	Available	N/A	N/A	N/A	N/A
	Disable	Enable	N/A	N/A	Available	N/A	N/A	N/A
	Disable	Disable	Available	Available	Available	Available	Available	Available
TPV (NAS volume)	Disable (*2)	Disable (*2)	–	–	–	–	Available	–

Available: Migration is available
N/A: Migration is not available
–: Not displayed or not available

*1:   "Wide Striping Volume" can be selected as the migration destination. If "Wide Striping Volume" is selected, "Deduplication" and "Compression" are fixed to "Disable". For the available migration combinations when "Wide Striping Volume" is selected, refer to .

*2:   If the migration source TPV is a NAS volume (NAS user volume, NAS backup volume, or NAS system volume), "Deduplication" and "Compression" are fixed to "Disable" because the Deduplication/Compression function is not supported.

Combinations of encryption conditions for which migration is available

The combinations of encryption conditions for which migration can be performed are shown in the following table.

Security priority	Encryption setting for the migration source volume	Encryption setting for the migration destination volume			
		None	by CM (*1)	use SED (Disabled Key Group) (*2)	use SED (Enabled Key Group) (*3)
Yes	None	Available	Available	Available	Available
	by CM	Available	Available	Available	Available
	use SED (Disabled Key Group)	Available	Available	Available	Available
	use SED (Enabled Key Group)	Available	Available	Available	Available
No (*4)	None	Available	Available	Available	Available
	by CM	N/A	Available	Available	Available
	use SED (Disabled Key Group)	N/A	Available	Available	Available
	use SED (Enabled Key Group)	N/A	N/A	N/A	Available

Available: Migration is available
N/A: Migration is not available

*1: When the encryption mode is disabled, "by CM" cannot be selected.

*2: Online SEDs, Nearline SEDs, and SSD SEDs that are managed by the common key (the RAID groups are not registered in the key group).

*3: Online SEDs, Nearline SEDs, and SSD SEDs for which the SED authentication key is managed by the key server (the RAID groups are registered in the key group). In this case, only RAID groups can be selected as the migration destination. Note that TPPs and FTRPs cannot be selected.

*4: If a user without the "Security Setting" policy logs into ETERNUS Web GUI, migration to reduce the security level cannot be performed.

Requirements for a migration source volume

- The "Type" is "Standard", "WSV", "TPV", or "FTV"
- The "Status" is not "✖ Broken"
- Formatting is not being performed (when the volume type is "Standard" or "WSV")
- Migration is not being performed (the target volume is not used as a migration source or a migration destination)
- TPV balancing is not being performed
- FTRP balancing is not being performed (*1)
- LDE is not being performed for the RAID group to which the target volume belongs
- Encryption is not being performed for the target volume
- A Storage Migration path is not created in the target volume
- For Deduplication/Compression Volumes, the volumes must belong to a TPP that does not include a DEDUP_SYS Volume in the "🟡 Readying", "✖ Not Available", "✖ Not Ready", "✖ Broken", or "✖ Data Lost" state

  *1: When the FTRP balancing is performed, the FTV balancing process starts in the FTSP. Refer to "Start Balancing Flexible Tier Pool" (page 567) for details.

Requirements for a migration destination RAID group

- The maximum number of volumes are not set in the destination RAID group
  Migration creates new volumes. The maximum number of volumes that can be created depends on the ETER-NUS DX/AF model.

Model	The maximum number of volumes	
	per RAID group	per ETERNUS DX/AF
ETERNUS DX60 S4/DX60 S3	128	1024
ETERNUS DX100 S4/DX100 S3		2048 (4096) (*1)
ETERNUS DX200 S4/DX200 S3		4096 (8192) (*1)
ETERNUS DX500 S4/DX500 S3 ETERNUS DX600 S4/DX600 S3		16384
ETERNUS DX8100 S3		16384
ETERNUS DX8700 S3 ETERNUS DX8900 S3		65535
ETERNUS AF250 S2/AF250		3072
ETERNUS AF650 S2/AF650		12288
ETERNUS DX200F		1536

   *1:   Values in parentheses indicate the maximum number of volumes when "Expand Volume Mode" is "Enable".

- "Standard", "WSV", "SDV", or "SDPV" is registered in the RAID group or the RAID group is not being used
- The RAID group does not belong to a TPP
- The RAID group does not belong to an FTRP
- The RAID group is not registered as an REC Disk Buffer
- The RAID group is not registered as an EXCP
- The "Status" of the RAID group is " Available"
- The RAID group is not blocked
- The free space of the RAID group is more than the capacity of the migration source volume (*1)
- The RAID group is not the same RAID group as the RAID group to which the migration source volume belongs
- LDE is not being performed in the target RAID group
   *1:   If the migration source is a TPV or an FTV, the capacity of the migration source volume indicates the logical capacity of the TPV or the FTV.
          If the migration source is a Deduplication/Compression Volume and "Disable" is selected for "Deduplication" and "Compression", the capacity of the migration source volume indicates the logical capacity of the Deduplication/Compression Volume.

Requirements for RAID groups that configure a migration destination WSV

- "Standard", "WSV", "SDV", or "SDPV" is registered in the RAID group or the RAID group is not being used
- The "Status" of the RAID group is " Available"
- The maximum number of volumes are not created in the RAID group (*1)
- The RAID group does not belong to a TPP
- The RAID group does not belong to an FTRP
- The RAID group is not registered as an REC Disk Buffer
- The RAID group is not registered as an EXCP
- The RAID group is not blocked
- LDE is not being performed in the target RAID group

- When using existing RAID groups (RAID groups configure the migration source WSV) to increase the number of concatenations, the RAID groups that are added must satisfy the following conditions:
    - The RAID group is the same RAID level as the existing RAID groups
    - The number of member drives in the RAID group is the same as the existing RAID groups
    - The Stripe Depth value is the same as the existing RAID groups
    - The drive type is the same as the existing RAID groups
    - The disk speed is the same as the existing RAID groups (recommended)
    - The SSD type (SSD-M/SSD-L/SSD-M SED/SSD-L SED) is the same as the existing RAID groups (recommended)
    - The key group setting is the same as the existing RAID groups (recommended)
- When using existing RAID groups to increase the number of concatenations, all of the RAID groups, including the existing RAID groups, must have sequential free area to migrate volumes (*2)
- When reducing the number of concatenations, all of the RAID groups that configure a WSV must have sequential free area to migrate volumes (*2)
- The number of concatenations for RAID group must be 2 - 64
    - *1:   When the migration destination is a WSV, one volume for each RAID group that configures striping is required (the same number of volumes as the number of RAID groups in total).
    - *2:   Because the volume (a part of the WSV that is striped by each RAID group) is moved into the free area in the same RAID group when migration is performed, another sequential free area is required as a migration destination in addition to the currently used area in the RAID group.

Requirements for a migration destination TPP

- The "Status" is "✅ Available", "🟡 Partially Readying", or "⚠️ Exposed"
- The TPP capacity is equal to or larger than the capacity of the migration source volume (*1)
- The sum of the total logical capacity for all the volumes in the pool and the capacity of the work volume is smaller (*2) than the maximum pool capacity (*3)
- The TPP is not the same as the TPP to which the migration source volume belongs (*4)
- The TPP does not include the DEDUP_SYS Volume in the "🟡 Readying", "❌ Not Available",

  "❌ Not Ready", "❌ Broken", or "❌ Data Lost" state if "Deduplication", "Compression", or both for the TPP are enabled
- The capacity of the migration destination TPP is not exhausted (*5)
    - *1:   If the migration source is a TPV or an FTV, the capacity indicates the used capacity (physical capacity that is allocated from a TPP or an FTRP).
      If the migration source is a Deduplication/Compression Volume and "Disable" is selected for "Deduplication" and "Compression", the capacity of the migration source volume indicates the logical capacity of the Deduplication/Compression Volume.
    - *2:   When a RAID migration is performed, an area for a work volume (or the migration destination TPV with the same capacity as the migration source) is temporarily acquired in the migration destination TPP. Therefore, if the sum of the work volume capacity and the total logical capacity of the volumes (TPVs and FTVs) in all the existing pools (TPPs and FTRPs) exceeds the maximum pool capacity, a work volume cannot be created, and this function becomes unavailable.
    - *3:   The maximum pool capacity is the maximum total capacity for TPPs and FTRPs that can be created in the ETERNUS DX/AF. Refer to "Create Thin Provisioning Pool" (page 539) for details.
    - *4:   Note that the same TPP as the migration source volume can be selected for the following conditions.
        - A migration from a Deduplication/Compression Volume to a TPV
          (when the "Deduplication" and "Compression" settings for the migration destination are both disabled)
        - A migration from a TPV to a Deduplication/Compression Volume
          (when the "Deduplication" and "Compression" settings for the migration destination are same as the TPP to which the migration source volume belongs)
    - *5:   If "Deduplication" or "Compression" for the migration destination volume is enabled and the migration destination TPP capacity is exhausted, an error occurs. Start the migration after expanding the TPP capacity.

Requirements for a migration destination FTRP

- The "Status" is " ✅ Available", " 🟠 Partially Readying", or " ⚠ Exposed"
- The capacity of the FTRP is more than the capacity of the migration source volume (*1)
- The capacity of the migration source volume is less than the maximum pool capacity (*2) for each model
- The FTRP is not the same as the FTRP to which the migration source volume belongs
  - *1:   When the migration source is a TPV or an FTV, the capacity of the migration source volume indicates used capacity (the physical capacity that is allocated from a TPP or an FTRP).
    If the migration source is a Deduplication/Compression Volume and "Disable" is selected for "Deduplication" and "Compression", the capacity of the migration source volume indicates the logical capacity of the Deduplication/Compression Volume.
  - *2:   The maximum pool capacity is the maximum total capacity for TPPs and FTRPs that can be created in the ETERNUS DX/AF. Refer to "Create Thin Provisioning Pool" (page 539) for details.

> **▷ Caution**

- The encryption function cannot be used for the ETERNUS DX60 S4/DX60 S3.
- To change the data protection method (Default/T10-DIF) for the migration destination, perform the following procedure.
  - Stop host access in advance.
  - Reboot the server after the migration is complete.
- After the migration of the External Volume is successfully completed, the migration source External Volume is deleted. Delete the "External RAID Groups", "External Drives", and "Non-disruptive Storage Migration License" after the migration is complete. Refer to "Delete External RAID Group" (page 533), "Delete External Drive" (page 195), and "Delete Non-disruptive Storage Migration License" (page 59) for details.
- Migration cannot be performed under the following conditions:
  - The maximum number of volumes is already registered in the ETERNUS DX/AF
  - A RAID group diagnosis is being performed in the ETERNUS DX/AF
  - A disk diagnosis is being performed in the ETERNUS DX
  - The RAID group to which the migration source volume belongs is blocked or failed
  - Advanced Copy is being performed by specifying the whole volume in the migration source volume and the settings for the volume capacity that is to be expanded are performed before and after migration
  - The total number of migration sessions, TPV balancing sessions, and FTV balancing sessions (*1) that are running in the ETERNUS DX/AF at the same time is 32
  - The total capacity for migration processes, TPV balancing processes, and FTV balancing processes (*1) that are running in the ETERNUS DX/AF at the same time is 128TB
  - The total logical capacity of the Deduplication/Compression Volumes in the single TPP has exceeded the limit capacity (*2)
  - The control information for Thin Provisioning is being re-configured in the ETERNUS DX8700 S3/DX8900 S3 (*3)
  - The migration source volume is the data migration destination of Storage Migration
  - The migration source and the migration destination are in the following conditions.
    - The migration source is either of the following.
      - TPVs that are used as copy destination volumes of SnapOPC or SnapOPC+
      - FTVs that are used as copy destination volumes of SnapOPC or SnapOPC+
    - The migration destination is either of the following.
      - RAID groups
      - TPPs that have Deduplication, Compression, or both enabled
- When performing migration for volumes for which "Cache Page Capacity" is changed using the procedure in "Modify Cache Parameters" (page 315), the "Cache Page Capacity" setting is reset to the initial value (Unlimited).

- When the destination volume capacity is expanded by migration, the expanded volume capacity must be recognized by the server after migration. Refer to the manuals of each OS or file system for information about server operation.
- When " ⚠ Attention" or " ❌ Warning" is displayed in the "Used Status" field for the migration destination TPP after migration, the used capacity of the relevant TPP is exceeding the threshold. In this case, expand TPP capacity by using the procedure in "Expand Thin Provisioning Pool" (page 549). Refer to "Thin Provisioning Pool (Basic Information)" (page 896) for TPP usage.
- When " ⚠ Attention" or " ❌ Warning" is displayed in the "Used Status" field for the migration destination FTRP after migration, the used capacity of the relevant FTRP is exceeding the threshold. Use ETERNUS SF Storage Cruiser to expand the capacity of the appropriate FTSP (for which expansion is determined to be necessary based upon the performance and usage). Refer to "Flexible Tier Pool (Basic Information)" (page 909) for FTRP usage.

    *1:   When the FTRP balancing is performed, the FTV balancing process starts in the FTSP. Refer to "Start Balancing Flexible Tier Pool" (page 567) for details.

    *2:   The limit capacity of the Deduplication/Compression Volumes according to the TPP configuration is described below.

    - If the TPP is configured with two or more RAID groups, the maximum logical volume capacity of the Deduplication/Compression Volumes must be equal to or less than ten times the logical capacity of the DEDUP_SYS Volume in the relevant TPP.
    - If the TPP is configured with one RAID group, the maximum logical volume capacity of the Deduplication/Compression Volumes must be equal to or less than five times the logical capacity of the DEDUP_SYS Volume in the relevant TPP.
    If the efficiency of the Deduplication/Compression function cannot be estimated, setting the total logical capacity of the Deduplication/Compression Volumes smaller than the logical capacity of the DEDUP_SYS Volume is recommended.

    *3:   If the system message indicates a re-configuration, the control information for Thin Provisioning is being synchronized in each CM. Wait at least five minutes before performing this function again. If a work volume that has failed to be deleted is displayed in the volume list, delete the relevant volume.

🔵 N o t e

- By using this function, External Volumes are migrated to the volumes in the local storage system. After the migration is completed, the migrated volumes can be handled equivalently to normal volumes.
- Progress of migration can be checked on the [Volume Detail] screen (Basic). Refer to "Volume Detail (Basic)" (page 802) for details.
- If the migration source and migration destination are both "WSV", not only can the migration of a WSV to other multiple RAID groups be performed, but also the number of concatenations for the existing RAID group can be changed.
- When Optimize TPV/FTV Capacity is reserved after migrating from "Standard" to "TPV" or from "Standard" to "FTV", the physical area that is filled with zeros is released and the Thin Provisioning function can be used efficiently. For volumes that are reserved for optimizing capacity, "Reserved Optimizing Capacity" is displayed in the "Process" field on the [Volume] screen. When the capacity optimization is performed after the migration is complete, the progress of capacity optimization can be checked with "Optimizing Capacity Progress" on the [Volume Detail] screen (Basic). Refer to "Volume Detail (Basic)" (page 802) for details.
- In the controller firmware versions earlier than V10L32, "Online SED" is displayed as "SED".

■ **When the migration destination volume type is "Standard", "TPV", or "FTV"**

The procedure to start a migration is as follows:

Procedure

1 Select the volume that to be migrated and click [Start RAID Migration] in [Action].

▷ **Caution**

[Start RAID Migration] cannot be clicked if one of the following volumes is selected.
- Volumes that are used for the Virtual Volume function (excluding "$VVOL_META")
- NAS expanded system volumes
- Deduplication/Compression System Volumes

2 Select "RAID Group / Thin Provisioning Pool / Flexible Tier Pool" for "Migration Destination". Set the volume information after migration, select the destination RAID group, the TPP, or the FTRP.

■ When migrating an External Volume
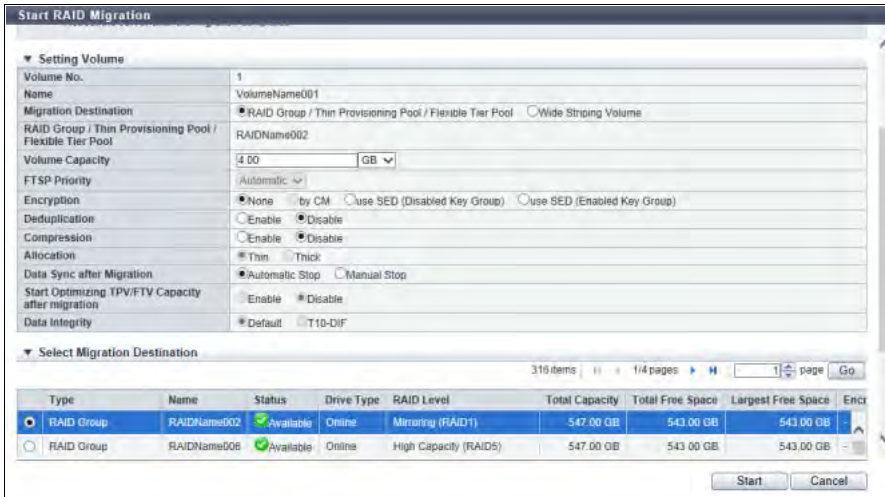
■ When migrating the other volumes

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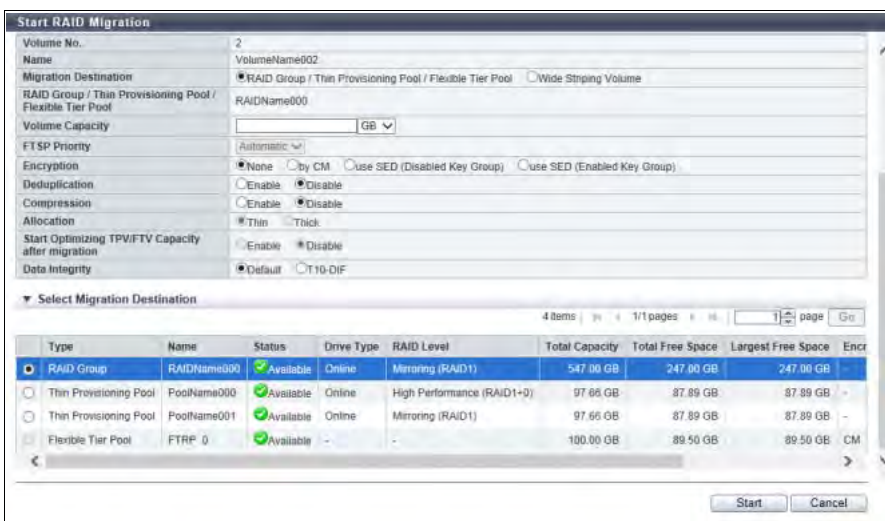
The main setting items are as follows.

● **Setting Volume**

- Volume Capacity
- FTSP Priority
- Encryption
- Deduplication
- Compression
- Allocation
- Data Sync after Migration
- Start Optimizing TPV/FTV Capacity after migration
- Data Integrity

● **Select Migration Destination**

- Select Migration Destination

▷ **Caution**

If the migration source is an ODX Buffer volume, select "RAID Group / Thin Provisioning Pool / Flexible Tier Pool" for "Migration Destination".

◯ **N o t e**

When a RAID group or a TPP is configured with SSDs, "SSD" is displayed for the "Drive Type" field regardless of the actual SSD type (SSD-M/SSD-L/SSD).

3 Click the [Start] button.

4 A confirmation screen appears. Click the [OK] button.
→ Migration starts.

5 Click the [Done] button to return to the [Volume] screen.

▷ **Caution**

If the "Provisioned Capacity" (or the total logical capacity) of the volumes in the migration destination TPP exceeds the total capacity of the migration destination TPP (or if the "Provisioned Rate" (or the capacity rate) exceeds "100 %") after the migration was started, a warning message appears in the result screen. Check the TPP used state and add drives to expand the TPP capacity as required. Check the [Thin Provisioning Pool Detail] screen for "Provisioned Rate". Refer to for details.

End of procedure

■ **When the migration destination volume is "WSV"**

> **⬤ N o t e**
>
> When changing the number of concatenations for a WSV, check "Wide Stripe Size" for the WSV, the specifications of the existing RAID groups (RAID level, Stripe Depth, drive type, disk speed, and number of member drives), and the RAID group number of all the concatenated RAID groups. The following describes how to check the specifications.
>
> **(1)** Click the [No.] link or the [Name] link of the migration source WSV in the volume list.
>
> **(2)** A detailed information screen for the WSV is displayed. Check "Wide Stripe Size" in the [Basic] tab screen.
>
> **(3)** Click the [Used RAID Group] tab to display the concatenation information of the WSV. Check "RAID Group No." and "Concatenation Order" that are configured for the WSV. The display order of the RAID group information indicates the "Concatenation Order".
>
> **(4)** Filter the RAID group list by the RAID group number that configures a WSV, and then click the [No.] link or the [Name] link of the RAID group. Any RAID group can be specified because the RAID groups in the WSV have the same specifications.
>
> **(5)** A detailed information screen for the RAID group is displayed. Check "RAID Level" and "Stripe Depth" in the [Basic] tab screen.
>
> **(6)** Click the [Drive] tab to display the information of the drives that are configured for the RAID group. Check "Type", "Speed", and "Number of Member Drives". For "Number of Member Drives", use the displayed number of drives.

The procedure to start a migration is as follows:

> **Procedure**

1 Select the volume that to be migrated and click [Start RAID Migration] in [Action].

> **▶ Caution**
>
> [Start RAID Migration] cannot be clicked if one of the following volumes is selected.
> - Volumes that are used for the Virtual Volume function (excluding "$VVOL_META")
> - NAS expanded system volumes
> - Deduplication/Compression System Volumes

2   Select "Wide Striping Volume" for "Migration Destination". Input the volume capacity, the encryption status, the detailed information of volumes, and the selection information for the RAID groups.
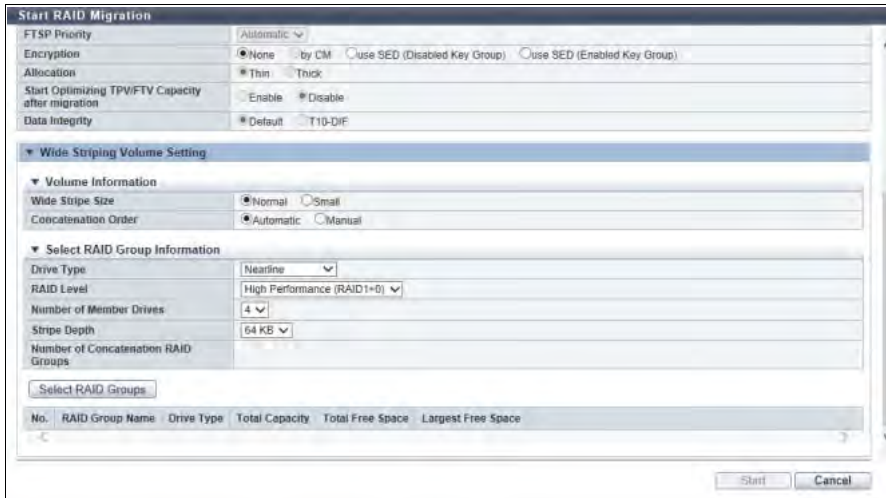
The main setting items are as follows.

● **Setting Volume**

- Volume Capacity
- Encryption

● **Wide Striping Volume Setting**

WSVs are created by concatenating volumes that are the same size in multiple RAID groups. Input the volume information for the migration destination WSV and the selection information for the RAID groups, and then specify the RAID groups that are to be concatenated. For detailed information about creating WSVs, refer to "Creating WSVs" (page 255).

> ▷ **Caution**

When changing the number of concatenations for a WSV, specifying the existing RAID groups is required. For details, refer to "Remarks" in "When the migration destination volume is "WSV"" (page 306).

- Select RAID Group Information

> ▷ **Caution**

When changing the number of concatenations for a WSV, select the same "Drive Type", "RAID Level", "Number of Member Drives", and "Stripe Depth" as the migration source WSV. Refer to "Remarks" in "When the migration destination volume is "WSV"" (page 306) for the procedure to check the specifications of an existing RAID group.

- Drive Type
- RAID Level
- Number of Member Drives

3   Click the [Select RAID Groups] button.
→ The [Select RAID Groups screen] screen appears.

4   Select the RAID group that is to be concatenated (multiple selections can be made).
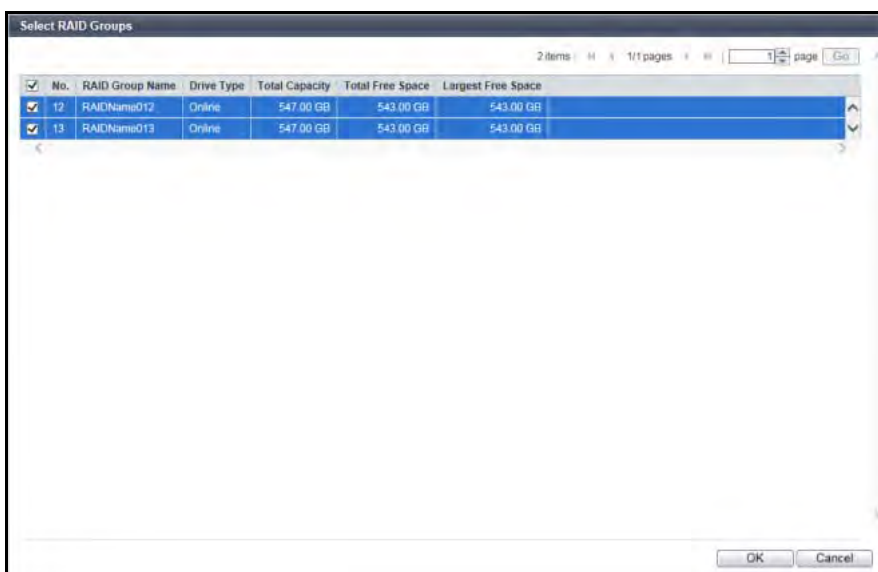
The main setting item is as follows.

● **Select RAID Groups**

- Checkbox to select RAID groups

> ▷ **Caution**

- When increasing the number of concatenations for a WSV, select all of the existing RAID groups for con-catenation and the new RAID groups. When reducing the number of concatenations for a WSV, select the RAID groups that will remain for concatenation from the existing RAID group list. For details, refer to "Remarks" in "When the migration destination volume is "WSV"" (page 306).
- When the drive type is "Online SED", "Nearline SED", or "SSD SED", setting the same "Encryption" set-tings (the set state of the key group) is recommended for all of the RAID groups that configure the WSV.

5   Click the [OK] button.
 → The display returns to the initial screen.

> ▷ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
- The "Number of Concatenation RAID Groups" field is left blank, "1" is specified, or a value that is "65" or more is specified
- The maximum free space in the selected RAID group is smaller than the volume size that is to be con-catenated
- LDE is being performed in the selected RAID group
- An ODX Buffer volume is selected as a migration source volume

> ⬤ **N o t e**

To change the concatenation order of the RAID groups, select "Manual" for "Concatenation Order" in the Volume Information field. Click the [Concatenation Order] link to display the [Setting Concatenation Order] screen. The concatenation order of the RAID groups can be changed in the [Setting Concatenation Order] screen.

6 After selecting RAID groups is complete, click the [Start] button.
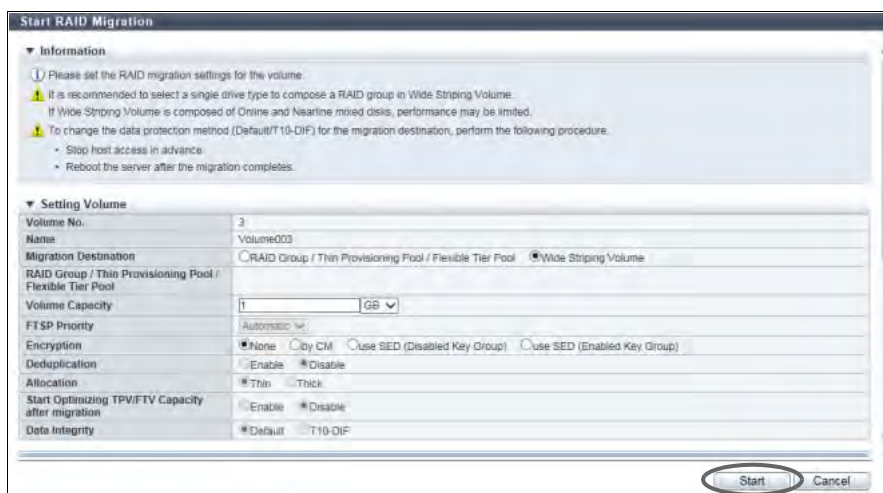
7 A confirmation screen appears. Click the [OK] button.
→ Migration starts.

8 Click the [Done] button to return to the [Volume] screen.

End of procedure

Stop RAID Migration

This function stops migration.

> ▷ **Caution**
>
> - This function stops the migration currently in progress. Therefore, this function cannot be executed when migration is not being performed for the selected volume.
> - Do not use this function to stop a data synchronization after the migration is completed. Refer to <u>"Stop External Volume Data Synchronization" (page 311)</u> for details. If "Manual Stop" is selected for "Data Sync after Migration" when a data migration is started for the Non-disruptive Storage Migration using the [Start RAID Migration] function, the data synchronization state occurs.

> ⬤ **N o t e**
>
> - If migration is canceled, the reservation for FTV/TPV capacity optimization is released.
> - When migration is stopped, data in the migration source volume can be accessed normally.
> - This function can stop migrations whose migration source is an External Volume.

The procedure to stop migration is as follows:

Procedure

1   Select the volume for which migration is to be stopped (multiple selections can be made) and click [Stop RAID Migration] in [Action].

2   A confirmation screen appears. Click the [OK] button.
→ The RAID migration stops.

3   Click the [Done] button to return to the [Volume] screen.

End of procedure

Stop External Volume Data Synchronization

This function stops the data synchronization between the migration source volume and the migration destination volume after the migration is completed and deletes the migration source volume.
This function is available only if the Non-disruptive Storage Migration License has been registered.

Volume Requirements for This Function

- Volumes whose "Usage" is "Migration" (or External Volumes)
- Volumes whose "Process" is "Migrating : Manual Stop"
- Volumes whose "Migration Status" in the [Volume Detail] screen is "Active" and whose "Progress" is "100 %" (or migration is completed)

Note

After this function is executed, the volume number and the volume name of the migration destination are changed to the volume number and the volume name of the migration source.

The procedure to stop the data synchronization of the External Volume is as follows:

Procedure

1 Select the migration source volume of the Non-disruptive Storage Migration whose data synchronization is to be stopped (multiple selections can be made) and click [Stop External Volume Data Synchronization] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ The data synchronization of the External Volume is stopped.

3 Click the [Done] button to return to the [Volume] screen.

End of procedure

Forbid Advanced Copy

This function protects a volume so that the volume cannot be registered as the copy destination volume of Advanced Copy.
The [Forbid Advanced Copy] is a function that protects the data in the selected volumes by forbidding the volume to be the copy destination of the Advanced Copy sessions or restoration setting. When the Advanced Copy function is used by multiple software, the same volumes may be used by multiple software, resulting in unexpected data corruption. This function is available to protect the data in the copy source from being deleted.
"Standard", "WSV", "TPV", and "FTV" type volumes can be protected.

▷ **Caution**

- If an Advanced Copy license is not registered, volume protection cannot be enabled.
- Do not protect the External Volumes (or volumes whose "Usage" is "Migration").
- The following volumes cannot be protected:
    - ODX Buffer volumes
    - NAS system volumes
    - Deduplication/Compression System Volumes
    - Volumes that are already protected
    - Volumes that are used for the Storage Cluster function

N o t e

Volumes that are already being used as the copy destination volumes can also be protected.

The procedure to protect a volume is as follows:

Procedure

1 Select the volume to be protected (multiple selections can be made) and click [Forbid Advanced Copy] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ Setting of the copy destination protect starts.

3 Click the [Done] button to return to the [Volume] screen.

End of procedure

Permit Advanced Copy

This function releases the protected volumes.
Released volumes can be used as the copy destination volume.

The procedure to release a volume protection is as follows:

Procedure

1   Select the protected volume to be released (multiple selections can be made) and click [Permit Advanced Copy] in [Action].

2   A confirmation screen appears. Click the [OK] button.
→ Releasing copy destination protect starts.

3   Click the [Done] button to return to the [Volume] screen.

End of procedure

Release Reservation

This function releases the reservation status of volumes that are specified by the host.
Reservation and release reservation of a volume is normally performed from the host. This function must be used only when a reservation of a volume cannot be released due to errors in the host.
This function provides the following features:

- Releasing the volume reservation status
- Releasing the volume persistent reservation status
- Deleting all the reservation keys that are registered in the ETERNUS DX/AF

> ▷ **Caution**

- Be sure to pay attention when releasing reserve status as it may cause data corruption. Check the status of the target volume before using this function.
- This function does not support Deduplication/Compression System Volumes.

The procedure to release the reservation status is as follows:

Procedure

1   Select the volumes to release the reservation (multiple selections can be made), and click [Release Reservation] in [Action].

2   A confirmation screen appears. Click the [OK] button.
→ Releasing volume reservation status starts.

3   Click the [Done] button to return to the [Volume] screen.

End of procedure

Modify Cache Parameters

This function changes the cache parameters of each volume.
Performance of the storage system varies depending on the cache hit rate. The ETERNUS DX/AF detects sequentiality when a host requests Read/Write. If sequentiality is detected when a Read request is issued, the cache hit rate is improved by reading the sequential data into the cache memory in advance. The characteristics of Read/Write requests from the host depends on the system. Performance of the storage system may improve by specifying a cache parameter that is suitable for the system that is being used.

The following parameters can be specified:
- Cache Page Capacity
  Specify the cache capacity that is used by volumes.
- Prefetch Limit (PL)
  Specify the value to calculate the amount of data that is to be read from the drive in advance (amount of data to prefetch from the disk) when the cache detects the sequentiality of data access (Read IO).
- Force Prefetch Mode (FP)
  Specify whether to perform prefetch even if the sequentiality of data access (Read IO) is not detected.
- Multi Writeback Count (MWC)
  Specify the number of processes that can be written back at the same time.
- Prefetch Sequential Detect Count (PSDC)
  Specify the number of times for sequential data detection to determine the sequentiality of data access (Read IO).
- Sequential Dirty Detect Count (SDDC)
  Specify the number of times for sequential data detection to determine the sequentiality of data access (Write I/O).
- Sequential Slope (SS)
  A parameter to determine the sequentiality of data access (Read I/O). Specify the number of Logical Block Addresses (LBAs) by which the previous I/O and the current I/O are considered as sequential data.
- Sequential Dirty Slope (SDS)
  A parameter to determine the sequentiality of data access (Write I/O). Specify the number of LBAs by which the previous I/O and the current I/O are considered as sequential data.
- Sequential Parallel Multi I/O Count (SPMC)
  A parameter to determine the sequentiality of data access (Read I/O and Write I/O). Specify the number of I/Os by which the previous I/O and the current I/O are considered as sequential data.
- Extreme Cache Pool
  Specify whether to "Enable" or "Disable" EXCP for the volumes.

> ▷ **Caution**
>
> - For TPVs, specify the MWC for each TPP. Refer to "Modify Cache Parameters (Thin Provisioning Pool)" (page 563) for details.
> - Cache parameters cannot be changed when pinned data exists in the ETERNUS DX/AF.
> - Cache parameters for Deduplication/Compression Volumes cannot be specified.
> - Do not set the cache parameters for the External Volumes (or volumes whose "Usage" is "Migration").

> ● **N o t e**
>
> The same cache parameter can be applied for multiple volumes in a single operation.

For details on the parameters for this function, refer to "A. Modify Cache Parameters" (page 1105).
For the factory default settings for this function, refer to "B. Modify Cache Parameters" (page 1269).

The procedure to modify cache parameters is as follows:

Procedure

1   Select which volume to change the cache parameters for (multiple selections can be made) and
        click [Modify Cache Parameters] in [Action].

▷ **Caution**

[Modify Cache Parameters] cannot be clicked if NAS expanded system volumes are selected.

2   Change the cache parameters.
        Refer to "Volume types for which Cache Parameters are available" (page 317) for the volume types for which
        the parameters can be specified.

⬤ **N o t e**

If the [Default] button is clicked before the [Modify] button, the default cache parameters are restored.

▷ **Caution**

If EXCP for the ETERNUS DX is enabled and the general status of the ETERNUS DX is "Not Ready", an error
screen appears. Check the parameter settings.

3   Click the [Modify] button.

4   A confirmation screen appears. Click the [OK] button.
        → The cache parameter modification starts.

5   Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

Volume types for which Cache Parameters are available

Item	Volume type						
	Standard	SDV	SDPV	Standard (LUN concatenation)	TPV	FTV	WSV
Cache Page Capacity	Available	Available	Available	N/A	N/A	N/A	N/A
Prefetch Limit (PL)	Available	Available	Available	Available	Available	N/A	Available
Force Prefetch Mode (FP)	Available	Available	Available	Available	Available	N/A	Available
Multi Writeback Count (MWC)	Available	Available	Available	N/A	(*1)	N/A	Available
Prefetch Sequential Detect Count (PSDC)	Available	Available	Available	Available	Available	N/A	Available
Sequential Dirty Detect Count (SDDC)	Available	Available	Available	Available	Available	N/A	Available
Sequential Slope (SS)	Available	Available	Available	Available	Available	N/A	Available
Sequential Dirty Slope (SDS)	Available	Available	Available	Available	Available	N/A	Available
Sequential Parallel Multi I/O Count (SPMC)	Available	Available	Available	Available	Available	N/A	Available
Extreme Cache Pool	Available	N/A	N/A	Available	Available	N/A	Available

Available: The parameter can be specified.
N/A: The parameter cannot be specified.

*1: The cache parameter is specified for each TPP. Refer to "Modify Cache Parameters (Thin Provisioning Pool)" (page 563) for details.

Export Cache Parameters

This function downloads the setting information of the cache parameters for all the volumes at the same time.

⊙ **N o t e**

- Cache parameters that are specified with <u>"Modify Cache Parameters" (page 315)</u> and <u>"Modify Cache Parameters (Thin Provisioning Pool)" (page 563)</u> are exported.
- Cache parameters can be downloaded from "Standard", "WSV", "TPV", "FTV", "SDV", and "SDPV" type volumes. Note that "Cache Page Capacity" cannot be downloaded from "WSV", "TPV", and "FTV" type volumes. Note that "Extreme Cache Pool" cannot be downloaded from "SDV" and "SDPV" type volumes.
- Cache parameters for Deduplication/Compression Volumes cannot be obtained.

The procedure to export cache parameters is as follows:

Procedure

1 Click [Export Cache Parameters] in [Action].

2 Click the [Export] button.
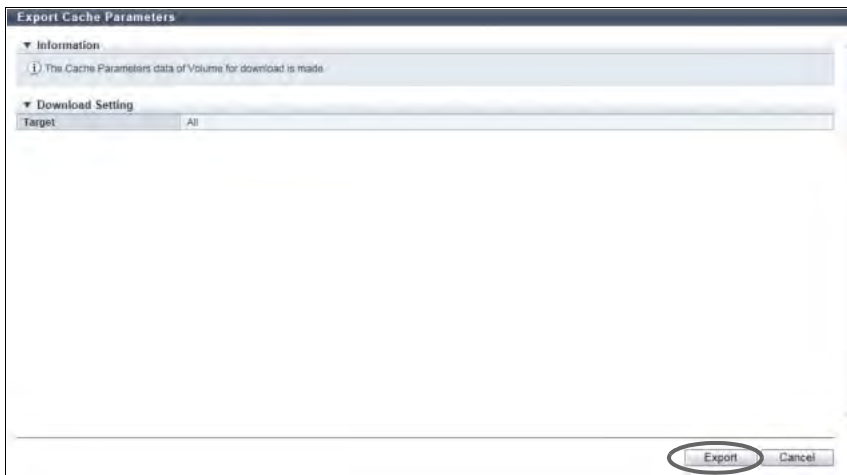
→ Exporting of the cache parameters is executed.
After the cache parameters are exported, a dialog box to download the file appears.

3 Click the [Download] button.

→ A dialog box to download the file appears.

4   Save the setting information file of the cache parameter.
The default file name is "CacheParam_serial number for the ETERNUS DX/AF_YYYY-MM-DD_hh-mm-ss.txt".
(YYYY-MM-DD_hh-mm-ss: the date and time when the download screen (Step 3) is displayed.)
→ The cache parameter download starts.

5   Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

Export Performance Information

This function exports the following performance information in a single operation and saves it as a text file.

- Performance (Host I/O)
- Performance (Advanced Copy)
- Performance (CA)
- Performance (CM)
- Performance (Drive)
- Performance (PCIe Flash Module)

> ▷ **Caution**

- If the performance monitoring is stopped, "0" is output for all the performance information.
- Note that the dedicated information for the NAS system performance (such as operations per second (OPS) and memory size for storing cache data) cannot be obtained with the ETERNUS Web GUI. Use ETERNUS CLI to obtain this information.

> ⬤ **N o t e**

- "Performance (Host I/O)" is the performance information of volumes for Host I/O. Note that the performance information for Deduplication/Compression System Volumes cannot be obtained.
- "Performance (Advanced Copy)" is the performance information of volumes for the Advanced Copy function. Note that the performance information for Deduplication/Compression System Volumes cannot be obtained.
- The target CA for exporting information of "Performance (CA)" is FC, iSCSI, FCoE, and SAS. The performance information for CAs that are installed in the ETERNUS DX/AF is exported. Note that performance information for FC port which port mode is "Initiator" cannot be obtained.
- "Performance (Drive)" is the drive usage. Note that the performance information for External Drives cannot be obtained.
- "Performance (PCIe Flash Module)" is obtained only when PFMs are installed in the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, and the ETERNUS DX8700 S3/DX8900 S3.
- The "Extreme Cache Cache Hit Rate" is obtained only when EXC or EXCP is enabled for the ETERNUS DX. Note that a "-" (hyphen) is output for volumes where Extreme Cache and Extreme Cache Pool are disabled. Refer to <u>"Performance (Host I/O)" (page 782)</u> and <u>"Performance (Advanced Copy)" (page 788)</u> for details.

The procedure to download the performance information is as follows:

Procedure

1   Click [Export Performance Info] in [Action].

2 Click the [Export] button.
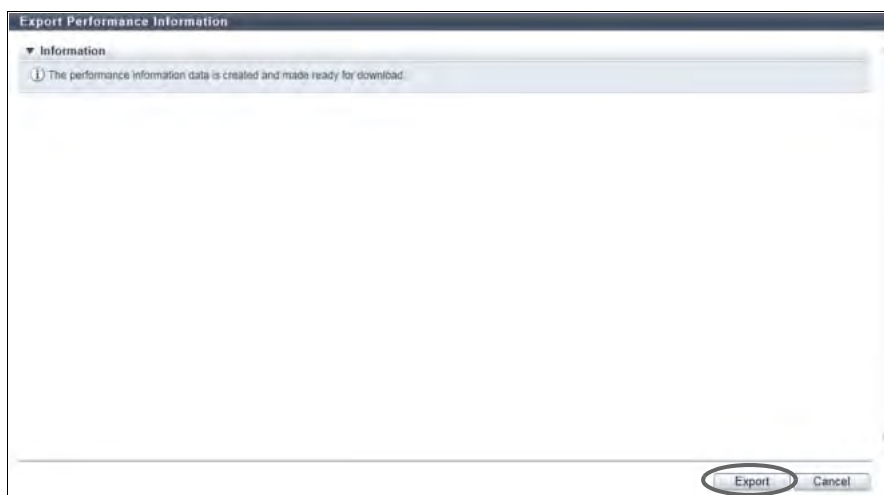
→ The registered performance information in the ETERNUS DX/AF is exported.
   After the performance information export is finished, a screen to execute downloading the file is dis-
   played.

3 Click the [Download] button.

→ A dialog box to download the file appears.

4 Save the downloaded performance information file.
   The default file name is "Perform_serial number for the ETERNUS DX/AF_YYYY-MM-DD_hh-mm-ss.txt".
   (YYYY-MM-DD_hh-mm-ss: the date and time when the download screen (Step 3) is displayed.)
   → Downloading the performance information file starts.

5 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

Set ALUA

This function sets Asymmetric Logical Unit Access (ALUA) for volumes.
ALUA can be set for "Standard", "WSV", "SDV", "TPV", and "FTV" type volumes that are to be mapped.
Use this function only when controlling paths for each volume. For normal operation, paths for all the volumes in the LUN group with the host affinity setting are controlled according to the "Asymmetric / Symmetric Logical Unit Access" setting of the host response that is allocated to the host group or the host.

▶ **Caution**

- Rebooting the server is required after changing the ALUA settings.
- The ALUA setting is enabled when all of the following conditions are satisfied.
  - The target volume is registered in a LUN group.
  - The host affinity is set for the relevant LUN group.
  - The TPGS mode for the relevant host affinity setting of the host group or the TPGS mode for the host response that is assigned to the host is "Enable (Default)".
- When ALUA for the volume is not "Follow Host Response", ALUA is given priority over the "Asymmetric / Symmetric Logical Unit Access" setting that is specified for the host group with the host affinity setting or for the host response that is assigned to the host.
- For volumes that are used for the Virtual Volume function, ALUA cannot be set.

● **N o t e**

- For the ALUA setting of each volume, refer to "Performance (Host I/O)" (page 782).
- If the ALUA setting is not changed by using this function, "Follow Host Response" is specified for all of the volumes that can be mapped.

For details on the parameters for this function, refer to "A. Set ALUA" (page 1109).
For the factory default settings for this function, refer to "B. Set ALUA" (page 1270).

The procedure to set ALUA for volumes is as follows:

Procedure

1   Select which volumes to set ALUA for (multiple selections can be made) and click [Set ALUA] in [Action].

▶ **Caution**

If a volume that cannot be mapped is selected, [Set ALUA] cannot be clicked. Conditions for volumes that cannot be mapped are as follows.
- "SDPV" or "Temporary" type volumes
- ODX Buffer volumes
- "Usage" is "File" or "System"

2   Select a new ALUA.
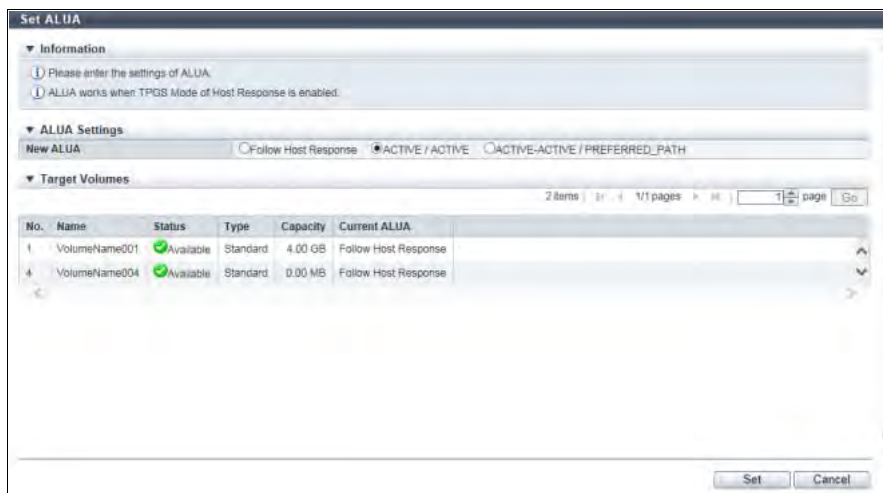
The main setting item is as follows.

● **ALUA Settings**

   • New ALUA

3   Click the [Set] button

4   A confirmation screen appears. Click the [OK] button.
→ Setting of ALUA starts.

5   Click the [Done] button to return to the [Performance (Host I/O)] screen.

End of procedure

Set Volume QoS

This function sets the bandwidth limit (maximum performance limit) for the volume.
By setting the volume QoS, the total performance from multiple CA ports to the target volume can be limited.

▷ Caution

- The target volume types for this function are Standard, SDV, WSV, TPV (including NAS user volumes and Deduplication/Compression Volumes), and FTV. Note that a volume QoS cannot be set for ODX Buffer volumes, NAS backup volumes, NAS system volumes, and Deduplication/Compression System Volumes.
- Do not set a bandwidth limit for NAS user volumes and snapshot destination SDVs.
- Do not set the bandwidth limit for External Volumes (or volumes whose "Usage" is "Migration").
- This function can be used, irrespective of whether the QoS mode has been enabled or disabled. If the QoS mode has been disabled, the host starts the operation within the configured bandwidth limit after the QoS mode is enabled.
- To set a bandwidth limit for the volumes that are used for the Virtual Volume function, use ETERNUS SF Storage Cruiser.

● N o t e

- To check whether the QoS mode is enabled or disabled, check the "Action" field of the [Host-LU QoS] screen under the [Connectivity] navigation. Refer to "Enable/Disable QoS" (page 452) for details.
- To limit the performance from a specific CA port to the target volume, set the Host-LU QoS. Refer to "Set Host-LU QoS" (page 454) for details.

For details on the parameters for this function, refer to "A. Set Volume QoS" (page 1109).
For the factory default settings for this function, refer to "B. Set Volume QoS" (page 1270).

The procedure to set bandwidth limit for each volume is as follows:

Procedure

1 Select which volumes to set the bandwidth limit (multiple selections can be made) and click [Set QoS] in [Action].

2 Select a new bandwidth limit.
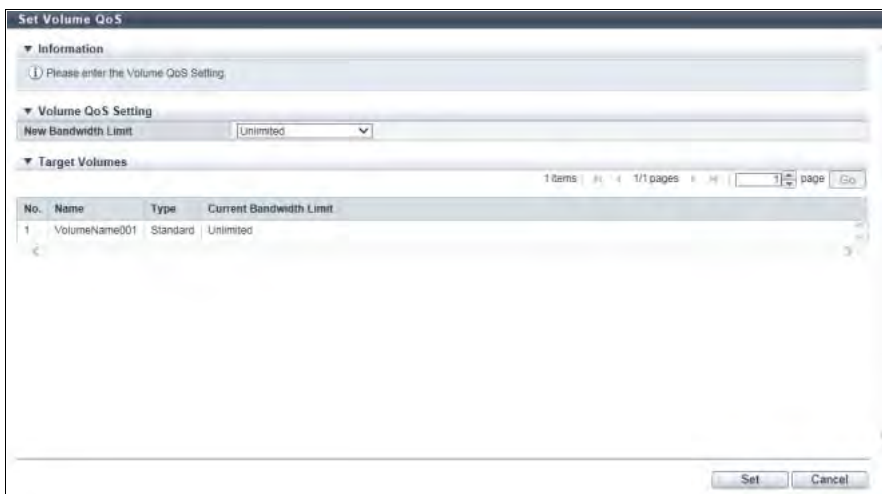
The main setting item is as follows.

● **Volume QoS Setting**

- New Bandwidth Limit

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
→ Setting of the volume QoS starts.

5 Click the [Done] button to return to the [Performance(QoS)] screen.

End of procedure

Snapshot Management for NAS Volumes

This section describes snapshot management for NAS volumes.
Snapshot management for NAS volumes provides the following functions:

- Set Snapshot
- Delete Snapshot
- Start Snapshot
- Stop Snapshot

Set Snapshot

This function creates a snapshot destination SDV for a NAS user volume and sets an acquisition schedule.
This function is displayed in a Unified Storage environment.

Snapshot acquisition methods

There are two methods to acquire a snapshot depending on the usage.

- Snapshots for file servers
  The snapshot is set from ETERNUS Web GUI, ETERNUS CLI, or ETERNUS SF Storage Cruiser. Use this function to set the snapshot from ETERNUS Web GUI. In this case, "Automatic" is displayed in the "Mode" field of the [Snapshot] screen.

- Snapshots for virtual machines
  The snapshot is set from VMware vSphere Web Client. Refer to "ETERNUS vCenter Plug-in User's Guide" for details. In this case, "Manual" is displayed in the "Mode" field of the [Snapshot] screen.

Initial Snapshot setting (*1)

- SDVs are automatically created in proportion to the specified number of generations.
- The logical capacity of SDVs is the same as the NAS user volumes. (*2)
- The base name for SDVs can be specified.
- The RAID group to store SDVs can be selected. (*3)
- If the collection mode is "Automatic", the acquisition schedule (day of the week and time) can be set.
- If the collection mode is "Automatic" and the snapshot setting is successfully completed, a snapshot is automatically acquired.
  - *1: "Initial snapshot setting" is when the snapshot is first configured from a non-configured state, or the first time a configuration is performed after the [Delete Snapshot] function has been executed.
  - *2: SDVs in proportion to the specified number of generations all have the same capacity.
  - *3: SDVs in proportion to the specified number of generations are stored in the selected RAID group.

Snapshot setting modification

- The number of generations can be changed.
- When increasing the number of generations, unused SDVs are automatically created.
- If the collection mode is "Automatic", the number of generations can be smaller than the number of snapshot sessions.
  In this case, SDVs are deleted from the unused SDVs first, and then older generation SDVs.
- If the collection mode is "Automatic", the acquisition schedule (day of the week and time) can be changed.
- When the snapshot is "Active", the snapshot start state is continued.

Requirements for RAID groups that store the snapshot destination SDVs

- The RAID group status is not " Broken", " No Drive Path", or " SED Locked"
- The maximum number of volumes or the maximum volume capacity that can be registered in a RAID group has not been reached
  (SDVs are created in proportion to the specified number of generations in the same RAID group in each NAS user volume.)
- RAID groups where volumes are already created or are unused
  (Snapshot destination SDVs for multiple NAS user volumes can be created in the same RAID group.)
- The RAID group must not belong to a TPP
- The RAID group must not belong to an FTRP
- The RAID group that is not registered as an REC Disk Buffer
- The RAID group that is not registered as an EXCP

Number of snapshot generation

The following table shows the maximum number of NAS user volumes and the maximum number of generations for each model.

Model		Maximum number of NAS user volumes	Maximum number of generations (per NAS user volume)	Maximum number of generations (*1) (per ETERNUS DX)
ETERNUS DX100 S4 (*2)		2	64	64
ETERNUS DX200 S4 (*2)		4	128	128
ETERNUS DX500 S4		4	128	128
ETERNUS DX600 S4		8	128	256
ETERNUS DX100 S3	With memory expansion (*3)	1	16	16
	With memory expansion (*2)	2	64	64
ETERNUS DX200 S3	With memory expansion (*3)	2	64	64
	With memory expansion (*2)	4	128	128
ETERNUS DX500 S3		4	128	128
ETERNUS DX600 S3		8	128	256

*1:   The total number of generations in the ETERNUS DX (or the total number of generations for the "Automatic" and "Manual" modes). For example, when the ETERNUS DX500 S4 is used and 64 generations of snapshots are created for two NAS user volumes, snapshots cannot be configured for the third NAS user volume.

*2:   The maximum number of NAS user volumes and generations when "Memory Extension" described below is installed. For the ETERNUS DX100 S4/DX100 S3, "Memory Extension" is used in the Unified Storage environment. For the ETERNUS DX200 S4/DX200 S3, "Memory Extension" is used in the Unified Storage environment or for the Deduplication/Compression function.

- ETERNUS DX100 S4/DX100 S3
  16GB/CM (the controller firmware version is V10L53 or later)

- ETERNUS DX200 S4/DX200 S3
  32GB/CM (the controller firmware version is V10L33 or later)

*3:   The maximum number of NAS user volumes and generations when "Memory Extension" described below is installed.

- ETERNUS DX100 S3
  8GB/CM

- ETERNUS DX200 S3
  16GB/CM

▷ **Caution**

- This function cannot be used for a NAS user volume if the status is "❌ Not Ready", "❌ Broken", or "❌ Data Lost".
- If a meta cache redistribution is being performed at the scheduled time for a snapshot acquisition, the start time of the snapshot acquisition may be delayed.
- This function uses the same copy tables, SDP, and SnapOPC+ sessions as the Advanced Copy function. If the SDP capacity becomes insufficient while the snapshot is being used, the snapshot acquisition may fail. To monitor the SDP capacity in advance, enabling the "SDP Usage Rate Over (Lv1, LV2, LV3)" event notifications is recommended. Refer to "Setup Event Notification" (page 155) for details.
- If the NAS user volume is updated and insufficient capacity cannot be supplemented with SDPVs, the SnapOPC+ session that is used with snapshot is in an Error Suspend state.
- A copy table size according to the number of snapshot generations is required. For a (rough estimate of) NAS user volume capacity where the snapshot setting is available, refer to "Configuration Guide (NAS)".

◯ **N o t e**

- Because this function uses SnapOPC+ generation management, the copy table size must be set in advance. The copy table size can be calculated using the formula (The table size for EC/REC and for OPC/QuickOPC/SnapOPC/SnapOPC+ without OPC Restoration (S1)) described in "How to calculate the copy table size". The number of generations is equivalent to the number of SnapOPC+ sessions. Refer to "How to calculate the copy table size" (page 1221) for details.
- To set snapshots, SDPVs must be created in advance. Create encrypted SDPVs if the snapshot is acquired from the encrypted NAS user volumes. Create unencrypted SDPVs if the snapshot is acquired from the unencrypted NAS user volumes. SDPVs with different encryption methods (encryption by CM or encryption by SED) from the NAS user volumes can also be used.
- If the NAS user volumes created in the encrypted TPP are selected and this function is executed, SDVs encrypted by the CM are created as snapshot destinations.
- To change the snapshot destination SDV name or the storage destination RAID group, execute the [Delete Snapshot] function and then use the [Set Snapshot] function again. If the [Delete Snapshot] function is executed, snapshots (SnapOPC+ sessions for all the generations), acquisition schedules for snapshots, and snapshot destination SDVs for all the generations are deleted. Refer to "Delete Snapshot" (page 330) for details.
- For snapshot destination SDVs, "File" is displayed for the usage of the volume list and "NAS Snapshot" is displayed for the usage details. Refer to "Volume (Basic Information)" (page 775) for details.
- Snapshot settings can be checked. Refer to "Snapshot" (page 799) for details.
- The snapshot status (SnapOPC+ session status) can be checked. Refer to "Advanced Copy (All Local Sessions)" (page 927) for details.
- The snapshot can be stopped. Refer to "Stop Snapshot" (page 332) for details.
- After stopping the process, the snapshot process can be restarted. Refer to "Start Snapshot" (page 331) for details.
- The snapshot settings can be deleted. Refer to "Delete Snapshot" (page 330) for details.

For details on the parameters for this function, refer to "A. Set Snapshot" (page 1110).
For the factory default settings for this function, refer to "B. Set Snapshot" (page 1271).

The procedure to set snapshot is as follows:

■ Initial snapshot setting

Procedure

1   Select which NAS user volumes to set snapshot for and click [Set Snapshot] in [Action].

2 Input the snapshot information.

The main setting items are as follows.

● **Snapshot Setting**

- Name
- Number of Generations
- Schedule

● **Select RAID Group**

- Radio buttons to select a RAID group

▷ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
- Encrypted SDPVs are not created when the NAS user volumes are encrypted (or when the total capacity of the encrypted area in the SDP is "0" (*1))
- Unencrypted SDPVs are not created when the NAS user volumes are not encrypted (or when the total capacity of the unencrypted area in the SDP is "0" (*1))
  *1:　Refer to "Snap Data Pool" (page 945) for details about the total capacity of encrypted and unencrypted areas in the SDP.

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
→ Setting of the snapshot starts.

5 Click the [Done] button to return to the [Snapshot] screen.
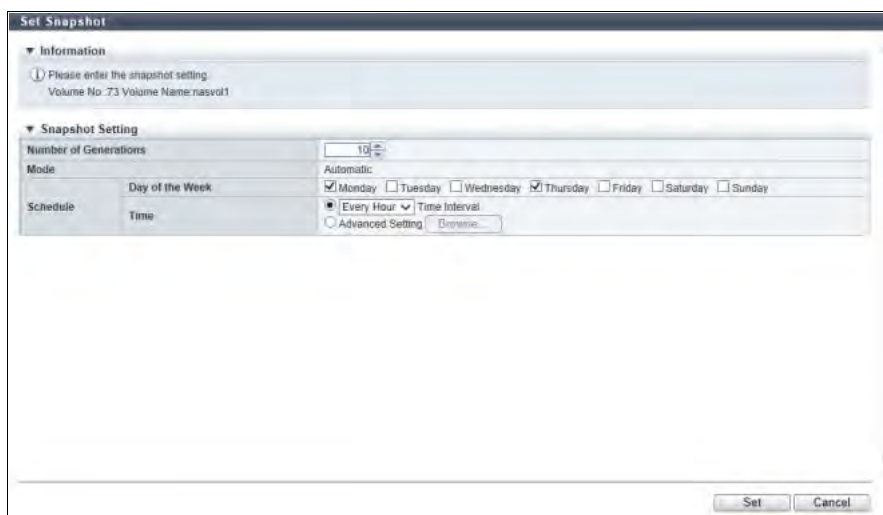
End of procedure

■ **Snapshot setting modification**

Procedure

1 Select which NAS user volumes to set snapshot for and click [Set Snapshot] in [Action].

2   Input the snapshot information.

The main setting items are as follows.

● **Snapshot Setting**

- Number of Generations
- Schedule

> ▷ **Caution**

- If the number of generations is reduced when changing the settings, a warning message appears. Check the parameter settings.
- If an error screen appears under the following conditions, check the parameter settings.
  - SDVs for additional generations cannot be created (the maximum number of volumes has already been created)
  - SDVs for additional generations cannot be created (insufficient capacity)
  - The number of generations is smaller than the number of snapshot sessions (when "Manual" is selected for "Mode")

3   Click the [Set] button.

4   A confirmation screen appears. Click the [OK] button.
→ Setting of the snapshot starts.

5   Click the [Done] button to return to the [Snapshot] screen.

End of procedure

Delete Snapshot

This function deletes the snapshot configuration information.
This function is displayed in a Unified Storage environment.

The following snapshot configuration information is deleted:

- Snapshot (SnapOPC+ sessions for all the generations)
- Snapshot acquisition schedule (number of generations, day of the week, and time)
- Snapshot destination SDVs for all the generations

Requirements for Deleting Snapshot Configuration Information

- No copy sessions other than snapshots are set in the snapshot destination SDVs

⬤ N o t e

- This function is available only when the snapshot status is "Active" or "Inactive" for the selected NAS user volume. Refer to "Snapshot" (page 799) for details about snapshot status.
- When acquiring the snapshot again after executing this function, register the snapshot configuration information. Refer to "Set Snapshot" (page 326) for details.

The procedure to delete snapshot configuration information is as follows:

Procedure

1 Select which NAS user volumes to delete snapshot for and click [Delete Snapshot] in [Action].

▷ Caution

If the controller firmware version is V10L33 or later, multiple NAS user volumes cannot be selected at the same time. To delete snapshots in multiple NAS user volumes, select the volumes one at a time and then delete the snapshots.

2 A confirmation screen appears. Click the [OK] button.
→ The snapshot deletion starts.

3 Click the [Done] button to return to the [Snapshot] screen.

End of procedure

Start Snapshot

This function restarts the snapshot acquisition.
This function is displayed in a Unified Storage environment.

⬤ N o t e

To acquire the snapshot again after deleting the snapshot settings, registration of the snapshot configuration information is required. Refer to "Set Snapshot" (page 326) for details.

The procedure to restart the snapshot acquisition is as follows:

Procedure

1 Select which NAS user volumes to start snapshot for (multiple selections can be made) and click [Start Snapshot] in [Action].

> **▶ Caution**
>
> [Start Snapshot] cannot be clicked if one of the following NAS user volumes is selected.
> - Snapshot is not set
> - Snapshot has already started
> - The collection mode for snapshot is set to "Manual" (or the "Mode" setting for the selected snapshot is "Manual")

2   A confirmation screen appears. Click the [OK] button.
    → The snapshot starts.

3   Click the [Done] button to return to the [Snapshot] screen.

End of procedure

Stop Snapshot

This function suspends the snapshot acquisition.
The snapshot that is being stopped cannot be acquired, but snapshots that have already been acquired before stopping the schedule are saved.
This function is displayed in a Unified Storage environment.

> **● N o t e**
>
> - This function stops snapshots (SnapOPC+ sessions for all generations).
> - After stopping the process, the snapshot process can be restarted. Refer to "Start Snapshot" (page 331) for details.

The procedure to suspend the snapshot acquisition is as follows:

Procedure

1   Select which NAS user volumes to stop snapshot for (multiple selections can be made) and click [Stop Snapshot] in [Action].

> **▶ Caution**
>
> [Stop Snapshot] cannot be clicked if one of the following NAS user volumes is selected.
> - Snapshot is not set
> - Snapshot is being stopped
> - The collection mode for snapshot is set to "Manual" (or the "Mode" setting for the selected snapshot is "Manual")

2   A confirmation screen appears. Click the [OK] button.
    → The snapshot stops.

3   Click the [Done] button to return to the [Snapshot] screen.

End of procedure

Delete External LU Information

This function deletes the External LU Information.
Use this function after the data migration is complete.

▷ Caution

- This function must be performed after a Non-disruptive Storage Migration from a storage system other than the ETERNUS storage system to the ETERNUS DX/AF is complete. Do not use this function if the Non-disruptive Storage Migration has been performed from the ETERNUS storage system to the ETERNUS DX/AF. If this function is used, the External LU Information is deleted and host access to the migration destination volume becomes unavailable.
- Before starting this function, stop the host access to the migration destination volume.
- After this function is performed, the server must be rebooted and the migration destination volume must be re-recognized.

● N o t e

- This function can be performed regardless of whether the Non-disruptive Storage Migration License has been registered.
- Performing this function changes the following.
  - The External LU Information (such as the UID, the vendor ID, and the product ID) of the volume is restored to the LU information of the local storage system
  - The value of "UID Mode" in the [Volume] screen is changed from "External" to "Default"

The procedure to delete the External LU Information is as follows:

Procedure

1   Select the volume to delete the External LU Information (multiple selections can be made) and click [Delete External LU Info] in [Action].

▷ Caution

[Delete External LU Info] cannot be clicked under the following conditions:
- A volume whose "Usage" is "Migration" (or an External Volume before or during a data migration) is selected
- A volume whose "UID Mode" is not "External" is selected

2   A confirmation screen appears. Click the [OK] button.
→ Deletion of the External LU Information starts.

3   Click the [Done] button to return to the [Volume] screen.

End of procedure

4. Connectivity Management

This chapter describes connectivity management.

When using functions in the Action area, select the desired function from the Action area that is displayed in the status display screen.
The functions in the Action area for Connectivity can be performed from the following display functions:

Functions in the Action area for Connectivity	Display function
Host Affinity Management	–
Create Host Affinity	• Connectivity (Basic Information) • Host Group
Delete Host Affinity	• Connectivity (Basic Information)
Modify Host Affinity	
Host Group Management	–
Add FC/FCoE Host Group	• Connectivity (Basic Information) • Host Group • FC/FCoE Host in Host Group
Add iSCSI Host Group	• Connectivity (Basic Information) • Host Group • iSCSI Host in Host Group
Add SAS Host Group	• Connectivity (Basic Information) • Host Group • SAS Host in Host Group
Delete Host Group	• Host Group
Modify Host Group	
Modify Host Group (FC/FCoE)	
Modify Host Group (iSCSI)	
Modify Host Group (SAS)	
Add FC/FCoE Host	• Connectivity (Basic Information) • FC/FCoE Host in Host Group
Add iSCSI Host	• Connectivity (Basic Information) • iSCSI Host in Host Group
Add SAS Host	• Connectivity (Basic Information) • SAS Host in Host Group
Delete FC/FCoE Host	• FC/FCoE Host in Host Group
Delete iSCSI Host	• iSCSI Host in Host Group
Delete SAS Host	• SAS Host in Host Group
Modify FC/FCoE Host	• FC/FCoE Host in Host Group
Modify iSCSI Host	• iSCSI Host in Host Group
Modify SAS Host	• SAS Host in Host Group

Functions in the Action area for Connectivity	Display function
CA Port Group Management	–
Create FC Port Group	• CA Port Group
Create iSCSI Port Group	
Create SAS Port Group	
Create FCoE Port Group	
Delete CA Port Group	
Modify CA Port Group	
Modify FC Port Parameters	• FC Port in Port Group
Modify iSCSI Port Parameters	• iSCSI Port in Port Group
Modify SAS Port Parameters	• SAS Port in Port Group
Modify FCoE Port Parameters	• FCoE Port in Port Group
Modify Port Mode	• FC Port in Port Group • iSCSI Port in Port Group
LUN Group Management	–
Add LUN Group	• LUN Group
Delete LUN Group	
Modify LUN Group	
Host Response Management	–
Add Host Response	• Host Response
Delete Host Response	
Modify Host Response	
Modify CA Reset Group	• CA Reset Group
Host-LU QoS Management	–
Enable/Disable QoS	• Host-LU QoS
Initialize QoS	
Set Host-LU QoS	
Release Host-LU QoS	
Start Host-LU QoS Performance Monitoring	
Stop Host-LU QoS Performance Monitoring	
Set FC/FCoE Host QoS	• FC/FCoE Host QoS in Host QoS
Set iSCSI Host QoS	• iSCSI Host QoS in Host QoS
Set SAS Host QoS	• SAS Host QoS in Host QoS
Set SAS Host QoS	• FC Port QoS in Host QoS
Set iSCSI Port QoS	• iSCSI Port QoS in Host QoS
Set SAS Port QoS	• SAS Port QoS in Host QoS
Set FCoE Port QoS	• FCoE Port QoS in Host QoS
Add LU QoS Group	• LU QoS Group
Delete LU QoS Group	
Modify LU QoS Group	

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Functions in the Action area for Connectivity	Display function
NAS Management	–
Create Shared Folder	• NAS
Delete Shared Folder	
Modify Shared Folder	
Clear NAS Data	
Create NAS Interface	• NAS Interface in NAS
Delete NAS Interface	
Modify NAS Interface	
Change NAS Server Name	• Environment Settings in NAS
Set DNS Server	
Set Authentication Server	
Add Local User	
Delete Local User	
Modify Local User	
Add Local Group	
Delete Local Group	
Add Quota Setting	• Quota Management in NAS
Delete Quota Setting	
Modify Quota Setting	
Initialize Meta Cache Distribution	• Meta Cache Distribution in NAS
Enable Automatic Meta Cache Distribution	
Disable Automatic Meta Cache Distribution	

Host Affinity Management

This section describes host affinity management.

Host Affinity management provides the following functions:

- Create Host Affinity
- Delete Host Affinity
- Modify Host Affinity

Create Host Affinity

This function creates a new host affinity.
When "Host Group - CA Port Group" is selected for "Target Connection", specify the existing "Host Group", "CA Port Group", and "LUN Group" settings. When "Host - CA Port" is selected for "Target Connection", select the existing "Host", "CA Port", "and "LUN Group" settings.
The host accesses a volume via a defined path. Configuring the host affinity can limit the volumes that can be referenced by the host.

- The maximum number of connectable hosts (the number of Host Bus Adapters (HBAs)) per CA port is 256 (32 for the ETERNUS DX60 S4/DX60 S3).

> ⯈ **Caution**
>
> - If a host group has been specified in the "Host Group" field of host affinity, all the member ports of the assigned "CA Port Group" have the affinity mode configured "ON".
> - If "All (all hosts)" has been specified in the "Host Group" field of host affinity, all the member ports of the assigned "CA Port Group" have the affinity mode configured "OFF".
> - When one port is registered in several CA port groups, and the affinity setting has been configured on one of the CA port groups including the corresponding port, the affinity setting is configured on all the CA port groups, which include the corresponding port, and also on the member ports.
> - CA port groups or CA ports without a host affinity setting can be used for creating a host affinity regardless of whether the affinity mode is enabled (ON) or disabled (OFF).
> - A host can be a member of several host groups. In addition, a CA port can be a member of several CA port groups. However, only one LUN group can be allocated to host and port combinations when configuring host affinity.

> ⬤ **N o t e**
>
> - To change the settings of the host affinities, refer to "Modify Host Affinity" (page 348).
> - Host groups with the host interface "FCoE" can configure host affinity with CA port groups with CA types "FC" or "FCoE".

For details on the parameters for this function, refer to "A. Create Host Affinity" (page 1114).
For the factory default settings for this function, refer to "B. Create Host Affinity" (page 1272).

■ **When "Host Group – CA Port Group" is selected for "Target Connection"**

The procedure to create a host affinity is as follows:

Procedure

1   Click [Create Host Affinity] in [Action].

2   Click the [Browse...] button for the host group.
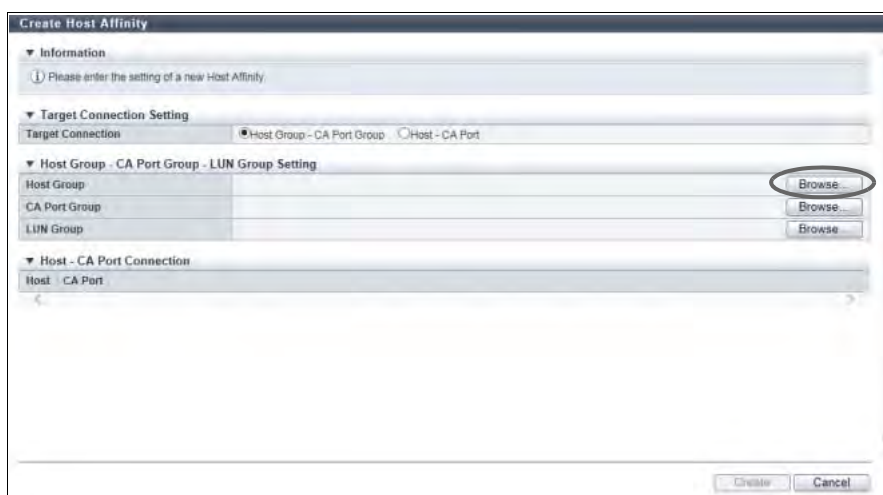
→ The [Select Host Group] screen appears.

3   Select the connection target.

■ When "Host Group" is selected

(1) Select a host group to configure a host affinity, and click the [OK] button.

→ The display returns to the initial screen.

■ When "All" is selected

(1) Select a host response, and click the [OK] button.

> 🔵 **N o t e**
>
> To allow all of the hosts to recognize the LUN group, select "All" for "Target Connection" and then select the host response. "All" is displayed in "All (host response name)" format.

→ The display returns to the initial screen.

4 Click the [Browse…] button for the CA port group.

→ The [Select CA Port Group] screen appears.

5   Select a CA port group to configure a host affinity, and click the [OK] button.

→ The display returns to the initial screen.

🔵 **N o t e**

- If a specific host group has been selected in the "Host Group" field, CA port groups for which the affinity mode is "OFF" are not displayed.
- If "All" has been selected in the "Host Group" field, CA port groups with any of the following conditions are not displayed:
  - The affinity mode is "ON"
  - Member CA ports that used in other CA port groups
  - CA port groups that are being used by other host affinities

6   Click the [Browse...] button for the LUN group.

→ The [Select LUN Group] screen appears.

7　Select a LUN group to configure a host affinity, and click the [OK] button.

→　The display returns to the initial screen.

> ⬤ **N o t e**
>
> ● When "All" is selected for "Host Group", the LUN groups in which LUNs are specified from LUN#512 onward are not displayed.
> ● LUN groups including volumes that are used for the Storage Cluster function are not displayed.

8　To edit the path between a host and a CA port, click the [Edit] button for the path to be edited.

→　The [Select CA Port] screen appears.

9   Select whether to enable or disable the path between a host and a CA port.

The main setting item is as follows.

● **CA Port Group**

  • Checkbox to select paths

10 Click the [OK] button.

11 Confirm the host affinity setting and the path between the host and the CA port, click the [Create] button.

> ⚠ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
  • When the host interface type of the host group and the CA type of the CA port group do not match
    Note that the CA types of "FCoE" and "FC" are regarded as the same CA type.
  • When the number of host affinities exceeds the maximum number per ETERNUS DX/AF
  • When the number of hosts exceeds the maximum number per CA port
  • When there are LUNs that cannot be referenced from the host
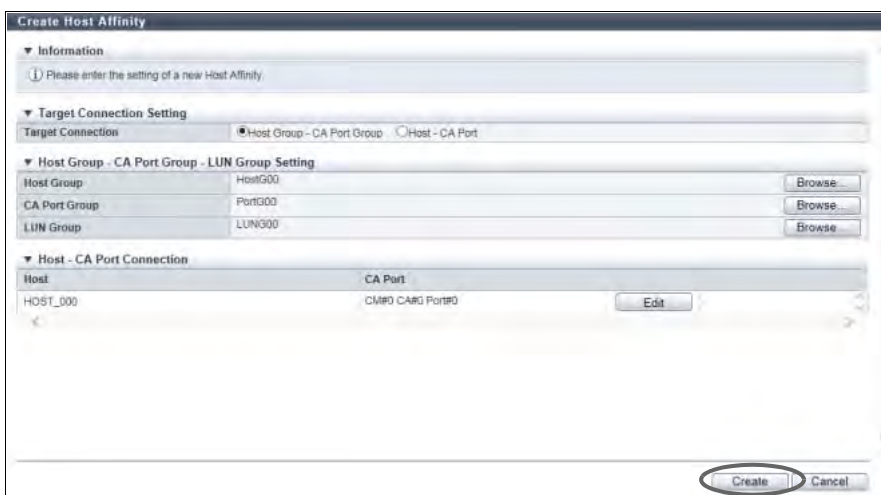
12 A confirmation screen appears. Click the [OK] button.
→ The host affinity creation starts.

13 Click the [Done] button to return to the [Connectivity] screen.

End of procedure

■ **When "Host - CA Port" is selected for "Target Connection"**

The procedure to create a host affinity is as follows:

Procedure

1 Click [Create Host Affinity] in [Action].

2 Click the [Browse...] button for the host.
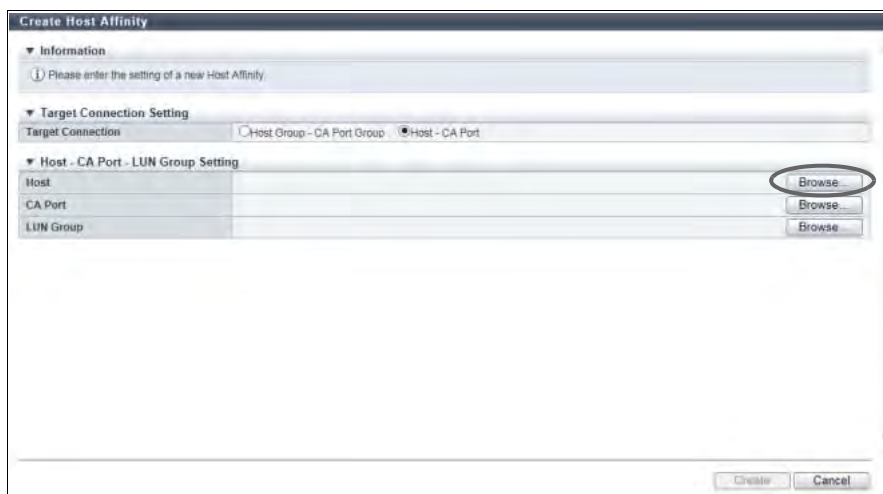
→ The [Select Host] screen appears.

3   Select the connection target.

■ When "Host" is selected

(1) Select a host to configure a host affinity, and click the [OK] button.
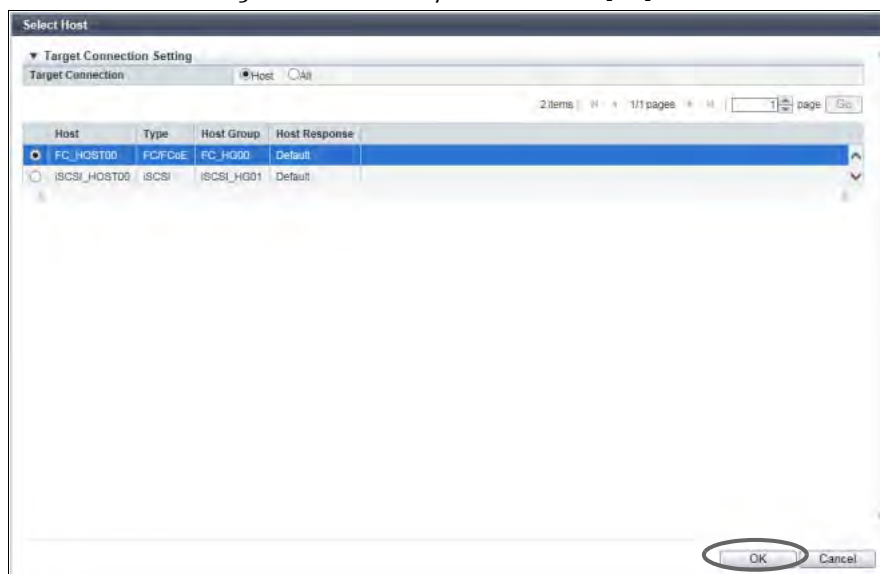
→ The display returns to the initial screen.

■ When "All" is selected

(1) Select a host response, and click the [OK] button.

> ◯ **N o t e**
>
> To allow all of the hosts to recognize the LUN group, select "All" for "Target Connection" and then select the host response. "All" is displayed in "All (host response name)" format.
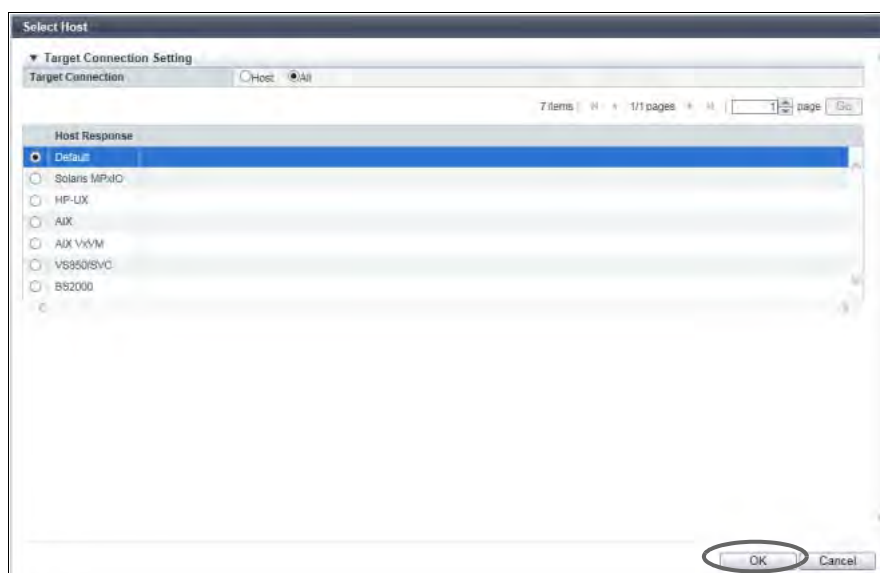
→ The display returns to the initial screen.

4   Click the [Browse...] button for the CA port.

→   The [Select CA Port] screen appears.

5   Select a CA port to configure a host affinity, and click the [OK] button.

→   The display returns to the initial screen.

> **N o t e**
>
> • If a specific host has been selected in the "Host" field, CA ports for which the affinity mode is "OFF" are not displayed.
> • If "All" has been selected in the "Host" field, CA ports with any of the following conditions are not displayed:
>   - The affinity mode is "ON"
>   - The CA ports are used in the CA port group
>   - The CA port is used by another host affinity
> • CA ports that are used for the Storage Cluster function are not displayed.

6 Click the [Browse…] button for the LUN group.

→ The [Select LUN Group] screen appears.

7 Select a LUN group to configure a host affinity, and click the [OK] button.

→ The display returns to the initial screen.

N o t e

- When "All" is selected for "Host", the LUN groups in which LUNs are specified from LUN#512 onward are not displayed.
- LUN groups including volumes that are used for the Storage Cluster function are not displayed.

8   After confirming the host affinity settings, click the [Create] button.

▷ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
- When the host interface type of the host and the CA type of the CA port do not match
  Note that the CA types of "FCoE" and "FC" are regarded as the same CA type.
- When the number of host affinities exceeds the maximum number per ETERNUS DX/AF
- When the number of hosts exceeds the maximum number per CA port
- When there are LUNs that cannot be referenced from the host

9   A confirmation screen appears. Click the [OK] button.
→   The host affinity creation starts.

10   Click the [Done] button to return to the [Connectivity] screen.

End of procedure

Delete Host Affinity

This function deletes the registered host affinity in the ETERNUS DX/AF.
When a host affinity is deleted, the paths between "Host Group", "CA Port Group", and "LUN Group" or the paths between "Host", "CA Port", "and "LUN Group" are also deleted.

▷ **Caution**

- When deleting a host affinity, make sure to stop the access of the host which has been associated with the host affinity to be deleted.
- The following host affinities cannot be deleted. When deleting, use ETERNUS SF Storage Cruiser.
  - The CA port with the host affinity setting is used for the Storage Cluster function
  - The LUN group with the host affinity setting is used for the Storage Cluster function
  - The host with the host affinity setting is used for the Virtual Volume function

The procedure to delete a host affinity is as follows:

> **Procedure**
>
> **1**   Select the host affinity to be deleted (multiple selections can be made) and click [Delete Host Affinity] in [Action].
>
> **2**   A confirmation screen appears. Click the [OK] button.
>   → The deletion of the host affinity starts.
>
> **3**   Click the [Done] button to return to the [Connectivity] screen.
>
> **End of procedure**

Modify Host Affinity

This function is used to perform the following modifications to the existing host affinity.
- Changing the "CA Port Group" or "CA Port" allocation
- Changing the "LUN Group" allocation
- Changing the path between the host and the port in "CA Port Group"
- Changing the "Host Response" allocation (only when "Host Group" or "Host" is "All")

Not only the path between the existing host and the CA port, but also the path between a host and a CA port, which has been added after creating a host affinity, can be modified.
- The maximum number of connectable hosts (the number of HBAs) per CA port is 256 (32 for the ETERNUS DX60 S4/DX60 S3).

Refer to each sections for the following each operation.
- Adding or deleting hosts from the host group ("Modify Host Group" (page 376))
- Adding or deleting member ports from the CA port group ("Modify CA Port Group" (page 416))
- Adding, changing, or deleting volume allocation from the LUN group ("Modify LUN Group" (page 441))
- Changing the host response that is specified for the host group ("Modify Host Group" (page 376))
- Changing the host response that is specified for the host ("Modify FC/FCoE Host" (page 403), "Modify iSCSI Host" (page 405), "Modify SAS Host" (page 406))

> ⏵ **Caution**
>
> - When modifying an active host affinity, make sure to stop the access of the host which has been associated with the host affinity to be modified. The server must be rebooted after the host response is changed. The host response can be changed only if the host group or host is "All".
> - When one port is registered in several CA port groups, and the affinity setting has been configured on one of the CA port groups including the corresponding port, the affinity setting is configured on all the CA port groups, which include the corresponding port, and also on the member ports.
> - CA port groups or CA ports without a host affinity setting can be used for creating a host affinity regardless of whether the affinity mode is enabled (ON) or disabled (OFF).
> - A host can be a member of several host groups. In addition, a CA port can be a member of several CA port groups. However, only one LUN group can be allocated to host and port combinations when changing host affinity settings.
> - A host affinity that is used for the Storage Cluster function cannot be modified with this function. When modifying, use ETERNUS SF Storage Cruiser.
> - Host affinities of which the Virtual Volume function is enabled cannot be modified by using ETERNUS Web GUI. To change host affinities, use the ETERNUS SF Storage Cruiser.

> ### ● N o t e
>
> - When the procedure in "Modify Host Group" (page 376) is used to add a host to a host group, the paths between the added host and all of the ports that are in the associated CA port group are configured.
> - When the procedure in "Modify CA Port Group" (page 416) is used to add a port to a CA port group, the paths between all of the hosts in the host group and the added port are configured.
> - Host groups with the host interface "FCoE" can configure host affinity with CA port groups with CA types "FC" or "FCoE".

For details on the parameters for this function, refer to "A. Modify Host Affinity" (page 1117).

■ When selecting a host affinity for "Host Group - CA Port Group"

The procedure to modify a host affinity is as follows:

Procedure

1 Select the host affinity to be modified, and click [Modify Host Affinity] in [Action].

2 Check the display contents of the host group.
The next step that needs to be performed depends on the display contents of the host group.

■ When the selected host group is "All (host response name)"

(1) Click the [Browse...] button.
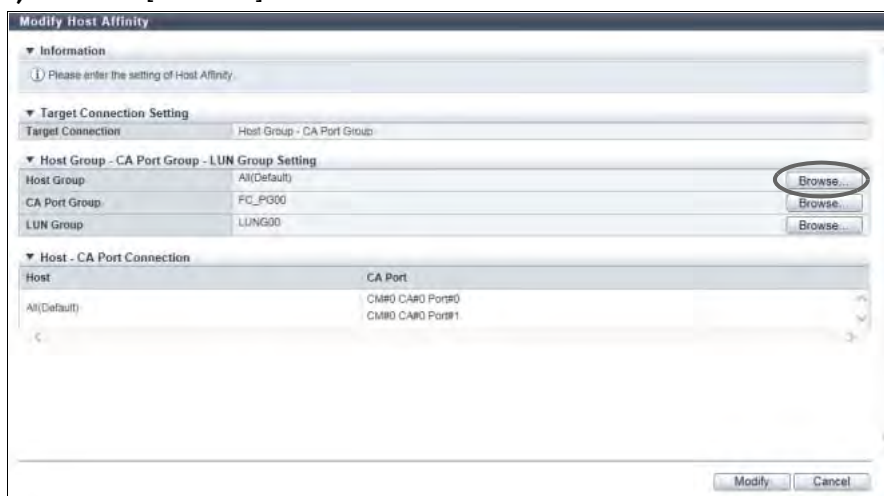
→ The [Select Host Group] screen appears. Proceed to Step 3.

■ When the host group is not "All (host response name)"

→ Proceed to Step 4.

3 Select the host response that is to be assigned to all of the hosts and click the [OK] button.

→ The display returns to the initial screen.

4 Click the [Browse...] button for the CA port group.
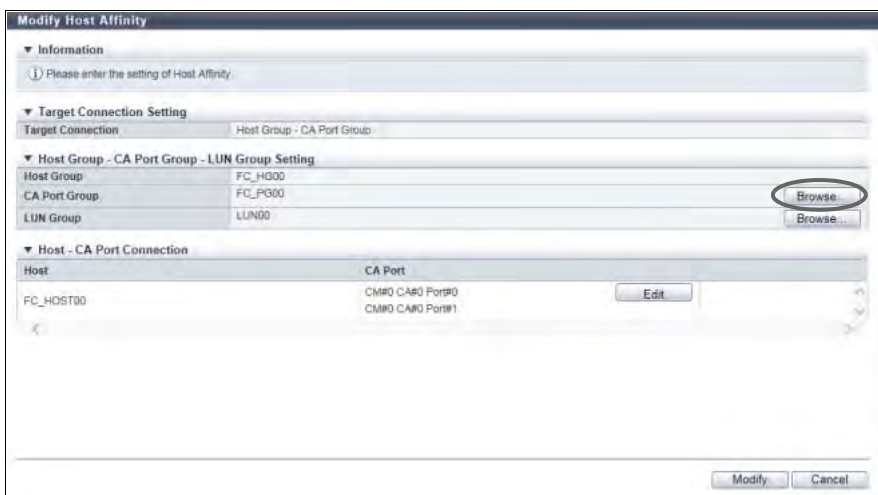
→ The [Select CA Port Group] screen appears.

5 Select a CA port group to configure a host affinity, and click the [OK] button.
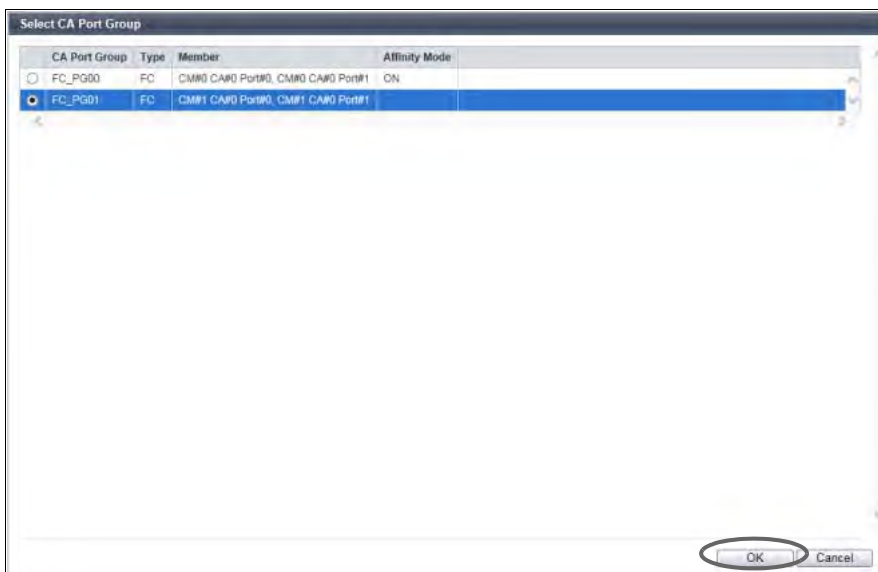
→ The display returns to the initial screen.

> ⬤ **N o t e**
>
> - If a specific host group has been selected in the "Host Group" field, CA port groups with any of the fol-lowing conditions are not displayed:
>   - The affinity mode is "OFF"
>   - The CA port group is used by another host affinity
> - If "All" has been selected in the "Host Group" field, CA port groups with any of the following conditions are not displayed:
>   - The CA port group is used by another host affinity
>   - Member CA ports that used in other CA port groups

6 Click the [Browse...] button for the LUN group.

→ The [Select LUN Group] screen appears.

7   Select a LUN group to configure a host affinity, and click the [OK] button.

→   The display returns to the initial screen.

🔵 N o t e

- When "All" is selected for "Host Group", the LUN groups in which LUNs are specified from LUN#512 onward are not displayed.
- LUN groups including volumes that are used for the Storage Cluster function are not displayed.

8   To edit the path between a host and a CA port, click the [Edit] button for the path to be edited.

→   The [Select CA Port] screen appears.

9 Select whether to enable or disable the path between a host and a CA port.

The main setting item is as follows.

● **CA Port Group**

• Checkbox to select paths

10 Click the [OK] button.

11 Confirm the modified host affinity setting and the path between the host and the CA port, click the [Modify] button.

> ▶ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
• When the host interface type of the host group and the CA type of the CA port group do not match
  Note that the CA types of "FCoE" and "FC" are regarded as the same CA type.
• When the number of hosts exceeds the maximum number per CA port
• When there are LUNs that cannot be referenced from the host

12 A confirmation screen appears. Click the [OK] button.
→ The modification of the host affinity starts.

13 Click the [Done] button to return to the [Connectivity] screen.

End of procedure

■ **When selecting a host affinity for "Host - CA Port"**

The procedure to modify a host affinity is as follows:

Procedure

1 Select the host affinity to be modified, and click [Modify Host Affinity] in [Action].

2 Check the display contents of the host.
The next step that needs to be performed depends on the display contents of the host.

■ When the selected host is "All (host response name)"

(1) Click the [Browse...] button.
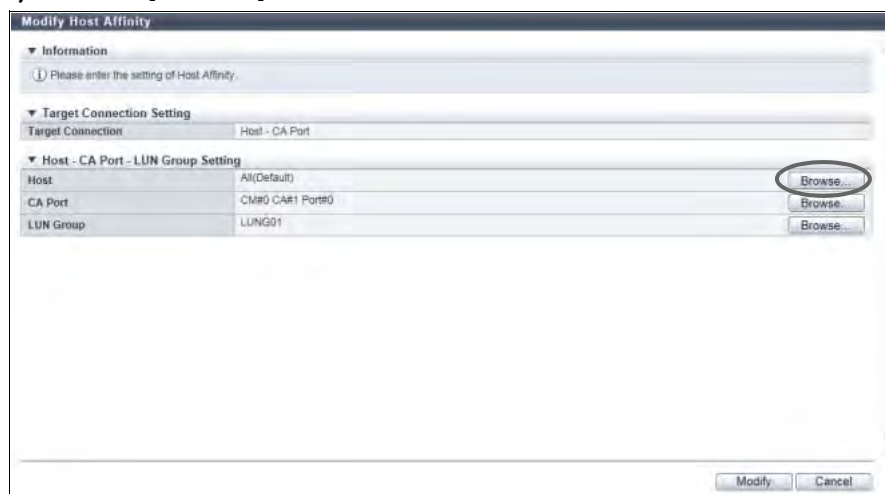
→ The [Select Host] screen appears. Proceed to Step 3.

■ When the host is not "All (host response name)"

→ Proceed to Step 4.

3 Select the host response that is to be assigned to all of the hosts and click the [OK] button.

→ The display returns to the initial screen.

4 Click the [Browse...] button for the CA port.
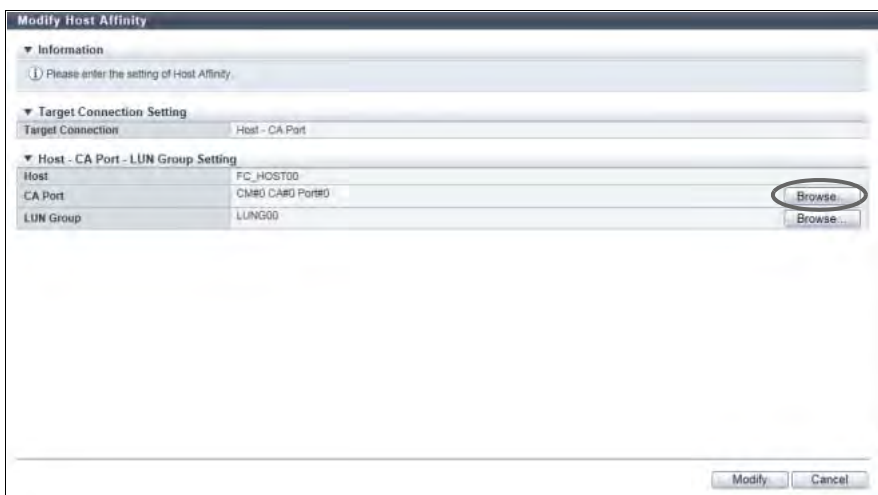
→ The [Select CA Port] screen appears.

5 Select a CA port to configure a host affinity, and click the [OK] button.
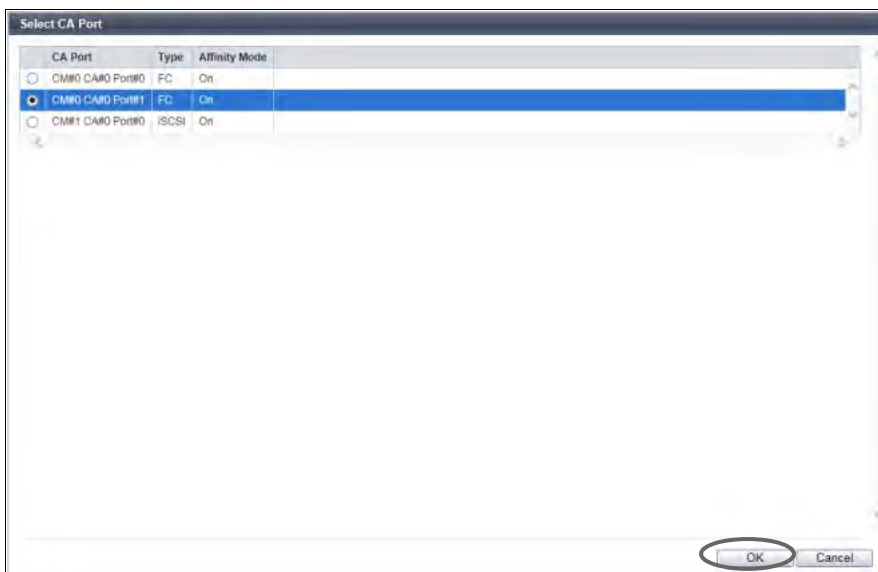
→ The display returns to the initial screen.

🔵 **N o t e**

- If a specific host has been selected in the "Host" field, CA ports with any of the following conditions are not displayed:
  - The affinity mode is "OFF"
  - The CA port is used by another host affinity
- If "All" has been selected in the "Host" field, CA ports with any of the following conditions are not displayed:
  - The CA port is used by another host affinity
  - The CA port is used in the CA port group
- CA ports that are used for the Storage Cluster function are not displayed.

6 Click the [Browse...] button for the LUN group.

→ The [Select LUN Group] screen appears.

7 Select a LUN group to configure a host affinity, and click the [OK] button.

→ The display returns to the initial screen.

> 🔵 **N o t e**

> • When "All" is selected for "Host", the LUN groups in which LUNs are specified from LUN#512 onward are not displayed.
> • LUN groups including volumes that are used for the Storage Cluster function are not displayed.

8 After confirming the host affinity settings, click the [Modify] button.

> ▷ **Caution**

> If an error screen appears under the following conditions, check the parameter settings.
> • The host interface type of the host and the CA type of the CA port do not match
>   Note that the CA types of "FCoE" and "FC" are regarded as the same CA type.
> • The number of hosts exceeds the maximum number per CA port
> • There are LUNs that cannot be referenced from the host.
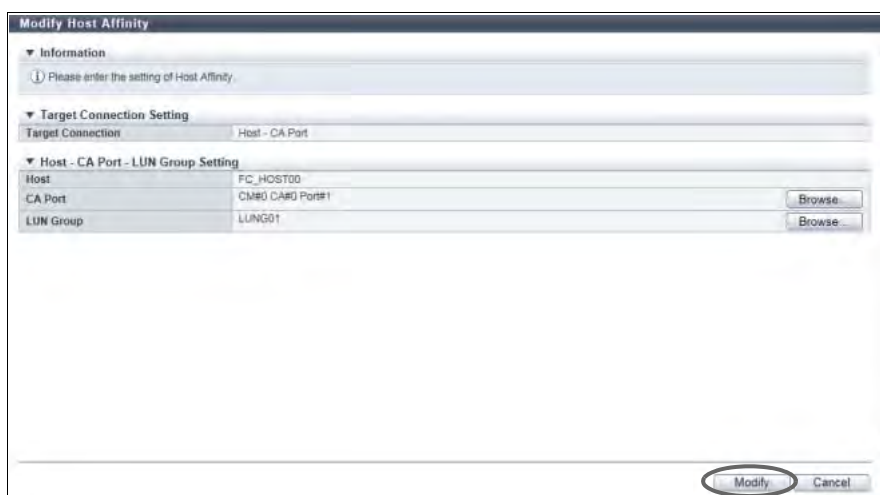
9 A confirmation screen appears. Click the [OK] button.
→ The modification of the host affinity starts.

10 Click the [Done] button to return to the [Connectivity] screen.

End of procedure

Host Group Management

This section describes host group management.

Host group management provides the following functions:

- Add FC/FCoE Host Group
- Add iSCSI Host Group
- Add SAS Host Group
- Delete Host Group
- Modify Host Group
- Modify Host Group (FC/FCoE)
- Modify Host Group (iSCSI)
- Modify Host Group (SAS)
- Add FC/FCoE Host
- Add iSCSI Host
- Add SAS Host
- Delete FC/FCoE Host
- Delete iSCSI Host
- Delete SAS Host
- Modify FC/FCoE Host
- Modify iSCSI Host
- Modify SAS Host

Add FC/FCoE Host Group

This function creates a new FC host group and registers which hosts are members of this group.
An FC host group uses FC or FCoE as the interface type, and groups the hosts (HBAs), which access the same LUN group. The Host Affinity is specified for each FC host group.

The number of host groups and hosts that can be registered

Model	Number of host groups (*1) per storage system	Number of hosts (HBAs) (*2) per storage system	Number of hosts (HBAs) per CA port	Number of hosts (HBAs) per host group
ETERNUS DX60 S4/DX60 S3	512	128	32	8
ETERNUS DX100 S4/DX100 S3 ETERNUS DX200 S4/DX200 S3		1024	256	
ETERNUS DX500 S4/DX500 S3 ETERNUS DX600 S4/DX600 S3		1024 (4096) (*3)		
ETERNUS DX8100 S3		1024		
ETERNUS DX8700 S3 ETERNUS DX8900 S3	1536	8192		64
ETERNUS AF250 S2/AF250	512	1024		8
ETERNUS AF650 S2/AF650		1024 (4096) (*3)		
ETERNUS DX200F		1024		

*1: The total number of host groups irrespective of the interface types.
*2: The total number of hosts irrespective of the interface types.
*3: Values in parentheses indicate the number of hosts when "Expand Host Mode" is "Enable". Refer to "Setup Subsystem Parameters" (page 65) for details.

▶ **Caution**

- Registration of the host is necessary to create a host group. Create a new host group when registering a host with ETERNUS Web GUI by using this function.
- A host can be a member of several host groups. However, only one LUN group can be allocated to host and port combinations when configuring host affinity.
- Refer to "Configuration Guide -Server Connection-" for each OS type to assign an appropriate host response to the created host group. A host response has a recommended pattern which has been prepared for each OS type. Refer to "Recommended patterns of host responses" (page 445) for details. If an appropriate host response is not configured to the host group, the path may not be switched correctly or the volume may not be recognized correctly.
- The host response that is specified for a host group is applied to all the member hosts in the target group. When a host belongs to multiple host groups, the same host response must be applied for all the groups to which the target host belongs. Refer to "Changing the host response when adding a host to multiple host groups" (page 364) for details.
- If a single host belongs to multiple host groups, pay attention to the changes in the host response.
- When creating the host group that is used for the Non-disruptive Storage Migration function, allocate the same host response as the host group that accesses the migration source volume in the external storage system.

🔵 **N o t e**

- To perform the following operations, refer to "Modify Host Group (FC/FCoE)" (page 376).
  - Changing the host group settings
  - Adding a host to an existing host group
- To change the host name or WWN, use the procedure in "Modify FC/FCoE Host" (page 403).
- An FC host and an FCoE host can be members of the same host group. Both "FC host" and "FCoE host" are abbreviated as "FC host" in this section.

For details on the parameters for this function, refer to "A. Add FC/FCoE Host Group" (page 1117).
For the factory default settings for this function, refer to "B. Add FC/FCoE Host Group" (page 1273).

The procedure to create an FC host group is as follows:

Procedure

1   Click [Add FC/FCoE Host Group] in [Action].

2   Input a host group name to be created, and select a host response to be assigned to the host
        group.
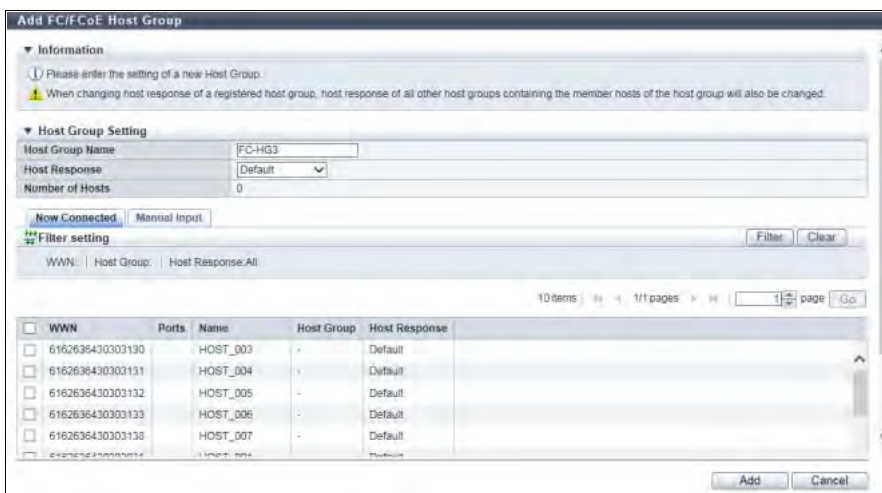
The main setting items are as follows.

● **Host Group Setting**

   • Host Group Name
   • Host Response

3   Register a host in a host group in the following procedures.

   ■ When registering a host by selecting from the host list

      (1) Click the [Now Connected] tab.

      (2) Select a host that is to be registered from the FC host list.

The main setting item is as follows.

● **Host Group Setting**

   • Checkbox to select a host

Filter setting

Filter	Description
WWN	Input the WWN of the FC/FCoE host that is to be displayed. When not using the WWN for filtering, leave this item blank.
Host Group	Input the name of the host group to which the FC/FCoE host that is to be displayed belongs. When not using the host group name for filtering, leave this item blank.
Host Response	Select the host response that is assigned to the FC/FCoE host that is to be displayed.

▶ **Caution**

- If the WWN is not displayed when clicking the [Rediscover] button, make sure that there is no error in the connection environment, such as the connection between the host and the switch, and the CA port settings of the ETERNUS DX/AF. If there is no error in the connection environment, contact the Support Department, or specify the WWN manually.
- If an error screen appears under the following conditions, check the parameter settings.
  - The total number of host groups has exceeded the maximum number for the ETERNUS DX/AF
  - The total number of hosts has exceeded the maximum number for the ETERNUS DX/AF

(3) Click the [Add] button.

■ When registering a host by manually specifying the host

(1) Click the [Manual Input] tab.

(2) Click the [Add] button.

→ The [Add FC/FCoE Host] screen appears.

(3) Manually specify the WWN of the host that is to be registered.

The main setting item is as follows.

● **Host Setting**

• WWN

(4) Click the [OK] button
   → Returns to the [Manual Input] screen.

(5) Repeat Step (2) through Step (4) to set more WWNs.

> ▷ **Caution**
>
> If an error screen appears under the following conditions, check the parameter settings.
>   • The total number of host groups has exceeded the maximum number for the ETERNUS DX/AF
>   • The total number of hosts has exceeded the maximum number for the ETERNUS DX/AF

(6) After adding the FC host is complete, click the [Add] button.
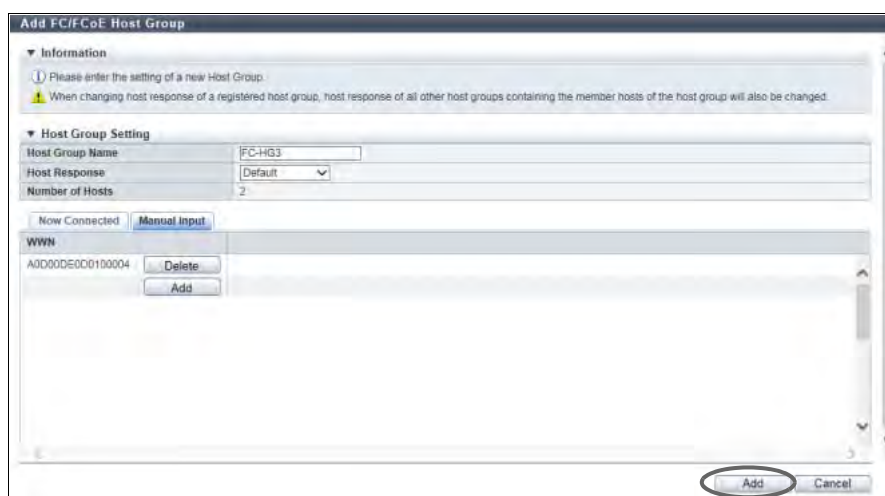
4 A confirmation screen appears. Click the [OK] button.
   → Registration of the FC host group starts.

5 Click the [Done] button to return to the [Host Group] screen.

> ⬤ **N o t e**
>
> Click the [Continue] button to continue registering FC host groups.

<div align="right">

End of procedure

</div>

■ Changing the host response when adding a host to multiple host groups

When a host that already belongs to an existing host group is added to a newly created host group, the host response of the new host group is applied to the host. The host response of the existing host group to which the target host belongs is also changed. Refer to the following for details.

[Example 1] When hosts are added to a newly created host group
When a new host group "Host_G3" (host response: HR_1) is created and "Host-3" and "Host-4" are added to that host group

● Configuration before the hosts are added

Host group (Host response)	Member host	Host response that is allocated to the host
Host_G1 (Default)	Host-1	Default
	Host-2	Default
Host_G2 (Default)	Host-2	Default
	Host-3	Default

● Configuration after the hosts are added
After the hosts are added, the same host response is applied to Host_G1, Host_G2, and Host_G3.

Host group (Host response)	Member host	Host response that is allocated to the host
Host_G1 (HR_1)	Host-1	HR_1
	Host-2	HR_1
Host_G2 (HR_1)	Host-2	HR_1
	Host-3	HR_1
Host_G3 (HR_1)	Host-3	HR_1
	Host-4	HR_1

● Details
The details on how the host response that is applied to the host is changed are as follows.

1. The host response for Host-3 is changed from "Default" to "HR_1" (the host response for Host_G3).

2. Since the host response for Host-3 is changed, the host response for Host_G2 to which Host-3 belongs is also changed from "Default" to "HR_1".
(The host response for Host_2, which is the member host of Host_G2, is changed from "Default" to "HR_1".)

3. Since the host response for Host-2 is changed, the host response for Host_G1 to which Host-2 belongs is also changed from "Default" to "HR_1".
(The host response for Host_1, which is the member host of Host_G1, is changed from "Default" to "HR_1".)

[Example 2] When a host is added to an existing host group
When "Host-3" is added to the existing host group "Host_G3" (host response: HR_1)

- Configuration before the host is added

Host group (Host response)	Member host	Host response that is allocated to the host
Host_G1 (Default)	Host-1	Default
	Host-2	Default
Host_G2 (Default)	Host-2	Default
	Host-3	Default
Host_G3 (HR_1)	Host-4	HR_1

- Configuration after the host is added
  After the host is added, the same host response is applied to Host_G1, Host_G2, and Host_G3.

Host group (Host response)	Member host	Host response that is allocated to the host
Host_G1 (HR_1)	Host-1	HR_1
	Host-2	HR_1
Host_G2 (HR_1)	Host-2	HR_1
	Host-3	HR_1
Host_G3 (HR_1)	Host-3	HR_1
	Host-4	HR_1

- Details
  The details on how the host response that is applied to the host is changed are as follows.

  1. The host response for Host-3 is changed from "Default" to "HR_1" (the host response for Host_G3).

  2. Since the host response for Host-3 is changed, the host response for Host_G2 to which Host-3 belongs is also changed from "Default" to "HR_1".
     (The host response for Host_2, which is the member host of Host_G2, is changed from "Default" to "HR_1".)

  3. Since the host response for Host-2 is changed, the host response for Host_G1 to which Host-2 belongs is also changed from "Default" to "HR_1".
     (The host response for Host_1, which is the member host of Host_G1, is changed from "Default" to "HR_1".)

Add iSCSI Host Group

This function creates a new iSCSI host group and registers which hosts are members of this group.
An iSCSI host group uses iSCSI as the interface type, and groups the hosts (HBAs), which access the same LUN group. The Host Affinity is specified for each iSCSI host group.

The number of host groups and hosts that can be registered in the ETERNUS DX/AF varies depending on the model. Refer to "The number of host groups and hosts that can be registered" (page 359) for details.

▷ **Caution**

- Registration of the host is necessary to create a host group. Create a new host group when registering a host with ETERNUS Web GUI by using this function.
- A host can be a member of several host groups. However, only one LUN group can be allocated to host and port combinations when configuring host affinity.
- Refer to "Configuration Guide -Server Connection-" for each OS type to assign an appropriate host response to the created host group. A host response has a recommended pattern which has been prepared for each OS type. Refer to "Recommended patterns of host responses" (page 445) for details. If an appropriate host response is not configured to the host group, the path may not be switched correctly or the volume may not be recognized correctly.
- The host response that is specified for a host group is applied to all the member hosts in the target group. When a host belongs to multiple host groups, the same host response must be applied for all the groups to which the target host belongs. Refer to "Changing the host response when adding a host to multiple host groups" (page 364) for details.
- If a single host belongs to multiple host groups, pay attention to the changes in the host response.
- Unlike ETERNUS Web GUI, ETERNUS CLI can register two iSCSI hosts that have the same iSCSI name by setting an IP address for one of these iSCSI hosts and by not setting an IP address for the other iSCSI host. However, if iSCSI hosts are registered in the ETERNUS DX/AF in this way, iSCSI hosts cannot be added using ETERNUS Web GUI. Avoid this configuration when using ETERNUS Web GUI and ETERNUS CLI together. If both iSCSI hosts already exist, use ETERNUS CLI to specify an IP address for the iSCSI host without the IP address.
- When creating the host group that is used for the Non-disruptive Storage Migration function, allocate the same host response as the host group that accesses the migration source volume in the external storage system.

🔵 **N o t e**

- To perform the following operations, refer to "Modify Host Group (iSCSI)" (page 380).
  - Changing the host group settings
  - Adding a host to an existing host group
- To change the iSCSI host information, use the procedure in "Modify iSCSI Host" (page 405).

For details on the parameters for this function, refer to "A. Add iSCSI Host Group" (page 1119).
For the factory default settings for this function, refer to "B. Add iSCSI Host Group" (page 1273).

The procedure to create an iSCSI host group is as follows:

Procedure

1 Click [Add iSCSI Host Group] in [Action].

2　Input a host group name to be created, and select a host response to be assigned to the host group.
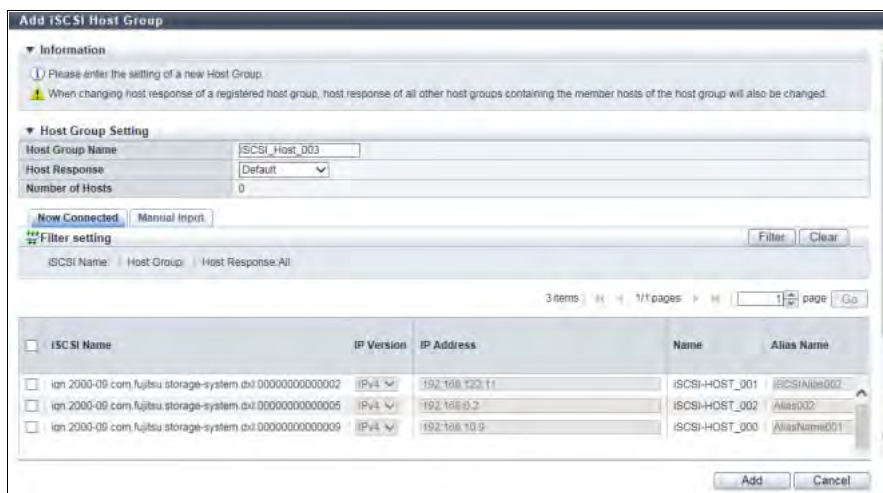
The main setting items are as follows.

● **Host Group Setting**

- Host Group Name
- Host Response

3　Register a host in a host group in the following procedures, and click the [Add] button.

■　When registering a host by selecting from the host list

(1)　Click the [Now Connected] tab.
　　The following hosts are displayed in the [Now Connected] tab:

- Hosts that are connected to an iSCSI-CA or an iSCSI-CA/RA but are not registered in the ETERNUS DX/AF (*1)

　　*1:　"Host that is not registered in the ETERNUS DX/AF" indicates that a host with the same iSCSI name, IP version, and Alias Name as the target host is not registered in the storage system. The host is regarded as unregistered host even if a host with the same iSCSI name, IP version, Alias Name, and different IP address is already registered. The obtained "iSCSI Name", "IP Version", "IP Address", and "Alias Name" are displayed.

- Hosts that are connected to an iSCSI-CA or an iSCSI-CA/RA and registered in the ETERNUS DX/AF

- Hosts that are not connected to an iSCSI-CA or an iSCSI-CA/RA but are registered in the ETERNUS DX/AF

　　Click the [Rediscover] button to update the iSCSI host list.

(2) Select a host to be registered from the iSCSI host list and register the iSCSI host information (the IP address and the Alias name, etc.) to the selected host.

The main setting items are as follows.

● **Host Group Setting**

- Checkbox to select a host
- IP Version
- IP Address
- Alias Name
- CHAP User ID
- Change CHAP Password
- CHAP Password
- Confirm CHAP Password

Filter setting

Filter	Description
iSCSI Name	Input the iSCSI name of the iSCSI host that is to be displayed. When not using the iSCSI name for filtering, leave this item blank.
Host Group	Input the name of the host group to which the iSCSI host that is to be displayed belongs. When not using the host group name for filtering, leave this item blank.
Host Response	Select the host response that is assigned to the iSCSI host that is to be displayed.

▷ **Caution**

- If the iSCSI host information is not displayed when clicking the [Rediscover] button, make sure that there is no error in the connection environment, such as the connection between the host and the switch, and the CA port settings of the ETERNUS DX/AF. If there is no error in the connection environment, contact the Support Department or manually specify the iSCSI host information.
- If an error screen appears under the following conditions, check the parameter settings.
  - The "IP Address" is specified and an iSCSI host with the same "iSCSI Name" and "IP Address" is already registered
  - The "IP Address" is not specified and an iSCSI host with the same "iSCSI Name" and "IP Version" is already registered
  - The total number of host groups has exceeded the maximum number for the ETERNUS DX/AF
  - The total number of hosts has exceeded the maximum number for the ETERNUS DX/AF

(3) Click the [Add] button.

■ When registering a host by manually specifying the host

(1) Click the [Manual Input] tab.

(2) Click the [Add] button.

   → The [Add iSCSI Host] screen appears.

(3) Specify the iSCSI host information of the host to be registered.
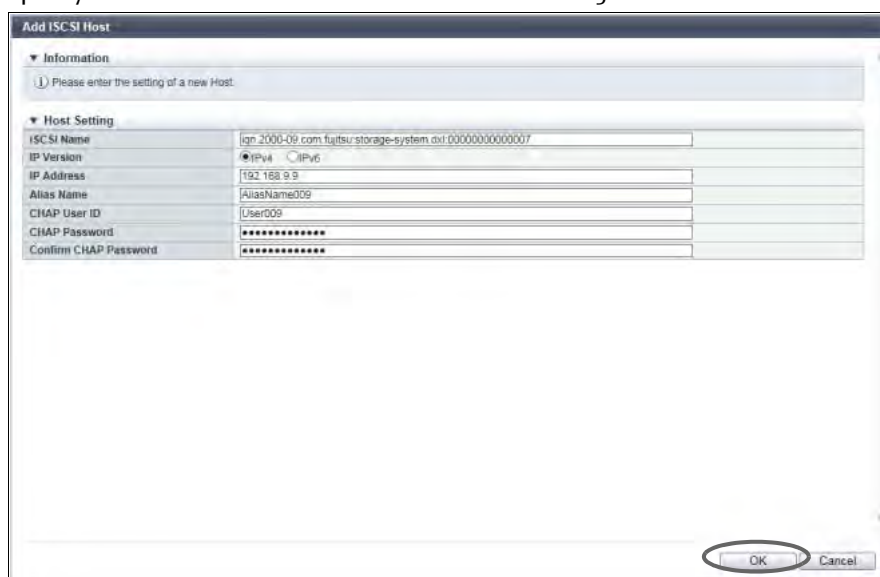
The main setting item is as follows.

● **Host Setting**

• iSCSI Name

◯ **N o t e**

Refer to Step (2) in "When registering a host by selecting from the host list" (page 367) for other settings.

(4) Click the [OK] button
   → Returns to the [Manual Input] screen.

(5) Repeat Step (2) through Step (4) to set more iSCSI hosts.

> ▷ **Caution**
>
> If an error screen appears under the following conditions, check the parameter settings.
> - The "IP Address" is specified and an iSCSI host with the same "iSCSI Name" and "IP Address" is already registered
> - The "IP Address" is not specified and an iSCSI host with the same "iSCSI Name" and "IP Version" is already registered
> - The total number of host groups has exceeded the maximum number for the ETERNUS DX/AF
> - The total number of hosts has exceeded the maximum number for the ETERNUS DX/AF

(6) After adding the iSCSI host is complete, click the [Add] button.
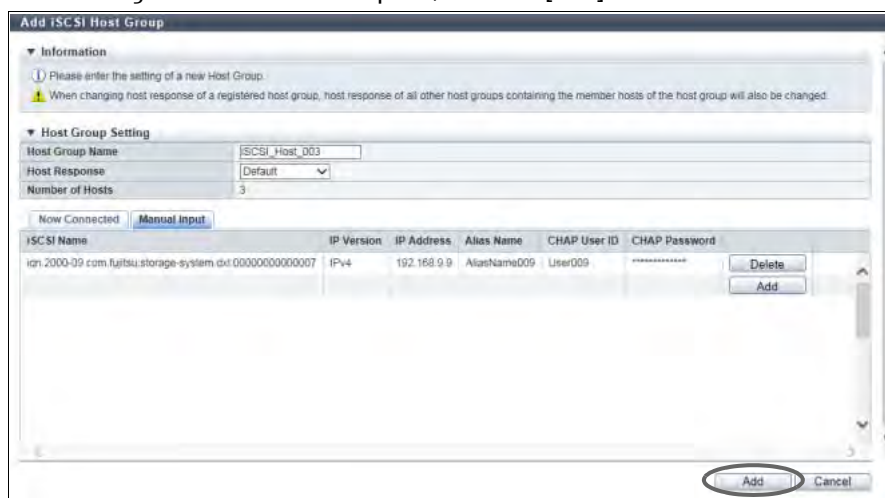
4 A confirmation screen appears. Click the [OK] button.
→ Registration of the iSCSI host group starts.

5 Click the [Done] button to return to the [Host Group] screen.

> ◯ **N o t e**
>
> Click the [Continue] button to continue registering iSCSI host groups.

End of procedure

■ **IPv6 Address Notation**

Since the IPv6 address is 128-bit and extremely long, this address is displayed using "xxxx", which describes 16-bit in hexadecimals as being one block that is separated by colons (":").

xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx

- Use 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) for inputting an IPv6 address.
- The current setting is displayed with 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
- Up to 128-bit
- The first 64-bit (prefix) of the link local address is fixed to "fe80::"

The following three abbreviation methods are available for IPv6 addresses:

(1) Omission of the first "0" of a block that follows consecutive zeros.

[Example]2001:1000:0120:0000:0000:0123:0000:0000

2001:1000:120:0000:0000:123:0000:0000

(2) Replacement of "0000" blocks with "0".

[Example] 2001:1000:120:0000:0000:123:0000:0000

2001:1000:120:0:0:123:0:0

(3) Replacement of a block with consecutive zeros by "::" is performed only once.

[Example] 2001:1000:120:0:0:123:0:0

2001:1000:120::123:0:0 is OK

2001:1000:120::123:: is not allowed

(Replacement of a block with consecutive zeros by "::" is allowed only once.)

(Replacement of a block with consecutive zeros by "::" is allowed only once.)

▷ **Caution**

The following IP addresses cannot be specified:
- Link local addresses (the address starts with "fe80::") for which all of the values for the low 64-bit are "0"
- Connect IP addresses (*1) for which the first 3-bit are not "001" or the first 7-bit are not "1111110"
 *1: The connect IP address indicates either a "global address", "unique local address", or "6to4 address".
- The first 64-bit of the gateway is "fe80::" and all of the values for low 64-bit are "0"
- Network addresses for which the first 3-bit of the gateway are "001"
- Network addresses for which the first 7-bit of the gateway are "1111110"
- DNS server IP addresses for which the first 3-bit are not "001" or the first 7-bit are not "1111110"

Add SAS Host Group

This function creates a new SAS host group and registers which hosts are members of this group.
A SAS host group uses SAS as the interface type, and groups the hosts (HBAs), which access the same LUN group.
The Host Affinity is specified for each SAS host group.

The number of host groups and hosts that can be registered in the ETERNUS DX varies depending on the model. Refer to for details.

▷ **Caution**

- Registration of the host is necessary to create a host group. If this function is used to register a host to the ETERNUS DX from ETERNUS Web GUI, a new host group is also created.
- A host can be a member of several host groups. However, only one LUN group can be allocated to host and port combinations when configuring host affinity.
- Refer to "Configuration Guide -Server Connection-" for each OS type to assign an appropriate host response to the created host group. A host response has a recommended pattern which has been prepared for each OS type. Refer to "Recommended patterns of host responses" (page 445) for details. If an appropriate host response is not configured to the host group, the path may not be switched correctly or the volume may not be recognized correctly.
- The host response that is specified for a host group is applied to all the member hosts in the target group. When a host belongs to multiple host groups, the same host response must be applied for all the groups to which the target host belongs. Refer to "Changing the host response when adding a host to multiple host groups" (page 364) for details.
- If a single host belongs to multiple host groups, pay attention to the changes in the host response.
- When creating the host group that is used for the Non-disruptive Storage Migration function, allocate the same host response as the host group that accesses the migration source volume in the external storage system.

🔵 **N o t e**

- To perform the following operations, refer to "Modify Host Group (SAS)" (page 385).
    - Changing the host group settings
    - Adding a host to an existing host group
- To change the host name or SAS address, use the procedure in "Modify SAS Host" (page 406).

For details on the parameters for this function, refer to "A. Add SAS Host Group" (page 1123).
For the factory default settings for this function, refer to "B. Add SAS Host Group" (page 1273).

The procedure to create a SAS host group is as follows:

Procedure

1 Click [Add SAS Host Group] in [Action].

2 Input a host group name to be created, and select a host response to be assigned to the host group.
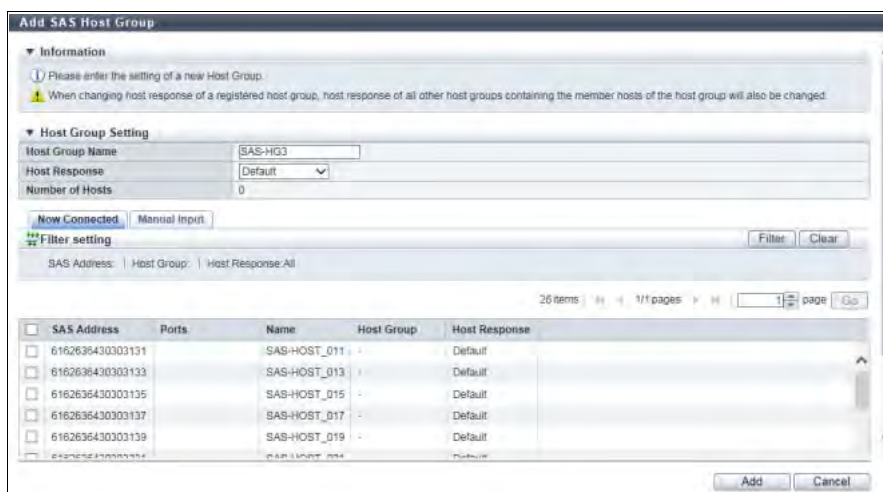
The main setting items are as follows.

● **Host Group Setting**

- Host Group Name
- Host Response

3 Register a host in a host group in the following procedures.

■ When registering a host by selecting from the host list

(1) Click the [Now Connected] tab.

(2) Select a host that is to be registered from the SAS host list.

The main setting item is as follows.

● **Host Group Setting**

- Checkbox to select a host

Filter setting

Filter	Description
SAS Address	Input the SAS address of the SAS host that is to be displayed. When not using the SAS address for filtering, leave this item blank.
Host Group	Input the name of the host group to which the SAS host that is to be displayed belongs. When not using the host group name for filtering, leave this item blank.
Host Response	Select the host response that is assigned to the SAS host that is to be displayed.

▶ **Caution**

- If the SAS address is not displayed when clicking the [Rediscover] button, make sure that there is no error in the connection environment, such as the connection between the host and the switch, and the CA port settings of the ETERNUS DX. If there is no error in the connection environment, contact the Support Department or manually specify the SAS address.
- If an error screen appears under the following conditions, check the parameter settings.
  - The total number of host groups has exceeded the maximum number for the ETERNUS DX
  - The total number of hosts has exceeded the maximum number for the ETERNUS DX

(3) Click the [Add] button.

■ When registering a host by manually specifying the host

(1) Click the [Manual Input] tab.

(2) Click the [Add] button.

→ The [Add SAS Host] screen appears.

(3) Manually specify the SAS address of the host that is to be registered.

The main setting item is as follows.

● **Host Setting**

• SAS Address

(4) Click the [OK] button
→ Returns to the [Manual Input] screen.

(5) Repeat Step (2) through Step (4) to set more SAS addresses.

⚠ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
• The total number of host groups has exceeded the maximum number for the ETERNUS DX
• The total number of hosts has exceeded the maximum number for the ETERNUS DX

(6) After adding the SAS host is complete, click the [Add] button.
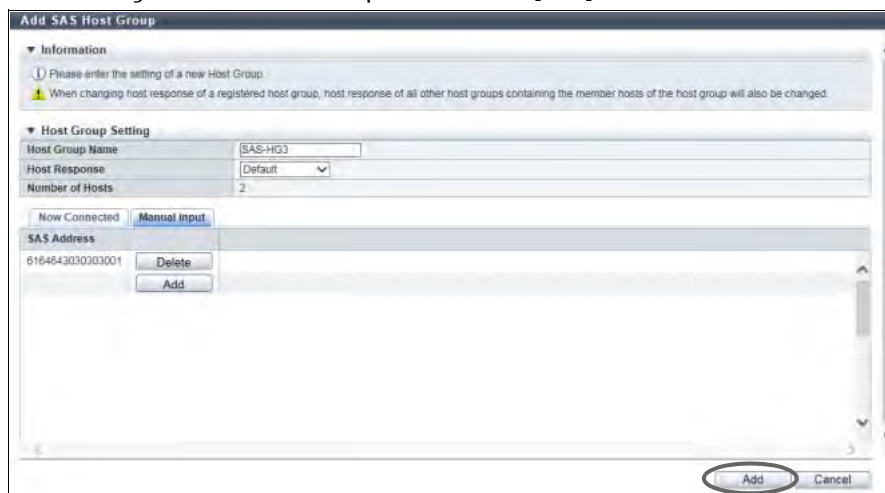
4 A confirmation screen appears. Click the [OK] button.
→ Registration of the SAS host group starts.

5 Click the [Done] button to return to the [Host Group] screen.

> ⬤ **N o t e**
>
> Click the [Continue] button to continue registering SAS host groups.

End of procedure

Delete Host Group

This function deletes a host group. When a host group is deleted, the hosts, which belong to the host group, are also deleted.

> ▶ **Caution**
>
> The host group, of which host affinity settings have been configured, cannot be deleted.

The procedure to delete a host group is as follows:

Procedure

1 Select the host group to be deleted (multiple selections can be made) and click [Delete Host Group] in [Action].

> ▶ **Caution**
>
> The host group, of which host affinity settings have been configured (the status of the host group is "Active"), cannot be deleted.

2 A confirmation screen appears. Click the [OK] button.
→ Deletion of the host group starts.

3 Click the [Done] button to return to the [Host Group] screen.

<div align="right">

End of procedure
</div>

Modify Host Group

This function performs the following modifications to the existing host group.

- Changing the "Host Group Name" settings
- Changing the "Host Response" allocation
- Changing the "Host" settings (including addition and deletion of member hosts in a host group)

Operation screens for modifying host groups vary with the interface types.

- Refer to <u>"Modify Host Group (FC/FCoE)" (page 376)</u> to modify FC/FCoE host groups.
- Refer to <u>"Modify Host Group (iSCSI)" (page 380)</u> to modify iSCSI host groups.
- Refer to <u>"Modify Host Group (SAS)" (page 385)</u> to modify SAS host groups.

Modify Host Group (FC/FCoE)

This function performs the following modifications to the existing FC/FCoE host group.

- Changing the "Host Group Name" settings
- Changing the "Host Response" allocation
- Changing the "Host" settings (including addition and deletion of member hosts in a host group)

Hosts can be added to host groups which the host affinity setting has been already configured, or deleted from host groups.
If a host is added, the host affinity setting is automatically configured to the host, as a host group member.
If a host is deleted, the host affinity setting is cleared from the corresponding host.
The number of hosts that can be registered varies depending on each model. Refer to <u>"The number of host groups and hosts that can be registered" (page 359)</u> for details.

> ▶ **Caution**
>
> - To perform the following operations, stop the host access that is associated with host affinity.
>   - Changing the "Host Response" allocation
>   The server must be rebooted after the host response allocation is changed. Refer to <u>"Requirements for changing parameters" (page 447)</u> for details.
>   - Deleting "Host" from the host group
> - To perform the following operations, stopping the host access that is associated with host affinity is not required.
>   - Changing "Host Group Name"
>   - Adding "Host" to the host group
> - Registration of the host is necessary to create a host group. It is not possible to delete all hosts from a host group.
> - A host that has been registered with ETERNUS Web GUI by using this function belongs to one of the host groups.
> - A host can be a member of several host groups. However, only one LUN group can be allocated to host and port combinations when configuring host affinity.

- Refer to "Configuration Guide -Server Connection-" for each OS type to assign an appropriate host response to the host group. A host response has a recommended pattern which has been prepared for each OS type. Refer to "Recommended patterns of host responses" (page 445) for details. If an appropriate host response is not configured to the host group, the path may not be switched correctly or the volume may not be recognized correctly.
- The host response that is specified for a host group is applied to all the member hosts in the target group. When a host belongs to multiple host groups, the same host response must be applied for all the groups to which the target host belongs. Refer to "Changing the host response when adding a host to multiple host groups" (page 364) for details.
- When changing the host response for the host group, the host responses of the other host groups to which the target host belongs are also changed.
- If a single host belongs to multiple host groups, pay attention to the changes in the host response.

⬤ N o t e

- When a host was added to a host group, of which the host affinity setting has been configured, paths between all the ports with the host affinity setting and the added host will be configured. To modify the path between a host and a port, refer to "Modify Host Affinity" (page 348).
- When a host in the host group for which the host affinity settings are already configured is deleted, the path from the host to the port is also deleted.
- To change the host name or WWN, use the procedure in "Modify FC/FCoE Host" (page 403).
- To create a new host group and register hosts, use the procedure in "Add FC/FCoE Host Group" (page 359).
- An FC host and an FCoE host can be members of the same host group. Both "FC host" and "FCoE host" are abbreviated as "FC host" in this section.

For details on the parameters for this function, refer to "A. Modify Host Group (FC/FCoE)" (page 1124).

The procedure to modify an FC host group is as follows:

Procedure

1 Select the FC host group to be changed, and click [Modify Host Group] in [Action].

2 Input a new host group name, or re-select a host response to be assigned to the host group.
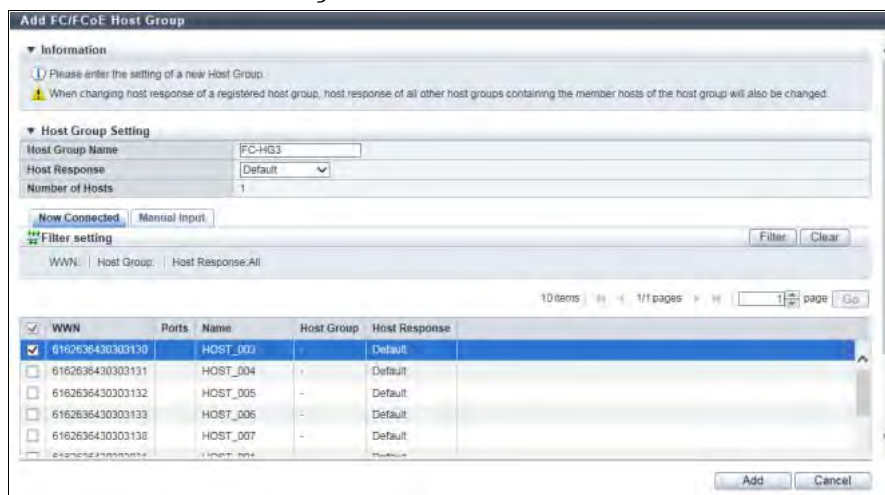
The main setting items are as follows.

● Host Group Setting

• Host Group Name

• Host Response

▶ **Caution**

• Before changing a host response, check the LUN setting state. If LUNs that are LUN#256 onward are used, the referable LUN setting cannot be changed to a "256 LUN" host response. Refer to "Host response and referable number of LUNs" (page 1118) for details.

• When hosts are to be added in an existing host group and the relevant host already belongs to another host group, the host response setting is also changed for that host group. If a LUN group belongs to a host affinity setting for another host group and this LUN group uses LUNs from LUN#256 onward, the host response setting cannot be changed to "256 LUN".

3   Add or delete a host in a host group in the following procedures.

■ When adding or deleting a host by selecting from the host list

(1)   Click the [Registered And Now Connected] tab.

(2)   Add or delete hosts.

The main setting item is as follows.

● Host Group Setting

• Checkbox to select a host

Filter setting

Filter	Description
WWN	Input the WWN of the FC/FCoE host that is to be displayed. When not using the WWN for filtering, leave this item blank.
Other Host Group	Input the name of the other host group to which the FC/FCoE host that is to be displayed belongs. "Other Host Group" indicates the host groups to which the FC/FCoE host belongs other than the one that is selected when this function is started. When not using the other host group name for filtering, leave this item blank.
Host Response	Select the host response that is assigned to the FC/FCoE host that is to be displayed.

> **▶ Caution**
>
> - If the WWN is not displayed when clicking the [Rediscover] button, make sure that there is no error in the connection environment, such as the connection between the host and the switch, and the CA port settings of the ETERNUS DX/AF. If there is no error in the connection environment, contact the Support Department or manually specify the WWN.
> - If an error screen appears under the following conditions, check the parameter settings.
>   - A host cannot see some LUNs
>   - The total number of hosts has exceeded the maximum number for the ETERNUS DX/AF

(3) Click the [Modify] button.

■ When adding a host by manually specifying the host

(1) Click the [Manual Input] tab.

(2) Click the [Add] button.
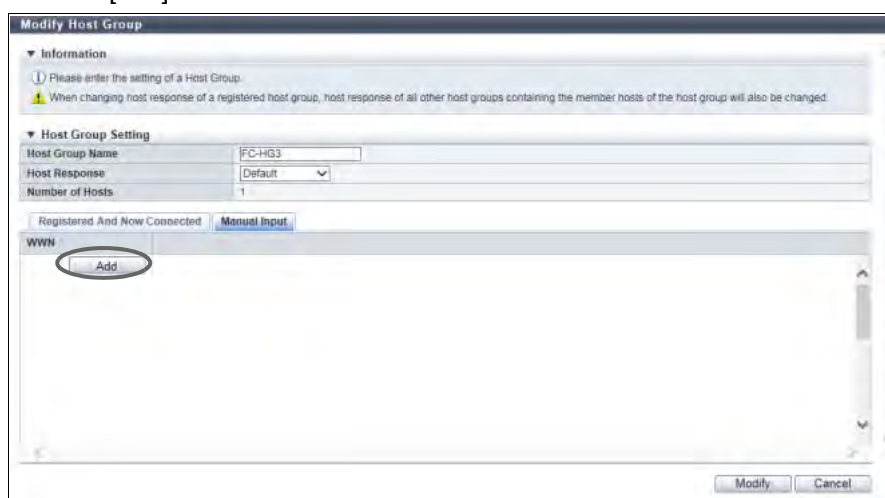
→ The [Add FC/FCoE Host] screen appears.

(3) Manually specify the WWN of the host to be added.
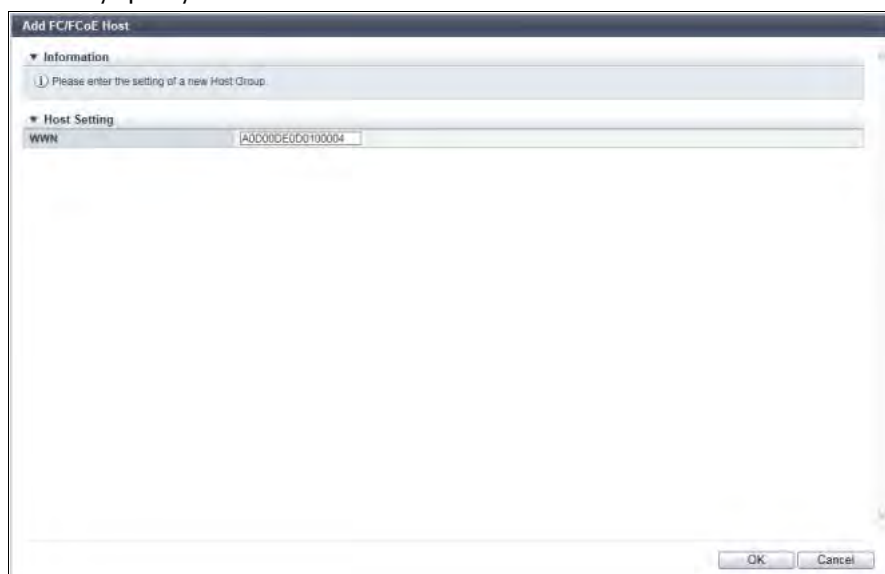
The main setting item is as follows.

● **Host Setting**

• WWN

(4) Click the [OK] button
→ Returns to the [Manual Input] screen.

(5) Repeat Step (2) through Step (4) to set more WWNs.

▷ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
• A host cannot see some LUNs
• The total number of hosts has exceeded the maximum number for the ETERNUS DX/AF

(6) After adding or deleting FC hosts is complete, click the [Modify] button.
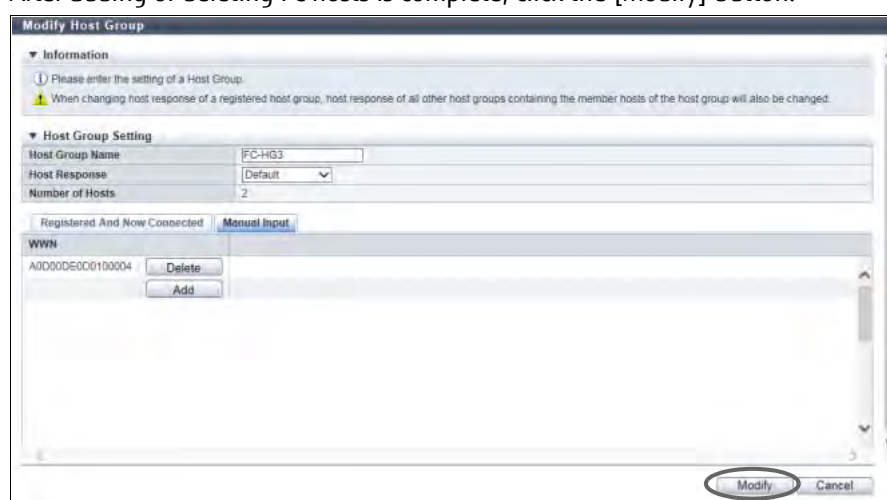
4 A confirmation screen appears. Click the [OK] button.
→ Modification of the FC host group starts.

5 Click the [Done] button to return to the [Host Group] screen.

End of procedure

Modify Host Group (iSCSI)

This function performs the following modifications to the existing iSCSI host group.

• Changing the "Host Group Name" settings
• Changing the "Host Response" allocation
• Changing the "Host" settings (including addition and deletion of member hosts in a host group)

Hosts can be added to host groups which the host affinity setting has been already configured, or deleted from host groups.
If a host is added, the host affinity setting is automatically configured to the host, as a host group member.
If a host is deleted, the host affinity setting is cleared from the corresponding host.

The number of hosts that can be registered in the ETERNUS DX/AF varies depending on the model. Refer to "The number of host groups and hosts that can be registered" (page 359) for details.

▷ **Caution**

- To perform the following operations, stop the host access that is associated with host affinity.
  - Changing the "Host Response" allocation
    The server must be rebooted after the host response allocation is changed. Refer to "Requirements for changing parameters" (page 447) for details.
  - Deleting "Host" from the host group
- To perform the following operations, stopping the host access that is associated with host affinity is not required.
  - Changing "Host Group Name"
  - Adding "Host" to the host group
- Registration of the host is necessary to create a host group. It is not possible to delete all hosts from a host group.
- A host that has been registered with ETERNUS Web GUI by using this function belongs to one of the host groups.
- A host can be a member of several host groups. However, only one LUN group can be allocated to host and port combinations when configuring host affinity.
- Refer to "Configuration Guide -Server Connection-" for each OS type to assign an appropriate host response to the host group. A host response has a recommended pattern which has been prepared for each OS type. Refer to "Recommended patterns of host responses" (page 445) for details. If an appropriate host response is not configured to the host group, the path may not be switched correctly or the volume may not be recognized correctly.
- The host response that is specified for a host group is applied to all the member hosts in the target group. When a host belongs to multiple host groups, the same host response must be applied for all the groups to which the target host belongs. Refer to "Changing the host response when adding a host to multiple host groups" (page 364) for details.
- When changing the host response for the host group, the host responses of the other host groups to which the target host belongs are also changed.
- If a single host belongs to multiple host groups, pay attention to the changes in the host response.
- Unlike ETERNUS Web GUI, ETERNUS CLI can register two iSCSI hosts that have the same iSCSI name by setting an IP address for one of these iSCSI hosts and by not setting an IP address for the other iSCSI host. However, if iSCSI hosts are registered in the ETERNUS DX/AF in this way, iSCSI host settings cannot be changed using ETERNUS Web GUI. Avoid this configuration when using ETERNUS Web GUI and ETERNUS CLI together. If both iSCSI hosts already exist, use ETERNUS CLI to specify an IP address for the iSCSI host without the IP address.

⬤ **N o t e**

- When a host was added to a host group, of which the host affinity setting has been configured, paths between all the ports with the host affinity setting and the added host will be configured. To modify the path between a host and a port, refer to "Modify Host Affinity" (page 348).
- When a host in the host group for which the host affinity settings are already configured is deleted, the path from the host to the port is also deleted.
- To change the iSCSI host information, use the procedure in "Modify iSCSI Host" (page 405).
- To create a new host group and register hosts, use the procedure in "Add iSCSI Host Group" (page 366).

For details on the parameters for this function, refer to "A. Modify Host Group (iSCSI)" (page 1124).

The procedure to modify an iSCSI host group is as follows:

Procedure

1 Select the iSCSI host group to be changed, and click [Modify Host Group] in [Action].

2 Input a new host group name, or re-select a host response to be assigned to the host group.

The main setting items are as follows.

● **Host Group Setting**

• Host Group Name
• Host Response

▷ **Caution**

• Before changing a host response, check the LUN setting state. If LUNs that are LUN#256 onward are used, the referable LUN setting cannot be changed to a "256 LUN" host response. Refer to "Host response and referable number of LUNs" (page 1118) for details.
• When hosts are to be added in an existing host group and the relevant host already belongs to another host group, the host response setting is also changed for that host group. If a LUN group belongs to a host affinity setting for another host group and this LUN group uses LUNs from LUN#256 onward, the host response setting cannot be changed to "256 LUN".

3 Add or delete a host in a host group in the following procedures.

■ When adding or deleting a host by selecting from the host list

(1) Click the [Registered And Now Connected] tab.
The following hosts are displayed in the [Registered And Now Connected] tab:
- Hosts that belong to the selected host group
- Hosts that are connected to an iSCSI-CA or an iSCSI-CA/RA but are not registered in the ETERNUS DX/AF (*1)
  *1: "Host that is not registered in the ETERNUS DX/AF" indicates that a host with the same iSCSI name, IP version, and Alias Name as the target host is not registered in the storage system. The host is regarded as unregistered host even if a host with the same iSCSI name, IP version, Alias Name, and different IP address is already registered. The obtained "iSCSI Name", "IP Version", "IP Address", and "Alias Name" are displayed.
- Hosts that are registered in the ETERNUS DX/AF but do not belong to the host group
- Hosts that are registered in the ETERNUS DX/AF and belong to the host group

Click the [Rediscover] button to update the iSCSI host list.

(2) Add or delete iSCSI hosts and register the iSCSI host information (the IP address and the Alias name, etc.) to the added host.

The main setting items are as follows.

● **Host Group Setting**

- Checkbox to select a host
- IP Version
- IP Address
- Alias Name
- CHAP User ID
- Change CHAP Password
- CHAP Password
- Confirm CHAP Password

Filter setting

Filter	Description
iSCSI Name	Input the iSCSI name of the iSCSI host that is to be displayed. When not using the iSCSI name for filtering, leave this item blank.
Other Host Group	Input the name of the other host group to which the iSCSI host that is to be displayed belongs. When not using the other host group name for filtering, leave this item blank.
Host Response	Select the host response that is assigned to the iSCSI host that is to be displayed.

▷ **Caution**

- If the iSCSI host information is not displayed when clicking the [Rediscover] button, make sure that there is no error in the connection environment, such as the connection between the host and the switch, and the CA port settings of the ETERNUS DX/AF. If there is no error in the connection environment, contact the Support Department or manually specify the iSCSI host information.
- If an error screen appears under the following conditions, check the parameter settings.
  - When the "IP Address" is specified and an iSCSI host with the same "iSCSI Name" and "IP Address" is already registered
  - When the "IP Address" is not specified and an iSCSI host with the same "iSCSI Name" and "IP Version" is already registered
  - A host cannot see some LUNs
  - The total number of hosts has exceeded the maximum number for the ETERNUS DX/AF

(3) Click the [Modify] button.

■ When adding a host by manually specifying the host

(1) Click the [Manual Input] tab.

(2) Click the [Add] button.

→ The [Add iSCSI Host] screen appears.

(3) Manually specify the iSCSI host information of the host to be added.

The main setting item is as follows.

● **Host Setting**

• iSCSI Name

> ◯ **N o t e**
>
> Refer to Step (2) in "When adding or deleting a host by selecting from the host list" (page 382) for other settings.

(4) Click the [OK] button
→ Returns to the [Manual Input] screen.

(5) Repeat Step (2) through Step (4) to set more iSCSI hosts.

> ▶ **Caution**
>
> If an error screen appears under the following conditions, check the parameter settings.
> - When the "IP Address" is specified and an iSCSI host with the same "iSCSI Name" and "IP Address" is already registered
> - When the "IP Address" is not specified and an iSCSI host with the same "iSCSI Name" and "IP Version" is already registered
> - A host cannot see some LUNs
> - The total number of hosts has exceeded the maximum number for the ETERNUS DX/AF

(6) After adding or deleting iSCSI hosts is complete, click the [Modify] button.
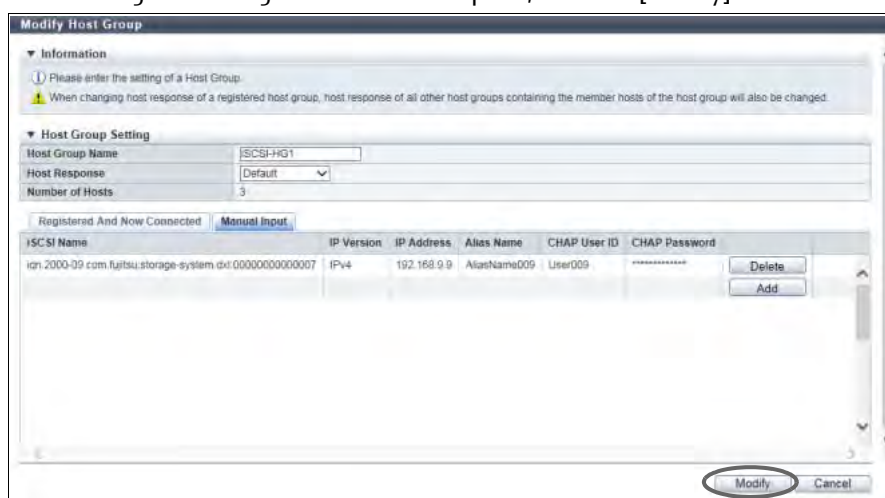
4 A confirmation screen appears. Click the [OK] button.
→ Modification of the iSCSI host group starts.

5 Click the [Done] button to return to the [Host Group] screen.

End of procedure

Modify Host Group (SAS)

This function performs the following modifications to the existing SAS host group.

- Changing the "Host Group Name" settings
- Changing the "Host Response" allocation
- Changing the "Host" settings (including addition and deletion of member hosts in a host group)

Hosts can be added to host groups which the host affinity setting has been already configured, or deleted from host groups.
If a host is added, the host affinity setting is automatically configured to the host, as a host group member.
If a host is deleted, the host affinity setting is cleared from the corresponding host.

The number of hosts that can be registered in the ETERNUS DX varies depending on the model. Refer to "The number of host groups and hosts that can be registered" (page 359) for details.

▶ **Caution**

- To perform the following operations, stop the host access that is associated with host affinity.
  - Changing the "Host Response" allocation
    The server must be rebooted after the host response allocation is changed. Refer to "Requirements for changing parameters" (page 447) for details.
  - Deleting "Host" from the host group
- To perform the following operations, stopping the host access that is associated with host affinity is not required.
  - Changing "Host Group Name"
  - Adding "Host" to the host group
- Registration of the host is necessary to create a host group. It is not possible to delete all hosts from a host group.
- A host that has been registered with ETERNUS Web GUI by using this function belongs to one of the host groups.
- A host can be a member of several host groups. However, only one LUN group can be allocated to host and port combinations when configuring host affinity.
- Refer to "Configuration Guide -Server Connection-" for each OS type to assign an appropriate host response to the host group. A host response has a recommended pattern which has been prepared for each OS type. Refer to "Recommended patterns of host responses" (page 445) for details. If an appropriate host response is not configured to the host group, the path may not be switched correctly or the volume may not be recognized correctly.
- The host response that is specified for a host group is applied to all the member hosts in the target group. When a host belongs to multiple host groups, the same host response must be applied for all the groups to which the target host belongs. Refer to "Changing the host response when adding a host to multiple host groups" (page 364) for details.
- When changing the host response for the host group, the host responses of the other host groups to which the target host belongs are also changed.
- If a single host belongs to multiple host groups, pay attention to the changes in the host response.

● **N o t e**

- When a host was added to a host group, of which the host affinity setting has been configured, paths between all the ports with the host affinity setting and the added host will be configured. To modify the path between a host and a port, refer to "Modify Host Affinity" (page 348).
- When a host in the host group for which the host affinity settings are already configured is deleted, the path from the host to the port is also deleted.
- To change the host name or SAS address, use the procedure in "Modify SAS Host" (page 406).
- To create a new host group and register hosts, use the procedure in "Add SAS Host Group" (page 371).

For details on the parameters for this function, refer to "A. Modify Host Group (SAS)" (page 1124).

The procedure to modify a SAS host group is as follows:

Procedure

1   Select the SAS host group to be changed, and click [Modify Host Group] in [Action].

2 Input a new host group name, or re-select a host response to be assigned to the host group.

The main setting items are as follows.

● **Host Group Setting**

• Host Group Name

• Host Response

> ▷ **Caution**

• Before changing a host response, check the LUN setting state. If LUNs that are LUN#256 onward are used, the referable LUN setting cannot be changed to a "256 LUN" host response. Refer to "Host response and referable number of LUNs" (page 1118) for details.

• When hosts are to be added in an existing host group and the relevant host already belongs to another host group, the host response setting is also changed for that host group. If a LUN group belongs to a host affinity setting for another host group and this LUN group uses LUNs from LUN#256 onward, the host response setting cannot be changed to "256 LUN".

3 Add or delete a host in a host group in the following procedures.

■ When adding or deleting a host by selecting from the host list

(1) Click the [Registered And Now Connected] tab.

(2) Add or delete hosts.

The main setting item is as follows.

● **Host Group Setting**
  • Checkbox to select a host

Filter setting

Filter	Description
SAS Address	Input the SAS address of the SAS host that is to be displayed. When not using the SAS address for filtering, leave this item blank.
Other Host Group	Input the name of the other host group to which the SAS host that is to be displayed belongs. When not using the other host group name for filtering, leave this item blank.
Host Response	Select the host response that is assigned to the SAS host that is to be displayed.

▶ **Caution**

• If the SAS address is not displayed when clicking the [Rediscover] button, make sure that there is no error in the connection environment, such as the connection between the host and the switch, and the CA port settings of the ETERNUS DX. If there is no error in the connection environment, contact the Support Department or manually specify the SAS address.
• If an error screen appears under the following conditions, check the parameter settings.
  - A host cannot see some LUNs
  - The total number of hosts has exceeded the maximum number for the ETERNUS DX

(3) Click the [Modify] button.

■ When adding a host by manually specifying the host

(1) Click the [Manual Input] tab.
(2) Click the [Add] button.

→ The [Add SAS Host] screen appears.

(3) Manually specify the SAS address of the host to be added.
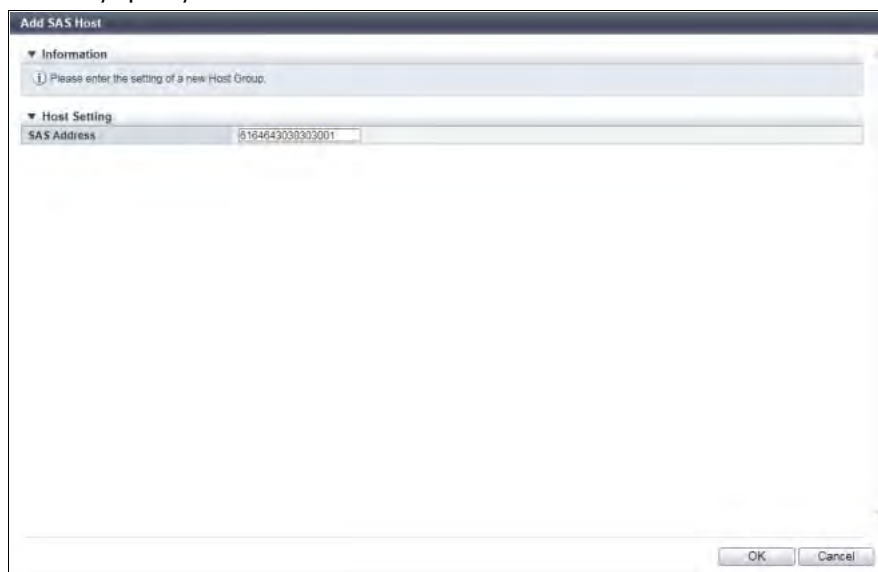
The main setting item is as follows.

● **Host Setting**

• SAS Address

(4) Click the [OK] button
    → Returns to the [Manual Input] screen.

(5) Repeat Step (2) through Step (4) to set more SAS addresses.

> ▷ **Caution**
>
> If an error screen appears under the following conditions, check the parameter settings.
> • A host cannot see some LUNs
> • The total number of hosts has exceeded the maximum number for the ETERNUS DX

(6) After adding or deleting SAS hosts is complete, click the [Modify] button.
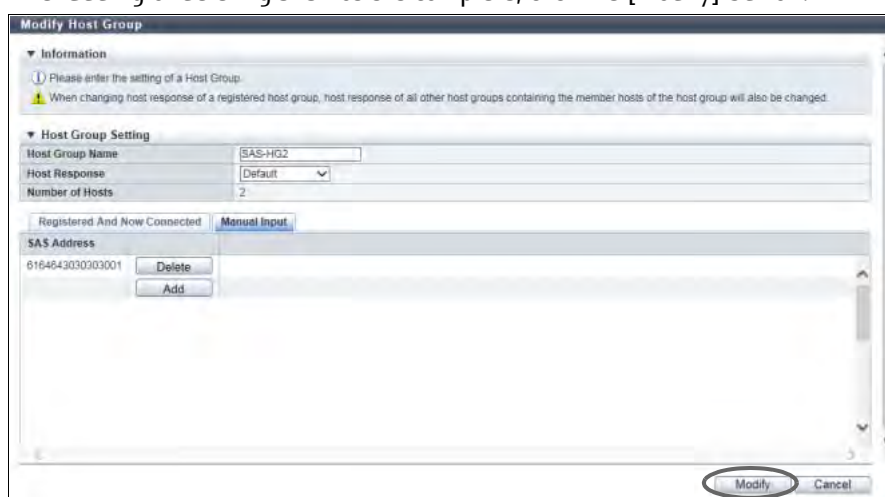
4 A confirmation screen appears. Click the [OK] button.
    → Modification of the SAS host group starts.

5 Click the [Done] button to return to the [Host Group] screen.

<div align="right">

End of procedure

</div>

Add FC/FCoE Host

This function registers a new FC/FCoE host (HBA).
The following list shows the maximum number of hosts (*1) that can be registered for each ETERNUS DX/AF model.

The maximum number of hosts that can be registered

- ETERNUS DX60 S4/DX60 S3
  128
- ETERNUS DX100 S4/DX100 S3 and ETERNUS DX200 S4/DX200 S3
  1024
- ETERNUS DX500 S4/DX500 S3 and ETERNUS DX600 S4/DX600 S3
  1024 (4096) (*2)
- ETERNUS DX8100 S3
  1024
- ETERNUS DX8700 S3 and ETERNUS DX8900 S3
  8192
- ETERNUS AF250 S2/AF250
  1024
- ETERNUS AF650 S2/AF650
  1024 (4096) (*2)
- ETERNUS DX200F
  1024

*1: The total number of hosts irrespective of the interface types.

*2: Values in parentheses indicate the number of hosts when "Expand Host Mode" is "Enable". Refer to "Setup Subsystem Parameters" (page 65) for details.

> ▷ **Caution**
>
> - This function is only displayed when the "Use "Add Host"" checkbox is selected for the "Function to Add Host" field in "Web GUI Settings". This checkbox is not selected (this function is not displayed) by default. Refer to "Setup Subsystem Parameters" (page 65) for details.
> - Note that this function does not create a host group. The ETERNUS DX/AF also has a function that creates new host groups to register hosts as its members. Refer to "Add FC/FCoE Host Group" (page 359) for details.
> - Hosts that are registered with this function can belong to multiple host groups. However, only one LUN group can be allocated to host and port combinations when configuring host affinity.
> - Refer to "Configuration Guide -Server Connection-" for each OS type to assign an appropriate host response to the host that is to be registered. A host response has a recommended pattern which has been prepared for each OS type. Refer to "Recommended patterns of host responses" (page 445) for details.
>   If an appropriate host response is not configured to the host, the path may not be switched correctly or the volume may not be recognized correctly.

> ⦿ **N o t e**
>
> - To change the FC host information, use the [Modify FC/FCoE Host] function. Refer to "Modify FC/FCoE Host" (page 403) for details.
> - The host affinity setting can be specified for each FC host. Refer to "Create Host Affinity" (page 337) for details.
> - Both "FC host" and "FCoE host" are abbreviated as "FC host" in this section.

For details on the parameters for this function, refer to "A. Add FC/FCoE Host" (page 1124).

For the factory default settings for this function, refer to "B. Add FC/FCoE Host" (page 1273).

The procedure to register an FC host is as follows:

Procedure

1 Click [Add FC/FCoE Host] in [Action].

2 Add a host in the ETERNUS DX/AF in the following procedures.

■ When registering a host by selecting from the host list

(1) Click the [Now Connected] tab.

(2) Select the host that is to be registered from the FC host list and input the FC host information.
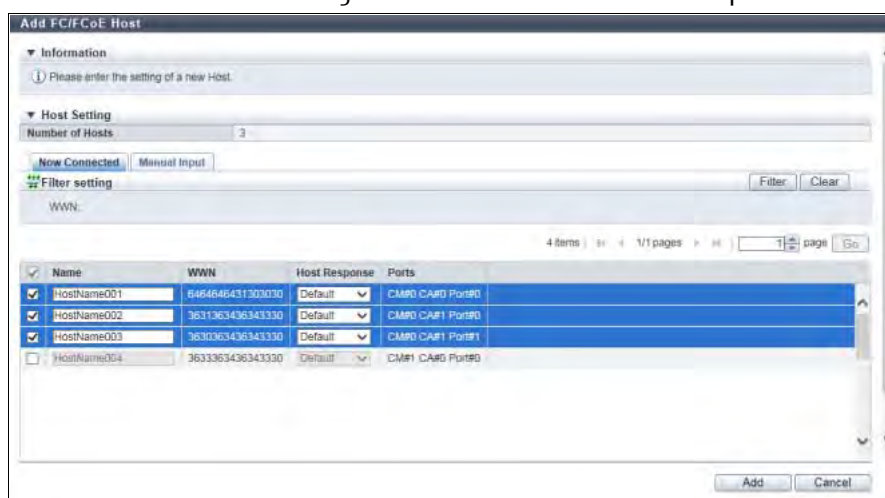
The main setting items are as follows.

● **Host Setting**

- Checkbox to select a host
- Name
- Host Response

Filter setting

Filter	Description
WWN	Input the WWN of the FC/FCoE host that is to be displayed. When not using the WWN for filtering, leave this item blank.

> **Caution**

- If the WWN is not displayed when clicking the [Rediscover] button, make sure that there is no error in the connection environment, such as the connection between the host and the switch, and the CA port settings of the ETERNUS DX/AF. If there is no error in the connection environment, contact the Support Department, or specify the WWN manually.
- If an error screen appears under the following conditions, check the parameter settings.
  - The number of hosts that are to be registered is "0"
  - The number of registered hosts has exceeded the maximum number for the ETERNUS DX/AF
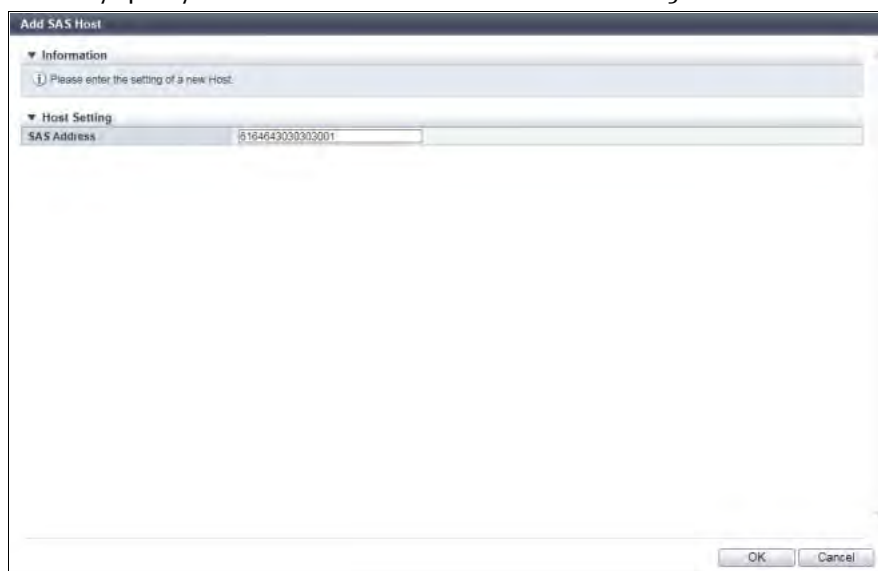
(3) Click the [Add] button.

■ When registering a host by manually specifying the host

(1) Click the [Manual Input] tab.

(2) Click the [Add] button.

→ The [Add FC/FCoE Host] screen appears.

(3) Specify the host information of the FC host that is to be registered.
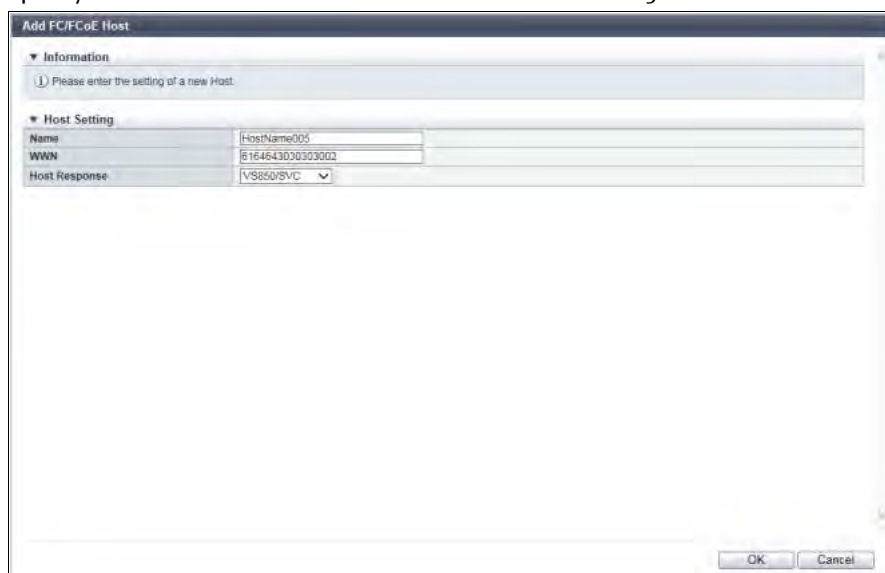
The main setting items are as follows.

● **Host Setting**

• Name

• WWN

• Host Response

(4) Click the [OK] button
    → Returns to the [Manual Input] screen.

(5) Repeat Step (2) through Step (4) when registering several FC hosts.

> ▷ **Caution**
>
> If an error screen appears under the following conditions, check the parameter settings.
> - The number of hosts that are to be registered is "0"
> - The number of registered hosts has exceeded the maximum number for the ETERNUS DX/AF

(6) After registering the FC host is complete, click the [Add] button.
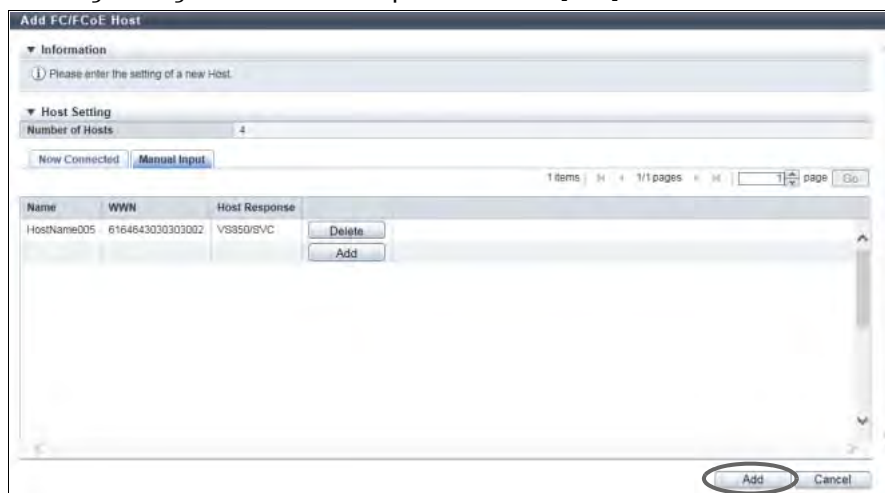
3 A confirmation screen appears. Click the [OK] button.
→ Registration of the FC host starts.

4 Click the [Done] button to return to the screen when starting this function in Step 1.

> ◯ **N o t e**
>
> Click the [Continue] button to continue registering FC hosts.

End of procedure

Add iSCSI Host

This function registers a new iSCSI host (HBA).
The following list shows the maximum number of hosts (*1) that can be registered for each ETERNUS DX/AF model.

The number of hosts that can be registered in the ETERNUS DX/AF varies depending on the model. Refer to "The maximum number of hosts that can be registered" (page 390) for details.

> ▶ **Caution**

- This function is only displayed when the "Use "Add Host"" checkbox is selected for the "Function to Add Host" field in "Web GUI Settings". This checkbox is not selected (this function is not displayed) by default. Refer to "Setup Subsystem Parameters" (page 65) for details.
- Note that this function does not create a host group. The ETERNUS DX/AF also has a function that creates new host groups to register hosts as its members. Refer to "Add iSCSI Host Group" (page 366) for details.
- Hosts that are registered with this function can belong to multiple host groups. However, only one LUN group can be allocated to host and port combinations when configuring host affinity.
- Refer to "Configuration Guide -Server Connection-" for each OS type to assign an appropriate host response to the host that is to be registered. A host response has a recommended pattern which has been prepared for each OS type. Refer to "Recommended patterns of host responses" (page 445) for details.
  If an appropriate host response is not configured to the host, the path may not be switched correctly or the volume may not be recognized correctly.
- Unlike ETERNUS Web GUI, ETERNUS CLI can register two iSCSI hosts that have the same iSCSI name by setting an IP address for one of these iSCSI hosts and by not setting an IP address for the other iSCSI host. However, if iSCSI hosts are registered in the ETERNUS DX/AF in this way, iSCSI hosts cannot be added using ETERNUS Web GUI. Avoid this configuration when using ETERNUS Web GUI and ETERNUS CLI together. If both iSCSI hosts already exist, use ETERNUS CLI to specify an IP address for the iSCSI host without the IP address.

> ⬤ **N o t e**

- To change the iSCSI host information, use the [Modify iSCSI Host] function. Refer to "Modify iSCSI Host" (page 405) for details.
- The host affinity setting can be specified for each iSCSI host. Refer to "Create Host Affinity" (page 337) for details.

For details on the parameters for this function, refer to "A. Add iSCSI Host" (page 1125).
For the factory default settings for this function, refer to "B. Add iSCSI Host" (page 1273).

The procedure to register an iSCSI host is as follows:

Procedure

1	Click [Add iSCSI Host] in [Action].

2	Add a host in the ETERNUS DX/AF in the following procedures.

■ When registering a host by selecting from the host list

(1) Click the [Now Connected] tab.
All of the unregistered hosts that are connected to the iSCSI-CAs or the iSCSI-CA/RAs and that can be recognized by the ETERNUS DX/AF (*1) are displayed. Select the hosts that are to be registered in the ETERNUS DX/AF and specify the iSCSI host information.

*1:	"Host that is not registered in the ETERNUS DX/AF" indicates that a host with the same iSCSI name, IP version, and Alias Name as the target host is not registered in the storage system. The host is regarded as unregistered host even if a host with the same iSCSI name, IP version, Alias Name, and different IP address is already registered. The obtained "iSCSI Name" and "Port" are displayed.

(2) Select the host that is to be registered from the iSCSI host list and input the iSCSI host information.

The main setting items are as follows.

● **Host Setting**

- Checkbox to select a host
- Name
- Host Response
- IP Version
- IP Address
- Alias Name
- CHAP User ID
- CHAP Password
- Confirm CHAP Password

Filter setting

Filter	Description
iSCSI Name	Input the iSCSI name of the iSCSI host that is to be displayed. When not using the iSCSI name for filtering, leave this item blank.

▶ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
- The "IP Address" is specified and an iSCSI host with the same "iSCSI Name" and "IP Address" is already registered
- The "IP Address" is not specified and an iSCSI host with the same "iSCSI Name" and "IP Version" is already registered
- The number of hosts that are to be registered is "0"
- The number of registered hosts has exceeded the maximum number for the ETERNUS DX/AF

(3) Click the [Add] button.

■ When registering a host by manually specifying the host

(1) Click the [Manual Input] tab.

(2) Click the [Add] button.

→ The [Add iSCSI Host] screen appears.

(3) Specify the host information of the iSCSI host that is to be registered.

The main setting item is as follows.

● **Host Setting**

• iSCSI Name

> 🔵 **N o t e**
>
> Refer to Step (2) in "When registering a host by selecting from the host list" (page 394) for other settings.

(4) Click the [OK] button
→ Returns to the [Manual Input] screen.

(5) Repeat <u>Step (2)</u> through <u>Step (4)</u> when registering several iSCSI hosts.

> ▷ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
- The "IP Address" is specified and an iSCSI host with the same "iSCSI Name" and "IP Address" is already registered
- The "IP Address" is not specified and an iSCSI host with the same "iSCSI Name" and "IP Version" is already registered
- The number of hosts that are to be registered is "0"
- The number of registered hosts has exceeded the maximum number for the ETERNUS DX/AF

(6) After registering the iSCSI host is complete, click the [Add] button.
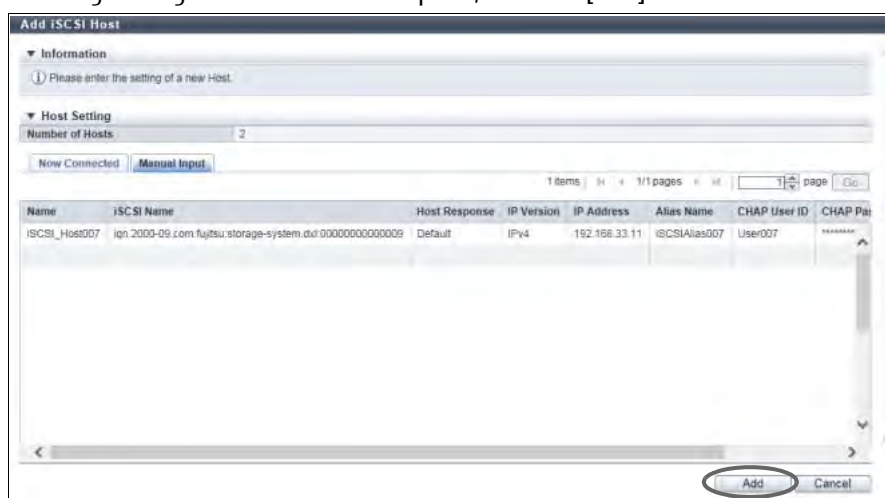
3   A confirmation screen appears. Click the [OK] button.
→ Registration of the iSCSI host starts.

4   Click the [Done] button to return to the screen when starting this function in <u>Step 1</u>.

> ⬤ **N o t e**

Click the [Continue] button to continue registering iSCSI hosts.

End of procedure

Add SAS Host

This function registers a new SAS host (HBA).
The total number of all the interface type hosts that can be registered in the ETERNUS DX is 1024 (128 for the ETERNUS DX60 S4/DX60 S3).

> ▷ **Caution**
>
> - This function is only displayed when the "Use "Add Host"" checkbox is selected for the "Function to Add Host" field in "Web GUI Settings". This checkbox is not selected (this function is not displayed) by default. Refer to "Setup Subsystem Parameters" (page 65) for details.
> - Note that this function does not create a host group. The ETERNUS DX also has a function that creates new host groups to register hosts as its members. Refer to "Add SAS Host Group" (page 371) for details.
> - Hosts that are registered with this function can belong to multiple host groups. However, only one LUN group can be allocated to host and port combinations when configuring host affinity.
> - Refer to "Configuration Guide -Server Connection-" for each OS type to assign an appropriate host response to the host that is to be registered. A host response has a recommended pattern which has been prepared for each OS type. Refer to "Recommended patterns of host responses" (page 445) for details.
> If an appropriate host response is not configured to the host, the path may not be switched correctly or the volume may not be recognized correctly.

> ⬤ **N o t e**
>
> - To change the SAS host information, use the [Modify SAS Host] function. Refer to "Modify SAS Host" (page 406) for details.
> - The host affinity setting can be specified for each SAS host. Refer to "Create Host Affinity" (page 337) for details.

For details on the parameters for this function, refer to "A. Add SAS Host" (page 1127).
For the factory default settings for this function, refer to "B. Add SAS Host" (page 1273).

The procedure to register a SAS host is as follows:

Procedure

1 Click [Add SAS Host] in [Action].

2 Add a host in the ETERNUS DX in the following procedures.

■ When registering a host by selecting from the host list

(1) Click the [Now Connected] tab.

(2) Select the host that is to be registered from the SAS host list and input the SAS host information.

The main setting items are as follows.

● **Host Setting**

• Checkbox to select a host
• Name
• Host Response

Filter setting

Filter	Description
SAS Address	Input the SAS address of the SAS host that is to be displayed. When not using the SAS address for filtering, leave this item blank.

▶ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
• The number of hosts that are to be registered is "0"
• The number of registered hosts has exceeded the maximum number for the ETERNUS DX

(3) Click the [Add] button.

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■ When registering a host by manually specifying the host

(1) Click the [Manual Input] tab.

(2) Click the [Add] button.

→ The [Add SAS Host] screen appears.

(3) Specify the host information of the SAS host that is to be registered.

The main setting items are as follows.

● **Host Setting**

• Name
• SAS Address
• Host Response

(4) Click the [OK] button
→ Returns to the [Manual Input] screen.

(5) Repeat Step (2) through Step (4) when registering several SAS hosts.

> ▷ **Caution**
>
> If an error screen appears under the following conditions, check the parameter settings.
> - The number of hosts that are to be registered is "0"
> - The number of registered hosts has exceeded the maximum number for the ETERNUS DX

(6) After registering the SAS host is complete, click the [Add] button.
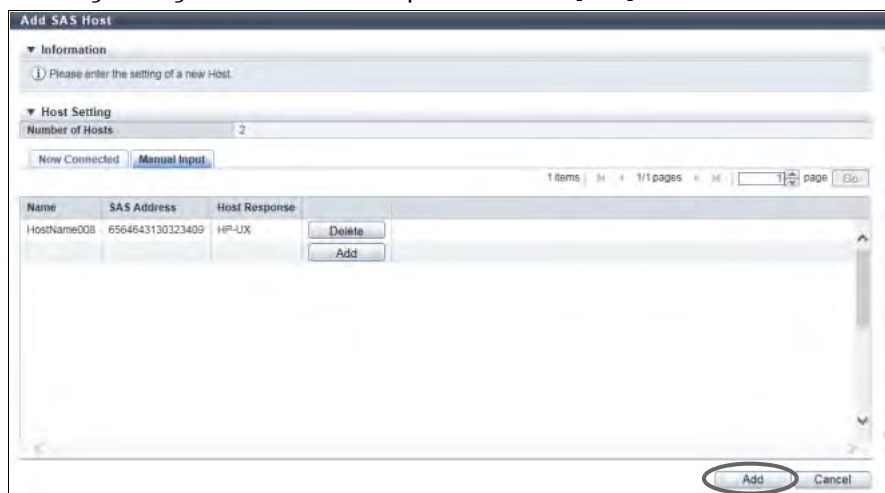
3 A confirmation screen appears. Click the [OK] button.
→ Registration of the SAS host starts.

4 Click the [Done] button to return to the screen when starting this function in Step 1.

> 🔵 **N o t e**
>
> Click the [Continue] button to continue registering SAS hosts.

End of procedure

Delete FC/FCoE Host

This function deletes an FC/FCoE host.
When an FC/FCoE host belongs to a host group, the FC/FCoE host can be deleted, irrespective of its host affinity settings.

> ▷ **Caution**
>
> - Not all of the hosts can be deleted from a host group.
> - When an FC host does not belong to a host group, the FC host, of which host affinity settings have been configured, cannot de deleted.

> **N o t e**
>
> - When a host in the host group for which the host affinity settings are already configured is deleted, the path from the host to the port is also deleted.
> - The "FCoE" host interface is regarded as "FC". Both "FC host" and "FCoE host" are abbreviated as "FC host" in this section.

The procedure to delete an FC host is as follows:

Procedure

1 Select the FC host to be deleted (multiple selections can be made) and click [Delete FC/FCoE Host] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ Deletion of the FC host starts.

3 Click the [Done] button to return to the [FC/FCoE Host] screen.

End of procedure

Delete iSCSI Host

This function deletes an iSCSI host.
When an iSCSI host belongs to a host group, the iSCSI host can be deleted, irrespective of its host affinity settings.

> ▷ **Caution**
>
> - Not all of the hosts can be deleted from a host group.
> - When an iSCSI host does not belong to a host group, the iSCSI host, of which host affinity settings have been configured, cannot de deleted.

> **N o t e**
>
> When a host in the host group for which the host affinity settings are already configured is deleted, the path from the host to the port is also deleted.

The procedure to delete an iSCSI host is as follows:

Procedure

1 Select the iSCSI host to be deleted (multiple selections can be made) and click [Delete iSCSI Host] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ Deletion of the iSCSI host starts.

3 Click the [Done] button to return to the [iSCSI Host] screen.

End of procedure

Delete SAS Host

This function deletes a SAS host.
When a SAS host belongs to a host group, the SAS host can be deleted, irrespective of its host affinity settings.

▷ **Caution**

- Not all of the hosts can be deleted from a host group.
- When a SAS host does not belong to a host group, the SAS host, of which host affinity settings have been configured, cannot de deleted.

⬤ **N o t e**

When a host in the host group for which the host affinity settings are already configured is deleted, the path from the host to the port is also deleted.

The procedure to delete a SAS host is as follows:

Procedure

1 Select the SAS host to be deleted (multiple selections can be made) and click [Delete SAS Host] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ Deletion of the SAS host starts.

3 Click the [Done] button to return to the [SAS Host] screen.

End of procedure

Modify FC/FCoE Host

This function changes the FC/FCoE host information.

▷ **Caution**

- When no FC/FCoE hosts are registered, the [Modify FC/FCoE Host] function cannot be used.
- When changing the WWN or the host response of an FC/FCoE host that is currently being used, make sure to stop access to that FC/FCoE host. The server must be rebooted after the host response is changed.

⬤ **N o t e**
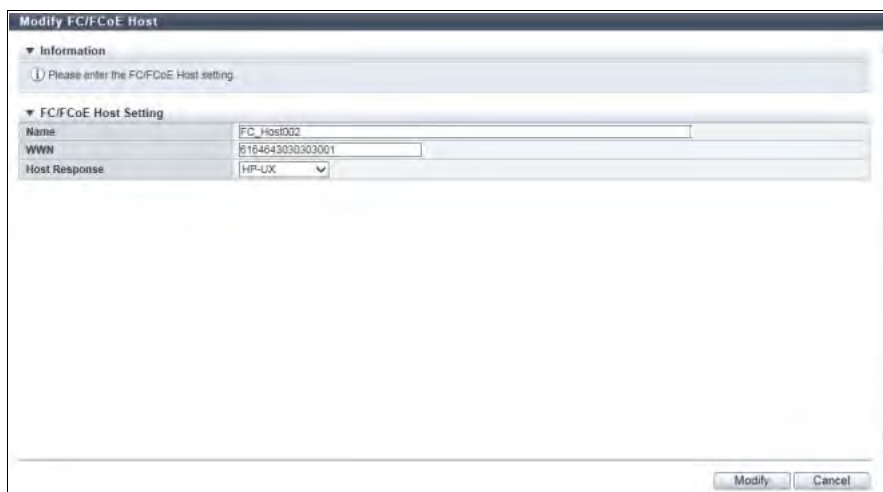
- This function can change the following FC/FCoE host information; "Name" and "WWN". When the FC host is not registered in a host group, the "Host Response" setting can also be changed.
- When the FC host is registered in a host group, use the [Modify Host Group] function to change the host response. Refer to "Modify Host Group (FC/FCoE)" (page 376) for details.
- Both "FC host" and "FCoE host" are abbreviated as "FC host" in this section.

For details on the parameters for this function, refer to "A. Modify FC/FCoE Host" (page 1127).

The procedure to change the FC host information is as follows:

Procedure

1   Select the FC host to change the host information for, and click [Modify FC/FCoE Host] in [Action].

2   Input new host information.

The main setting items are as follows.

● FC/FCoE Host Setting

- Name
- WWN
- Host Response

> ▶ **Caution**
>
> - Before changing a host response, check the LUN setting state. If LUNs that are LUN#256 onward are used, the referable LUN setting cannot be changed to a "256 LUN" host response. Refer to "Host response and referable number of LUNs" (page 1118) for details.
> - If there are LUNs that cannot be referenced from the FC host because the "Host Response" setting has been changed (only for FC hosts that are not registered to a host group), an error screen appears. Check the parameter settings.

3   Click the [Modify] button

4   A confirmation screen appears. Click the [OK] button.
        → Changing of the FC host information starts.

5   Click the [Done] button to return to the [FC/FCoE Host] screen.

End of procedure

Modify iSCSI Host

This function changes the iSCSI host information.

> **▷ Caution**
>
> • When no iSCSI hosts are registered, the [Modify iSCSI Host] function cannot be used.
> • When changing the information or the host response of an iSCSI host that is currently being used, make sure to stop access to that iSCSI host. The server must be rebooted after the host response is changed.

> **◉ N o t e**
>
> • This function can change the following iSCSI host information; "Name", "iSCSI Name", "IP Version", "IP Address", "Alias Name", "CHAP User ID", and "CHAP Password". When the iSCSI host is not registered in a host group, the "Host Response" setting can also be changed.
> • When the iSCSI host is registered in a host group, use the [Modify Host Group] function to change the host response. Refer to "Modify Host Group (iSCSI)" (page 380) for details.

For details on the parameters for this function, refer to "A. Modify iSCSI Host" (page 1128).

The procedure to change the iSCSI information is as follows:

Procedure

1   Select the iSCSI host to change the host information for, and click [Modify iSCSI Host] in [Action].

2   Input new iSCSI host information.

The main setting items are as follows.

● **iSCSI Host Setting**

• Name
• iSCSI Name
• Host Response
• IP Version
• IP Address
• Alias Name
• CHAP User ID

- Change CHAP Password
- CHAP Password
- Confirm CHAP Password

▷ **Caution**

- Before changing a host response, check the LUN setting state. If LUNs that are LUN#256 onward are used, the referable LUN setting cannot be changed to a "256 LUN" host response. Refer to "Host response and referable number of LUNs" (page 1118) for details.
- If an error screen appears under the following conditions, check the parameter settings.
  - Several iSCSI hosts with the same "IP Address" and "iSCSI Name" are already configured
  - Several iSCSI hosts without any entered IP addresses are specified with the same "iSCSI Name"
  - There are LUNs that cannot be referenced from the iSCSI host because the "Host Response" setting has been changed (only for iSCSI hosts that are not registered to a host group)

3 Click the [Modify] button.

4 A confirmation screen appears. Click the [OK] button.
→ Changing of the iSCSI host information starts.

5 Click the [Done] button to return to the [iSCSI Host] screen.

End of procedure

Modify SAS Host

This function changes the SAS host information.

▷ **Caution**

- When no SAS hosts are registered, the [Modify SAS Host] function cannot be used.
- When changing the SAS address or the host response of a SAS host that is currently being used, make sure to stop access to that SAS host. The server must be rebooted after the host response is changed.

◯ **N o t e**

- This function can change the following SAS host information; "Name" and "SAS Address". When the SAS host is not registered in a host group, the "Host Response" setting can also be changed.
- When the SAS host is registered in a host group, use the [Modify Host Group] function to change the host response. Refer to "Modify Host Group (SAS)" (page 385) for details.
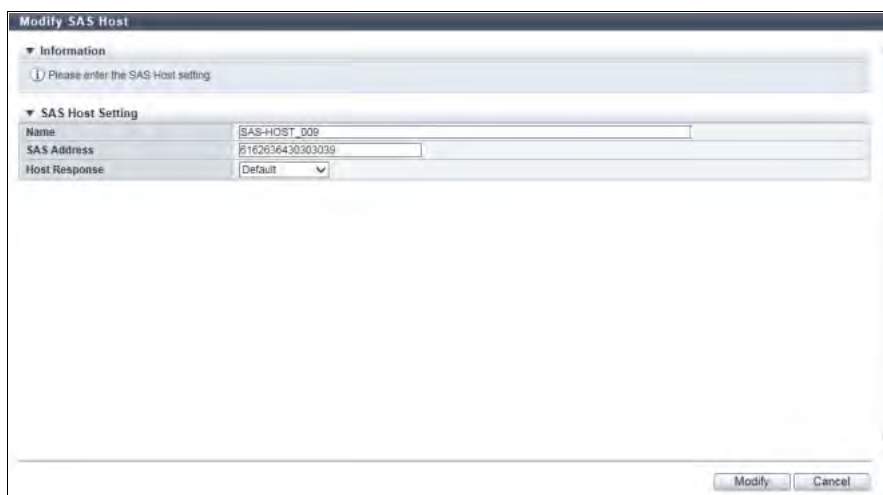
For details on the parameters for this function, refer to "A. Modify SAS Host" (page 1131).

The procedure to change the SAS host information is as follows:

Procedure

1 Select the SAS host to change the host information for, and click [Modify SAS Host] in [Action].

2 Input new host information.

The main setting items are as follows.

● **SAS Host Setting**

- Name
- SAS Address
- Host Response

> **Caution**

- Before changing a host response, check the LUN setting state. If LUNs that are LUN#256 onward are used, the referable LUN setting cannot be changed to a "256 LUN" host response. Refer to "Host response and referable number of LUNs" (page 1118) for details.
- If there are LUNs that cannot be referenced from the SAS host because the "Host Response" setting has been changed (only for SAS hosts that are not registered to a host group), an error screen appears. Check the parameter settings.

3 Click the [Modify] button.

4 A confirmation screen appears. Click the [OK] button.
→ Changing of the SAS host information starts.

5 Click the [Done] button to return to the [SAS Host] screen.

End of procedure

CA Port Group Management

This section describes CA port group management.

CA Port Group management provides the following functions:

- Create FC Port Group
- Create iSCSI Port Group
- Create SAS Port Group
- Create FCoE Port Group
- Delete CA Port Group
- Modify CA Port Group
- Modify FC Port Parameters
- Modify iSCSI Port Parameters
- Modify SAS Port Parameters
- Modify FCoE Port Parameters
- Modify Port Mode

Create FC Port Group

This function creates a new FC port group, and registers the port to be a member.
An FC port group is a group of FC-CA type ports that are connected to the specified host group. The Host Affinity is specified for each FC port group.

- The maximum number of port groups per storage system is 128 (with a maximum number of 384 for the ETER-NUS DX8700 S3/DX8900 S3), irrespective of the CA types.
- The maximum number of ports per port group is 8.
- A port can be a member of several port groups.

> **Caution**

- Registration of the port is necessary to create a port group. A port group cannot be created if the port to be a member has not been registered from ETERNUS Web GUI.
- Only ports with "CA" or "CA/RA" as the port mode can be added to a port group. Ports with other port modes cannot be added to a port group.
- Ports that are used for the Storage Cluster function cannot be registered in the port group.
- A port in the affinity mode enabled (On) and a port in the affinity mode disabled (Off) cannot exist together in a port group.
  - The affinity mode (On/Off) of a port group is decided when the host affinity setting has been configured on the corresponding port group. All of the member ports in a port group have the same affinity mode.
  - The affinity mode (On/Off) of a port group is not changed until the host affinity setting has been released from the corresponding port group.
  - When one port is registered in several port groups, and the affinity setting has been configured on one of the port groups including the corresponding port, the affinity setting is configured on all the port groups, which include the corresponding port, and also on the member ports.
  - Ports without the host affinity setting can be members of a port group, regardless of whether the affinity mode for the group is enabled (On) or disabled (Off).

🔵 **N o t e**

- To perform the following operations, refer to "Modify CA Port Group" (page 416).
    - Changing the port group settings
    - Adding a port to an existing port group
- To change the port mode from "RA" or "Initiator" to "CA" or "CA/RA", refer to "Modify Port Mode" (page 433).

For details on the parameters for this function, refer to "A. Create FC Port Group" (page 1132).

The procedure to create an FC port group is as follows:

Procedure

1   Click [Create FC Port Group] in [Action].

2   Specify the name of the port group to be created and select all the ports to be registered in the port group.
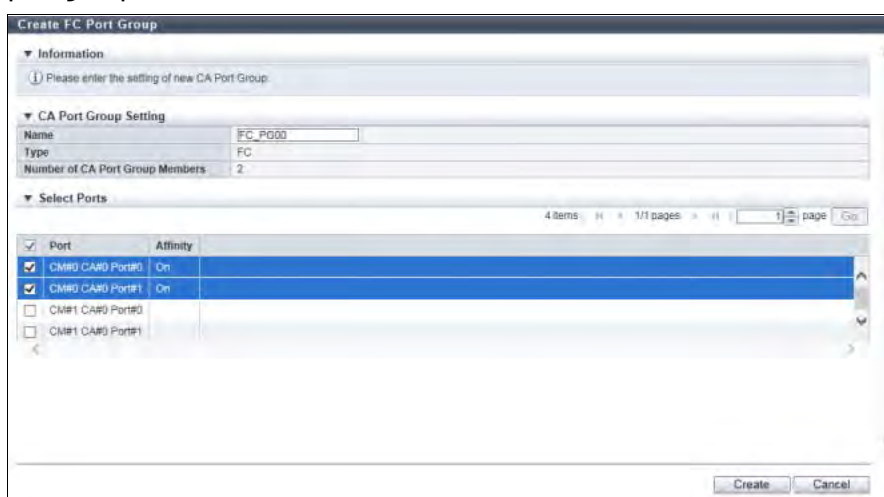
The main setting items are as follows.

● **CA Port Group Setting**

- Name
- Checkbox to select ports

▶ **Caution**

If the total number of port groups has exceeded the maximum number for the ETERNUS DX/AF, an error screen appears. Check the parameter settings.

> **⬤ N o t e**
>
> - FC ports that satisfy all of the following conditions are displayed.
>   - Ports which port mode are "CA" or "CA/RA"
>   - Not used for the Storage Cluster function
> - For the following ports, "Affinity" is blank. These ports can be members of a port group, regardless of whether the affinity mode for the group is enabled (On) or disabled (Off).
>   - Ports that are not registered to a port group
>   - Ports that are registered to port groups and the host affinity setting is not set for all the port groups to which the relevant ports belong

3   Click the [Create] button.

4   A confirmation screen appears. Click the [OK] button.
→   Registration of the FC port group starts.

5   Click the [Done] button to return to the [CA Port Group] screen.

End of procedure

Create iSCSI Port Group

This function creates a new iSCSI port group, and registers the port to be a member.
An iSCSI port group is a group of iSCSI-CA type ports that are connected to the specified host group. The Host Affinity is specified for each iSCSI port group.

- The maximum number of port groups per storage system is 128 (with a maximum number of 384 for the ETERNUS DX8700 S3/DX8900 S3), irrespective of the CA types.
- The maximum number of ports per port group is 8.
- A port can be a member of several port groups.

> **▷ Caution**
>
> - Registration of the port is necessary to create a port group. A port group cannot be created if the port to be a member has not been registered from ETERNUS Web GUI.
> - Only ports with "CA" or "CA/RA" as the port mode can be added to a port group. Ports with "RA" as the port mode cannot be added to a port group.
> - A port in the affinity mode enabled (On) and a port in the affinity mode disabled (Off) cannot exist together in a port group.
>   - The affinity mode (On/Off) of a port group is decided when the host affinity setting has been configured on the corresponding port group. All of the member ports in a port group have the same affinity mode.
>   - The affinity mode (On/Off) of a port group is not changed until the host affinity setting has been released from the corresponding port group.
>   - When one port is registered in several port groups, and the affinity setting has been configured on one of the port groups including the corresponding port, the affinity setting is configured on all the port groups, which include the corresponding port, and also on the member ports.
>   - Ports without the host affinity setting can be members of a port group, regardless of whether the affinity mode for the group is enabled (On) or disabled (Off).

> **Note**
>
> - To perform the following operations, refer to "Modify CA Port Group" (page 416).
>   - Changing the port group settings
>   - Adding a port to an existing port group
> - To change the port mode from "RA" to "CA" or "CA/RA", refer to "Modify Port Mode" (page 433).

For details on the parameters for this function, refer to "A. Create iSCSI Port Group" (page 1132).

The procedure to create an iSCSI port group is as follows:

Procedure

1   Click [Create iSCSI Port Group] in [Action].

2   Specify the name of the port group to be created and select all the ports to be registered in the port group.

The main setting items are as follows.

● **CA Port Group Setting**

- Name
- Checkbox to select ports

> **Caution**
>
> If the total number of port groups has exceeded the maximum number for the ETERNUS DX/AF, an error screen appears. Check the parameter settings.

> **◯ N o t e**
>
> - iSCSI ports that satisfy all of the following conditions are displayed.
>   - Ports which port mode are "CA" or "CA/RA"
>   - Not used for the Storage Cluster function
> - For the following ports, "Affinity" is blank. These ports can be members of a port group, regardless of whether the affinity mode for the group is enabled (On) or disabled (Off).
>   - Ports that are not registered to a port group
>   - Ports that are registered to port groups and the host affinity setting is not set for all the port groups to which the relevant ports belong

3 Click the [Create] button.

4 A confirmation screen appears. Click the [OK] button.
→ Registration of the iSCSI port group starts.

5 Click the [Done] button to return to the [CA Port Group] screen.

End of procedure

Create SAS Port Group

This function creates a new SAS port group, and registers the port to be a member.
A SAS port group is a group of SAS-CA type ports that are connected to the specified host group. The Host Affinity is specified for each SAS port group.

- The maximum number of port groups per storage system is 128, irrespective of the CA types.
- The maximum number of ports per port group is 8.
- A port can be a member of several port groups.

> **▷ Caution**
>
> - Registration of the port is necessary to create a port group. A port group cannot be created if the port to be a member has not been registered from ETERNUS Web GUI.
> - A port in the affinity mode enabled (On) and a port in the affinity mode disabled (Off) cannot exist together in a port group.
>   - The affinity mode (On/Off) of a port group is decided when the host affinity setting has been configured on the corresponding port group. All of the member ports in a port group have the same affinity mode.
>   - The affinity mode (On/Off) of a port group is not changed until the host affinity setting has been released from the corresponding port group.
>   - When one port is registered in several port groups, and the affinity setting has been configured on one of the port groups including the corresponding port, the affinity setting is configured on all the port groups, which include the corresponding port, and also on the member ports.
>   - Ports without the host affinity setting can be members of a port group, regardless of whether the affinity mode for the group is enabled (On) or disabled (Off).

> **◯ N o t e**
>
> To perform the following operations, refer to <u>"Modify CA Port Group" (page 416)</u>.
> - Changing the port group settings
> - Adding a port to an existing port group

For details on the parameters for this function, refer to <u>"A. Create SAS Port Group" (page 1132)</u>.

The procedure to create a SAS port group is as follows:

Procedure

1 Click [Create SAS Port Group] in [Action].

2 Specify the name of the port group to be created and select all the ports to be registered in the port group.

The main setting items are as follows.

● **CA Port Group Setting**

- Name
- Checkbox to select ports

▷ **Caution**

If the total number of port groups has exceeded the maximum number for the ETERNUS DX, an error screen appears. Check the parameter settings.

◯ **N o t e**

For the following ports, "Affinity" is blank. These ports can be members of a port group, regardless of whether the affinity mode for the group is enabled (On) or disabled (Off).
- Ports that are not registered to a port group
- Ports that are registered to port groups and the host affinity setting is not set for all the port groups to which the relevant ports belong

3 Click the [Create] button.

4 A confirmation screen appears. Click the [OK] button.
→ Registration of the SAS port group starts.

5 Click the [Done] button to return to the [CA Port Group] screen.

End of procedure

Create FCoE Port Group

This function creates a new FCoE port group, and registers the port to be a member.
An FCoE port group is a group of FCoE-CA type ports that are connected to the specified host group. The Host Affinity is specified for each FCoE port group.

- The maximum number of port groups per storage system is 128 (with a maximum number of 384 for the ETERNUS DX8700 S3/DX8900 S3), irrespective of the CA types.
- The maximum number of ports per port group is 8.
- A port can be a member of several port groups.

▷ **Caution**

- Registration of the port is necessary to create a port group. A port group cannot be created if the port to be a member has not been registered from ETERNUS Web GUI.
- A port with the affinity mode enabled ("On") and a port with the affinity mode disabled ("Off") cannot exist together in a port group.
    - The affinity mode ("On" or "Off") of a port group is decided when the host affinity setting has been configured on the corresponding port group. All of the member ports in a port group have the same affinity mode.
    - The affinity mode ("On" or "Off") of a port group is not changed until the host affinity setting has been released from the corresponding port group.
    - When one port is registered in several port groups, and the host affinity setting has been configured on one of the port groups including the corresponding port, the same affinity setting is configured on all the port groups, which include the corresponding port, and also on the member ports.
    - Ports without the host affinity setting can be members of a port group, regardless of whether the affinity mode for the group is enabled ("On") or disabled ("Off").

🔵 **N o t e**

To perform the following operations, refer to "Modify CA Port Group" (page 416).
- Changing the port group settings
- Adding a port to an existing port group

For details on the parameters for this function, refer to "A. Create FCoE Port Group" (page 1132).

The procedure to create an FCoE port group is as follows:

Procedure

1 Click [Create FCoE Port Group] in [Action].

2 Specify the name of the port group to be created, select all the ports to be registered in the port group.

The main setting items are as follows.

● **CA Port Group Setting**

- Name
- Checkbox to select ports

> ▶ **Caution**

If the total number of port groups has exceeded the maximum number for the ETERNUS DX, an error screen appears. Check the parameter settings.

> ◉ **N o t e**

For the following ports, "Affinity" is blank. These ports can be members of a port group, regardless of whether the affinity mode for the group is enabled (On) or disabled (Off).
- Ports that are not registered to a port group
- Ports that are registered to port groups and the host affinity setting is not set for all the port groups to which the relevant ports belong

3 Click the [Create] button.

4 A confirmation screen appears. Click the [OK] button.
→ Registration of the FCoE port group starts.

5 Click the [Done] button to return to the [CA Port Group] screen.

                                                          End of procedure

Delete CA Port Group

This function deletes a CA port group.

▷ **Caution**

CA port groups that are being used for the host affinity settings (or the CA port groups whose status is "Active" in the CA port group list) cannot be deleted.

The procedure to delete a CA port group is as follows:

Procedure

1 Select the CA port group to be deleted (multiple selections can be made) and click [Delete Port Group] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ Deletion of the CA port group starts.

3 Click the [Done] button to return to the [CA Port Group] screen.

End of procedure

Modify CA Port Group

This function performs the following modifications for existing CA port groups:
- CA Port Group Name
- Port (Add and delete member ports in a CA port group)

Ports can be added to CA port groups for which the host affinity setting is already configured and ports can also be deleted from CA port groups.
If a port has been added, the host affinity setting is automatically configured to the corresponding port as a CA port group member.
If a port has been deleted, the host affinity setting is cleared from the corresponding port.

- The maximum number of CA port groups per storage system is 128 (with a maximum number of 384 for the ETERNUS DX8700 S3/DX8900 S3), irrespective of the CA types.
- The maximum number of ports per CA port group is 8.
- A port can be a member of several CA port groups.

> **▷ Caution**

- Registration of the port is necessary to create a CA port group. Not all of the ports can be deleted from a CA port group.
- Only ports with "CA" or "CA/RA" as the port mode can be added to a CA port group. Ports with other port modes cannot be added to a CA port group.
- Ports that are used for the Storage Cluster function cannot be added to the port group.
- A port with the affinity mode enabled ("On") and a port with the affinity mode disabled ("Off") cannot exist together in a CA port group.
    - The affinity mode ("On" or "Off") of a CA port group is decided when the host affinity setting has been configured on the corresponding CA port group. All of the member ports in a CA port group have the same affinity mode.
    - The affinity mode ("On" or "Off") of a CA port group is not changed until the host affinity setting has been released from the corresponding CA port group.
    - When one port is registered in several CA port groups, and the host affinity setting has been configured on one of the CA port groups including the corresponding port, the same affinity setting is configured on all the CA port groups, which include the corresponding port, and also on the member ports.
    - Ports without the host affinity setting can be members of a CA port group, regardless of whether the affinity mode for the host group is enabled ("On") or disabled ("Off").

> **● N o t e**

- Host access does not need to be stopped when adding or deleting ports from the CA port group where the host affinity setting has been configured.
- When a port was added to a CA port group, of which the host affinity setting has been configured, paths between all the hosts with the host affinity setting and the added port will be configured. To modify the path between a host and a port, refer to "Modify Host Affinity" (page 348).
- When a port in the CA port group for which the host affinity settings are already configured is deleted, the path from the host to the port is also deleted.
- When creating a new CA port group and registering a port in the CA port group, refer to the following sections depending on the CA port type.
    - "Create FC Port Group" (page 408)
    - "Create iSCSI Port Group" (page 410)
    - "Create SAS Port Group" (page 412)
    - "Create FCoE Port Group" (page 414)
- To change the CA port mode to "CA" or "CA/RA", refer to "Modify Port Mode" (page 433).

For details on the parameters for this function, refer to "A. Modify CA Port Group" (page 1133).

The procedure to modify a CA port group is as follows:

Procedure

1 Select the CA port group to be changed, and click [Modify Port Group] in [Action].

2 Specify the new name and add a port to the CA port group (select the checkbox) or delete a port from the CA port group (clear the checkbox).
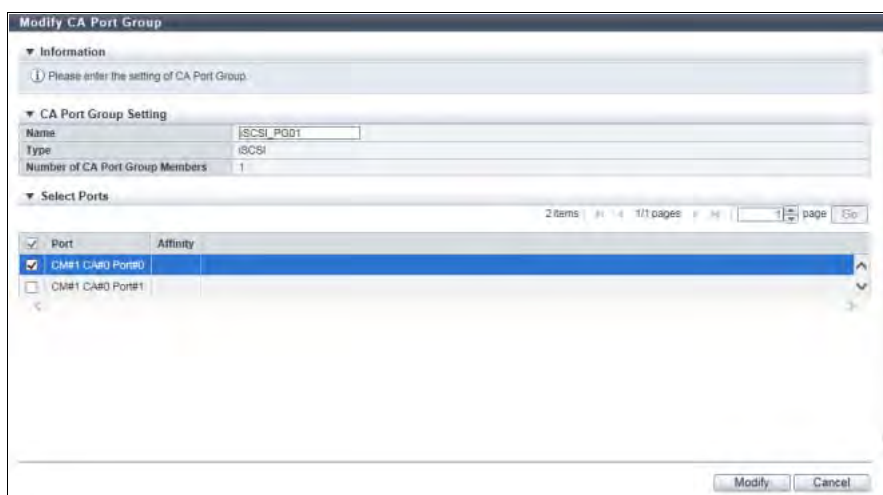
The main setting items are as follows.

● **CA Port Group Setting**

- Name
- Checkbox to select ports

> **N o t e**
>
> Ports that satisfy all of the following conditions are displayed.
> - "FC", "iSCSI", "SAS", or "FCoE" type CA ports (the same type as the selected CA port group)
> - The port mode is "CA" or "CA/RA (when the type is FC or iSCSI)"
> - Not used for the Storage Cluster function

3 Click the [Modify] button.

4 A confirmation screen appears. Click the [OK] button.
→ Modification of the CA port group starts.

5 Click the [Done] button to return to the [CA Port Group] screen.

End of procedure

Modify FC Port Parameters

This function sets the parameters for the FC host interface port that connects between the ETERNUS DX/AF and the host, or connects between the storage systems for REC or Storage Migration.

> ▷ **Caution**
>
> - When changing port parameters during operation, stop access from the server that is connected to the target port. Host access does not need to be stopped to change the port parameters of newly added CA ports.
> - The port parameters of an FC-Initiator port that has Storage Migration paths cannot be changed.

> ⬤ **N o t e**
>
> - There are four types of port modes for FC ports; CA, RA, CA/RA, and Initiator. CA is used for connecting to a server, RA is used for REC, CA/RA is used for connecting to a server and for REC, and Initiator is used for Storage Migration. To change the port mode, refer to "Modify Port Mode" (page 433). The default value is "CA".
> - For more details on the parameter settings of FC-CA, refer to "Configuration Guide -Server Connection-" for each OS type.
> - When changing the port parameters for FC-Initiator port, delete the path group specified in the target port. Refer to "Delete Storage Migration Path" (page 187) for details.

For details on the parameters for this function, refer to "A. Modify FC Port Parameters" (page 1133).

For the factory default settings for this function, refer to the following sections.
- "B. Modify FC Port Parameters (when the port mode is "CA")" (page 1273)
- "B. Modify FC Port Parameters (when the port mode is "RA" or "CA/RA")" (page 1274)
- "B. Modify FC Port Parameters (when the port mode is "Initiator")" (page 1274)

■ Setting FC Port Parameters Manually

The procedure to set FC port parameters is as follows:

Procedure

1 Select which FC port to set the parameters for (multiple selections can be made) and click [Configure FC Port] in [Action].

> ⬤ **N o t e**
>
> - Multiple selections can be made from FC ports that have the same SFP type and port mode. Note that multiple FC ports can also be selected if the SFP types are one of the following combinations.
>   - A mix of "16G SFP+(SMF)" and "16G SFP+(MMF)"
>   - A mix of "SFP+(SMF)", "SFP+(MMF)", "Unknown", and "Unmount"
> - Multiple ports can be set with the same or with different parameters in a single operation. To set parameters to multiple ports, select the target ports and specify the parameters for each port. After the specification is complete, click the [Modify] button.

2 Set the parameters for all of the selected ports.
The settings of port parameters vary depending on the port mode ("When the port mode is "CA"" (page 420), "When the port mode is "RA" or "CA/RA"" (page 420), or "When the port mode is "Initiator"" (page 421)).

■ When the port mode is "CA"

The main setting items are as follows.

● **Port Settings**

• Port
• Connection
• Set Loop ID
• Loop ID
• Transfer Rate

■ When the port mode is "RA" or "CA/RA"

The main setting items are as follows.

● **Port Settings**

• Port
• Connection
• Set Loop ID

- Loop ID
- Transfer Rate

■ When the port mode is "Initiator"

The main setting items are as follows.

● **Port Settings**

- Port
- Connection
- Set Loop ID
- Loop ID
- Transfer Rate
- WWN (Port Name)
- WWN (Node Name)

3 Click the [Modify] button.

> **Caution**

If the Loop ID is changed while a server is operating, reboot the server immediately. If the server is oper-
ated without being rebooted, a warning message may appear or a system failure may occur.

4 A confirmation screen appears. Click the [OK] button.
→ Modification of the FC port parameters starts.

5 Click the [Done] button to return to the [FC Port] screen.

End of procedure

■ Copying FC Port Parameters

The procedure to copy FC port parameters is as follows:

Procedure

1 Select the copy source port of parameters and all the copy destination ports, and click [Configure FC Port] in [Action].

> ○ **N o t e**
>
> - Multiple selections can be made from FC ports that have the same SFP type and port mode. Note that multiple FC ports can also be selected if the SFP types are one of the following combinations.
>   - A mix of "16G SFP+(SMF)" and "16G SFP+(MMF)"
>   - A mix of "SFP+(SMF)", "SFP+(MMF)", "Unknown", and "Unmount"
> - Setting and copying the FC port parameters can be performed with a single operation.

2 Set the copy source port parameters and then click the [Copy] button.

→ The [Copy Settings] screen appears.

3 Select all of the copy destination ports.

The main setting item is as follows.

● **Destination**

- Checkbox to select copy destination port

4 Click the [Copy] button.
→ Returns to the [Modify FC Port Parameters] screen.

5 Specify the parameter that is not to be copied and click the [Set] button.

▷ **Caution**

- The "parameter that is not to be copied" indicates the "Loop ID" setting for "Set Loop ID (Manual)".
  When the connection type is "FC-AL" and the Loop ID setting is "Manual", specify the "Loop ID" value
  after copying of the parameters is complete.
- If the Loop ID is changed while a server is operating, reboot the server immediately. If the server is
  operated without being rebooted, a warning message may appear or a system failure may occur.

6 A confirmation screen appears. Click the [OK] button.
→ Setting of the FC port parameters starts.

7 Click the [Done] button to return to the [FC Port] screen.

End of procedure

Modify iSCSI Port Parameters

This function sets the parameters for the iSCSI host interface port that connects between the ETERNUS DX/AF and the host, or connects between the storage systems for REC.

> ▷ **Caution**
>
> - When changing port parameters during operation, stop access from the server that is allocated to the target port. Host access does not need to be stopped to change the port parameters of newly added CA ports.
> - Multiple VLAN can be set for ports with "CA" or "CA/RA" as the port mode. For "CA/RA" ports, IP addresses that are added (15 addresses in maximum) can be used as "CA" type ports.
> - When the Multiple VLAN setting is enabled and the port mode for the relevant iSCSI ports is changed from "CA" or "CA/RA" to "RA", all of the added IP address information is deleted. Refer to "Modify Port Mode" (page 433) for details.

> ◯ **N o t e**
>
> - There are three port modes for an iSCSI port; CA, RA, and CA/RA. CA is used for connecting to a server, RA is used for REC, and CA/RA is used for connecting to a server and for REC. To switch the port mode, refer to "Modify Port Mode" (page 433). The default value is "CA".
> - For more details on iSCSI-CA parameter settings, refer to "Configuration Guide -Server Connection-" for each OS type.

For details on the parameters for this function, refer to "A. Modify iSCSI Port Parameters" (page 1138).

For the factory default settings for this function, refer to the following sections.
- "B. Modify iSCSI Port Parameters (when the port mode is "CA")" (page 1274)
- "B. Modify iSCSI Port Parameters (when the port mode is "RA")" (page 1275)
- "B. Modify iSCSI Port Parameters (when the port mode is "CA/RA")" (page 1276)
- "B. Modify iSCSI Port Parameters ([Send Ping] screen)" (page 1277)

The procedure to set iSCSI port parameters is as follows:

Procedure

1 Select which iSCSI port to set the parameters for (multiple selections can be made) and click [Configure iSCSI Port] in [Action].

> ◯ **N o t e**
>
> - Multiple "1G iSCSI", "10G iSCSI", or "10G Base-T iSCSI" type iSCSI ports with the same port mode can be selected.
> - Multiple ports can be set with the same or with different parameters in a single operation. To set parameters to multiple ports, select the target ports and specify the parameters for each port. After the specification is complete, click the [Modify] button.

2 Set the parameters for all of the selected ports.
The settings of port parameters vary depending on the port type and the port mode ("When the port mode is "CA"" (page 425), "When the port mode is "RA"" (page 426), or "When the port mode is "CA/RA"" (page 427)).

■ When the port mode is "CA"
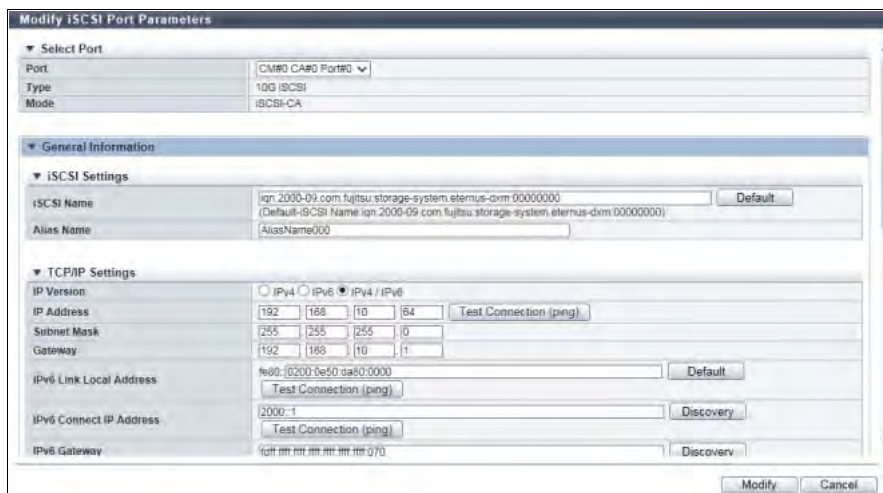
The main setting items are as follows.

● **Select Port**

• Port

● **General Information**

• iSCSI Settings
   - iSCSI Name
   - Alias Name
• TCP/IP Settings
   - IP Version
   - IP Address
   - Subnet Mask
   - Gateway
   - IPv6 Link Local Address
   - IPv6 Connect IP Address
   - IPv6 Gateway
   - TCP Port No.
   - TCP Window Scale
   - VLAN ID
   - Jumbo Frame
• Security Settings
   - CHAP
   - CHAP User ID
   - New Password
   - Confirm new Password
• General Settings
   - Transfer Rate (This item is displayed only when the port type is "10G Base-T iSCSI")

● **Additional IP Address Information**

• Additional IP Address Settings
   - Multiple VLAN
   - VLAN ID

- IP Version
- IP Address
- Subnet Mask
- Gateway
- IPv6 Link Local Address
- IPv6 Connect IP Address
- IPv6 Gateway
- TCP Port No.
- TCP Window Scale
- Jumbo Frame

■ When the port mode is "RA"
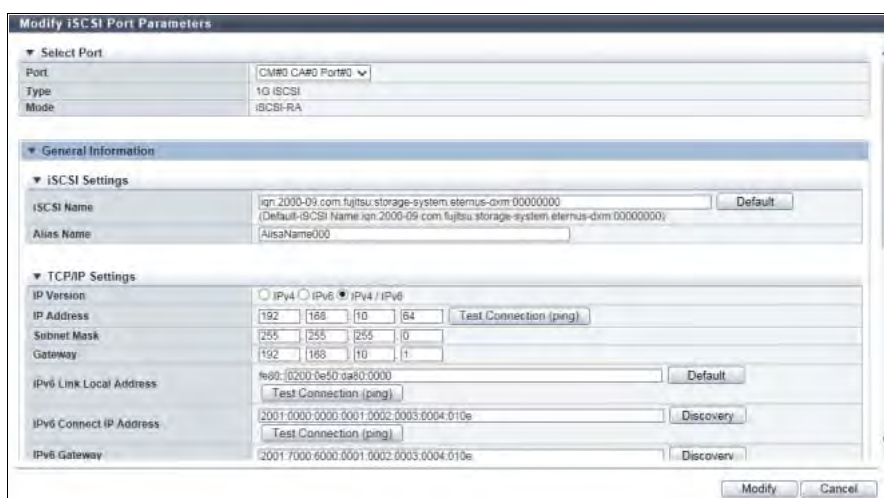
The main setting items are as follows.

● **Select Port**

• Port

● **General Information**

• iSCSI Settings
  - iSCSI Name
  - Alias Name
• TCP/IP Settings
  - IP Version
  - IP Address
  - Subnet Mask
  - Gateway
  - IPv6 Link Local Address
  - IPv6 Connect IP Address
  - IPv6 Gateway
  - TCP Port No.
  - TCP Window Scale
  - VLAN ID
  - MTU
• Security Settings
  - CHAP

      - CHAP User ID
      - New Password
      - Confirm new Password
    • General Settings
      - Transfer Rate (This item is displayed only when the port type is "10G Base-T iSCSI")

■ When the port mode is "CA/RA"
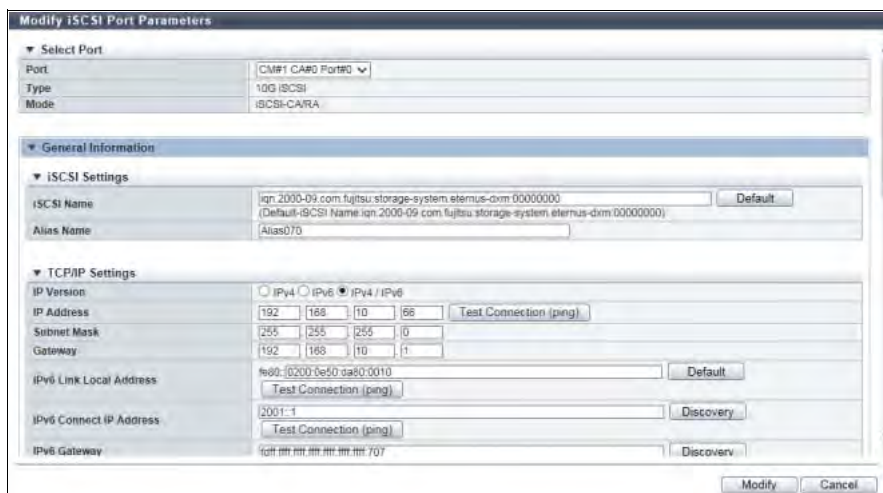
The main setting items are as follows.

● **Select Port**

• Port

● **General Information**

• iSCSI Settings
  - iSCSI Name
  - Alias Name
• TCP/IP Settings
  - IP Version
  - IP Address
  - Subnet Mask
  - Gateway
  - IPv6 Link Local Address
  - IPv6 Connect IP Address
  - IPv6 Gateway
  - TCP Port No.
  - TCP Window Scale
  - VLAN ID
  - MTU
• Security Settings
  - CHAP (CA)
  - CHAP User ID (CA)
  - New Password (CA)
  - Confirm new Password (CA)
  - CHAP (RA)
  - CHAP User ID (RA)

- New Password (RA)
- Confirm new Password (RA)
- General Settings
  - Transfer Rate (This item is displayed only when the port type is "10G Base-T iSCSI")

● **Additional IP Address Information**

- Additional IP Address Settings
  - Multiple VLAN
  - VLAN ID
  - IP Version
  - IP Address
  - Subnet Mask
  - Gateway
  - IPv6 Link Local Address
  - IPv6 Connect IP Address
  - IPv6 Gateway
  - TCP Port No.
  - TCP Window Scale
  - iSNS Server
  - iSNS Server Port No.
  - Jumbo Frame

■ [Send ping] Screen

Check the connection status between the target port and the destination storage system.
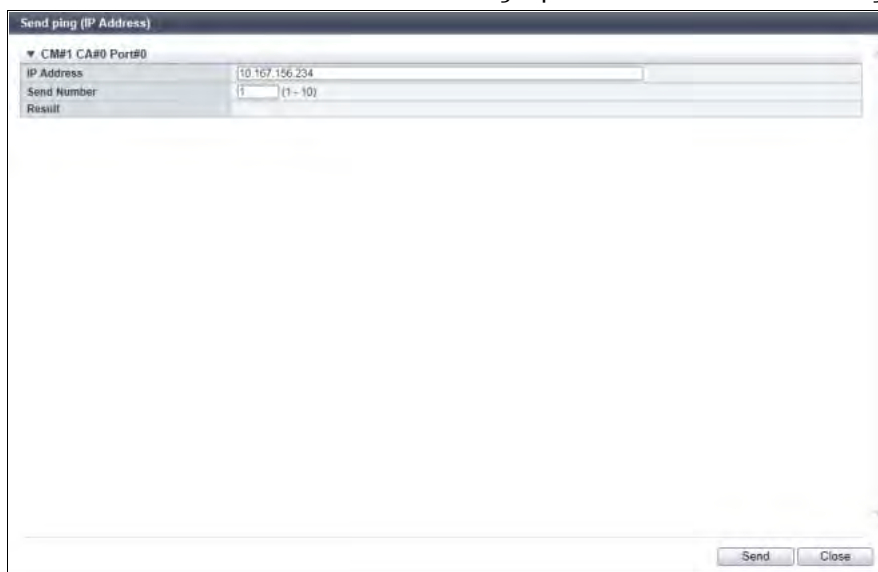
The main setting items are as follows.

● **Send ping (IP address)**

- IP Address
- Send Number
- Result

> ▶ **Caution**
>
> If an error screen appears under the following conditions, check the parameter settings.
> - "255.255.255.255" is input for the IP address, the subnet mask, or the gateway
> - The IP address and the network address are the same
> - The IP address and the broadcast address are the same
> - The gateway is set and the IP address and the gateway are the same
> - The gateway is set and the IP Address and the gateway are not in the same subnet
> - The gateway is set and the gateway and the network address are the same
> - The gateway is set and the gateway and the broadcast address are the same

> ● **N o t e**
>
> - When the [Discovery] button is clicked for "IPv6 Connect IP Address", the IPv6 connect IP address can be created automatically from the prefix value that is obtained from the router that is connected to the ETERNUS DX/AF and the input IPv6 link local address.
> - When the [Discovery] button is clicked for "IPv6 Gateway", the gateway information can be obtained from the connected router.
> - When the port mode is "CA" or "CA/RA" and Multiple VLAN is enabled, click the [Add] button to register up to 15 IP address information for each port.
> - To check whether the IP address is allocated correctly and the connection status for the remote device, click the [Test Connection (ping)] button for "IP Address", "IPv6 Link Local Address", or "IPv6 Connect IP Address".

3   Click the [Modify] button.

4   A confirmation screen appears. Click the [OK] button.
→   Modification of the iSCSI port parameters starts.

5   Click the [Done] button to return to the [iSCSI Port] screen.

End of procedure

Modify SAS Port Parameters

This function sets the parameters for the SAS host interface port that connects between the ETERNUS DX and the host.

> ▶ **Caution**
>
> - "12G SAS" is supported in the ETERNUS DX60 S4/DX100 S4/DX200 S4.
> - When changing port parameters during operation, stop access from the server that is allocated to the target port. Host access does not need to be stopped to change the port parameters of newly added CA ports.

> ● **N o t e**
>
> For more details on SAS parameter settings, refer to "Configuration Guide -Server Connection-" for each OS type.

The procedure to set SAS port parameters is as follows:
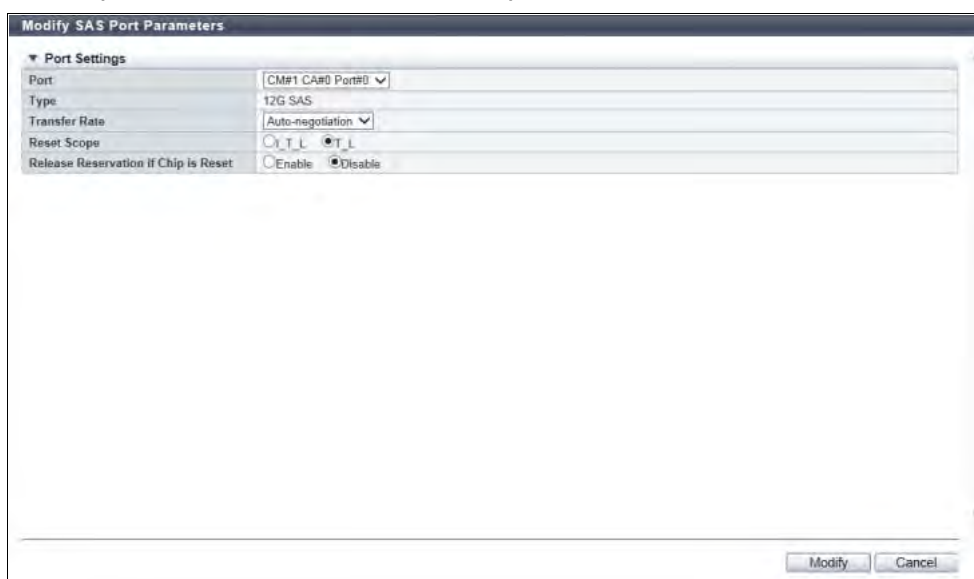
Procedure

1 Select the SAS port to set the parameters for (multiple selections can be made) and click [Configure SAS Port] in [Action].

> 🔵 **N o t e**
>
> Multiple ports can be set with the same or with different parameters in a single operation. To set parameters to multiple ports, select the target ports and specify the parameters for each port. After the specification is complete, click the [Modify] button.

2 Set the parameters for all of the selected ports.

The main setting items are as follows.

● **Port Settings**

- Port
- Transfer Rate

3 Click the [Modify] button.

4 A confirmation screen appears. Click the [OK] button.
→ Modification of the SAS port parameters starts.

5 Click the [Done] button to return to the [SAS Port] screen.

End of procedure

Modify FCoE Port Parameters

This function sets the parameters for the FCoE host interface port that connects between the ETERNUS DX and the host.

▷ **Caution**

When changing port parameters during operation, stop access from the server that is allocated to the target port. Host access does not need to be stopped to change the port parameters of newly added CA ports.

● **N o t e**

For more details on FCoE parameter settings, refer to "Configuration Guide -Server Connection-" for each OS type.

For details on the parameters for this function, refer to "A. Modify FCoE Port Parameters" (page 1151).
For the factory default settings for this function, refer to "B. Modify FCoE Port Parameters" (page 1278).

■ Setting FCoE Port Parameters Manually

The procedure to set FCoE port parameters is as follows:

Procedure

1 Select the FCoE port to set the parameters for (multiple selections can be made) and click [Configure FCoE Port] in [Action].

● **N o t e**

Multiple ports can be set with the same or with different parameters in a single operation. To set parameters to multiple ports, select the target ports and specify the parameters for each port. After the specification is complete, click the [Modify] button.

2 Set the parameters for all of the selected ports.

The main setting items are as follows.

● **Port Settings**

- Port
- Transfer Rate (Gbit/s)
- Set VLAN ID
- VLAN ID
- Set Fabric Name
- Fabric Name
- Frame Size

3 Click the [Modify] button.

4 A confirmation screen appears. Click the [OK] button.
→ Modification of the FCoE port parameters starts.

5 Click the [Done] button to return to the [FCoE Port] screen.

End of procedure

■ Copying FCoE Port Parameters

The procedure to copy FCoE port parameters is as follows:

Procedure

1 Select the copy source port of parameters and all the copy destination ports, and click [Configure FCoE Port] in [Action].

◯ **N o t e**

Setting and copying the FCoE port parameters can be performed with a single operation.

2 Set the copy source port parameters and then click the [Copy] button.
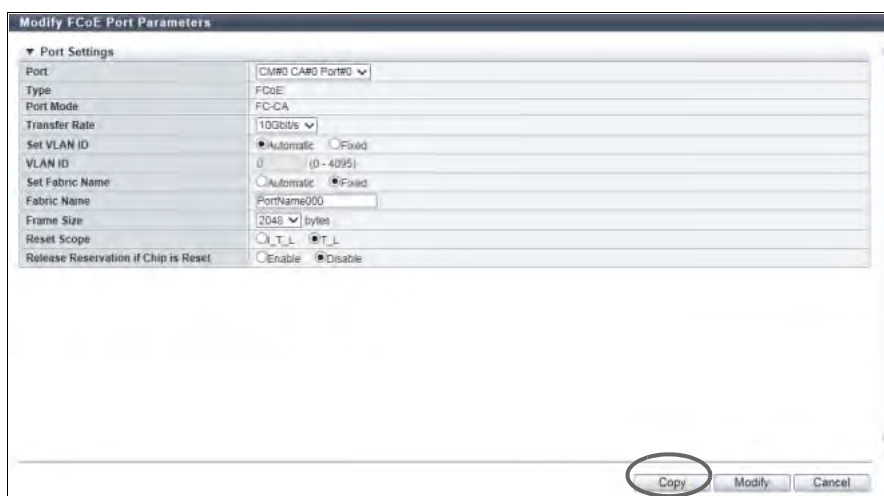
→ The [Copy Settings] screen appears.

3 Select all of the copy destination ports.
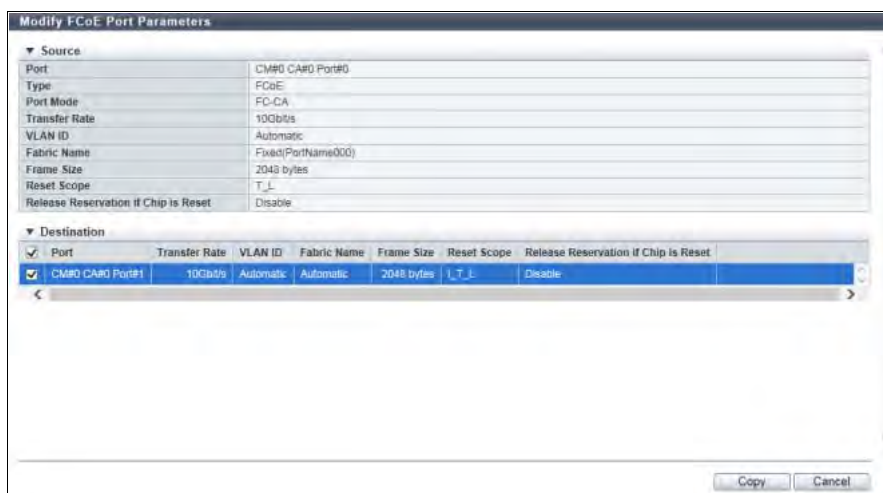
The main setting item is as follows.

● **Destination**

- Checkbox to select copy destination port

4 Click the [Copy] button.
→ Returns to the [Modify FCoE Port Parameters] screen.

5 Check the FCoE port parameters, and click the [Set] button.

6 A confirmation screen appears. Click the [OK] button.
→ Setting of the FCoE port parameters starts.

7 Click the [Done] button to return to the [FCoE Port] screen.

End of procedure

Modify Port Mode

This function changes the port mode of each port among CA, Remote Adapter (RA), CA/RA, and Initiator.
The port modes of the FC port and the iSCSI port can be changed.

Switchable port mode

Port	Port Mode	Usage
FC Port	CA	CA is used for connecting to the host.
	RA	RA is used for performing REC.
	CA/RA	CA/RA is used for connecting the host and for performing REC.
	Initiator	Initiator is used for performing Storage Migration.
iSCSI Port	CA	CA is used for connecting to the host.
	RA	RA is used for performing REC.
	CA/RA	CA/RA is used for connecting the host and for performing REC.

> **▶ Caution**
>
> - The mapping information or the Advanced Copy path information may be deleted from the currently used port. Refer to "Retained and deleted information when changing the port mode" (page 434) for details.
>   - If the mapping information is to be deleted due to the change of the port mode, stop access from the host that is connected to the target CA port in advance.
>   - If the Advanced Copy path information is to be deleted due to the change of the port mode, perform this function when no sessions exist in the target port.
> - When the Multiple VLAN setting is enabled and the port mode for the relevant iSCSI ports are changed from "CA" or "CA/RA" to "RA", all of the specified IP address information is deleted. If this occurs, only the IP address that is specified in the general information remains for the iSCSI port.
> - When the Advanced Copy license has been registered or the Storage Cluster function is "Enable", the port mode can be changed to "RA" or "CA/RA".
> - Whether the port mode can be changed varies depending on the status of the Storage Cluster function (used/unused). Refer to "The Storage Cluster function and port mode modification" (page 435) for details.
> - The port mode cannot be changed in the following conditions:
>   - When the port type is "SAS" or "FCoE"
>   - When selecting an FC-Initiator port with a Storage Migration path
> - If the ETERNUS DX60 S4/DX60 S3 is used with iSCSI or SAS host interfaces, this function is not displayed in [Action].

Retained and deleted information when changing the port mode

		Port mode after modification			
		CA	RA	CA/RA	Initiator
Port mode before modification	CA	–	Mapping information is deleted	Mapping information is retained	Mapping information is deleted
	RA	Advanced Copy path information is deleted	–	• Advanced Copy path information is retained • REC Line No. is retained • REC Transfer Mode is retained	Advanced Copy path information is deleted
	CA/RA	• Mapping information is retained • Advanced Copy path information is deleted	• Mapping information is deleted • Advanced Copy path information is retained • REC Line No. is retained • REC Transfer Mode is retained	–	• Mapping information is deleted • Advanced Copy path information is deleted

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The Storage Cluster function and port mode modification

Port mode before modification	The Storage Cluster's usage of the port		Port mode after modification		
			RA	CA/RA	Initiator
CA	The Storage Cluster function is not used	WWN is not changed	OK	OK	OK
		WWN is changed (*1)	OK	N/A	OK
	The Storage Cluster function is used		N/A	N/A	N/A

OK: The port mode can be changed
N/A: The port mode cannot be changed
*1:   The port is being used for the Storage Cluster function, but the port is not used currently.

> **⬤ N o t e**
>
> - If the port mode has been changed, the port parameter returns to the default setting. Note that the port parameters are retained if the port mode is changed from "RA" to "CA/RA" or from "CA/RA" to "RA, and host access does not need to be stopped when the port mode is changed between "RA" and "CA/RA".
> - When changing the port mode for FC-Initiator port, delete the path group specified in the target port. Refer to "Delete Storage Migration Path" (page 187) for details.
> - To check whether or not the WWN for the target port has been changed, use the [FC Port] screen. Refer to "FC Port" (page 832) for details.

For details on the parameters for this function, refer to "A. Modify Port Mode" (page 1152).
For the factory default settings for this function, refer to "B. Modify Port Mode" (page 1278).

The procedure to change the port mode is as follows:

Procedure

1   Click [Modify Port Mode] in [Action].

2   Select the port mode to be changed over to.
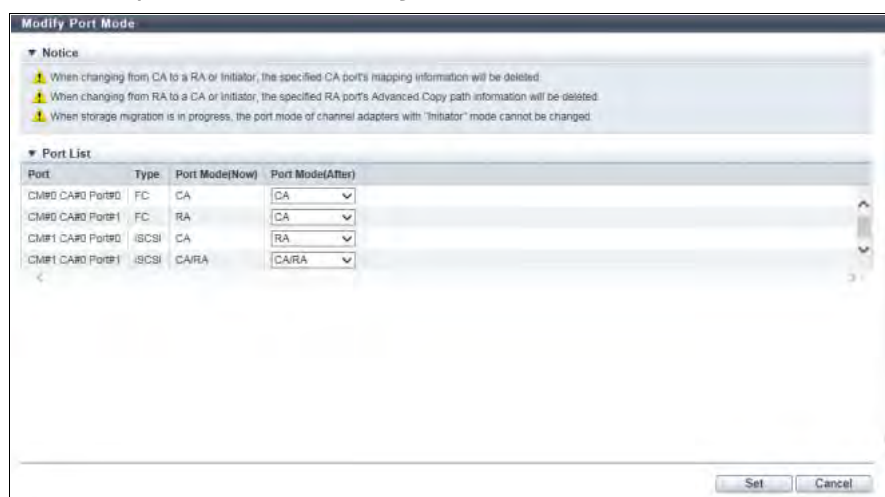
The main setting item is as follows.

⬤ Port List

- Port Mode (After)

3 Click the [Set] button.

> 🔵 **N o t e**
>
> "RA" and "CA/RA" are displayed as options only for the models that support REC.

4 A confirmation screen appears. Click the [OK] button.
→ Port mode changeover starts.

5 Click the [Done] button to return to the [CA Port] screen.

End of procedure

LUN Group Management

This section describes LUN group management.

LUN group management provides the following functions:

- Add LUN Group
- Delete LUN Group
- Modify LUN Group

Add LUN Group

This function creates a new LUN group, and allocates a volume number in the ETERNUS DX/AF to the LUN, which can be recognized by the host.
The following list shows the maximum number of LUN groups that can be created for each model.

- ETERNUS DX60 S4/DX60 S3
  128
- ETERNUS DX100 S4/DX100 S3
  ETERNUS DX200 S4/DX200 S3
  1024
- ETERNUS DX500 S4/DX500 S3
  ETERNUS DX600 S4/DX600 S3
  1024 (2048) (*1)
- ETERNUS DX8100 S3
  1024
- ETERNUS DX8700 S3
  ETERNUS DX8900 S3
  6144
- ETERNUS AF250 S2/AF250
  1024
- ETERNUS AF650 S2/AF650
  1024 (2048) (*1)
- ETERNUS DX200F
  1024

*1:   Values in parentheses indicate the number of LUN groups when "Expand Host Mode" is "Enable". Refer to "Setup Subsys-
       tem Parameters" (page 65) for details.

> **▷ Caution**
>
> - Only the volumes with "Standard", "WSV", "TPV", "FTV", or "SDV" volume types can be registered in the LUN group. "SDPV" volumes cannot be registered in the LUN group.
> - A LUN group cannot be created when no volumes have been registered in the ETERNUS DX/AF.
> - Up to 4096 LUNs can be created. If the host affinity setting is performed for the host groups or hosts to which the host response setting has been allocated, the number of LUNs that can be referenced by the host vary depending on the host response setting. Refer to "Host response and referable number of LUNs" (page 1118) for details.
> - Note that if a LUN group to which volumes are mapped from LUN#512 onward exists, the maximum number of LUN groups cannot be created. This is because when volumes are mapped for LUN#512 onward, an additional LUN group is created as an internal resource for every 512 LUNs.
> - The following volumes cannot be registered in the LUN group. These volumes are not displayed as selectable volumes.
>   - Volumes with the mirroring reservation attribute (*1)
>   - ODX Buffer volumes
>   - NAS volumes and NAS system volumes that are used in a Unified Storage environment
>   - Volumes that are used for the Virtual Volume function (including "$VVOL_META")
>   - Deduplication/Compression System Volumes
>
> *1:　An attribute to be set to a volume being created as the REC copy destination by the Dynamic LUN Mirroring function. The volumes with this attribute may have been left in the storage system due to unsuccessful creation. Volumes that have the mirroring reservation attribute can be checked in the "Forbid Advanced Copy" field on the [Volume] screen. Refer to "Volume (Basic Information)" (page 775) for details.

For details on the parameters for this function, refer to "A. Add LUN Group" (page 1153).
For the factory default settings for this function, refer to "B. Add LUN Group" (page 1278).

The procedure to create a LUN group is as follows:

Procedure

1　Click [Add LUN Group] in [Action].
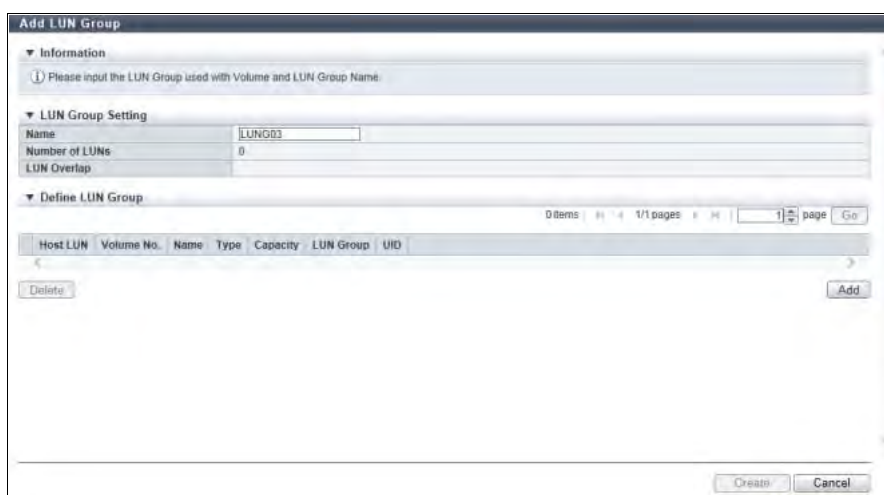
2　Specify the LUN group name.

The main setting item is as follows.

● **LUN Group Setting**

• Name

3   Click the [Add] button.
→ The [Add LUN] screen is displayed.

🔵 **N o t e**

To delete the allocation information between LUNs and volumes, select the checkbox for allocation information to delete and click the [Delete] button.

4   Specify the LUN and the number of LUNs for volume allocation, select the volume numbers to start the allocation to the corresponding LUNs from.
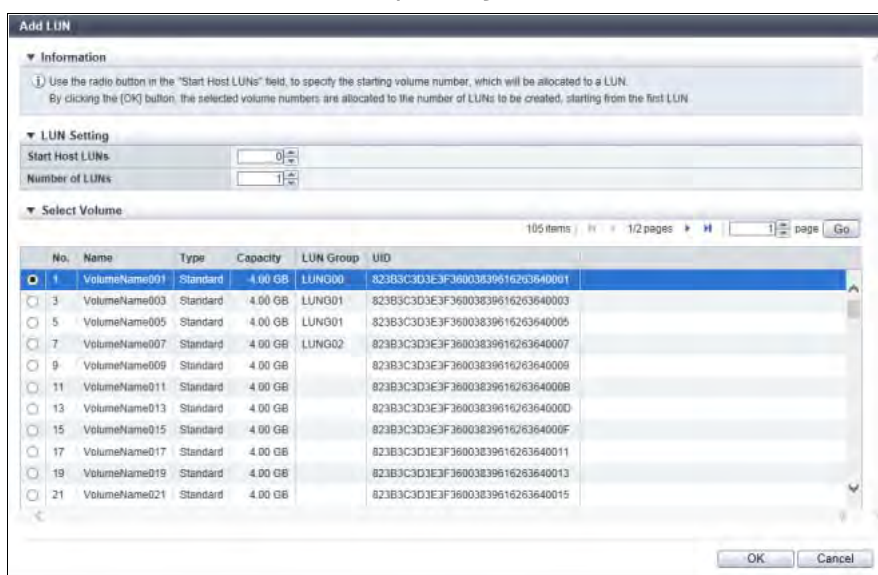
The main setting items are as follows.

● **LUN Setting**

• Start Host LUNs
• Number of LUNs
• Select Volume

▶ **Caution**

If the required number of LUNs, which are specified in "Number of LUNs", cannot be allocated to volumes, an error screen appears. Check the parameter settings.

5   Click the [OK] button.
→ Returns to the [Add LUN Group] screen.

6   Repeat Step 3 through Step 5 to set multiple allocation information between the LUNs and the volumes.

▶ **Caution**

If the total number of LUN groups has reached the maximum number of storage systems, an error screen appears. Check the parameter settings.

7   Check the LUN and the volume allocation information to be registered in the LUN group, click the [Create] button.

8   A confirmation screen appears. Click the [OK] button.
→ Adding LUN group starts.

9   Click the [Done] button to return to the [LUN Group] screen.

End of procedure

Delete LUN Group

This function deletes LUN groups.

> ▷ **Caution**

The following LUN groups cannot be deleted:
• The LUN group is used for the host affinity settings
• The LUN group includes a volume that is used for the Storage Cluster function

The procedure to delete a LUN group is as follows:

Procedure

1   Select the LUN group that is to be deleted, and click [Delete LUN Group] in [Action].

2   A confirmation screen appears. Click the [OK] button.
→ LUN group deletion starts.

3   Click the [Done] button to return to the [LUN Group] screen.

End of procedure

Modify LUN Group

This function modifies LUN groups.

> ▷ **Caution**

- When changing or deleting the volume allocation in a running LUN group, stop access from the associated host.
- When adding LUNs or volume allocation to a running LUN group, stopping access from the associated host is not necessary.
- Only the volumes with "Standard", "WSV", "TPV", "FTV", or "SDV" volume types can be registered in the LUN group. "SDPV" volumes cannot be registered in the LUN group.
- To change a LUN group that has host affinity settings, the number of LUNs which can be referenced from the host depends on the host response setting that is allocated to the host group or the host. Refer to "Host response and referable number of LUNs" (page 1118) for details. When adding LUNs to a LUN group, check the host response.
- The following volumes cannot be registered in the LUN group. These volumes are not displayed as selectable volumes.
    - Volumes with the mirroring reservation attribute
    - ODX Buffer volumes
    - NAS volumes and NAS system volumes that are used in a Unified Storage environment
    - Volumes that are used for the Virtual Volume function (including "$VVOL_META")
    - Deduplication/Compression System Volumes

For details on the parameters for this function, refer to "A. Modify LUN Group" (page 1154).

The procedure to modify a LUN group is as follows:

Procedure

1   Select the LUN group that is to be changed, and click [Modify LUN Group] in [Action].

2   Specify the LUN group name (if required).

The main setting item is as follows.

● **LUN Group Setting**

- Name

3 Click the [Add] button
→ The [Add LUN] screen is displayed.

> **⬤ N o t e**
>
> • To delete the LUN and the volume allocation information from a LUN group, select the allocation infor-
>   mation checkbox to delete and click the [Delete] button.
> • To change the allocation information between LUNs and volumes, delete the allocation information
>   that is to be changed. Restart this function to add a new allocation of LUNs and volumes in the LUN
>   group.

4 Specify the LUN and the number of LUNs for volume allocation, select the volume numbers to
start the allocation to the corresponding LUNs from.
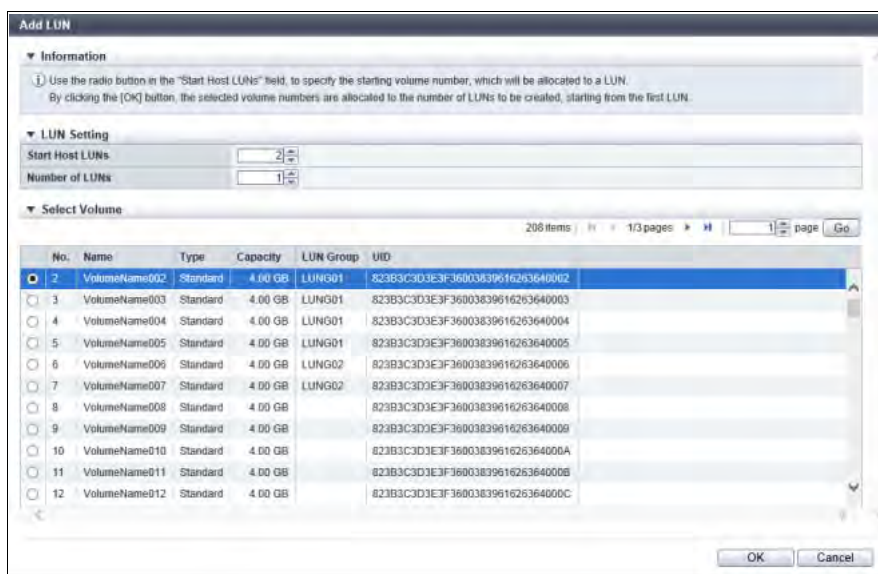
The main setting items are as follows.

⬤ LUN Setting

• Start Host LUNs
• Number of LUNs

⬤ Select Volume

• Select Volume

> **▶ Caution**
>
> If the required number of LUNs, which are specified in "Number of LUNs", cannot be allocated to volumes,
> an error screen appears. Check the parameter settings.

5 Click the [OK] button.
→ Returns to [Modify LUN Group] screen.

6   Repeat Step 3 through Step 5 to set multiple allocation information between the LUNs and the volumes.

▷ **Caution**

If there are LUNs that cannot be referenced from the host, an error screen appears. Check the parameter settings.

7   Check the LUN and the volume allocation information to be registered in the LUN group, click the [Modify] button.
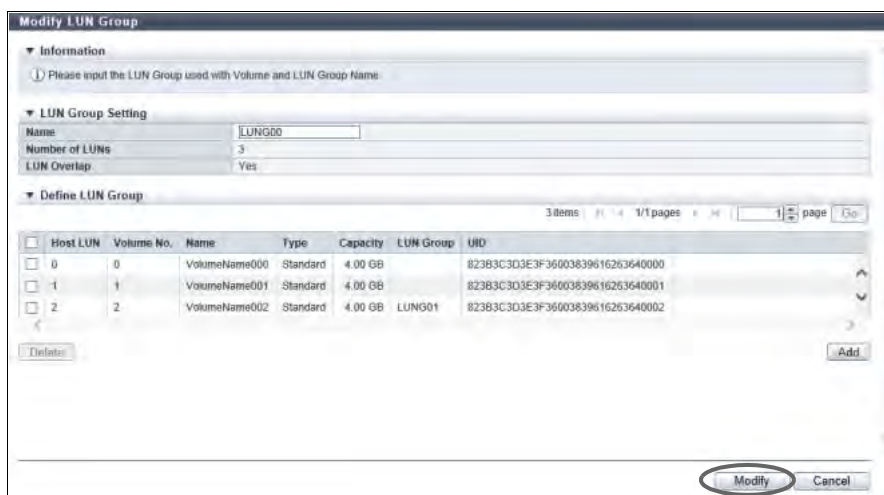
8   A confirmation screen appears. Click the [OK] button.
→   Modifying LUN group starts.

9   Click the [Done] button to return to the [LUN Group] screen.

End of procedure

Host Response Management

This section describes host response management.

Host Response management provides the following functions:

- Add Host Response
- Delete Host Response
- Modify Host Response

Add Host Response

This function adds a host response.
Up to 200 host responses for each storage system can be created.
For more details on setting the host response parameters, refer to "Configuration Guide -Server Connection-" for each OS type.

> ▷ **Caution**

- If an appropriate host response is not configured to the host affinity, the path may not be switched correctly or the volume may not be recognized correctly.
- When customizing the host response, make sure to understand the setting parameters and create the host response with careful attention.
- When ALUA is set for the volume, ALUA is given priority over the "Asymmetric / Symmetric Logical Unit Access" setting that is specified in this function. Refer to "Set ALUA" (page 322) for details.

> ⬤ **N o t e**

- Assign a host response when adding or changing a host group. Refer to the following functions:
    - "Add FC/FCoE Host Group" (page 359)
    - "Add iSCSI Host Group" (page 366)
    - "Add SAS Host Group" (page 371)
    - "Modify Host Group" (page 376)
- Assign a host response when adding or changing a host. Refer to the following functions:
    - "Add FC/FCoE Host" (page 390)
    - "Add iSCSI Host" (page 393)
    - "Add SAS Host" (page 398)
    - "Modify FC/FCoE Host" (page 403)
    - "Modify iSCSI Host" (page 405)
    - "Modify SAS Host" (page 406)
- To change a host response, refer to "Modify Host Response" (page 447).

Recommended patterns of host responses

Host Response Name	Connection Environment
Solaris MPxIO	Set this parameter to connect to an Oracle Solaris host and to use the OS standard Multipath Driver (MPxIO).
HP-UX	Set this parameter to connect to an HP-UX host.
AIX	Set this parameter to connect to an AIX host.
AIX VxVM	Set this parameter to connect to an AIX host and to use Veritas Volume Manager (VxVM).
VS850/SVC	Set this parameter to connect to an ETERNUS VS850 Virtualization Storage or an IBM SAN Volume Controller (SVC).
BS2000	Set this parameter to connect to a BS2000 host and to enable the LUN expand mode.
Default	Set this parameter for any host connection environments that are not listed above.

For the setting values, refer to "Default values for recommended patterns of host responses" (page 1159).

For details on the parameters for this function, refer to "A. Add Host Response" (page 1154).
For the factory default settings for this function, refer to "B. Add Host Response" (page 1278).

The procedure to add a host response is as follows:

Procedure

1 Click [Add Host Response] in [Action].

2 Specify the host response name and set each parameter.

> **Caution**

- A host response has a recommended pattern which has been prepared for each OS type.
  Refer to "Recommended patterns of host responses" (page 445) for details.
  Select "Default" in other host connection environments.
- The host response setting can be customized. Use this function to create a new host response.

The main setting items are as follows.

● **Host Response Name**

- Name

● **ALUA Settings**

- Asymmetric / Symmetric Logical Unit Access
- TPGS Mode
- TPG Referrals Mode

3   Click the [Add] button.

4   A confirmation screen appears. Click the [OK] button.
→ Addition of the host response starts.

5   Click the [Done] button to return to the [Host Response] screen.

End of procedure

Delete Host Response

This function deletes a host response.

▷ **Caution**

- A host response that is being used cannot be deleted. In this case, release the assignment from the host groups or the hosts before performing this function.
- The recommended pattern and the default setting of the host response cannot be deleted.

The procedure to delete a host response is as follows:

Procedure

1   Select the host response to be deleted (multiple selections can be made) and click [Delete Host Response] in [Action].

2   A confirmation screen appears. Click the [OK] button.
→ Deletion of the host response starts.

3   Click the [Done] button to return to the [Host Response] screen.

End of procedure

Modify Host Response

This function modifies host response settings.
For more details on setting the host response parameters, refer to "Configuration Guide -Server Connection-" for each OS type.

▷ **Caution**

- The server may need to be rebooted after host response parameters are changed. Refer to "Requirements for changing parameters" (page 447) for details.
- If an appropriate host response is not configured to the host affinity, the path may not be switched correctly or the volume may not be recognized correctly.
- When customizing the host response, make sure to understand the setting parameters and create the host response with careful attention.
- The recommended pattern and the default setting of the host response cannot be modified.
- When ALUA is set for the volume, ALUA is given priority over the "Asymmetric / Symmetric Logical Unit Access" setting that is specified in this function. Refer to "Set ALUA" (page 322) for details.

⬤ **N o t e**

- Assign a host response when adding or changing a host group. Refer to the following functions:
    - "Add FC/FCoE Host Group" (page 359)
    - "Add iSCSI Host Group" (page 366)
    - "Add SAS Host Group" (page 371)
    - "Modify Host Group" (page 376)
- Assign a host response when adding or changing a host. Refer to the following functions:
    - "Add FC/FCoE Host" (page 390)
    - "Add iSCSI Host" (page 393)
    - "Add SAS Host" (page 398)
    - "Modify FC/FCoE Host" (page 403)
    - "Modify iSCSI Host" (page 405)
    - "Modify SAS Host" (page 406)
- Refer to "Add Host Response" (page 444) to add a new host response.

Requirements for changing parameters

Some parameters that allow online modification can be changed during operation. If parameters that do not allow online modifications are changed, the server may need to be rebooted after these parameters are changed.

Category	Parameter	Online modification is available	Online modification is not available
Host Response Name	Name	Available	N/A
LUN Settings	LUN Addressing	N/A	Available
	LUN Expand Mode (Peripheral Device Addressing)	N/A	Available
ALUA Settings	Asymmetric / Symmetric Logical Unit Access	N/A	Available
	TPGS Mode	N/A	Available
	TPG Referrals Mode	N/A	Available

Category	Parameter	Online modification is available	Online modification is not available
Inquiry Command Settings	Peripheral Device Type (Peripheral Device Addressing)	N/A	Available
	Peripheral Device Type (Flat Space Addressing)	N/A	Available
	SCSI Version	N/A	Available
	NACA	N/A	Available
	Device ID Type	N/A	Available
	Product ID	N/A	Available
Test Unit Ready Command Settings	Reservation Conflict Response	Available	N/A
Sense Settings	Notify Change of Volume Mapping	Available	N/A
	Notify Change of Volume Expansion	Available	N/A
	Notify Vendor Unique Sense	Available	N/A
	Sense Data Conversion	Available	N/A
Mode Sense Command Settings	Reservation Conflict Response (Write Exclusive)	Available	N/A
Other Settings	Command Monitor Time	Available	N/A
	Load Balance Response Status	Available	N/A
	iSCSI Discovery Reply Mode	Available	N/A
	iSCSI Reservation Range	N/A	Available

For details on the parameters for this function, refer to .

The procedure to modify a host response is as follows:

Procedure

1 Select the host response to be modified, and click [Modify Host Response] in [Action].

2 Modify the host response name or each item.

The main setting items are as follows.

● **Host Response Name**

- Name

● **ALUA Settings**

- Asymmetric / Symmetric Logical Unit Access
- TPGS Mode
- TPG Referrals Mode

▷ **Caution**

If there are LUNs that cannot be referenced, an error screen appears. Check the parameter settings.

3 Click the [Modify] button.

4 A confirmation screen appears. Click the [OK] button.
→ Modification of the host response starts.

5 Click the [Done] button to return to the [Host Response] screen.

End of procedure

Modify CA Reset Group

This function edits a CA reset group.
All of the ports are configured to be members of one CA reset group on the initial setting. This function can create a CA reset group with only specific ports or change the member ports of an existing CA reset group when ports cannot be accessed.
The maximum number of CA reset groups is equal to the number of ports.

▷ **Caution**

- If a host is unable to access the volumes in a port, this function releases the volumes reserved by the inaccessible port to the ports in the specified CA reset group, without affecting other ports.
- When a port is shared by multiple servers using the host affinity function, only volumes that can be released under the instructions from the servers are included in the LUN group, with a host affinity configured with the target server.
- One port cannot be registered in multiple CA reset groups.
- Only the ports with the "CA" or "CA/RA" port mode can be registered in a CA reset group.

● **N o t e**

- If some ports have been removed from the modification target CA reset group, a different group is created using those ports. For instance, if ports (Port#2 and Port#3) have been removed from the modification target CA reset group A (Port#0, Port#1, Port#2 and Port#3), a CA reset group A (Port#0 and Port#1) and a CA reset group B (Port#2 and Port#3) are created after modification. The minimum number of ports per CA reset group is one port.
- CA reset groups are required for certain servers to switch clusters correctly.
- Ports with different CA types can be members of the same CA reset group.
- For more details on which servers are required to configure the CA reset group, refer to "Configuration Guide -Server Connection-" for each OS type.

For the factory default settings for this function, refer to .

The procedure to modify a reset group is as follows:

Procedure

1 Select the CA reset group to be modified, and click [Modify Reset Group] in [Action].

2 Modify the member ports in a CA reset group, and click the [Modify] button.
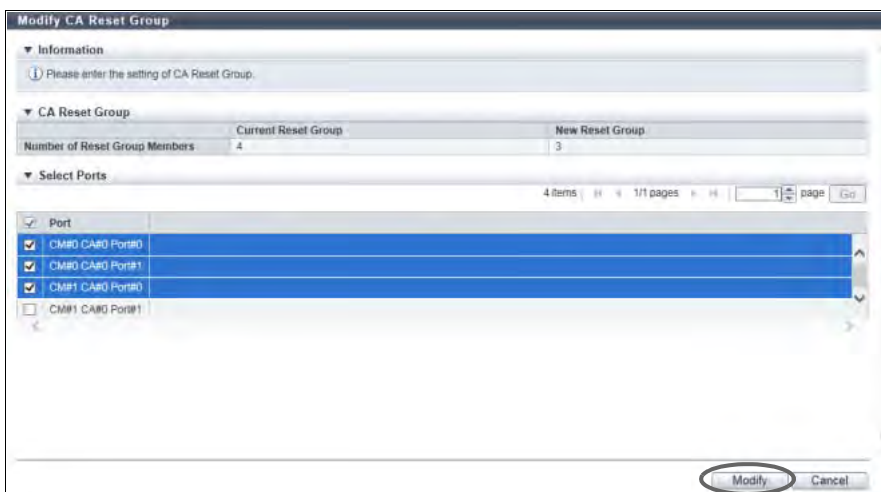
🔵 **N o t e**

Checkboxes of the member ports of the specified CA reset group are selected. Select the checkbox of the port to be added in the corresponding CA reset group. Clear the checkbox of the port to be deleted from the corresponding CA reset group.

▶ **Caution**

- One port cannot be registered in multiple CA reset groups. If a member port of another CA reset group has been selected, the member port is deleted from the existing CA reset group.
- If the selected "Port" does not exist, an error screen appears. If this occurs, check the parameter settings.

3 A confirmation screen appears. Click the [OK] button.
→ Modification of the CA reset group starts.

4 Click the [Done] button to return to the [CA Reset Group] screen.

End of procedure ▪

Host-LU QoS Management

This section describes Host-LU QoS management.

Host-LU QoS management provides the following functions:

- Enable/Disable QoS
- Initialize QoS
- Set Host-LU QoS
- Release Host-LU QoS
- Start Host-LU QoS Performance Monitoring
- Stop Host-LU QoS Performance Monitoring
- Set FC/FCoE Host QoS
- Set iSCSI Host QoS
- Set SAS Host QoS
- Set FC Port QoS
- Set iSCSI Port QoS
- Set SAS Port QoS
- Set FCoE Port QoS
- Add LU QoS Group
- Delete LU QoS Group
- Modify LU QoS Group
- Set Volume QoS

Enable/Disable QoS

This function enables or disables the QoS mode.

> 🔵 **N o t e**
>
> - If the QoS mode is changed from "Enable" to "Disable", the configured bandwidth limit is saved.
> - If the QoS mode is changed from "Disable" to "Enable", the QoS operates within the saved bandwidth limit.
> - If the bandwidth limit is not specified when the QoS mode is changed to "Enable", "Unlimited" is applied to all the bandwidth limit settings for hosts, ports, LUNs, and volumes (the setting value is not changed).

For the factory default settings for this function, refer to "B. QoS" (page 1279).

■ Enabling QoS mode

The procedure to enable the QoS mode is as follows:

> **Procedure**

1 Click [Enable QoS] in [Action].

> ▶ **Caution**
>
> If the QoS mode has already been enabled, [Enable QoS] cannot be clicked.

2 A confirmation screen appears. Click the [OK] button.
→ Enabling of QoS starts.

3   Click the [Done] button to return to the [Host-LU QoS] screen.

<div align="right">End of procedure ▐</div>

■ Disabling QoS mode

The procedure to disable the QoS mode is as follows:

Procedure

1   Click [Disable QoS] in [Action].

> ▷ **Caution**
>
> If the QoS mode has already been disabled, [Disable QoS] cannot be clicked.

2   A confirmation screen appears. Click the [OK] button.
→   Disabling of QoS starts.

3   Click the [Done] button to return to the [Host-LU QoS] screen.

<div align="right">End of procedure ▐</div>

Initialize QoS

This function initializes all the QoS settings (Example: Host-LU QoS and volume QoS).
This function changes the bandwidth limit for hosts, ports, and volumes to the default value ("Unlimited") and deletes all the LU QoS groups. Note that this function does not change the QoS mode (enable or disable) and the Host-LU QoS performance monitoring status (start or stop).

The procedure to initialize QoS settings is as follows:

Procedure

1   Click [Initialize QoS] in [Action].

2   A confirmation screen appears. Click the [OK] button.
→   The QoS initialization starts.

3   Click the [Done] button to return to the [Host-LU QoS] screen.

<div align="right">End of procedure ▐</div>

Set Host-LU QoS

This function assigns an LU QoS group to a "host - CA port - LUN group" on which the host affinity setting has been configured. A bandwidth limit (the maximum performance limit) is configured to each host LUN in an LU QoS group.

> ▷ **Caution**
>
> - This function can be used, irrespective of whether the QoS mode has been enabled or disabled. If the QoS mode has been disabled, the host starts the operation within the configured bandwidth limit after the QoS mode is enabled.
> - When assigning an LU QoS group to the "Host - CA Port - LUN Group", check the number of host LUNs and the current usage for the LUN group, and assign the appropriate LU QoS group.

> ⬤ **N o t e**
>
> - Before executing the [Set Host-LU QoS] function, configure a bandwidth limit on each host LUN. Refer to "Add LU QoS Group" (page 467) for details.
> - When checking the number of host LUNs and the bandwidth limit of each LUN in the LU QoS group, refer to "Modify LU QoS Group" (page 469).
> - Configure a bandwidth limit on each host. Refer to the following sections for details:
>   - "Set FC/FCoE Host QoS" (page 459)
>   - "Set iSCSI Host QoS" (page 460)
>   - "Set SAS Host QoS" (page 461)
> - Configure the CA port bandwidth limit on each CA port. Refer to the following sections for details:
>   - "Set FC Port QoS" (page 462)
>   - "Set iSCSI Port QoS" (page 464)
>   - "Set SAS Port QoS" (page 465)
>   - "Set FCoE Port QoS" (page 466)

For details on the parameters for this function, refer to "A. Set Host-LU QoS" (page 1162).

The procedure to set the Host-LU QoS is as follows:

Procedure

1   Select the "Host - CA Port - LUN Group" to set the Host-LU QoS (multiple selections can be made) and click [Set Host-LU QoS] in [Action].

2 Click the [Browse...] button in the "LUN Group: LUN QoS Group No." field.
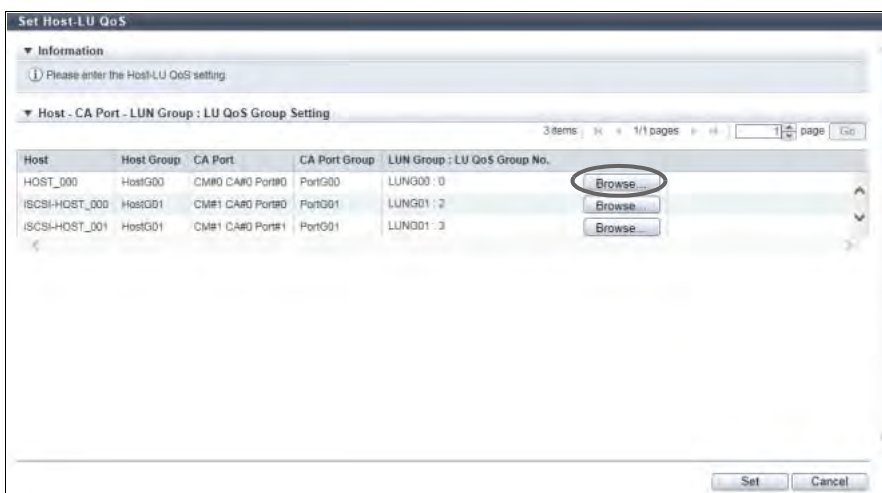
→ The [Select LU QoS Group] screen is displayed.

3 Select a LUN QoS group.
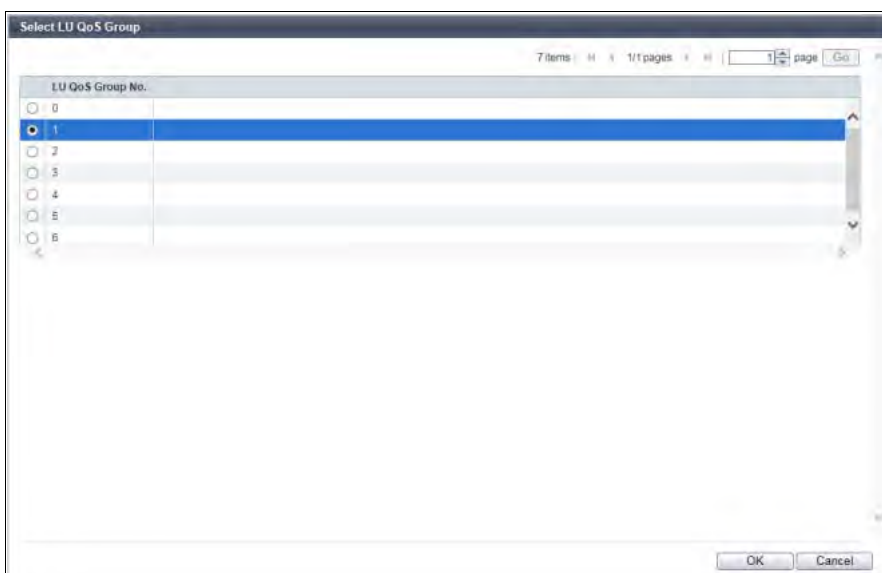
The main setting item is as follows.

● **Select LU QoS Group**

• Select LU QoS Group

4 Click the [OK] button.
→ The display returns to the initial screen.

5 After confirming the association between "Host", "CA Port", and "LUN Group : LU QoS Group No.", click the [Set] button.
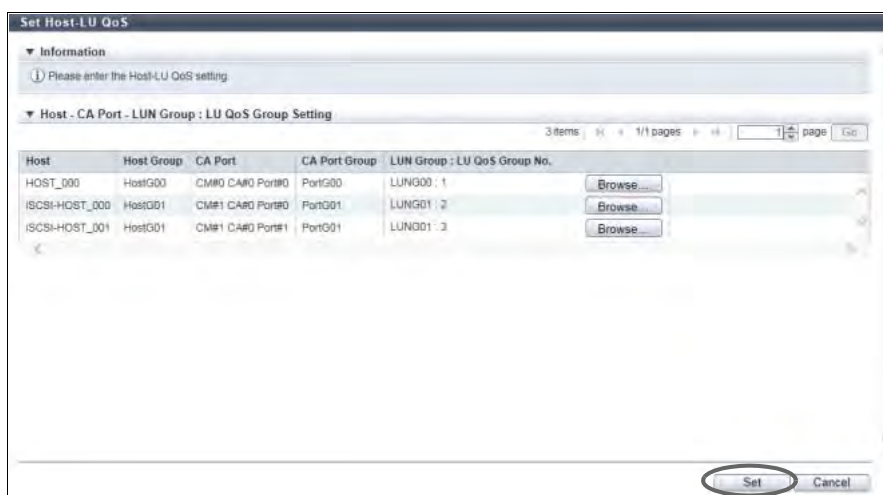
6 A confirmation screen appears. Click the [OK] button.
   → The Host-LU QoS setting starts.

7 Click the [Done] button to return to the [Host-LU QoS] screen.

End of procedure

Release Host-LU QoS

This function releases the LU QoS groups that are assigned to a "Host - CA Port - LUN Group" with host affinity settings.

● N o t e

If a "Host - CA Port - LUN Group" for which an LU QoS group is not assigned is selected, the [Release Host-LU QoS] function cannot be used.

The procedure to release Host-LU QoS is as follows:

Procedure

1 Select the "Host - CA Port - LUN Group" for which the Host-LU QoS is to be released (multiple selections can be made) and click [Release Host-LU QoS] in [Action].

2 A confirmation screen appears. Click the [OK] button.
   → Releasing of the Host-LU QoS starts.

3 Click the [Done] button to return to the [Host-LU QoS] screen.

End of procedure

Start Host-LU QoS Performance Monitoring

This function starts performance monitoring of Host-LU QoS.

Target ports for monitoring performance

- When this function is selected in the [Host-LU QoS] screen, performance monitoring of Host-LU QoS is started for the following ports:
    - All FC, iSCSI, SAS, and FCoE ports that are installed in the ETERNUS DX/AF
    - Ports which port mode are "CA" or "CA/RA"
    - Ports without "   Undefined" state or "   Undefined (Error)" state
- When this function is selected in each [Port QoS] screen for FC, iSCSI, SAS, or FCoE, performance monitoring of Host-LU QoS is started for the following ports:
    - Ports that are selected in the [Port QoS] screen for each host interface (multiple selections can be made)

> **Caution**

When this function is started after port selection, ports with different host interfaces cannot be selected at the same time.

N o t e

Performance monitoring can be started even if other performance information is being obtained. If performance monitoring is restarted, the performance information that is already obtained is deleted and the collection of performance starts again. The start time is changed to the last time when performance monitoring was restarted.

The procedure to start the Host-LU QoS performance monitoring is as follows:

■ When this function is selected in the [Host-LU QoS] screen

Procedure

1   Click [Start Perfmon] in [Action].

2   A confirmation screen appears. Click the [OK] button.
     → Acquisition of Host-LU QoS performance information starts.

3   Click the [Done] button to return to the [Host-LU QoS] screen.

End of procedure

■ When this function is selected in the [Port QoS] screen for each host interface

Procedure

1   Select the port to start the Host-LU QoS performance monitoring for (multiple selections can be made) and click [Start Perfmon] in [Action].

2   A confirmation screen appears. Click the [OK] button.
     → Acquisition of Host-LU QoS performance information starts.

3 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

Stop Host-LU QoS Performance Monitoring

This function stops performance monitoring of Host-LU QoS.

▷ **Caution**

When this function is started after port selection, ports with different host interfaces cannot be selected at the same time.

The procedure to stop the Host-LU QoS performance monitoring is as follows:

■ When this function is selected in the [Host-LU QoS] screen

Procedure

1 Click [Stop Perfmon] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ Acquisition of Host-LU QoS performance information stops.

3 Click the [Done] button to return to the [Host-LU QoS] screen.

End of procedure

■ When this function is selected in the [Port QoS] screen for each host interface

Procedure

1 Select the port to stop the Host-LU QoS performance monitoring for (multiple selections can be made) and click [Stop Perfmon] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ Acquisition of Host-LU QoS performance information stops.

3 Click the [Done] button to return to the screen when starting this function in Step 1.

End of procedure

Set FC/FCoE Host QoS

This function configures the bandwidth limit (the maximum performance limit) of the FC/FCoE host.

▷ **Caution**

This function can be used, irrespective of whether the QoS mode has been enabled or disabled. If the QoS mode has been disabled, the host starts the operation within the configured bandwidth limit after the QoS mode is enabled.

◉ **N o t e**

- Configure the port bandwidth limit on each port. Refer to the following sections for details:
  - "Set FC Port QoS" (page 462)
  - "Set iSCSI Port QoS" (page 464)
  - "Set SAS Port QoS" (page 465)
  - "Set FCoE Port QoS" (page 466)
- The LUN bandwidth limit can be configured in the LU QoS group. Refer to "Set Host-LU QoS" (page 454) for details.

For details on the parameters for this function, refer to "A. Set FC/FCoE Host QoS" (page 1162).
For the factory default settings for this function, refer to "B. Set FC/FCoE Host QoS" (page 1279).

The procedure to set the FC/FCoE host QoS is as follows:

Procedure

1 Select the FC/FCoE host to set the bandwidth limit (multiple selections can be made), and click [Set FC/FCoE Host QoS] in [Action].

2 Select the FC/FCoE host bandwidth limit.
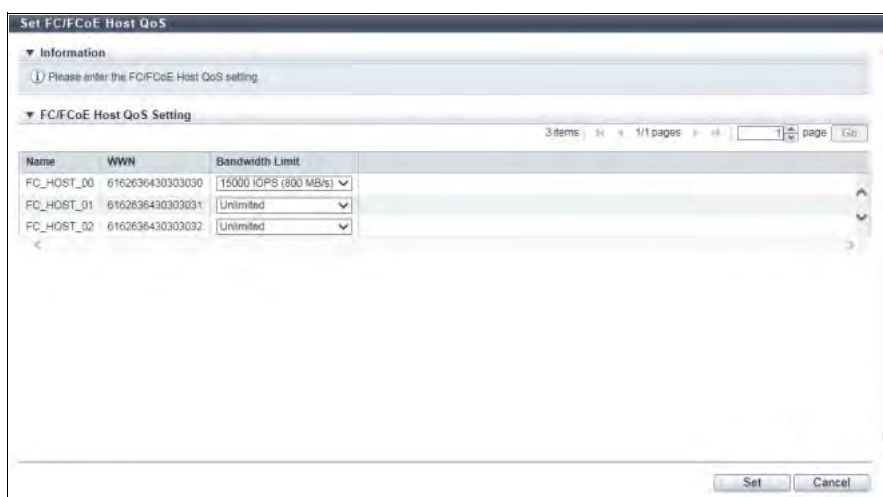
The main setting item is as follows.

● **FC/FCoE Host QoS Setting**

- Bandwidth Limit

3 Click the [Set] button.

4   A confirmation screen appears. Click the [OK] button.
→   The FC/FCoE host QoS setting starts.

5   Click the [Done] button to return to the [FC/FCoE Host QoS] screen.

<div align="right">

End of procedure

</div>

Set iSCSI Host QoS

This function configures the bandwidth limit (the maximum performance limit) of the iSCSI host.

▷ **Caution**

This function can be used, irrespective of whether the QoS mode has been enabled or disabled. If the QoS mode has been disabled, the host starts the operation within the configured bandwidth limit after the QoS mode is enabled.

🔵 **N o t e**

- Configure the port bandwidth limit on each port. Refer to the following sections for details:
  - "Set FC Port QoS" (page 462)
  - "Set iSCSI Port QoS" (page 464)
  - "Set SAS Port QoS" (page 465)
  - "Set FCoE Port QoS" (page 466)
- The LUN bandwidth limit can be configured in the LU QoS group. Refer to "Set Host-LU QoS" (page 454) for details.

For details on the parameters for this function, refer to "A. Set iSCSI Host QoS" (page 1163).
For the factory default settings for this function, refer to "B. Set iSCSI Host QoS" (page 1279).

The procedure to set the iSCSI host QoS is as follows:

Procedure

1   Select the iSCSI host to set the bandwidth limit (multiple selections can be made), and click [Set iSCSI Host QoS] in [Action].

2   Select the iSCSI host bandwidth limit.
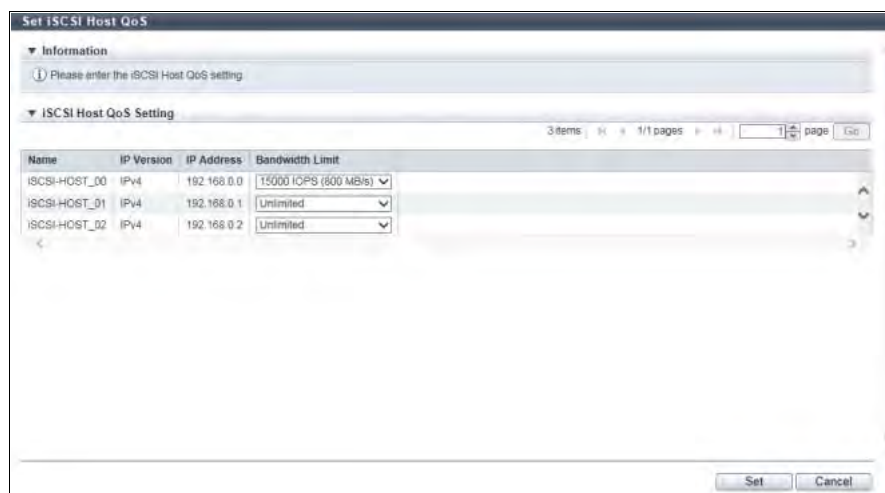
The main setting item is as follows.

● **iSCSI Host QoS Setting**

  • Bandwidth Limit

3   Click the [Set] button.

4   A confirmation screen appears. Click the [OK] button.
      → The iSCSI host QoS setting starts.

5   Click the [Done] button to return to the [iSCSI Host QoS] screen.

<div align="right">End of procedure ▌</div>

Set SAS Host QoS

This function configures the bandwidth limit (the maximum performance limit) of the SAS host.

▷ **Caution**

This function can be used, irrespective of whether the QoS mode has been enabled or disabled. If the QoS mode has been disabled, the host starts the operation within the configured bandwidth limit after the QoS mode is enabled.

◯ **N o t e**

• Configure the port bandwidth limit on each port. Refer to the following sections for details:
    - "Set FC Port QoS" (page 462)
    - "Set iSCSI Port QoS" (page 464)
    - "Set SAS Port QoS" (page 465)
    - "Set FCoE Port QoS" (page 466)
• The LUN bandwidth limit can be configured in the LU QoS group. Refer to "Set Host-LU QoS" (page 454) for details.

For details on the parameters for this function, refer to "A. Set SAS Host QoS" (page 1163).
For the factory default settings for this function, refer to "B. Set SAS Host QoS" (page 1280).

The procedure to set the SAS host QoS is as follows:

▌ **Procedure**

1   Select the SAS host to configure a bandwidth limit (multiple selections can be made), and click [Set SAS Host QoS] in [Action].

2 Select the SAS host bandwidth limit.

The main setting item is as follows.

● **SAS Host QoS Setting**

• Bandwidth Limit

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
→ The SAS host QoS setting starts.

5 Click the [Done] button to return to the [SAS Host QoS] screen.

End of procedure

Set FC Port QoS

This function specifies the bandwidth limit (maximum performance limit) for the FC port.

▷ **Caution**

• The bandwidth limit can be configured only for the ports in the port mode of "CA" or "CA/RA". For ports of other port modes, the bandwidth limit cannot be configured.

• If the port mode has been changed from "CA" or "CA/RA" to other port modes, the bandwidth limit returns to the default value.

• This function can be used, irrespective of whether the QoS mode has been enabled or disabled. If the QoS mode has been disabled, the port starts the operation within the configured bandwidth limit after the QoS mode is enabled.

🔵 **N o t e**

• Configure the host bandwidth limit on each host. Refer to the following sections for details:
  - "Set FC/FCoE Host QoS" (page 459)
  - "Set iSCSI Host QoS" (page 460)
  - "Set SAS Host QoS" (page 461)
• The LUN bandwidth limit can be configured in the LU QoS group. Refer to "Set Host-LU QoS" (page 454) for details.

For details on the parameters for this function, refer to "A. Set FC Port QoS" (page 1164).
For the factory default settings for this function, refer to "B. Set FC Port QoS" (page 1280).

The procedure to set the FC port QoS is as follows:

Procedure

1   Select the FC port to set the bandwidth limit (multiple selections can be made), and click [Set FC Port QoS] in [Action].

2   Select the FC port bandwidth limit.
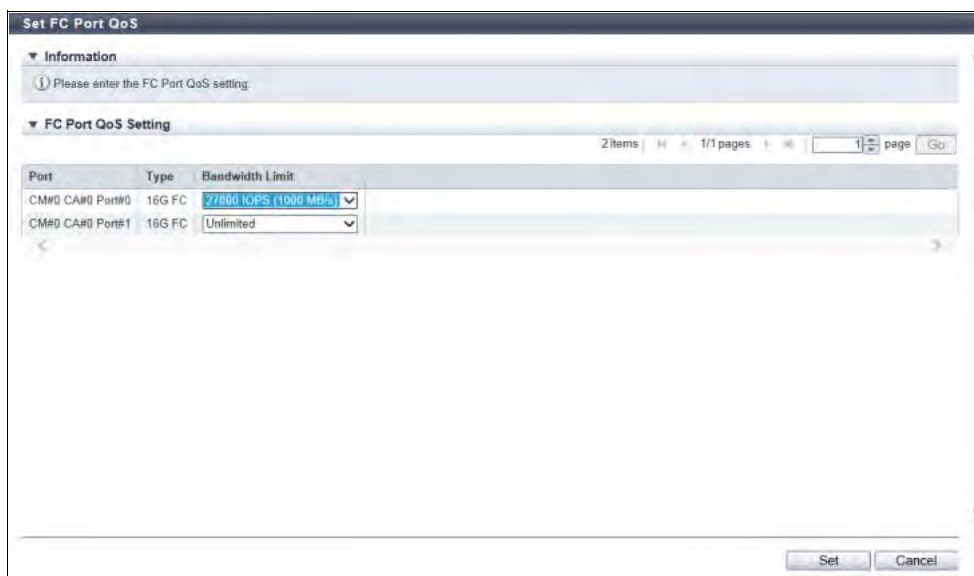
The main setting item is as follows.

● **FC Port QoS Setting**

  • Bandwidth Limit

3   Click the [Set] button.

4   A confirmation screen appears. Click the [OK] button.
       → The FC port QoS setting starts.

5   Click the [Done] button to return to the [FC Port QoS] screen.

End of procedure

Set iSCSI Port QoS

This function specifies the bandwidth limit (maximum performance limit) for the iSCSI port.

▷ **Caution**

- The bandwidth limit can be configured only for the ports in the port mode of "CA" or "CA/RA". For the ports in the port mode of "RA", the bandwidth limit cannot be specified.
- If the port mode has been changed from "CA" or "CA/RA" to "RA", the bandwidth limit returns to the default value.
- This function can be used, irrespective of whether the QoS mode has been enabled or disabled. If the QoS mode has been disabled, the port starts the operation within the configured bandwidth limit after the QoS mode is enabled.

🔵 **N o t e**

- Configure the host bandwidth limit on each host. Refer to the following sections for details:
    - "Set FC/FCoE Host QoS" (page 459)
    - "Set iSCSI Host QoS" (page 460)
    - "Set SAS Host QoS" (page 461)
- The LUN bandwidth limit can be configured in the LU QoS group. Refer to "Set Host-LU QoS" (page 454) for details.

For details on the parameters for this function, refer to "A. Set iSCSI Port QoS" (page 1164).
For the factory default settings for this function, refer to "B. Set iSCSI Port QoS" (page 1280).

The procedure to set the iSCSI port QoS is as follows:

Procedure

1   Select the iSCSI port to set the bandwidth limit (multiple selections can be made), and click [Set iSCSI Port QoS] in [Action].

2   Select the iSCSI port bandwidth limit.
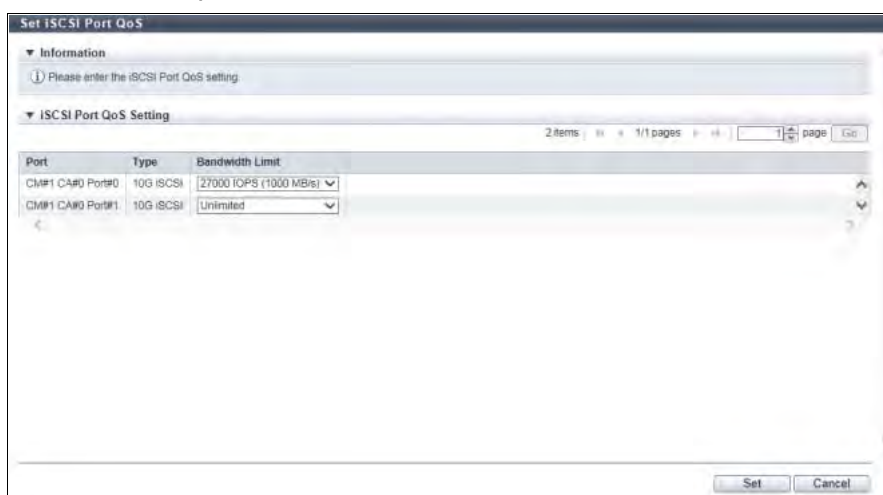
The main setting item is as follows.

● **iSCSI Port QoS Setting**

- Bandwidth Limit

3   Click the [Set] button.

4   A confirmation screen appears. Click the [OK] button.
→ The iSCSI port QoS setting starts.

5   Click the [Done] button to return to the [iSCSI Port QoS] screen.

End of procedure

Set SAS Port QoS

This function configures the bandwidth limit (the maximum performance limit) of the SAS port.

▷ **Caution**

This function can be used, irrespective of whether the QoS mode has been enabled or disabled. If the QoS mode has been disabled, the port starts the operation within the configured bandwidth limit after the QoS mode is enabled.

🔵 **N o t e**

- Configure the host bandwidth limit on each host. Refer to the following sections for details:
  - "Set FC/FCoE Host QoS" (page 459)
  - "Set iSCSI Host QoS" (page 460)
  - "Set SAS Host QoS" (page 461)
- The LUN bandwidth limit can be configured in the LU QoS group. Refer to "Set Host-LU QoS" (page 454) for details.

For details on the parameters for this function, refer to "A. Set SAS Port QoS" (page 1164).
For the factory default settings for this function, refer to "B. Set SAS Port QoS" (page 1280).

The procedure to set the SAS port QoS is as follows:

Procedure

1   Select the SAS port to configure the bandwidth limit (multiple selections can be made), and click [Set SAS Port QoS] in [Action].

2	Select the SAS port bandwidth limit.
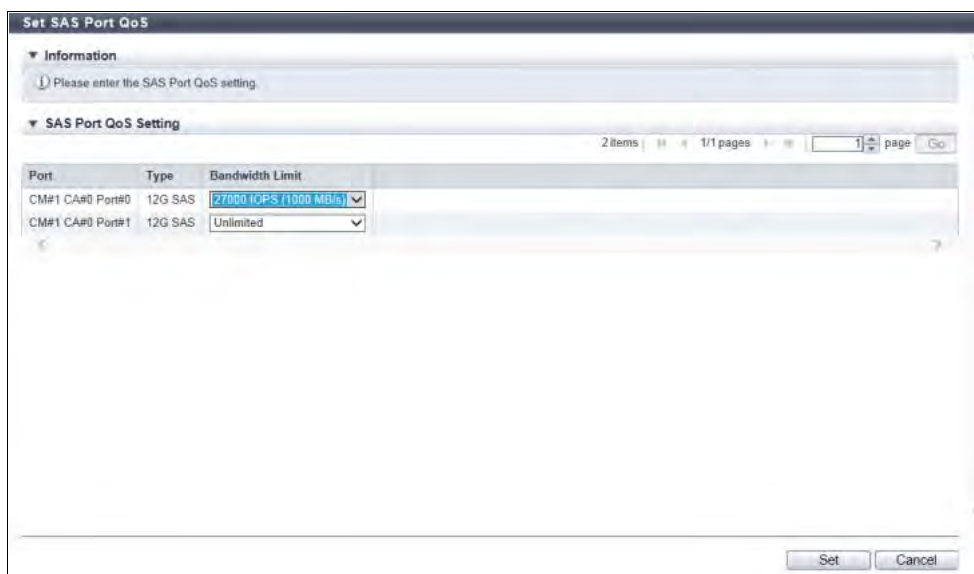
The main setting item is as follows.

● **SAS Port QoS Setting**

	• Bandwidth Limit

3	 Click the [Set] button.

4	A confirmation screen appears. Click the [OK] button.
	→ The SAS port QoS setting starts.

5	Click the [Done] button to return to the [SAS Port QoS] screen.

	End of procedure

Set FCoE Port QoS

This function specifies the bandwidth limit (maximum performance limit) for the FCoE port.

▷ **Caution**

This function can be used, irrespective of whether the QoS mode has been enabled or disabled. If the QoS mode has been disabled, the port starts the operation within the configured bandwidth limit after the QoS mode is enabled.

◯ **N o t e**

• Configure the host bandwidth limit on each host. Refer to the following sections for details:
	- "Set FC/FCoE Host QoS" (page 459)
	- "Set iSCSI Host QoS" (page 460)
	- "Set SAS Host QoS" (page 461)
• The LUN bandwidth limit can be configured in the LU QoS group. Refer to "Set Host-LU QoS" (page 454) for details.

For details on the parameters for this function, refer to "A. Set FCoE Port QoS" (page 1165).
For the factory default settings for this function, refer to "B. Set FCoE Port QoS" (page 1280).

The procedure to set the FCoE port QoS is as follows:

Procedure

1 Select the FCoE port to set the bandwidth limit (multiple selections can be made), and click [Set FCoE Port QoS] in [Action].

2 Select the FCoE port bandwidth limit.
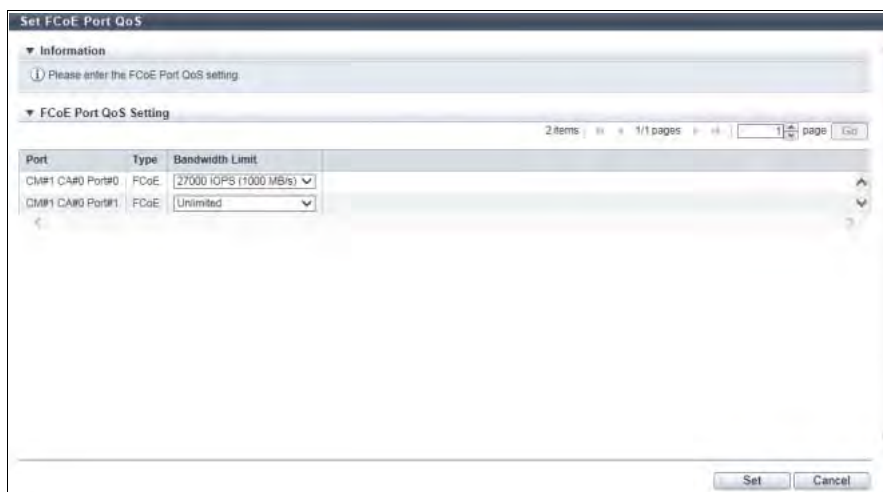
The main setting item is as follows.

● **FCoE Port QoS Setting**

• Bandwidth Limit

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
→ The FCoE port QoS setting starts.

5 Click the [Done] button to return to the [FCoE Port QoS] screen.

End of procedure

Add LU QoS Group

This function adds LU QoS groups with bandwidth limit (the maximum performance limit) settings to each host LUN.

▷ **Caution**

• Use one LU QoS group number per 512 Host LUNs as an internal resource. When there are LU QoS groups with a bandwidth limit other than "Unlimited" from Host LUN#512 onward, the maximum number of QoS groups cannot be created.
• Host-LU QoS does not support from LUN#1024 onward. Even if volumes are mapped from LUN#1024 onward, only up to 1024 LUNs (LUN#0 - LUN#1023) can be specified for the bandwidth limit.

> **◉ N o t e**
>
> Assigning an LU QoS group to a LUN group with Host Affinity set, the bandwidth limit can be configured for each LUN. Refer to "Set Host-LU QoS" (page 454) for details.

For details on the parameters for this function, refer to "A. Add LU QoS Group" (page 1165).
For the factory default settings for this function, refer to "B. Add LU QoS Group" (page 1280).

The procedure to set the bandwidth limit for host LUN is as follows:

Procedure

1   Click [Add LU QoS Group] in [Action].

2   Select a host LUN bandwidth limit.
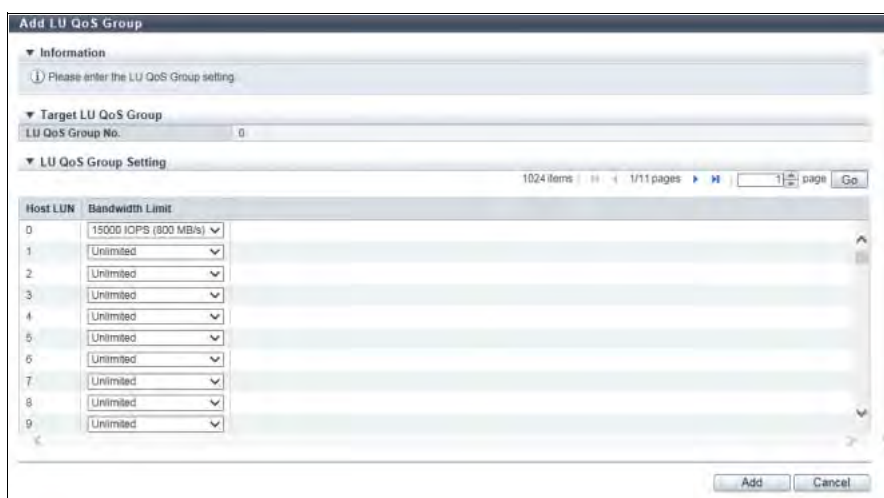
The main setting item is as follows.

● **LU QoS Group Setting**

    • Bandwidth Limit

3   Click the [Add] button.

4   A confirmation screen appears. Click the [OK] button.
       → Addition of LU QoS group starts.

5   Click the [Done] button to return to the [LU QoS Group] screen.

                                                              End of procedure

Delete LU QoS Group

This function deletes LU QoS groups.

> ▷ **Caution**
>
> An LU QoS group in the "Active" state cannot be deleted.

The procedure to delete LU QoS groups is as follows:

Procedure

1 Select the LU QoS group that is to be deleted (multiple selections can be made) and click [Delete LU QoS Group] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ Deletion of LU QoS group starts.

3 Click the [Done] button to return to the [LU QoS Group] screen.

End of procedure

Modify LU QoS Group

This function changes the bandwidth limit (the maximum performance limit) settings of each host LUN.

> ▷ **Caution**
>
> - Use one LU QoS group number per 512 Host LUNs as an internal resource. When there are LU QoS groups with a bandwidth limit other than "Unlimited" from Host LUN#512 onward, the maximum number of QoS groups cannot be created.
> - Host-LU QoS does not support from LUN#1024 onward. Even if volumes are mapped from LUN#1024 onward, only up to 1024 LUNs (LUN#0 - LUN#1023) can be specified for the bandwidth limit.

> ◯ **N o t e**
>
> Assigning an LU QoS group to a LUN group with Host Affinity set, the bandwidth limit can be configured for each LUN. Refer to "Set Host-LU QoS" (page 454) for details.

For details on the parameters for this function, refer to "A. Modify LU QoS Group" (page 1166).

The procedure to change the bandwidth limit for host LUN is as follows:

Procedure

1 Select the LU QoS group to modify the bandwidth limit, and click [Modify LU QoS Group] in [Action].

2 Select a host LUN bandwidth limit.
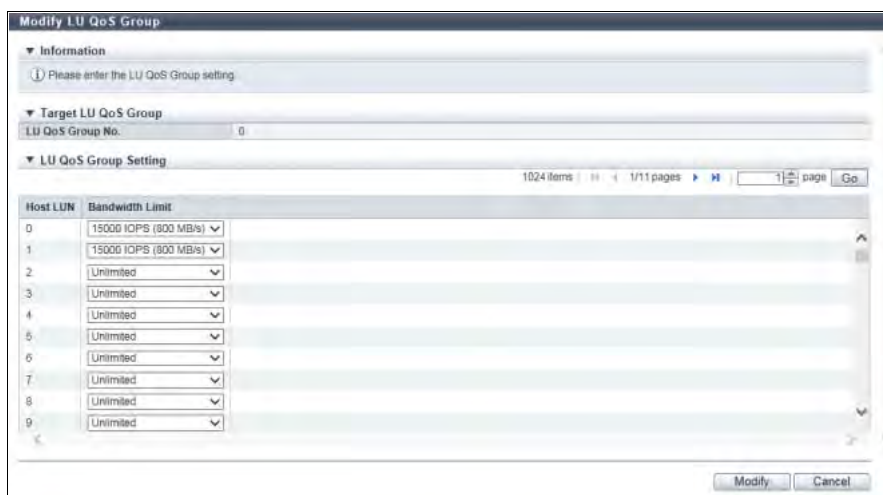
The main setting item is as follows.

● **LU QoS Group Setting**

  • Bandwidth Limit

3 Click the [Modify] button.

4 A confirmation screen appears. Click the [OK] button.
→ Modification of LU QoS group setting starts.

5 Click the [Done] button to return to the [LU QoS Group] screen.

End of procedure

NAS Management

This section describes NAS management.

NAS management provides the following functions:
- Create Shared Folder
- Delete Shared Folder
- Modify Shared Folder
- Clear NAS Data
- Create NAS Interface
- Delete NAS Interface
- Modify NAS Interface
- Change NAS Server Name
- Set DNS Server
- Set Authentication Server
- Add Local User
- Delete Local User
- Modify Local User
- Add Local Group
- Delete Local Group
- Add Quota Setting
- Delete Quota Setting
- Modify Quota Setting
- Initialize Meta Cache Distribution
- Enable Automatic Meta Cache Distribution
- Disable Automatic Meta Cache Distribution

Create Shared Folder

This function creates shared folders.
Specify the access protocols, hosts which are allowed or denied access, and CIFS access permissions to each shared folder.
This function also creates home directories.
This function is used in a Unified Storage environment.

Number of shared folders that can be registered

Protocol	Number of shared folders per ETERNUS DX (*1)
Windows CIFS	256
UNIX NFS	256
Total number of Windows CIFS and UNIX NFS	256

*1:　The maximum number of shared folders may be less in some operating environments.

> **▷ Caution**
>
> - The following settings must be performed before creating shared folders.
>   - Create the TPPs that are to be used in the Unified Storage environment. Refer to "Create Thin Provisioning Pool" (page 539) for details.
>   - Create NAS user volumes. Refer to "Create Volume" (page 246) for details.
> - Confirm that the authentication server setup is complete in advance. To set the authentication server, use the procedure in "Set Authentication Server" (page 487).
> - An error occurs when the total number of input characters exceeds the maximum (5120 characters). Confirm the used characters when this error occurs even if the total of input characters does not exceed the maximum. Note that a double quotation (0x22) and a single quotation (0x27) are regarded as being two characters.
> - If the shared folder creation has not been completed successfully, wait for the ETERNUS DX S4/S3 series status to return to normal and then try again.
> - If shared folders are created in the NAS user volume where a meta cache redistribution is being performed, the process for this function may be delayed for a maximum of two minutes.
> - The CIFS access permission is enabled from the next CIFS access session that is established after the permission is set.

> **◯ N o t e**
>
> - When a new shared folder is created, the following setup items are automatically specified for the created shared folder.
>   - "Yes (Writable)" is specified for "Writable"
>   - "Disable (Not use)" is specified for "Oplocks"
>   Note that the "Writable" and the "Oplocks" settings can be changed. Refer to "Modify Shared Folder" (page 477) for details.
> - "Home directory" is created for each user and is used as a dedicated folder that can be used freely by the user. Home directories can be used by users that are authenticated by the Active Directory authentication server or the local user authentication. Users use the home directory with a CIFS connection.

For details on the parameters for this function, refer to "A. Create Shared Folder" (page 1166).
For the factory default settings for this function, refer to "B. Create Shared Folder" (page 1280).

The procedure to create shared folders as follows:

■ When "CIFS" or "CIFS/NFS" is selected as the protocol

> **Procedure**

1 Click [Create Shared Folder] in [Action].

2   Specify parameters.

■ When "File Sharing" is selected for "Usage"

■ When "Home Directory" is selected for "Usage"

The main setting items are as follows.

● **Shared Folder Settings**

• Usage
• Shared Folder Name
• Protocol
• Owner
• Group
• SMB Encryption of Data Access
• Access Based Enumeration
• CIFS Allowed Hosts
• CIFS Denied Hosts
• NFS Allowed Hosts

● **CIFS Permissions**

• Checkbox to permit CIFS access

● **Select Volume**

• Radio button to select a volume

> ⬤ **N o t e**
>
> "CIFS Permissions" is displayed when "File Sharing" is selected for "Usage".

3 When adding a CIFS access permission, click the [Add] button in the "CIFS Permissions" field.

> ⊳ **Caution**
>
> If no CIFS access permissions are added, proceed to .

→ The [Add CIFS Permission] screen appears.

4 Enter each item of the CIFS access permissions.

The main setting items are as follows.

⬤ **Add CIFS Permission**

- Type
- Name
- Authority

> ⬤ **N o t e**
>
> To change CIFS access permissions, delete the relevant "CIFS Permissions" and then add it again using this function.

5 Click the [OK] button.
   → The display returns to the initial screen.

6 After confirming the settings, click the [Create] button.
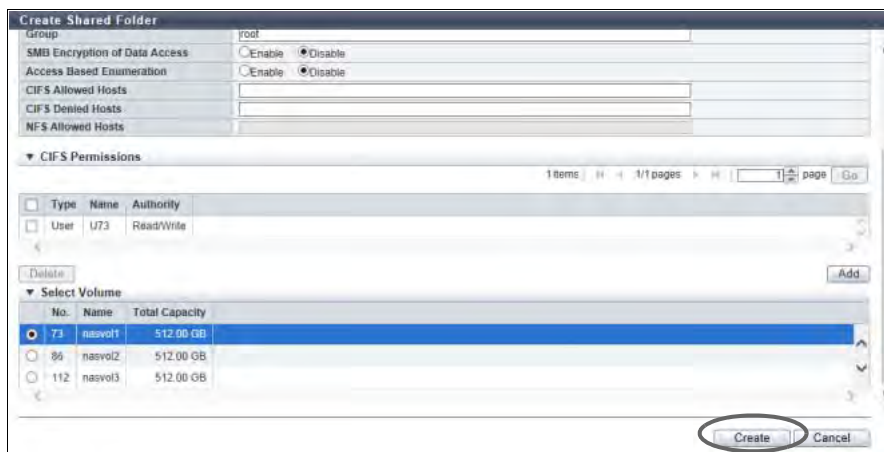
7 A confirmation screen appears. Click the [OK] button.
→ Shared folder creation starts.

8 Click the [Done] button to return to the [NAS] screen.

End of procedure

■ **When "NFS" is selected as the protocol**

Procedure

1 Click [Create Shared Folder] in [Action].

2 Specify parameters.
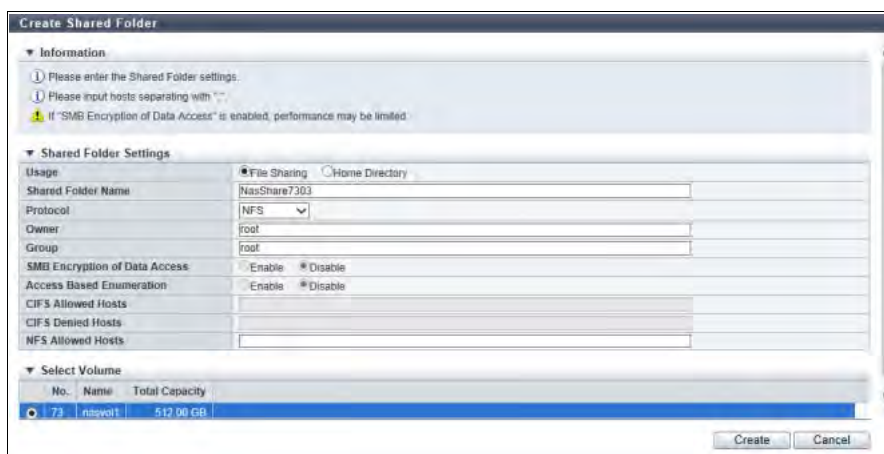
The main setting items are as follows.

● **Shared Folder Settings**

• Shared Folder Name
• Protocol
• Owner
• Group
• SMB Encryption of Data Access

- Access Based Enumeration
- NFS Allowed Hosts

● **Select Volume**

- Radio button to select a volume

3 Click the [Create] button.

4 A confirmation screen appears. Click the [OK] button.
→ Shared folder creation starts.

5 Click the [Done] button to return to the [NAS] screen.

End of procedure

Delete Shared Folder

This function deletes shared folders.
This function can also delete home directories.
This function is used in a Unified Storage environment.

▷ **Caution**

- Before deleting the shared folders, all user data and directories in the relevant shared folder must be deleted in advance. Shared folders cannot be deleted if user data or directories exist. Refer to "Clear NAS Data" (page 481) to forcibly delete user data and directories.
- Shared folders cannot be deleted if they are connected from a client via CIFS (or if client sessions exist).
- When deleting shared folders, quota setting information assigned to that shared folder are also deleted at the same time.
- If shared folders are deleted from the NAS user volume where a meta cache redistribution is being performed, the process for this function may be delayed for a maximum of two minutes.

The procedure to delete shared folders is as follows:

Procedure

1 Select the shared folder that is to be deleted (multiple selections can be made) and click [Delete Shared Folder] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ Deletion of shared folder starts.

3 Click the [Done] button to return to the [NAS] screen.

End of procedure

Modify Shared Folder

This function changes the shared folder settings.
Set the write privileges, Oplocks, hosts which are allowed or denied access, and CIFS access permissions to each shared folder.
This function can also change the home directory settings.
This function is used in a Unified Storage environment.

▷ **Caution**

- An error occurs when the total number of input characters exceeds the maximum (5120 characters). Confirm the used characters when this error occurs even if the total of input characters does not exceed the maximum. Note that a double quotation (0x22) and a single quotation (0x27) are regarded as being two characters.
- If the shared folder modification has not been completed successfully, wait for the ETERNUS DX S4/S3 series status to return to normal and then try again.
- If the settings for shared folders in the NAS user volume where a meta cache redistribution is being performed are changed, the process for this function may be delayed for a maximum of two minutes.
- The CIFS access permission is enabled from the next CIFS access session that is established after the permission is set. Note that if the CIFS access session is established before the CIFS access permission is set, the session operates with authority when this function is started.

For details on the parameters for this function, refer to .

The procedure to change the shared folder settings is as follows:

■ **When the protocol of the shared folder that is to be modified is "CIFS" or "CIFS/NFS"**

Procedure

1   Select the shared folder that is to be changed and click [Modify Shared Folder] in [Action].

2   Change the parameters.

■ When "File Sharing" is selected for "Usage"

■ When "Home Directory" is selected for "Usage"

The main setting items are as follows.

● **Shared Folder Settings**

- Writable
- Oplocks
- Owner
- Group
- SMB Encryption of Data Access
- Access Based Enumeration
- CIFS Allowed Hosts
- CIFS Denied Hosts
- NFS Allowed Hosts

● **CIFS Permissions**

- Checkbox to permit CIFS access

▶ **Caution**

If this function is used, all the existing "CIFS Permissions" settings are overwritten. Do not delete the "CIFS Permissions" settings that are to be used.

● **N o t e**

- When deleting a CIFS access permission, select "CIFS Permissions" that is to be deleted and click the [Delete] button. Proceed to Step 6.
- If no CIFS access permissions are changed, proceed to Step 6.
- "CIFS Permissions" is displayed when "Usage" is "File Sharing".

3 When adding a CIFS access permission, click the [Add] button in the "CIFS Permissions" field.

▶ **Caution**

If no CIFS access permissions are added, proceed to Step 6.

→ The [Add CIFS Permission] screen appears.
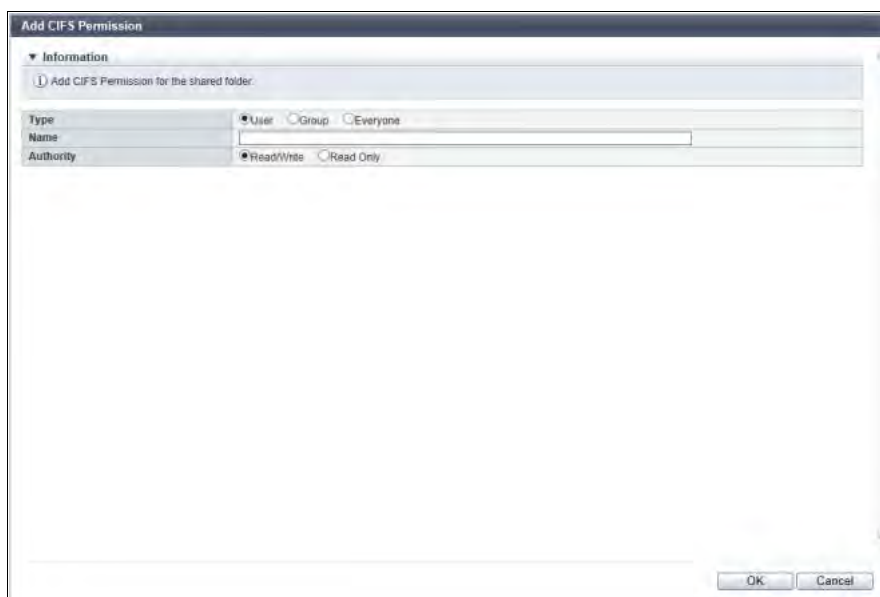
4 Enter each item of the CIFS access permissions.

The main setting items are as follows.

● **Add CIFS Permission**

- Type
- Name
- Authority

○ **N o t e**

To change CIFS access permissions, delete the relevant "CIFS Permissions" and then add it again using this function.

5 Click the [OK] button.
   → The display returns to the initial screen.

6 After confirming the settings, click the [Modify] button.

7 A confirmation screen appears. Click the [OK] button.
   → Modification of shared folder setting starts.

8 Click the [Done] button to return to the [NAS] screen.

End of procedure

■ **When the protocol of the shared folder that is to be modified is "NFS"**

Procedure

1 Select the shared folder that is to be changed and click [Modify Shared Folder] in [Action].

2 Change the parameters.

The main setting items are as follows.

● **Shared Folder Settings**

  • Writable
  • Oplocks
  • Owner
  • Group
  • SMB Encryption of Data Access
  • Access Based Enumeration
  • NFS Allowed Hosts

3 Click the [Modify] button.

4 A confirmation screen appears. Click the [OK] button.
  → Modification of shared folder setting starts.

5 Click the [Done] button to return to the [NAS] screen.

End of procedure

Clear NAS Data

This function deletes all user data and directories in the shared folder.
This function can also delete user data in the home directory.
This function is used in a Unified Storage environment.

> 🔵 **N o t e**
>
> • If shared folders cannot be deleted, use this function to delete NAS data in the shared folders (including home directories).
> • Use the [NAS] screen to check whether the NAS data is being deleted. Refer to "NAS" (page 863) for details.

The procedure to clear NAS data is as follows:

Procedure

1   Select the shared folder where the NAS data to be deleted exists (multiple selections can be made) and click [Clear NAS Data] in [Action].

2   A confirmation screen appears. Click the [OK] button.
→ Deletion of the NAS data starts.

3   Click the [Done] button to return to the [NAS] screen.

End of procedure

Create NAS Interface

This function creates NAS interfaces. Up to 160 NAS interfaces can be created.
This function is used in a Unified Storage environment.

> ▷ **Caution**
>
> If the NAS interface creation has not been completed successfully, wait for the ETERNUS DX S4/S3 series status to return to normal and then try again.

> 🔵 **N o t e**
>
> To use the Active-Active connection, specify different IP addresses on the same subnetwork for the ports of each CM that will be duplicated.

For details on the parameters for this function, refer to "A. Create NAS Interface" (page 1174).
For the factory default settings for this function, refer to "B. Create NAS Interface" (page 1281).

The procedure to create a NAS interface is as follows:

Procedure

1   Click [Create] in [Action].

2 Specify parameters for the NAS interface.

The main setting items are as follows.

● **NAS Interface Settings**

- Port
- RIP Setting
- Redundant Port
- IP Address
- Subnet Mask
- Gateway
- IPv6 Link Local Address
- IPv6 Connect IP Address
- IPv6 Gateway
- IPv6 Prefix length

▷ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
- The IP address and the network address are the same
- The IP address and the broadcast address are the same
- The gateway is set and the gateway and the network address are the same
- The gateway is set and the gateway and the broadcast address are the same

3 Click the [Create] button.

4 A confirmation screen appears. Click the [OK] button.
→ The NAS interface creation starts.

5 Click the [Done] button to return to the [NAS Interface] screen.

End of procedure

Delete NAS Interface

This function deletes the NAS interfaces.
This function is used in a Unified Storage environment.

▷ **Caution**

If a NAS interface is deleted, the multipath settings of the relevant ports are released.

The procedure to delete NAS interfaces is as follows:

Procedure

1   Select the NAS interface that is to be deleted (multiple selections can be made) and click [Delete] in [Action].

2   A confirmation screen appears. Click the [OK] button.
→ Deletion of NAS interface starts.

3   Click the [Done] button to return to the [NAS Interface] screen.

End of procedure

Modify NAS Interface

This function changes the NAS interface settings.
This function is used in a Unified Storage environment.

▷ **Caution**

If the NAS interface modification has not been completed successfully, wait for the ETERNUS DX S4/S3 series status to return to normal and then try again.

⬤ **N o t e**

To use the Active-Active connection, specify different IP addresses on the same subnetwork for the ports of each CM that will be duplicated.

For details on the parameters for this function, refer to <u>"A. Modify NAS Interface" (page 1176)</u>.

The procedure to modify the NAS interface settings is as follows:

Procedure

1   Select the NAS interface that is to be changed, and click [Modify] in [Action].

2 Change the parameters.

The main setting items are as follows.

● **NAS Interface Settings**

- RIP Setting
- Redundant Port
- IP Address
- Subnet Mask
- Gateway
- IPv6 Link Local Address
- IPv6 Connect IP Address
- IPv6 Gateway
- IPv6 Prefix length

▶ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
- The IP address and the network address are the same
- The IP address and the broadcast address are the same
- The gateway is set and the gateway and the network address are the same
- The gateway is set and the gateway and the broadcast address are the same

3 Click the [Modify] button.

4 A confirmation screen appears. Click the [OK] button.
→ Changing of NAS interface settings starts.

5 Click the [Done] button to return to the [NAS Interface] screen.

End of procedure

Change NAS Server Name

This function changes the server name (host name) for the ETERNUS DX S4/S3 series that is used for the NAS system.
This function is used in a Unified Storage environment.

> ▷ **Caution**
>
> - When performing Active Directory authentication, the ETERNUS DX S4/S3 series' NAS Engine uses the NAS server name as the NetBIOS name. If the NAS server name is changed, the Active Directory authentication server must be reconfigured.
> - If the Active Directory authentication server has already been registered before changing the NAS server name, perform the following operations.
>
>   (1) Delete the setup information for the Active Directory authentication server before starting this function.
>
>   (2) Execute this function to change the NAS server name and then register the Active Directory authentication server again.
>   Refer to "Set Authentication Server" (page 487) for procedures on how to delete and re-register the Active Directory authentication server setup information.

> ⬤ **N o t e**
>
> - As a factory default NAS server name, "DXyyyyyyyyyy" ("DX" is fixed and "yyyyyyyyyy" indicates the serial number of the ETERNUS DX S4/S3 series) is specified for the ETERNUS DX S4/S3 series.
> - To revert back to the default NAS server name, clear the "Name" field and click the [Change] button.
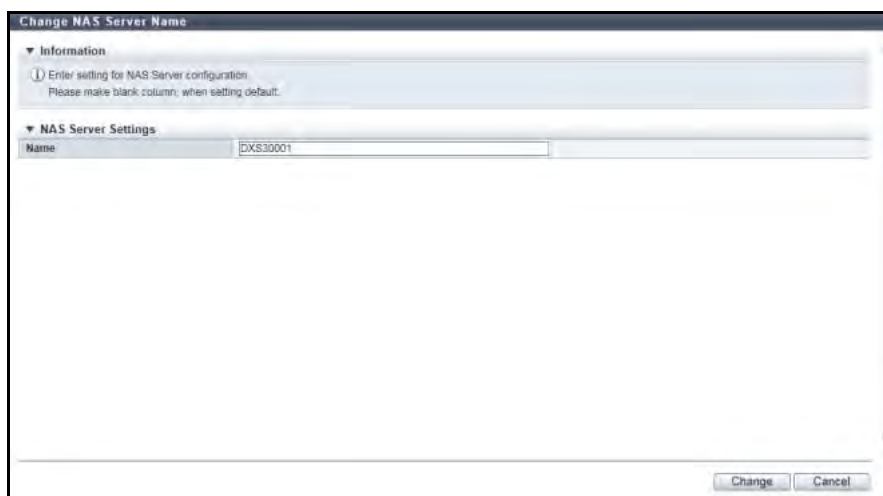
For details on the parameters for this function, refer to "A. Change NAS Server Name" (page 1176).
For the factory default settings for this function, refer to "B. Change NAS Server Name" (page 1281).

The procedure to change the server name that is used for the NAS system is as follows:

Procedure

1 Click [Change NAS Server Name] in [Action].

2 Enter the name.

The main setting item is as follows.

● **NAS Server Settings**

  • Name

3   Click the [Change] button.

4   A confirmation screen appears. Click the [OK] button.
      → Changing of the NAS server name starts.

5   Click the [Done] button to return to the [Environment Settings] screen.

End of procedure

Set DNS Server

This function sets the DNS server that is used for the NAS system.
This function is used in a Unified Storage environment.

▷ **Caution**

The DNS server settings must be performed before configuring the authentication server.

◯ **N o t e**

To delete the DNS server settings, clear the setting fields and complete the setup.

For details on the parameters for this function, refer to "A. Set DNS Server" (page 1176).

The procedure to set the DNS server that is used for the NAS system is as follows:

Procedure

1   Click [Set DNS Server] in [Action].

2   Specify parameters.

The main setting items are as follows.

● **DNS Server Settings**

- Primary IP Address
- Secondary IP Address
- IPv6 Primary IP Address
- IPv6 Secondary IP Address

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
→ DNS server setting starts.

5 Click the [Done] button to return to the [Environment Settings] screen.

End of procedure

Set Authentication Server

This function sets the Active Directory authentication server and the LDAP authentication server that are used for the NAS function.
By setting the Active Directory authentication server, access to the directories and files for users can be managed with the CIFS protocol.
By setting the LDAP authentication server, access to the directories and files for users can be managed with the NFS protocol.
This function is used in a Unified Storage environment.

▷ **Caution**

- The NAS interface settings must be performed before configuring the authentication server. Refer to "Create NAS Interface" (page 481) for details.
- Make sure to access the authentication server from both CMs (CM#0 and CM#1) to enable communications in advance.
  "Enable communication" indicates that both CMs satisfy all of the following conditions.
  - An IP address is assigned to at least one port (*1)
  - Communication between the port assigned with an IP address and the authentication server is enabled (the port is in a Link up status) (*2)
  *1: Refer to "Create NAS Interface" (page 481) for details.
  *2: To check the link status, refer to "Port Detail" (page 757).
- To set a new authentication server, the following information must also be specified; the domain name, the domain administrator, and one or more servers among the three authentication servers.
- Specify the authentication server with an IP address or an FQDN. To specify an authentication server with an FQDN, a DNS server for name resolution is required. The DNS server settings must be performed in advance. Refer to "Set DNS Server" (page 486) for details. Note that the DNS server must be set up to use the Active Directory authentication server.
- To use the Active Directory authentication server, time synchronization is required between the ETERNUS DX S4/S3 series and the Active Directory authentication server. Using NTP for automatic time correction is recommended. Refer to "Modify Date and Time" (page 61) for details.
- If the authentication server setup has not been completed successfully, wait for the system status to return to normal and then try again.
- This function cannot be executed if the local user authentication is used. Delete all the local users and local groups before using this function. However, there is no need to delete the BUILTIN groups (or "BUILTIN_Administrators", "BUILTIN_Users", and "BUILTIN_BackupOperators").

> **◯ N o t e**
>
> • To use the CIFS protocol, set the Active Directory authentication server.
> • To use the NFS protocol, set the LDAP authentication server.
> • To use both the CIFS protocol and the NFS protocol, refer to "Configuration Guide (NAS)" for details.
> • To delete the Active Directory authentication settings, clear all of the setting fields and complete the setup.
> • To delete the LDAP authentication settings, clear all of the setting fields and complete the setup.

For details on the parameters for this function, refer to <u>"A. Set Authentication Server" (page 1177)</u>.

The procedure to set an authentication server is as follows:

Procedure

1 Click [Set Authentication Server] in [Action].

2 Specify parameters.

The main setting items are as follows.

● **Active Directory Authentication Settings, LDAP Authentication Settings**

• Domain Name
• Domain Administrator
• Change Password
• Domain Administrator's Password
• Confirm Password
• Authentication Server (1) – (3)

> **▷ Caution**
>
> If the authentication server information cannot be obtained, an error screen appears. Check the parameter settings.

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
→ Authentication server setting starts.

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5 Click the [Done] button to return to the [Environment Settings] screen.

<div align="right">

End of procedure

</div>

Add Local User

This function adds local users that are used for the local user authentication.
For added local users, CIFS access, NFS access, and FTP access to the shared folders are available on a per user basis.
Up to 100 local users can be added in the ETERNUS DX.
This function is used in a Unified Storage environment.

> ▷ **Caution**
>
> - This function cannot be executed if an Active Directory authentication server or an LDAP authentication server is used. Remove all the authentication servers before using this function.
> - This function cannot be executed if the port for changing the local user authentication password is in the open state.
>   Use the "set nas-port" ETERNUS CLI command to open and close the port for changing the local user authentication password. Use the "show nas-port" ETERNUS CLI command to check the port status. Refer to "ETERNUS CLI User's Guide" for details about each command.

> ⬤ **N o t e**
>
> - If the controller firmware version is V10L51 or earlier and the authentication servers are not being used, all users share the fixed user account. In this case, the local user "shareuser$" is automatically created when the existing controller firmware version is updated to V10L53 or later. The local user "shareuser$" can be deleted or created again with ETERNUS Web GUI or ETERNUS CLI in the same way as local users that are added with ETERNUS Web GUI.
> - Local users can be deleted. Refer to "Delete Local User" (page 491) for details.
> - The password for a local user and the groups (primary and secondary groups) to which the local user belongs can be changed. Refer to "Modify Local User" (page 491) for details.
> - Create local groups to which local users belong. Refer to "Add Local Group" (page 493) for details.

For details on the parameters for this function, refer to "A. Add Local User" (page 1179).
For the factory default settings for this function, refer to "B. Add Local User" (page 1281).

The procedure to add a local user is as follows:

Procedure

1 Click [Add Local User] in [Action].

2 Specify parameters.

The main setting items are as follows.

● **Local User Settings**

- Name
- User ID
- Password
- Confirm Password

● **Member group selection ([Primary Group] tab)**

- Radio button to select a primary group

● **Member group selection ([Secondary Group] tab)**

- Checkbox to select a secondary group

> ▷ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
- The number of selected secondary groups exceeds the maximum number per local user
- The total number of local users has reached the maximum number of local users for the ETERNUS DX

> ◯ **N o t e**

For details about the group IDs and group names of the local groups that are automatically created in the ETERNUS DX, refer to "Special group" (page 1180).

3 Click the [Add] button.

4 A confirmation screen appears. Click the [OK] button.
→ Addition of the local user starts.

5 Click the [Done] button to return to the [Environment Settings] screen.

End of procedure

Delete Local User

This function deletes the local user.
One local user can be deleted at a time.
This function is used in a Unified Storage environment.

> ▷ **Caution**

- A local user that is currently accessing the shared folder cannot be deleted.
- This function cannot be used to delete a home directory that belongs to the deletion target local user. To delete home directories, use the procedure in "Delete Shared Folder" (page 476).
- This function cannot be executed if the port for changing the local user authentication password is in the open state.

> ⬤ **N o t e**

If all the local users that belong to the local group "sharegroup$" (group ID: 451) are deleted by using this function, "sharegroup$" is automatically deleted. Note that local groups other than "sharegroup$" are not automatically deleted even if all local users belonging to them are deleted.

The procedure to delete a local user is as follows:

Procedure

1   Select the local user that is to be deleted, and click [Delete Local User] in [Action].

2   A confirmation screen appears. Click the [OK] button.
    → Deletion of the local user starts.

3   Click the [Done] button to return to the [Environment Settings] screen.

End of procedure

Modify Local User

This function changes the password and groups of the local user.
One local user can be modified at a time.
This function is used in a Unified Storage environment.

> ▷ **Caution**

- "Name" and "User ID" of the existing local users cannot be changed. To change "Name" or "User ID", delete the relevant local user and then create it again.
- This function cannot be executed if the port for changing the local user authentication password is in the open state.

For details on the parameters for this function, refer to "A. Modify Local User" (page 1181).
For the factory default settings for this function, refer to "B. Modify Local User" (page 1281).

The procedure to modify a local user is as follows:

Procedure

1 Select the local user that is to be modified, and click [Modify Local User] in [Action].

2 Specify parameters.

The main setting items are as follows.

● Local User Settings

- Change Password
- Password
- Confirm Password

● Member group selection ([Primary Group] tab)

- Radio button to select a primary group

● Member group selection ([Secondary Group] tab)

- Checkbox to select a secondary group

> **▶ Caution**
>
> If the number of selected secondary groups exceeds the maximum number per local user, an error screen appears. Check the parameter settings.

> **◯ N o t e**
>
> For details about the group IDs and group names of the local groups that are automatically created in the ETERNUS DX, refer to "Special group" (page 1180).

3 Click the [Modify] button.

4 A confirmation screen appears. Click the [OK] button.
   → Modification of the local user settings starts.

5   Click the [Done] button to return to the [Environment Settings] screen.

<div style="text-align: right">**End of procedure** ▮</div>

Add Local Group

This function adds local groups to which the local users belong.
For added local groups, CIFS access, NFS access, and FTP access to the shared folders are available on a per group basis.
Up to 100 local groups can be added in the ETERNUS DX.
This function is used in a Unified Storage environment.

▷ **Caution**

- This function cannot be executed if an Active Directory authentication server or an LDAP authentication server is used. Remove all the authentication servers before using this function.
- "Name" and "Group ID" of the existing local groups cannot be changed. To change "Name" or "Group ID", delete the relevant local group and then create it again.
- Note that this function cannot be used to create the following special groups because these groups are automatically created by the ETERNUS DX.
  - sharegroup$
  - BUILTIN_Administrators
  - BUILTIN_Users
  - BUILTIN_BackupOperators

  Special groups are included in the maximum number of groups.
- This function cannot be executed if the port for changing the local user authentication password is in the open state.
  Use the "set nas-port" ETERNUS CLI command to open and close the port for changing the local user authentication password. Use the "show nas-port" ETERNUS CLI command to check the port status. Refer to "ETERNUS CLI User's Guide" for details about each command.

🔵 **N o t e**

- If the controller firmware version is V10L51 or earlier and the authentication servers are not being used, all users share the fixed user account. In this case, the local group "shareuser$" is automatically created when the existing controller firmware version is updated to V10L53 or later. The local group "shareuser$" can be deleted or created again with ETERNUS Web GUI or ETERNUS CLI in the same way as local groups that are added with ETERNUS Web GUI.
- Local groups can be deleted. Refer to "Delete Local Group" (page 495) for details.
- Local users are registered to the local group. Refer to "Add Local User" (page 489) for details.
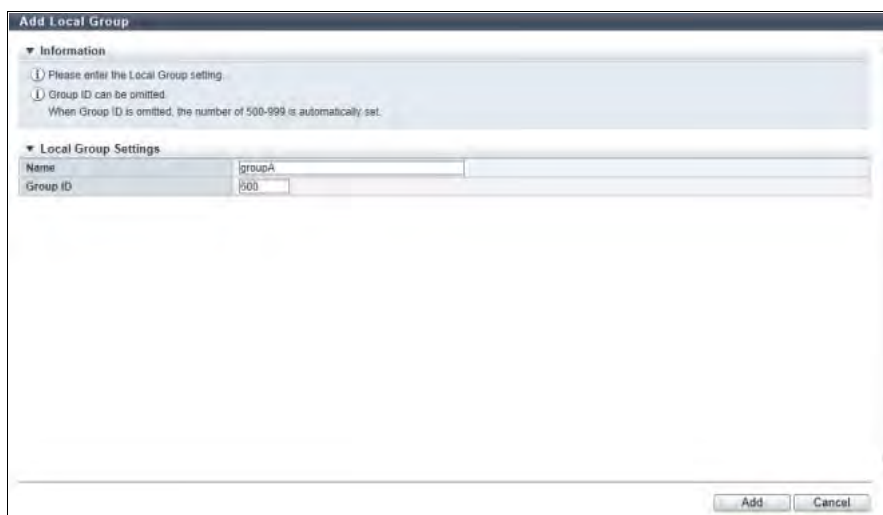
For details on the parameters for this function, refer to "A. Add Local Group" (page 1182).

The procedure to add a local group is as follows:

Procedure

1   Click [Add Local Group] in [Action].

2 Specify parameters.

The main setting items are as follows.

● Local Group Settings

- Name
- Group ID

> ▶ **Caution**
>
> If the total number of local groups has reached the maximum number of local groups for the ETERNUS DX,
> an error screen appears. Check the parameter settings.

> ● **N o t e**
>
> For details about the group IDs and group names of the local groups that are automatically created in the
> ETERNUS DX, refer to "Special group" (page 1180).

3 Click the [Add] button.

4 A confirmation screen appears. Click the [OK] button.
→ Addition of the local group starts.

5 Click the [Done] button to return to the [Environment Settings] screen.

End of procedure

Delete Local Group

This function deletes the local group.
One local group can be deleted at a time.
This function is used in a Unified Storage environment.

▷ **Caution**

- This function cannot be executed if the port for changing the local user authentication password is in the open state.
- The following local groups cannot be deleted.
  - A local group that is specified as the primary group of a local user
  - sharegroup$
  - BUILTIN_Administrators
  - BUILTIN_Users
  - BUILTIN_BackupOperators

🔵 **N o t e**

- If all the local users that belong to the local group "sharegroup$" (group ID: 451) are deleted by using the [Delete Local User] function, "sharegroup$" is automatically deleted. Note that local groups other than "sharegroup$" are not automatically deleted even if all local users belonging to them are deleted.
- If a local group is used as a secondary group for the local users, that local group is deleted from the secondary group.

The procedure to delete a local group is as follows:

Procedure

1   Select the local group that is to be deleted, and click [Delete Local Group] in [Action].

2   A confirmation screen appears. Click the [OK] button.
      → Deletion of the local group starts.

3   Click the [Done] button to return to the [Environment Settings] screen.

End of procedure

Add Quota Setting

This function adds a new quota setting information. Drive space and file count thresholds (Warning and Limit) can be set.
Quota is a function that limits drive space or the number of files used on a NAS user volume or a shared folder to prevent the depletion of resources in the ETERNUS DX.
This function is displayed in a Unified Storage environment.

Maximum Quota Setting Information for Each Model

Model	Maximum quota setting information (*1)
ETERNUS DX100 S4/DX100 S3	5000
ETERNUS DX200 S4/DX200 S3	10000
ETERNUS DX500 S4/DX500 S3	15000
ETERNUS DX600 S4/DX600 S3	20000

*1:   The maximum number of quota setting information for this function may be less in some operating environments.

> ▷ **Caution**

- Quotas for NAS user volumes are set for users or groups that are registered in the authentication server. When using this function, registering the users or groups in the authentication server in advance is necessary.
- Quotas for shared folders are set for shared folders that are registered in the ETERNUS DX. Create the shared folders in advance. Refer to "Create Shared Folder" (page 471) for details.
- To configure the quota information for each shared folder to which the NAS user volume belongs where the NAS FS version is "2", "3", or "4", updating the file system version and reconfiguring the file system information are required. Perform the following procedure before setting the quota using this function.

    (1) Unmount CIFS and NFS from the client.

    (2) Use the [Reconfigure NAS Volume] function to reconfigure the relevant NAS user volume. The NAS FS version is changed to "5".

    (3) Unmount the relevant NAS user volume with the "forced nas-fsunmount" ETERNUS CLI command.

    (4) Create quota information on the file system with the "start nas-fsck" ETERNUS CLI command. (Select "repair" or "force-repair" for the "mode" parameter.)

    (5) Mount the relevant NAS user volume again with the "forced nas-fsmount" ETERNUS CLI command.
    Refer to "ETERNUS CLI User's Guide" for details about each command.
- When inconsistencies in the quota information occur, restore the quota information by executing the "start nas-fsck" ETERNUS CLI command. Refer to "ETERNUS CLI User's Guide" for details.
- This function sets two thresholds (Warning and Limit) for the drive space or the file count.
    - When exceeding the warning threshold
      This is a predictive notification and writing to the relevant NAS user volume is not prohibited.
    - When exceeding the limit threshold
      Writing to the relevant NAS user volume is prohibited.
- In each NAS user volume, add a quota setting information to multiple users, groups, and shared folders. Note that the maximum number of quota setting information that can be added in a single operation (by clicking the [Add] button on the bottom of the screen) is 100 regardless of the operating environment.
- When deleting NAS user volumes, quota setting information assigned to that volume are also deleted at the same time.
- When deleting shared folders, quota setting information assigned to that shared folder are also deleted at the same time.

> **Ｎｏｔｅ**
>
> - Event notifications for the conditions described below can be sent using the specified method. Refer to "Setup Event Notification" (page 155) for details.
>   - The drive space or the file count has exceeded the threshold
>   - The drive space or the file count has returned to a normal state below the threshold value
> - The quota setting information in the ETERNUS DX can be checked. Refer to "Quota Management" (page 871) for details.
> - The quota setting information in the ETERNUS DX can be changed. Refer to "Modify Quota Setting" (page 500) for details.
> - The quota setting information in the ETERNUS DX can be deleted. Refer to "Delete Quota Setting" (page 500) for details.
> - The "NAS FS Version" for the NAS user volume can be checked in the [Volume Detail] screen. Refer to "Volume Detail (Basic)" (page 802) for details.
> - Shared folders include home directories.

For details on the parameters for this function, refer to "A. Add Quota Setting" (page 1183).
For the factory default settings for this function, refer to "B. Add Quota Setting" (page 1281).

The procedure to add quota settings is as follows:

Procedure

1   Click [Add Quota Setting] in [Action].

> **Ｎｏｔｅ**
>
> When performing a quota setting for the shared folder, if the NAS user volume to which the relevant shared folder belongs is unknown, proceed to Step 3.

2   Select a NAS user volume to add a quota setting information.
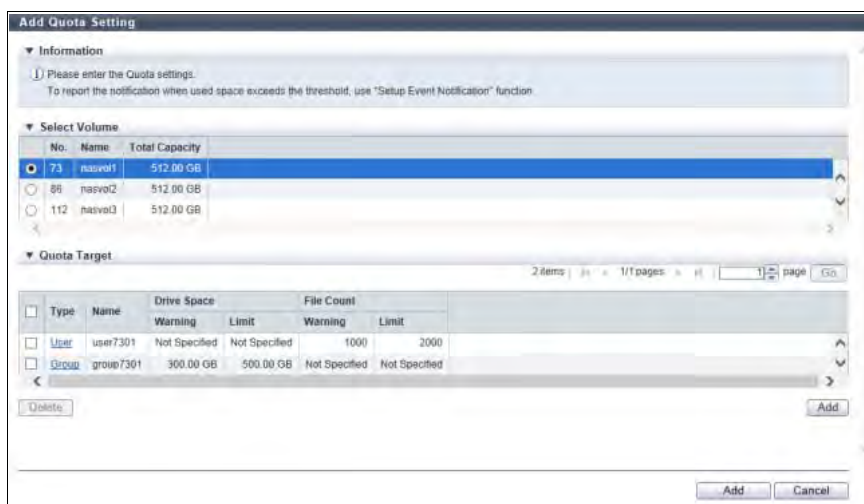
The main setting item is as follows.

● Select Volume

- Radio button to select a NAS user volume

3   Add a quota setting information.

3-1   Click the [Add] button on the bottom right of the quota target list.

> ▶ **Caution**
>
> - The [Add] button cannot be clicked under the following conditions. Check the parameter settings.
>   - The total number of quota setting information to be added exceeds 100 lines
>   - The total number of existing quota setting information and quota setting information to be added exceeds the maximum number of information for each model
> - The [Delete] button cannot be clicked If no quota setting information is added.
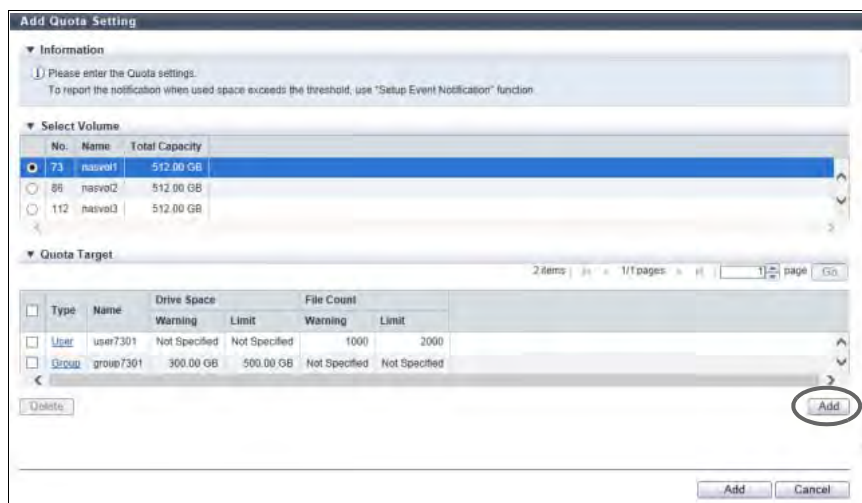
→   The [Add Quota Target] screen appears.

3-2   Input or edit the Quota setting information.
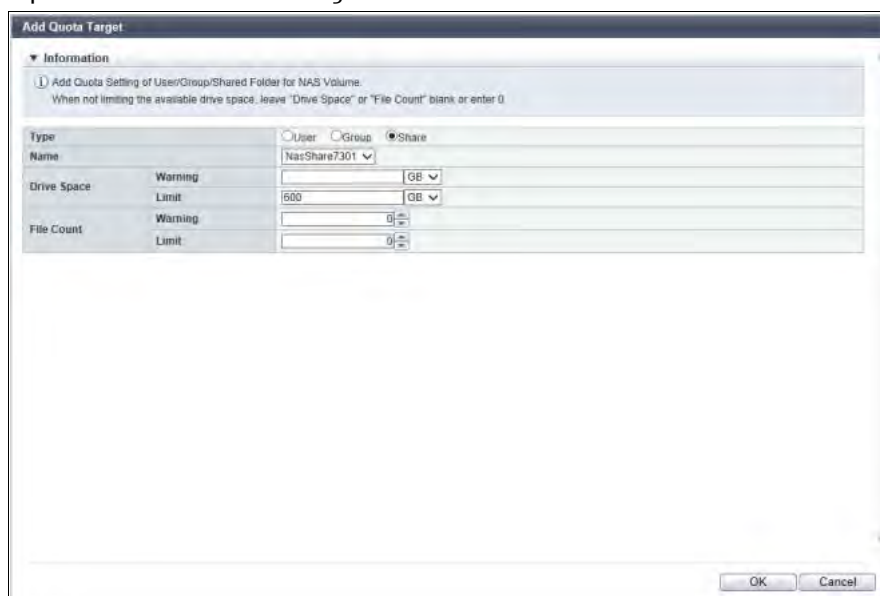
The main setting items are as follows.

● **Add Quota Target**

- Type
- Name
- Drive Space
- File Count

> ▶ **Caution**
>
> A total of four threshold values can be set (two for the drive space and two for the file count) in a single quota setting information (for each line in the quota target list). However, specifying "0" for all the thresholds (which includes changing the drive space value to "Not Specified") is not allowed. At least one threshold must have a valid value.

> ⬤ **N o t e**
>
> When a NAS user volume is not selected in the initial screen and "Share" is selected for "Type" in the [Add Quota Target] screen, all the shared folders that are registered in the ETERNUS DX are displayed as options for "Name".

3-3 Click the [OK] button
→ The display returns to the initial screen.

> ⬤ **N o t e**
>
> - In the initial screen, by re-clicking the [Add] button on the bottom right of the quota target list, the quota setting information that was previously specified in the [Add Quota Target] screen is displayed.
> - If the [Type] link for the added quota setting information is clicked, the [Edit Quota Target] screen is displayed. The quota setting information can be edited in the displayed screen.
> - When deleting the added quota setting information from the quota target list, select the relevant quota setting information, and click the [Delete] button.

3-4 To set multiple quota settings for the selected NAS user volume, repeat Step 3-1 through Step 3-3.

> ▶ **Caution**
>
> If an error screen appears under the following conditions, check the parameter settings.
> - Quota targets do not exist
> - A quota setting information with the same "NAS user volume", the same "Type" of quota target, and the same "Name" of the quota target already exists

4 Click the [Add] button.
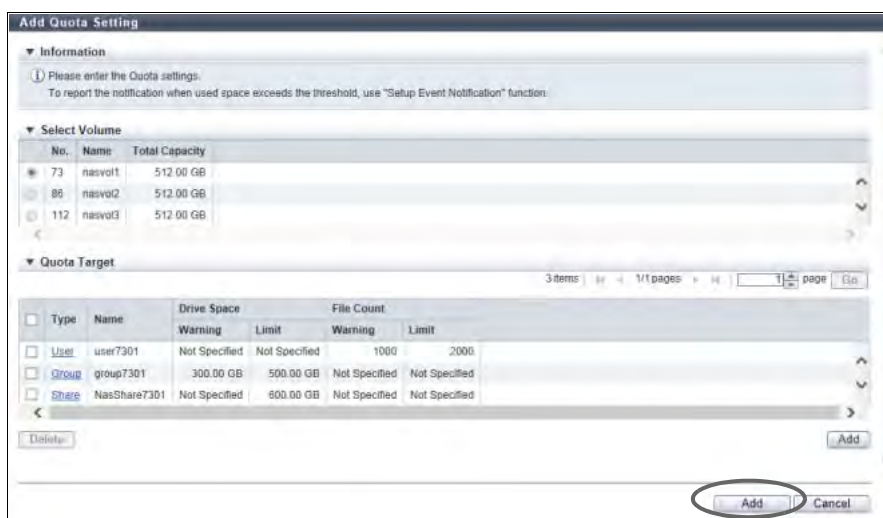
5 A confirmation screen appears. Click the [OK] button.
→ Adding of the quota setting starts.

6   Click the [Done] button to return to the [Quota Management] screen.

<div align="right">

End of procedure
</div>

Delete Quota Setting

This function deletes the quota setting information.
This function is displayed in a Unified Storage environment.

> 🔵 **N o t e**
>
> This function can also delete the quota setting information for home directories.

The procedure to delete the quota setting is as follows:

Procedure

1   Select the quota setting information that is to be deleted (multiple selections can be made) and click [Delete Quota Setting] in [Action].

2   A confirmation screen appears. Click the [OK] button.
→ Deletion of the quota setting starts.

3   Click the [Done] button to return to the [Quota Management] screen.

<div align="right">

End of procedure
</div>

Modify Quota Setting

This function changes the quota setting information. Drive space and file count thresholds (Warning and Limit) can be changed.
This function is displayed in a Unified Storage environment.

> ▶ **Caution**
>
> • Quotas for NAS user volumes are set for users or groups that are registered in the authentication server. When using this function, registering the users or groups in the authentication server in advance is necessary.
> • Quotas for shared folders are set for shared folders that are registered in the ETERNUS DX. Create the shared folders in advance. Refer to "Create Shared Folder" (page 471) for details.
> • This function sets two thresholds (Warning and Limit) for the drive space or the file count.
>   - When exceeding the warning threshold
>   This is a predictive notification and writing to the relevant NAS user volume is not prohibited.
>   - When exceeding the limit threshold
>   Writing to the relevant NAS user volume is prohibited.
> • The type (of User/Group/Share) and name (of the User/Group/Shared folder) of the quota setting target information cannot be changed. To change the "Type" or "Name", delete the relevant quota setting information and add the setting again.

> **◉ N o t e**
>
> - Event notifications for the conditions described below can be sent using the specified method. Refer to "Setup Event Notification" (page 155) for details.
>   - The drive space or the file count has exceeded the threshold
>   - The drive space or the file count has returned to a normal state below the threshold value
> - The quota setting information can be added. Refer to "Add Quota Setting" (page 496) for details.
> - The quota setting information in the ETERNUS DX can be deleted. Refer to "Delete Quota Setting" (page 500) for details.
> - The quota setting information in the ETERNUS DX can be checked. Refer to "Quota Management" (page 871) for details.
> - Shared folders include home directories.

For details on the parameters for this function, refer to "A. Modify Quota Setting" (page 1185).

The procedure to change the quota settings is as follows:

Procedure

1   Select the quota setting information that is to be changed and click [Modify Quota Setting] in [Action].

2   Edit the quota setting information.
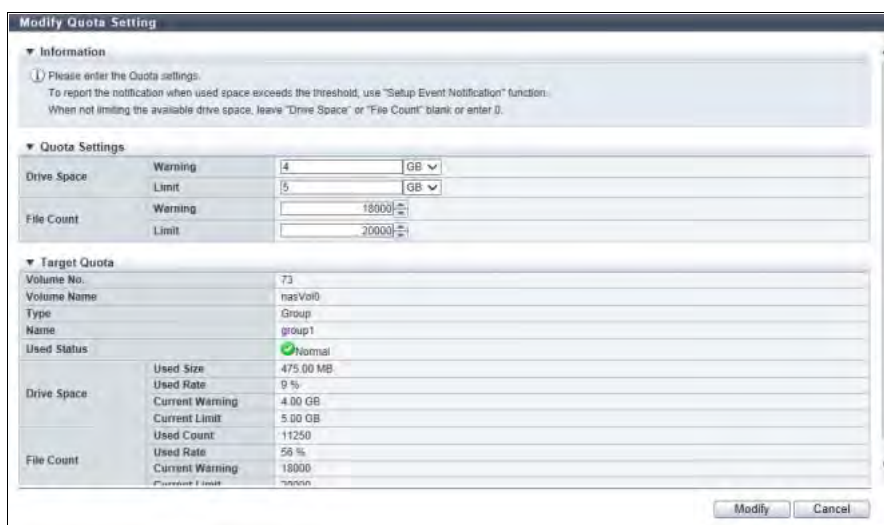
The main setting items are as follows.

● Quota Settings

- Drive Space
- File Count

> **▶ Caution**
>
> A total of four threshold values can be set (two for the drive space and two for the file count) in a single quota setting information. However, specifying "0" for all the thresholds (which includes changing the drive space value to "Not Specified") is not allowed. At least one threshold must have a valid value.

3 Click the [Modify] button.

> ▶ **Caution**
>
> In the following conditions, a warning message indicates that writing to the drive is prohibited appears.
> - The modified limit value of the drive space is less than the currently used drive space
> - The modified limit value of the file count is less than the currently used file count

4 A confirmation screen appears. Click the [OK] button.
→ Changing of the quota setting starts.

5 Click the [Done] button to return to the [Quota Management] screen.

End of procedure

Initialize Meta Cache Distribution

This function restores the meta cache to the initial location manually.
"Meta cache" is a cache area in NAS for storing the management information of the file system. The meta cache is distributed (or initially located) between CMs (CM#0 and CM#1) when NAS volumes (NAS user volumes and NAS backup volumes) are created. If the NAS volume is blocked or an unmount occurs, a failover of the meta cache to the other CM is performed. If the distribution of the meta cache becomes uneven, the memory of the CM with the larger meta cache may become insufficient or the access performance to the NAS volumes from the other CM may be reduced.
There are two methods to restore the meta cache to the initial location.

- Initialize meta cache distribution
  Manually restores the meta cache.
  This function restores the meta cache of the selected NAS volumes in the ETERNUS DX to the initial location at any time.

- Automatic meta cache distribution
  Automatically restores the meta cache to the initial location.
  Refer to "Enable Automatic Meta Cache Distribution" (page 504) for details.

To redistribute the meta cache, using this function is recommended. If the [Enable Automatic Meta Cache Distribution] function is used, a meta cache redistribution is performed every hour on the half hour regardless of the host I/O and the processes that are related to NAS may be delayed for a maximum of two minutes.

This function is used in a Unified Storage environment.

▷ **Caution**

- Redistributing the meta cache (or the process of restoring the initial location) may take a maximum of two minutes for each NAS volume (or NAS user volume and NAS backup volume).
- If the meta cache is being redistributed at the scheduled start time of the snapshot acquisition, the start time of the snapshot acquisition may be delayed. Make sure to execute this function while snapshot acquisitions are not reserved.
- If the following operations are executed for NAS volumes where a meta cache redistribution is being performed, the operation may be delayed for a maximum of two minutes in each NAS volume until the redistribution is complete.
  - Deletion of the NAS volumes
  - Displaying the NAS volume status
  - Displaying the shared folder list
  - Creation of the shared folders
  - Deletion of the shared folders
  - Modification of the shared folder settings
- The meta cache cannot be redistributed for the following conditions.
  - Automatic meta cache distribution is being executed
  - A snapshot is being acquired (and the snapshot acquisition is not complete within a certain period of time)
  - The ETERNUS DX is in the high-load state (*1)
  *1:   If the message indicates that the meta cache distribution cannot be initialized due to the ETERNUS DX being overloaded, wait at least 30 minutes and then try again.

◯ **N o t e**

- The current and the initial meta cache locations can be checked. Refer to <u>"Meta Cache Distribution" (page 874)</u> for details.
- This function can be used even if "Automatic Meta Cache Distribution" is "Enable".

The procedure to restore the meta cache to the initial location manually is as follows:

Procedure

1   Select the NAS volume (multiple selections can be made) to redistribute the meta cache and click [Initialize Distribution] in [Action].

◯ **N o t e**

For NAS volumes that are targets of a meta cache redistribution, "Current Location" is different from "Initial Location" in the [Meta Cache Distribution] screen. If NAS volumes with the same "Current Location" and "Initial Location" are selected and [Initialize Distribution] is clicked, the process is completed normally without any changes.

2   A confirmation screen appears. Click the [OK] button.
   → Initialization of the meta cache distribution starts.

3   Click the [Done] button to return to the [Meta Cache Distribution] screen.

End of procedure

Enable Automatic Meta Cache Distribution

This function enables the automatic meta cache distribution.
If "Current Location" of the meta cache is different from "Initial Location", the meta cache of every NAS volume in the ETERNUS DX is automatically returned to the initial location for the following times.

- When the NAS Engine or the CM is activated
- Every hour on the half hour

This function is used in a Unified Storage environment.

▷ **Caution**

- If the following operations are executed for NAS volumes where a meta cache redistribution is being performed, the operation may be delayed for a maximum of two minutes in each NAS volume until the redistribution is complete.
    - Deletion of the NAS volumes
    - Displaying the NAS volume status
    - Displaying the shared folder list
    - Creation of the shared folders
    - Deletion of the shared folders
    - Modification of the shared folder settings
- If the following operations conflict with the execution time of the automatic meta cache distribution, the process that was started earlier is given priority.
    - Expanding the NAS user volume capacity
    - Backing up of the NAS user volume
    - Acquiring snapshots
    If the process that was started earlier is not complete within five minutes, an error occurs for the process that was started later.
- Automatic meta cache distribution is executed when all of the following processes are complete.
    - Application of the controller firmware
    - Matching the controller firmware versions of both CMs (CM#0 and CM#1)
    - Activation of the CM

● **N o t e**

The current and the initial meta cache locations can be checked. Refer to "Meta Cache Distribution" (page 874) for details.

For the factory default settings for this function, refer to "B. Automatic Meta Cache Distribution" (page 1282).

The procedure to enable the automatic meta cache distribution is as follows:

Procedure

1	Click [Enable Automatic Distribution] in [Action].

▷ **Caution**

[Enable Automatic Distribution] cannot be clicked if "Automatic Meta Cache Distribution" is "Enable".

2 A confirmation screen appears. Click the [OK] button.
    → Enabling of the automatic meta cache distribution starts.

3 Click the [Done] button to return to the [Meta Cache Distribution] screen.

End of procedure

Disable Automatic Meta Cache Distribution

This function disables the automatic meta cache distribution.
This function is used in a Unified Storage environment.

The procedure to disable the automatic meta cache distribution is as follows:

Procedure

1 Click [Disable Automatic Distribution] in [Action].

▷ **Caution**

[Disable Automatic Distribution] cannot be clicked if "Automatic Meta Cache Distribution" is "Disable".

2 A confirmation screen appears. Click the [OK] button.
    → Disabling of the automatic meta cache distribution starts.

3 Click the [Done] button to return to the [Meta Cache Distribution] screen.

End of procedure

5. RAID Group Management

This chapter describes RAID group management.

When using functions in the Action area, select the desired function from the Action area that is displayed in the status display screen.
The functions in the Action area for RAID group can be performed from the following display functions:

Functions in the Action area for RAID Group	Display function
Create RAID Group	• RAID Group (Basic Information)
Delete RAID Group	
Rename RAID Group	
Change Controlling CM	
Expand RAID Group	
Modify RAID Group Parameters	• Tuning
Assign Eco-mode Schedule (RAID Group)	• Eco-mode Schedule (RAID Group)
Set Key Group (RAID Group)	• SED Key Group
Recovery SED	
External RAID Group Management	–
Create External RAID Group	• External RAID Group
Delete External RAID Group	
Recover External RAID Group	

Create RAID Group

This function creates RAID groups.
A RAID group is a group of drives that configure a RAID level.

> **N o t e**
>
> For RAID groups that configure Thin Provisioning Pools, the required RAID levels and number of member drives that can be used are different. Refer to "Create Thin Provisioning Pool" (page 539) for details.

Features and required number of drives for each RAID level

The following table shows the features and the required number of drives for each RAID level.
Actual RAID group configurations (or the number of available drives) vary depending on the maximum number of drives that can be installed in the ETERNUS DX/AF.
Note that "Striping (RAID0)" has no data redundancy.

RAID level	Feature	Required number of drives (*1)
High Performance (RAID1+0)	The high I/O performance of RAID0 (striping) is combined with the reliability of RAID1 (mirroring).	2D+2M – 16D+16M
High Capacity (RAID5)	Data divided into units of blocks and parity information that is created from the data are allocated across multiple drives to allow data redundancy.	2D+1P – 15D+1P
High Reliability (RAID6)	The use of double parity allows the full recovery of lost data even in the event that two of the drives fail.	3D+2P – 14D+2P
High Reliability (RAID6-FR)	Configure a single RAID group with multiple RAID redundant sets and reserved areas equivalent to a hot spare. Distributing data in RAID groups allows high-speed rebuilding when the first drive fails. A recovery can be performed with up to two drive failures, however when the second drive fails, the rebuild is operated at a normal speed. Several restrictions apply to the RAID groups and volumes of this RAID level. For the details, refer to "Restrictions for RAID6-FR" (page 507).	(3D+2P)x2+1HS (4D+2P)x2+1HS (6D+2P)x2+1HS (9D+2P)x2+1HS (12D+2P)x2+1HS (5D+2P)x4+1HS (13D+2P)x2+1HS (8D+2P)x3+1HS (4D+2P)x5+1HS (3D+2P)x6+1HS
Reliability (RAID5+0)	Multiple RAID5 volumes are RAID0 striped. For large capacity configurations, use of RAID5+0 instead of RAID5 results in enhanced performance, improved reliability, and shorter rebuilding times. Several restrictions apply to the RAID groups of this RAID level. For the details, refer to "Restrictions for RAID5+0" (page 508).	(2D+1P)x2 – (15D+1P)x2
Mirroring (RAID1)	Data is mirrored to two drives. If one drive fails, the other drive continues operation (mirroring).	1D+1M
Striping (RAID0)	Data is split in unit of blocks and stored across multiple drives (striping). RAID0 has no data redundancy.	2D – 16D

*1: D: Data drives, M: Mirror drives, P: Parity drives, HS: Hot Spares

Restrictions for RAID6-FR

The following restrictions apply to RAID groups (hereinafter referred to as "Fast Recovery RAID groups") that were created with RAID6-FR and volumes created in those RAID groups.
- The following operations that use LDE cannot be performed for Fast Recovery RAID groups.
  - Changing the RAID level to "RAID6-FR"
  - Changing the RAID level from "RAID6-FR"
  - Expanding the RAID group capacity by adding drives

- "Standard (including concatenation volumes by means of LUN Concatenation)" and ODX Buffer volumes can be created in the Fast Recovery RAID group.
- Encrypted volumes can be created in the Fast Recovery RAID groups. However, encrypting volumes that exist in Fast Recovery RAID groups is not allowed.
- The Stripe Depth for a new Fast Recovery RAID group is fixed at "64KB".
- The Copybackless function is not performed when the first drive fails in a Fast Recovery RAID group. A high-speed rebuild is performed in a hot spare area within the RAID group, and when the failed drive is exchanged for a normal drive, copyback is performed.

Restrictions for RAID5+0

The following restrictions apply to RAID groups that are created with "RAID5+0".

- The following operations that use LDE cannot be performed.
  - Changing the RAID level to "RAID5+0"
  - Changing the RAID level from "RAID5+0"
  - Expanding the RAID group capacity by adding drives
- The Stripe Depth for a new RAID group is fixed at "64KB".

Conditions for the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3 drive layout

The drive layout to configure RAID groups in the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3 must satisfy the conditions described below.
RAID groups cannot be created if the required conditions are not satisfied.

- For the ETERNUS DX8100 S3

RAID level	Drive layout conditions	
Mirroring (RAID1)	Required	Allocate mirroring pair drives to different DEs.
High Performance (RAID1+0)	Required	Allocate mirroring pair drives to different DEs.
	Recommended	Allocate striping drives to as many DEs as possible.
High Capacity (RAID5) Reliability (RAID5+0) High Reliability (RAID6) High Reliability (RAID6-FR)	Recommended	Distribute member drives to as many DEs as possible.

- For the ETERNUS DX8700 S3/DX8900 S3

RAID level	Drive layout conditions	
Mirroring (RAID1)	Required	Allocate mirroring pair drives to different DEs.
	Recommended	Allocate mirroring pair drives to DEs (*1) under different CEs when possible. Allocate mirroring pair drives to different SAS cascades (*2) when possible.
High Performance (RAID1+0)	Required	Allocate mirroring pair drives to different DEs.
	Recommended	Allocate striping drives to DEs under as many CEs as possible. Allocate striping drives to as many SAS cascades (*2) as possible.
High Capacity (RAID5)	Required	Allocate member drives to different DEs.
	Recommended	Distribute member drives to DEs under as many CEs as possible. Distribute member drives to as many SAS cascades (*2) as possible.
Reliability (RAID5+0)	Required	Allocate two or less member drives to the same DE. Member drives in the same DE must belong to different redundant groups.
	Recommended	Distribute member drives to DEs under as many CEs as possible. Distribute member drives to as many SAS cascades (*2) as possible.
High Reliability (RAID6) High Reliability (RAID6-FR)	Required	Allocate two or less member drives to the same DE.
	Recommended	Distribute member drives to DEs under as many CEs as possible. Distribute member drives to as many SAS cascades (*2) as possible.

*1: "DEs under the different CEs" can be found by checking the DE number. DEs under different CEs have different numbers as the first digit of the DE number.

*2: "SAS cascade" for the ETERNUS DX8700 S3/DX8900 S3 refers to DEs that are attached to one drive interface port. The DEs that are allocated to the same SAS cascade configuration are as follows:

- DE#x0, DE#x1, DE#x2, and DE#x3 that are connected to CE#x/DI Port#0 (x: 0 - B)
- DE#x4, DE#x5, DE#x6, and DE#x7 that are connected to CE#x/DI Port#1 (x: 0 - B)
- DE#x8, DE#x9, DE#xA, and DE#xB that are connected to CE#x/DI Port#2 (x: 0 - B)
- DE#xC, DE#xD, DE#xE, and DE#xF that are connected to CE#x/DI Port#3 (x: 0 - B)

(Example) DE#00, DE#01, DE#02, and DE#03 that are connected to CE#0/DI Port#0 are on the same SAS cascade.

The maximum number of RAID groups for each model

The maximum number of RAID groups varies depending on each model. The following table shows the maximum number of RAID groups for each model.

Model	The maximum number of RAID groups
ETERNUS DX60 S4/DX60 S3	48
ETERNUS DX100 S4/DX100 S3	72
ETERNUS DX200 S4/DX200 S3	132
ETERNUS DX500 S4/DX500 S3	264
ETERNUS DX600 S4/DX600 S3	528
ETERNUS DX8100 S3	48
ETERNUS DX8700 S3	768
ETERNUS DX8900 S3	2304
ETERNUS AF250 S2/AF250	24
ETERNUS AF650 S2/AF650	96
ETERNUS DX200F	12

Drive combinations that can configure a RAID group

The following table shows the drive combinations that can configure a RAID group.

	Online	Nearline	SSD	Online SED	Nearline SED	SSD SED
Online	OK	Not recommended	NG	NG	NG	NG
Nearline	Not recommended	OK	NG	NG	NG	NG
SSD	NG	NG	OK	NG	NG	NG
Online SED (*1)	NG	NG	NG	OK	Not recommended	NG
Nearline SED	NG	NG	NG	Not recommended	OK	NG
SSD SED	NG	NG	NG	NG	NG	OK

OK: RAID groups can be created, Not recommended: RAID groups can be created, but not a recommended configuration, NG: RAID groups cannot be created

*1: In the controller firmware versions earlier than V10L32, "Online SED" is displayed as "SED".

▷ **Caution**

- For the ETERNUS DX60 S4/DX60 S3, SEDs cannot be used for configuring a RAID group.
- "Striping (RAID0)" has no data redundancy. The use of "High Performance (RAID1+0)", "High Capacity (RAID5)", "High Reliability (RAID6)", "High Reliability (RAID6-FR)", "Reliability (RAID5+0)", or "Mirroring (RAID1)" is recommended.

For details on the parameters for this function, refer to .
For the factory default settings for this function, refer to .

There are two methods to create a volume: automatic drive selection and manual drive selection.

■ Automatically selecting drives to create RAID groups

> **Caution**
>
> The drives must be selected manually for the following cases.
> - SSDs with an interface speed of 12Gbit/s (SSD-M/SSD-L) are installed in a high-density drive enclosure with an interface speed of 6Gbit/s.
>   If drives are automatically selected, all the SSDs operate at 6Gbit/s for any of the following conditions.
>   - SSDs in the 6Gbit/s high-density drive enclosures are selected
>   - SSDs in both the 6Gbit/s high-density drive enclosures and other drive enclosures are selected
> - Drives that satisfy all of the following conditions are installed in the ETERNUS DX/AF.
>   - The drive types are the same
>   - The drive capacities are the same
>   - The sector format (AF-compliant/non-AF-compliant) is different

The procedure to create a RAID group is as follows:

Procedure

1 Click [Create] in [Action].

2 Select "Automatic" for "Create Mode" and specify the detailed information of new RAID groups.

The main setting items are as follows.

● **New RAID Group**

- Name

● **Automatic Setting**

- Number of RAID Group
- Drive Type
- RAID Level

- Select Drives
- RAID Group Capacity

> ▶ **Caution**

- When using SSDs, the SSD types (SSD-M/SSD-L/SSD) cannot be specified. SSDs that are the same type and have the necessary capacity are selected. If SSDs with the same type are not available, RAID groups cannot be created. Note that if multiple RAID groups are created at once, different SSD types may be used for each RAID group. SSD types have no order of priority.
  When using SSD SEDs, the SSD types (SSD-M SED/SSD-L SED) cannot be specified. If "SSD SED" is selected for the drive type, drives are operated in the same way as SSDs.
- If "High Performance (RAID1+0)", "High Capacity (RAID5)", or "Reliability (RAID5+0)" is selected for the RAID level, RAID groups cannot be created with drives that are 6TB or larger (except SSDs and SSD SEDs).
- If RAID groups cannot be created by using the drives that are installed in the ETERNUS DX/AF, an error screen appears. Check the parameter settings.

3 Click the [Create] button

4 A confirmation screen appears. Click the [OK] button.
→ RAID group creation starts.

5 Click the [Done] button to return to the [RAID Group] screen.

End of procedure

■ Manually selecting drives to create RAID groups

Requirements for selecting drives

- The drive requirements for creating RAID groups are listed below.
  - The drive status is "🔲 Present"
  - The drives are not registered in any RAID group, TPP, FTRP, REC Disk Buffer, or EXCP
  - The drives are not registered as hot spares
  - The drive type (Online/Nearline/SSD/Online SED/Nearline SED/SSD SED) must be the same
    (Although "Online" type drives and "Nearline" type drives can be used in the same RAID group, using only "Online" type drives or using only "Nearline" type drives is recommended. Also, "Online SED" type drives and "Nearline SED" type drives can be used in the same RAID group, but using only "Online SED" type drives or using only "Nearline SED" type drives is recommended. This is because the available capacity and the access performance may be reduced when these drives are used in the same RAID group.)
  - If "High Performance (RAID1+0)", "High Capacity (RAID5)", or "Reliability (RAID5+0)" is selected for the RAID level, drives that are 6TB or larger (except SSDs and SSD SEDs) cannot be specified.
- Drive recommendations for creating RAID groups are listed below.
  - Select drives that are the same size and the same speed. If drives of different capacities exist in a RAID group, the smallest capacity becomes the standard, and all other drives are regarded as having the same capacity as the smallest drive. In this case, the remaining drive space is not used. In addition, if drives of different speeds exist in a RAID group, the access performance of the RAID group is reduced by the slower drives.
  - Select the same SSD type (SSD-M/SSD-L/SSD /SSD-M SED/SSD-L SED). If different types of SSDs exist in a RAID group, the access performance for all SSDs in the RAID group is adjusted to the SSD of the lowest interface speed.
  - Select the same sector format of drives (AF-compliant/non-AF-compliant).

- If the host connection environment does not support AF, select non-AF-compliant drives (*1). If AF-compli-
  ant drives (*2) are selected, a data format conversion occurs and the drive access performance is reduced.
  When the host to be connected supports AF, both AF-compliant and non-AF-compliant drives can be
  selected.
  *1:   Drives (such as 2.5" Online, 2.5" Nearline) where "AF" is not displayed for the type.
  *2:   Drives (such as 2.5" Online AF, 2.5" Nearline AF) where "AF" is displayed for the type.
- When "High Performance (RAID1+0)" or "Mirroring (RAID1)" is selected for the RAID level, allocate the drives
  (mirroring pair drives) by dividing them into two or more connection lines (for the ETERNUS DX500 S4/
  DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS AF650 S2, and the ETERNUS AF650).
- When "High Capacity (RAID5)", "High Reliability (RAID6)", or "High Reliability (RAID6-FR)" is selected for the
  RAID level, allocate the drives (multiple drives configuring a striping) by dividing them into two or more
  connection lines (for the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS
  AF650 S2, and the ETERNUS AF650).
- If "Mirroring (RAID1)" is selected for the RAID level, using drives other than SSD is recommended.
- There are conditions for the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3 drive layout. Refer to
for details.
  Note that these conditions are not applied to other models.

The procedure to create a RAID group is as follows:

Procedure

1   Click [Create] in [Action].

2   Select "Manual" for "Create Mode" and specify the detailed information of new RAID groups.
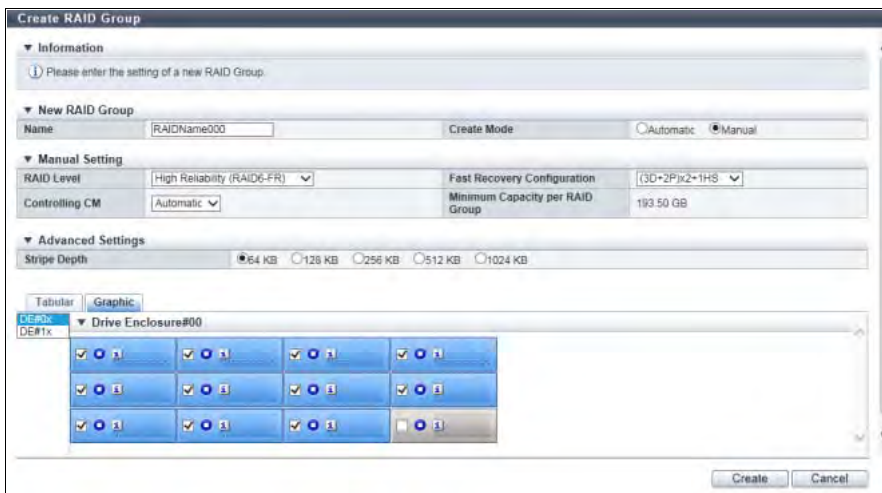
The main setting items are as follows.

● New RAID Group

- Name

● Manual Setting

- RAID Level
- Fast Recovery Configuration
- RAID Group Capacity

3 Select drives using a list of the drives or the installation location image.

> ▷ **Caution**
>
> - SSDs with an interface speed of 12Gbit/s (SSD-M/SSD-L) must be installed in a high-density drive enclosure with the same interface speed. When these SSDs are installed in a high-density drive enclosure with an interface speed of 6Gbit/s, the SSDs operate at 6Gbit/s.
> - The drive capacity that is displayed for the SSD-L differs from the product's actual capacity. For example, the drive capacity of a "1.92TB SSD-L" is displayed as "2.00 TB".

> ⬤ **N o t e**
>
> - When the number of drives for each RAID level and the number of selected drives does not match, the [Create] button cannot be clicked.
> - When SSDs are selected manually, the SSD type (SSD-M/SSD-L/SSD/SSD-M SED/SSD-L SED) must be the same. If different types of SSDs exist in a RAID group, the access performance for all SSDs in the RAID group is adjusted to the SSD of the lowest interface speed.

■ Selecting drives from a list of the drives

Click the [Tabular] tab to select drives from the list.
Only unused drives are displayed on the list.

The main setting items are as follows.
- Checkbox to select drives

■ Selecting drives from the installation location image

Click the [Graphic] tab to select drives from the drive installation image.
The installation images of all the drives installed in the ETERNUS DX/AF are displayed. Checkboxes are displayed for unused drives.

The main setting items are as follows.
- DE selection list box
- Checkbox to select drives

4 Click the [Create] button

5 A confirmation screen appears. Click the [OK] button.
→ RAID group creation starts.

6 Click the [Done] button to return to the [RAID Group] screen.

End of procedure

Delete RAID Group

This function deletes the registered RAID groups in the ETERNUS DX/AF.
When a RAID group is deleted, the status of the drives that configured the RAID group change to data drives that are not used by any RAID group.

▷ **Caution**

- The following RAID groups cannot be deleted:
  - RAID groups in which volumes are registered
  - RAID groups that are registered in TPPs or FTRPs (*1)
  - RAID groups that are registered as REC Disk Buffers
  - RAID groups that are registered as EXCPs
  *1:   Use ETERNUS SF Storage Cruiser to delete the RAID groups that are registered in the FTRPs.
- When deleting a RAID group where volumes are registered, delete the volumes in advance.
- Up to 128 RAID groups can be deleted at once.

The procedure to delete a RAID group is as follows:

Procedure

1   Select the RAID group that is to be deleted (multiple selections can be made) and click [Delete] in [Action].

2   A confirmation screen appears. Click the [OK] button.
   → RAID group deletion starts.

3   Click the [Done] button to return to the [RAID Group] screen.

End of procedure

Rename RAID Group

This function changes the name of RAID groups that are registered in the ETERNUS DX/AF.
Multiple RAID groups can be renamed with a single operation.

> ▷ **Caution**

The following RAID groups cannot be renamed:
- RAID groups that configure FTRPs
- RAID groups that are registered as EXCPs

For details on the parameters for this function, refer to <u>"A. Rename RAID Group" (page 1195)</u>.
For the factory default settings for this function, refer to <u>"B. Rename RAID Group" (page 1283)</u>.

The procedure to rename RAID group is as follows:

Procedure

1   Select the RAID group to be renamed (multiple selections can be made) and click [Rename] in [Action].

2   Input the new "Name" and the "Start of Suffix".

The main setting items are as follows.

● **Rename Setting**

- Name
- Start of Suffix

3   Click the [Rename] button

4   A confirmation screen appears. Click the [OK] button.
→ Changing RAID group name starts.

5   Click the [Done] button to return to the [RAID Group] screen.

End of procedure

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Change Controlling CM

This function changes the Controlling CM that is allocated to the RAID group.
Unequal loading between the CMs can be resolved by changing the Controlling CM.

▷ **Caution**

- While changing the Controlling CM, the storage system status is changed from Write Back mode to Write Through mode, reducing the I/O performance for the ETERNUS DX/AF. Perform this function when there are not many I/O operations. Changing the Controlling CM may take up to 20 or 30 minutes.
- This function cannot be used under the following conditions:
  - A CM that is not in the "✅ Normal" state exists
  - Formatting or LUN Concatenation is being performed in the volumes that are registered in the target RAID group
  - Encryption is being performed in the target RAID group
  - The target RAID group status is not "✅ Available"
  - The rebuild, copyback, or redundant copy is being performed in the target RAID group
  - The target RAID group belongs to a TPP that has Deduplication, Compression, or both enabled and the DEDUP_SYS Volume in that TPP is in the "🟠 Readying", "❌ Not Available", "❌ Not Ready",
    "❌ Broken", or "❌ Data Lost" state
  - LDE is being performed in the ETERNUS DX/AF
  - The RAID migration is being performed in the ETERNUS DX/AF
  - The RAID group diagnosis is being performed in the ETERNUS DX/AF
  - The disk diagnosis is being performed in the ETERNUS DX
  - The TPV balancing is being performed in the ETERNUS DX/AF
  - The FTRP balancing is being performed in the ETERNUS DX/AF
  - Pinned data exists in the ETERNUS DX/AF

🔵 **N o t e**

This function can also be used for changing the Controlling CM of the RAID groups that configure a TPP.

For details on the parameters for this function, refer to "A. Change Controlling CM" (page 1196).
For the factory default settings for this function, refer to "B. Change Controlling CM" (page 1283).

The procedure to change Controlling CM of the RAID group is as follows:

Procedure

1   Select the RAID group to change the Controlling CM (multiple selections can be made) and click [Change Controlling CM] in [Action].

▷ **Caution**

[Change Controlling CM] cannot be clicked under the following conditions:
- The usage for the selected RAID group is "Extreme Cache Pool"
- The selected RAID groups are used for configuring FTRPs

2 Select the Controlling CM after changing.
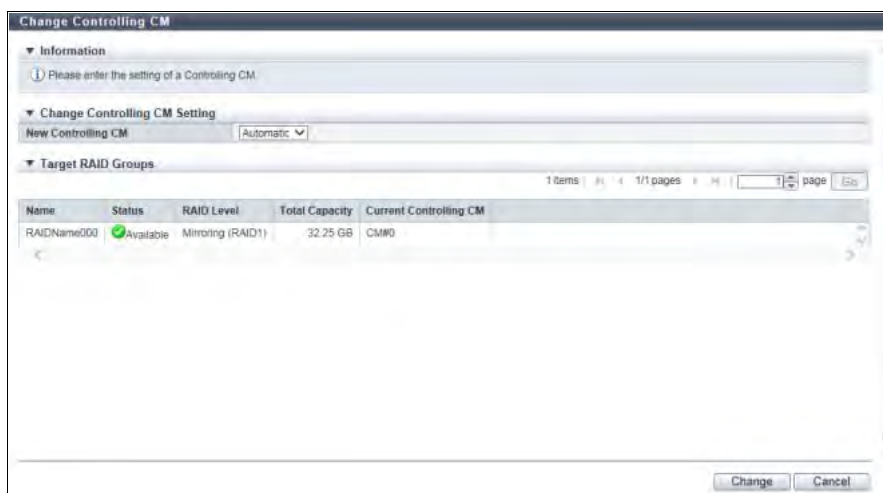
The main setting item is as follows.

● **Change Controlling CM Setting**

   • New Controlling CM

3 Click the [Change] button

4 A confirmation screen appears. Click the [OK] button.
   → Changing Controlling CM starts.

   ▶ **Caution**

   During Controlling CM change, the storage system status is changed from Write Back mode to Write Through mode.

5 Click the [Done] button to return to the [RAID Group] screen.

End of procedure

Expand RAID Group

This function adds drives to the existing RAID group by using the Logical Device Expansion (LDE) function to dynamically expand the RAID group capacity. This function can also dynamically change the RAID level of an existing RAID group.

RAID Group Expansion provides the following features without stopping the ETERNUS DX/AF operation:

- RAID Group Expansion adds disks to the existing RAID group in units of one drive. This enables capacity expansion of RAID groups with smaller number of drive expansion.
- RAID groups can be expanded and any existing data in these RAID groups is retained.

Requirements for RAID groups to expand capacity

- The "Status" is " ✅ Available"
- Standard volumes, SDVs, or SDPVs are registered
- WSVs are not registered
- Not registered in the TPP
- Not registered in the FTRP
- Not registered as an REC Disk Buffer
- Not registered as an EXCP
- RAID level is not "Reliability (RAID5+0)" or "Reliability (RAID6-FR)"
- The RAID group is not blocked
- Rebuild, copyback, or redundant copy is not being performed
- One of the following functions is not being performed for the volume that is registered in the RAID group
  - Format volume
  - Expand volume
  - RAID migration
  - Encrypt volume
- Storage Migration paths are not created in the volume that is registered in the RAID group
- The stripe size of the RAID group is not expanded (*1)
  - *1: A RAID group for which the Stripe Depth value in the [RAID Group (Basic)] screen of the [RAID Group (Basic Information)] screen is 128KB or more. Note that the Stripe Depth value for RAID1 cannot be changed. Refer to "Advanced Setting" (page 1194) in "Create RAID Group" (page 1187) for details.

Requirements for the ETERNUS DX/AF to expand capacity

- The cache mode is "Write Back Mode"
- All the CMs are in the normal state
- LDE is not being performed
- RAID group diagnosis is not being performed
- Disk diagnosis is not being performed
- Application of controller firmware is not being performed
- Application of disk firmware is not being performed

> **▶ Caution**

- Before expanding the RAID group, back up data in all the logical volumes in the target RAID group to a different location. If not, data cannot be recovered when expansion fails. If expansion fails, data can be recovered from the backed up data.
- RAID Group Expansion can only be performed for one RAID group at a time.
- RAID Group Expansion cannot be suspended.
- The following functions cannot be used for RAID groups in which RAID Group Expansion is being performed:
  - Format volume
  - Create volume
  - Encrypt volume
  - RAID migration for the volume
  - Expand volume
  - Preventive maintenance
  - Diagnosis for RAID group
  - Diagnosis for disks
- For some combinations of RAID levels, LDE cannot be used. Refer to "Availability of LDE for each combination of RAID levels" (page 519) for details.

> **● N o t e**

- RAID groups can be expanded when the RAID group capacity after performing expansion is the same or larger than the current RAID group capacity.
- When expanding the drive capacity that configures a RAID group, use the procedure in "Start RAID Migration" (page 296) instead of this function.
- In the controller firmware versions earlier than V10L32, "Online SED" is displayed as "SED".

Availability of LDE for each combination of RAID levels

The following table shows availability of LDE functions (changing RAID levels or capacity expansion by adding drives).

		RAID level after changing						
		RAID0	RAID1	RAID1+0	RAID5	RAID5+0	RAID6	RAID6-FR
RAID level before changing	RAID0	OK	N/A	OK	OK	N/A	OK	N/A
	RAID1	N/A	N/A	OK	OK	N/A	OK	N/A
	RAID1+0	N/A	N/A	OK	OK	N/A	OK	N/A
	RAID5	N/A	N/A	OK	OK	N/A	OK	N/A
	RAID5+0	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	RAID6	N/A	N/A	OK	OK	N/A	OK	N/A
	RAID6-FR	N/A	N/A	N/A	N/A	N/A	N/A	N/A

OK: LDE is available, N/A: LDE is not available

Requirements for selecting drives

- The drive requirements for adding to RAID groups are listed below.
  - The drive selection requirements is the same as when manually creating RAID groups. Refer to "Requirements for selecting drives" (page 511) in "Create RAID Group" for details.
  - If "High Performance (RAID1+0)" or "High Capacity (RAID5)" is selected for the RAID Level after an expansion, drives that are 6TB or larger (except SSDs and SSD SEDs) cannot be specified.
    (Note that when drives that are 6TB or larger (except SSDs and SSD SEDs) already exist in the RAID group before the expansion, these drives can be used after changing the RAID level.)

- Drive recommendations for the expansion target RAID groups are listed below.
  - The recommended drive condition is the same as when manually creating RAID groups. Also, the drive layout conditions related to the RAID level after an expansion is the same as when manually creating RAID groups. Refer to "Requirements for selecting drives" (page 511) in "Create RAID Group" for details.
  - When the Dedicated Hot Spare is registered for the expansion target RAID group, use the drive smaller than the Dedicated Hot Spare capacity.
- There are conditions for the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3 drive layout. Refer to "Conditions for the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3 drive layout" (page 508) for details. These conditions apply when the RAID level after expansion is "High Performance (RAID1+0)", "High Capacity (RAID5)", and "High Reliability (RAID6)".
  Note that these conditions are not applied to other models.

Drive selection requirements for changing the RAID level

The following conditions are also required when changing the RAID level.
- When the RAID level before and after LDE is not changed:
  The drives that are used in the RAID group before LDE was performed cannot be deleted.
- When the RAID level is changed after LDE:
  - The number of RAID group data drives (*1) after LDE cannot be less than the number before LDE.

RAID level	Drive configuration (*2)	Number of data drives
RAID1+0	nD+nM	n
RAID5	nD+1P	n
RAID6	nD+2P	n
RAID1	1D+1M	1
RAID0	nD	n

*1: "Number of data drives" indicates the number of logical drives in RAID groups that contain user data. This number is different for each RAID level.

*2: D: Data drives, M: Mirror drives, P: Parity drives

  - Drives that are not used after changing the RAID level can be deleted from the RAID group. However, not all of the drives can be deleted from a RAID group.

For details on the parameters for this function, refer to "A. Expand RAID Group" (page 1196).
For the factory default settings for this function, refer to "B. Expand RAID Group" (page 1283).

The procedure to expand RAID group capacity is as follows:

Procedure

1 Select the RAID group that is to be expanded and click [Expand] in [Action].

> **Caution**

[Expand] cannot be clicked when the following RAID group is selected.
- The RAID level is "RAID5+0" or "RAID6-FR"
- The usage is "Extreme Cache Pool"
- WSVs are registered
- The stripe size is not "64KB"

2   Select the RAID level after expansion.
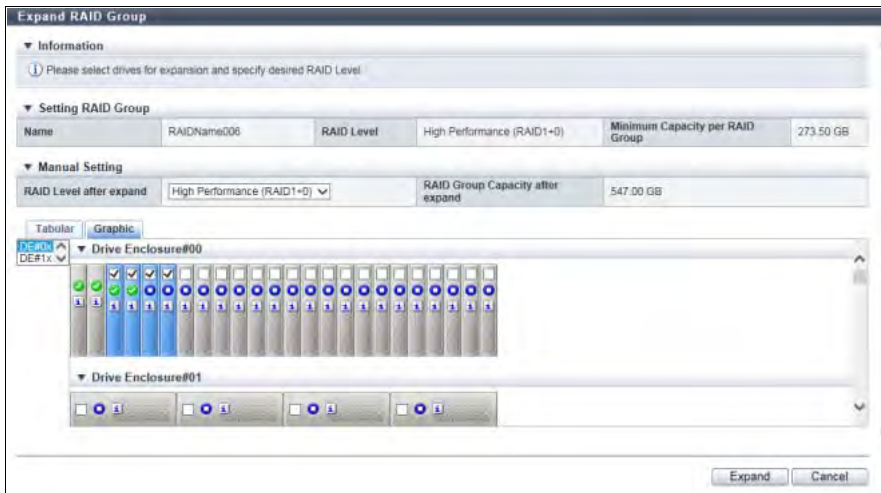
The main setting items are as follows.

● **Manual Setting**

  • RAID Level after expand

> ⊳ **Caution**

If the selected number of drives exceeds the maximum, an error screen appears. If this occurs, check the parameter settings.

3   Select drives using a list of the drives or the installation location image.

> ⊳ **Caution**

  • SSDs with an interface speed of 12Gbit/s (SSD-M/SSD-L) must be installed in a high-density drive enclosure with the same interface speed. When these SSDs are installed in a high-density drive enclosure with an interface speed of 6Gbit/s, the SSDs operate at 6Gbit/s.
  • The drive capacity that is displayed for the SSD-L differs from the product's actual capacity. For example, the drive capacity of a "1.92TB SSD-L" is displayed as "2.00 TB".

■ Selecting drives from a list of the drives

Click the [Tabular] tab to select drives from the list.

The drives that are being used in the selected RAID group and the unused drives that can be used for expansion are displayed in the list.
The main setting items are as follows.
  • Checkbox to select drives

■ Selecting drives from the installation location image

Click the [Graphic] tab to select drives from the drive installation image.
The installation images of all the drives installed in the ETERNUS DX/AF are displayed.

The main setting items are as follows.
  • DE selection list box
  • Checkbox to select drives

4 Click the [Expand] button.

5 A confirmation screen appears. Click the [OK] button.
→ RAID Group Expansion starts.

6 Click the [Done] button to return to the [RAID Group] screen.

End of procedure

Modify RAID Group Parameters

This function tunes the following parameters of each RAID group.

- Parameters Setting
  - Rebuild Priority
    Specify the level to give priority to rebuild, copyback, and redundant copy instead of host access. Specifying a larger "Rebuild Priority" value may improve rebuild, copyback, and redundant copy performance.

- Advanced Settings
  - DCMF
    DCMF is a coefficient for the command issuance amount of the drive. Specify this parameter to improve the sequential writing access performance. The bigger the value is, the more commands issue.

  - Drive Access Priority
    This mode controls the command issuance order during drive access. Changing the command issuance order improves the throughput for all of the drives.

  - Throttle
    Throttle is the proportion of the number of commands that are issued to a drive at the same time to the maximum number of commands that can be issued. By limiting the number of commands that are issued at the same time to the drive, the load on the specific RAID group (drive) is reduced.

  - Ordered Cut
    Ordered Cut is the number of commands for optimizing drive access processing (priority control). By performing the priority control of commands in increments of the specified number, a long queue time for low-priority commands can be eliminated.

▷ **Caution**

- For normal use, it is not necessary to change the default setting of the RAID group parameters.
- When the "Rebuild Priority" setting is changed, the priority is changed not only for a rebuild, copyback, and redundant copy that will be performed after the setting is changed, but also for any rebuild, copyback, and redundant copy operations that are currently being performed.
- When the target RAID group is registered as an REC Disk Buffer, do not select "High" for the "Rebuild Priority" setting. Even if "High" is selected, rebuilding, copyback, and redundant copy are performed with "Middle" priority during host access.
- Specify the same RAID group parameters for all of the RAID groups that configure a WSV. If different RAID group parameters are specified, the host access performance may be reduced.
- If "Usage" for the selected RAID group is "Extreme Cache Pool", then "Rebuild Priority", "Drive Access Priority", and "Ordered Cut" cannot be specified.
- This function cannot be used under the following conditions:
  - LDE is being performed in the ETERNUS DX/AF
  - The target RAID group belongs to an FTSP

🔵 **N o t e**

- When specifying "Throttle " or "Ordered Cut", select "Enable" for "Drive Tuning Parameter Setting" in advance.
- RAID groups that configure a WSV can be checked in the [Volume Detail] screen ([Used RAID Group] tab). Refer to "Volume Detail (Used RAID Group)" (page 814) for details.

For details on the parameters for this function, refer to "A. Modify RAID Group Parameters" (page 1197).
For the factory default settings for this function, refer to "B. Modify RAID Group Parameters" (page 1284).

The procedure to change the RAID group parameters is as follows:

Procedure

1   Select which RAID groups to change the RAID group parameters for (multiple selections can be made) and click [Modify RAID Group Parameters] in [Action].

2   Specify the RAID group parameters.

3   Click the [Modify] button

> ▶ **Caution**
>
> The response performance to the server may be affected by changing RAID group parameters.

4   A confirmation screen appears. Click the [OK] button.
     → The RAID group parameter modification starts.

5   Click the [Done] button to return to the [RAID Group] screen.

End of procedure

Assign Eco-mode Schedule (RAID Group)

This function assigns the Eco-mode schedule to the RAID groups and sets the Eco-mode action.
Refer to "Specifications of the Eco-mode function" (page 525) for details about the Eco-mode function.

Specifications of the Eco-mode function

Eco-mode is a function to reduce power consumption by stopping the drive motors or turning off the drives that configure the RAID group or TPP while the RAID group or TPP is not accessed from the host. There are three Eco-mode actions; "Drive motor off", "Drive power off", and "Drive always on".
To enable the Eco-mode, assign the Eco-mode schedule to a RAID group or TPP and select "Drive motor off" or "Drive power off" as the Eco-mode action. When Eco-mode is enabled, the drives are activated during the scheduled event period. In the time periods outside the scheduled event, the drive status is changed according to the specified Eco-mode actions. Refer to "Drive status when Eco-mode action is configured" (page 525) for details.
If the RAID group or TPP is accessed from the host while the drives are turned off or the drive motors are stopped, the drives are activated and can be accessed within 1 - 5 minutes.

Drive status when Eco-mode action is configured

Eco-mode Schedule Setting			Eco-mode General Setting		
			Enabled		Disabled
			Drive power	Drive motor	
Eco-mode Action	Drive power off	During scheduled event term	Drive power is on	Drive motor is activated	Drive power is on or the drive motor runs regardless of the schedule.
		Times other than scheduled event term (*1)	Drive power is off	Drive motor is stopped	
	Drive motor off	During scheduled event term	Drive power is on	Drive motor is activated	
		Times other than scheduled event term (*1)	Drive power is on	Drive motor is stopped	
	Drive always on		Drive power is on	Drive motor is always activated	
Eco-mode schedule is not assigned			Drive power is on	Drive motor is always activated	
Drives not registered in the RAID groups or TPP			Drive power is on	Drive motors are always stopped	

*1: If the RAID group is accessed, the drives are activated and can be accessed within 1 - 5 minutes.

▶ **Caution**

- Eco-mode is not available for the following RAID groups:
    - No volumes are created
    - Volumes other than Standard, WSV, SDV, or SDPV types are registered
    - A Storage Migration path is created in the volume
    - Configured by SSDs or SSD SEDs
    - Registered as an REC Disk Buffer
    - Registered as an EXCP
- RAID groups to which the SDPVs belong cannot be selected as the target for drive motor management by the Eco-mode.
- When using Eco-mode, make sure to set the time/date correctly. If the time/date of the ETERNUS DX is wrong, processes used for stopping and starting the drive motor cannot be performed per the Eco-mode schedule.
- When the "External" (drive motor management by the Storage Foundation Software ETERNUS SF) is selected, it can be changed to the Eco-mode schedule. But when the Eco-mode schedule is selected, it cannot be changed to "External".
- If any of the following conditions occur when drive motors are stopped, the drive will be started even when the drive motor is inactive. The Eco-mode schedule is re-enabled when the conditions listed have finished. (*1)
    - The status of the RAID group is other than "✅ Available"
    - Functions that change the RAID group or the volume configuration are being performed
    - Rebuild or copyback is being performed in the target RAID group
    - LDE is being performed in the target RAID group
    - Formatting is being performed in the volumes registered in the RAID group
    - RAID migration is being performed in the volumes registered in the RAID group
    - Advanced Copy is being performed in the volume registered in the RAID group (copy session status is not "Suspend" or the phase is not "Tracking")
    - Encryption is being performed in the volumes registered in the RAID group
    - ODX Buffer volumes exist in the RAID group
    - During maintenance
    - A disk diagnosis or a RAID group diagnosis is being performed or G-List is being exported
    - A module error related to the access paths of the controller modules and drives is detected
- Specify the same Eco-mode schedule for all of the RAID groups that configure a WSV. If a different Eco-mode schedule is specified, activation of a stopped drive is required to accept the host access, and the performance of the response may be reduced.
- If the server OS or software periodically accesses the ETERNUS DX, the drive motor may not stop even when the Eco-mode is enabled.(*1)

　*1:　This does not only affect the motor stoppage, but includes the cutting of the drives power as well.

🔵 **N o t e**

- Before applying Eco-mode for RAID groups, use the procedure in <u>"Modify Eco-mode General Setting" (page 94)</u> to enable the Eco-mode setting for the ETERNUS DX S4/S3 series.
- Set the Eco-mode schedule using the procedure in <u>"Modify Eco-mode Schedule" (page 98)</u>.
- When selecting multiple RAID groups as the target of the Eco-mode, the same Eco-mode schedule can be specified for all the selected RAID groups.
- RAID groups that configure a WSV can be checked in the [Volume Detail] screen. Refer to <u>"Volume Detail (Used RAID Group)" (page 814)</u> for details.
- To use Eco-mode for RAID groups registered in Thin Provisioning Pools, assign the Eco-mode schedule to the Thin Provisioning Pools. Refer to <u>"Assign Eco-mode Schedule (Thin Provisioning Pool)" (page 565)</u> for details.
- Note that Eco-mode cannot be set to RAID groups registered in the FTSP.

For details on the parameters for this function, refer to "A. Assign Eco-mode Schedule (RAID Group)" (page 1200).
For the factory default settings for this function, refer to "B. Assign Eco-mode Schedule (RAID Group)" (page 1284).

The procedure to set Eco-mode schedule for the RAID group is as follows:

Procedure

1   Select the RAID group to assign the Eco-mode schedule (multiple selections can be made) to
      and click [Assign Eco-mode] in [Action].

2   Select the Eco-mode schedule that is to be assigned and select the Eco-mode action.
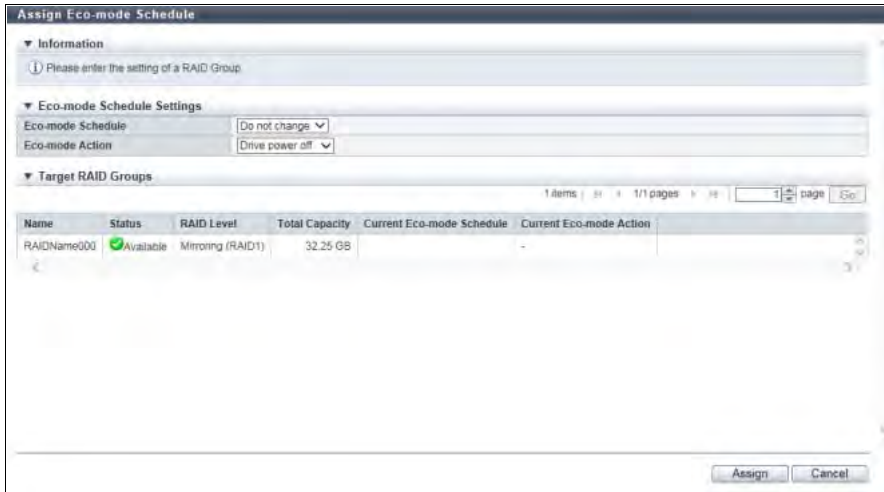
The main setting items are as follows.

● **Eco-mode Schedule Setting**

  • Eco-mode Schedule

  • Eco-mode Action

3   Click the [Assign] button

4   A confirmation screen appears. Click the [OK] button.
      → Assigning of the Eco-mode schedule starts.

5   Click the [Done] button to return to the [Eco-mode Schedule] screen.

                                                                                    End of procedure

Set Key Group (RAID Group)

This function registers or deletes any RAID groups that are configured with SEDs in the key group.
The key group combines all of the RAID groups that use the same SED authentication key.
RAID groups in the key group are managed by the SED authentication key that is obtained from the key server. One key group can be created in the ETERNUS DX/AF.
If a RAID group is not registered in the key group, the RAID group is managed by the common key.

> ▷ **Caution**

- Before registering RAID groups in the key group, perform the following settings:

    (1) Create a key group.

    (2) Allocate the master server or the slave server to the key group.

    (3) Set the key for the key group and confirm that the key status is "Normal".

    Refer to "Create Key Group" (page 174) and "Update SED Authentication Key" (page 177) for details.

- RAID groups cannot be added to the key group when the RAID groups are configured by SEDs for which the common key is not registered.

> ● **N o t e**

- Information on the RAID groups that are configured by SEDs and registration status to the key group can be checked in the [SED Key Group] screen. Refer to "SED Key Group" (page 882) for details.
- Use the [Key Group] screen to check the SED authentication key information and the SSL/KMIP certificate information that is used for the key group. Refer to "Key Group" (page 653) for details.
- Even when operations are being performed for volumes that configure a key management target RAID group, this RAID group can be added to or deleted from the key group.

For details on the parameters for this function, refer to "A. Set Key Group (RAID Group)" (page 1200).
For the factory default settings for this function, refer to "B. Set Key Group (RAID Group)" (page 1284).

The procedure to register or delete the RAID groups in the key group is as follows:

Procedure

1	Select which RAID group to add to or delete from the key group (multiple selections can be made), and click [Set Key Group] in [Action].

> ▷ **Caution**

Settings for the selected RAID groups are applied in a single process. To add or delete multiple RAID groups, only select the RAID groups that are to be added or deleted (do not select all of the RAID groups).

2 Select the key group setting state.
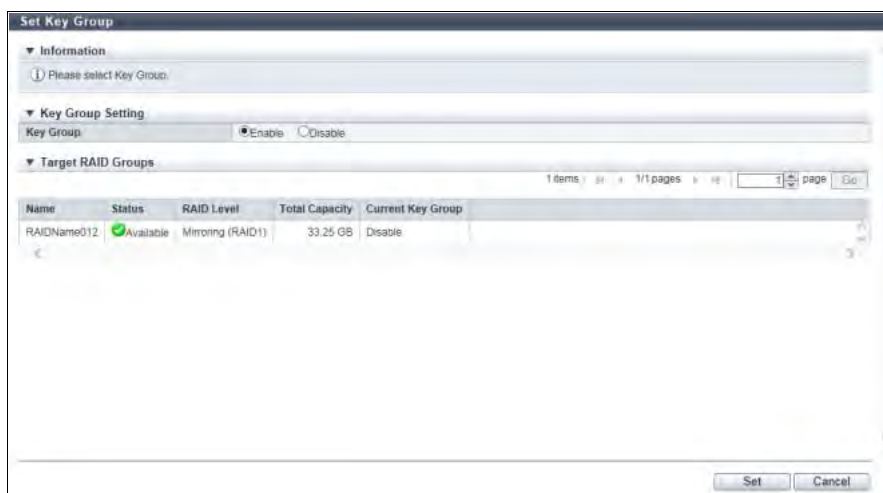
The main setting item is as follows.

● **Key Group Setting**

• Key Group

3 Click the [Set] button

> **Caution**

If an error screen appears under the following conditions, check the parameter settings.
   • If there is a RAID group with a status other than " ✅ Available"
   • If the status of the key in the key group is not "Normal", "Expiration", or "Modifying"

4 A confirmation screen appears. Click the [OK] button.
   → Key group setting starts.

5 Click the [Done] button to return to the [SED Key Group] screen.

End of procedure

Recovery SED

This function recovers the RAID groups that are in locked status.
"Locked status" indicates that the RAID group is blocked because the SED authentication key could not be obtained from the key server.

Conditions that can be recovered by using the "Recovery SED" function

- Locked status when enabling or forcibly enabling a disk
- Locked status when forcibly recovering or forcibly enabling a RAID group
- Locked status when recovering from DE failure
- Locked status when applying disk firmware
- Locked status when starting an operation after a disk has been stopped by the Eco-mode
- Locked status when communication with the key server failed when starting or rebooting the ETERNUS DX/AF

> ▷ **Caution**

This function can only be used to recover locked RAID groups. This function cannot be used for recovering blocked RAID groups that occur due to errors that are not listed above. Recovery operation of RAID groups for which the status is "❌ Broken" can be performed by using the [Recover RAID Group] function. Note that the [Recover RAID Group] function can be performed by a maintenance engineer who has the "Maintenance Operation" policy.

> ⬤ **N o t e**

- SED recovery from locked status is performed according to the "Recovery Mode" setting of the key group. The "Recovery Mode" setting can be checked in the [Key Group] screen. Refer to <u>"Key Group" (page 653)</u> for details.
  - When "Recovery Mode" is "Automatic", the ETERNUS DX/AF monitors the RAID group periodically. If a locked RAID group is detected, recovery is performed on the RAID group by the ETERNUS DX/AF automatically.
  - When "Recovery Mode" is "Manual", use this function to manually recover the locked RAID group.
- "Recovery Mode" can be specified when creating a key group. Refer to <u>"Create Key Group" (page 174)</u> for details.
- This function can be used even if a key group is not created or no locked RAID groups are exist. If there are no locked RAID groups that can be recovered, this function completes successfully.

The procedure to recover RAID groups that are in the locked status is as follows:

Procedure

1   Click [Recovery SED] in [Action].

2   A confirmation screen appears. Click the [OK] button.
→ Recovery of the SED starts.

3   Click the [Done] button to return to the [SED Key Group] screen.

End of procedure

External RAID Group Management

This section describes External RAID Group management.

External RAID Group management provides the following functions:

- Create External RAID Group
- Delete External RAID Group
- Recover External RAID Group

Create External RAID Group

This function creates External RAID Groups from External Drives.
This function is available only if the Non-disruptive Storage Migration License has been registered.

The maximum number of External RAID Groups for each model

The maximum number of External RAID Groups that can be created in the ETERNUS DX/AF varies depending on each model. The following table shows the maximum number of External RAID Groups that can be created for each model.

Model	The maximum number of External RAID Groups
ETERNUS DX60 S4/DX60 S3	512
ETERNUS DX100 S4/DX100 S3	2048
ETERNUS DX200 S4/DX200 S3	4096
ETERNUS DX500 S4/DX500 S3	8192
ETERNUS DX600 S4/DX600 S3	8192
ETERNUS DX8100 S3	8192
ETERNUS DX8700 S3	16384
ETERNUS DX8900 S3	16384
ETERNUS AF250 S2/AF250	4096
ETERNUS AF650 S2/AF650	8192
ETERNUS DX200F	4096

▷ **Caution**

- Creating an External Drive is required in advance. Refer to "Create External Drive" (page 192) for details.
- The Controlling CM of the External RAID Group is automatically allocated.
- The following operations are not available for the created External RAID Groups:
    - Changing the External RAID Group information (rename, change Controlling CM, expand capacity, modify parameters, and assign Eco-mode schedule)
    - Diagnosing External RAID Groups
    - Creating TPPs using External RAID Groups

🔵 **N o t e**

- One External RAID Group consists of one External Drive. If multiple External Drives are selected, the same number of External RAID Groups are created with a single operation.
- Created External RAID Groups are displayed in the [External RAID Group] screen. Refer to "External RAID Group" (page 890) for details.
- External RAID Groups can be deleted. Refer to "Delete External RAID Group" (page 533) for details.
- External RAID Groups can be recovered. Refer to "Recover External RAID Group" (page 533) for details.

For details on the parameters for this function, refer to .

The procedure to create External RAID Groups is as follows:

Procedure

1 Click [Create] in [Action].

2 Specify the External RAID Group detailed information.
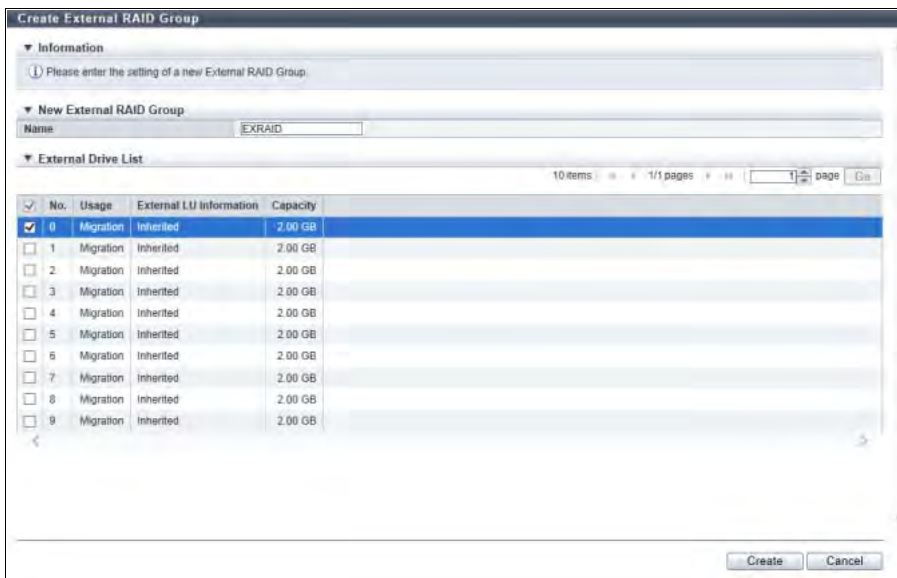
The main setting items are as follows.

● **New External RAID Group**

• Name

● **External Drive List**

• Checkbox to select External Drives

> **N o t e**
>
> • Select the checkbox to the left of "No." to create External RAID Groups from all External Drives.
> • If no External Drives are selected, the [Create] button cannot be clicked.

> ▶ **Caution**
>
> If an error screen appears under the following conditions, check the parameter settings.
> • The status of the selected External Drive is not " Present"
> • The number of External RAID Groups for each model exceeds the maximum number

3 Click the [Create] button

4 A confirmation screen appears. Click the [OK] button.
→ External RAID Group creation starts.

5 Click the [Done] button to return to the [External RAID Group] screen.

<div align="right">

End of procedure ■

</div>

Delete External RAID Group

This function deletes the registered External RAID Groups.
This function is available only if the Non-disruptive Storage Migration License has been registered.

> ▷ **Caution**
>
> External RAID Groups where External Volumes are registered cannot be deleted. Delete the External Volumes before starting this function. Refer to "Delete Volume" (page 268) for details.

> ⬤ **N o t e**
>
> • The list of External RAID Groups is displayed in the [External RAID Group] screen. Refer to "External RAID Group" (page 890) for details.
> • Use the [Volume] screen to check the External RAID Groups where External Volumes are registered. Refer to the "Volume (Basic Information)" (page 775) for details.

The procedure to delete External RAID Groups is as follows:

Procedure

1 Select the External RAID Group that is to be deleted (multiple selections can be made) and click [Delete] in [Action].

2 A confirmation screen appears. Click the [OK] button.

→ The External RAID Group deletion starts.

3 Click the [Done] button to return to the [External RAID Group] screen.

<div align="right">

End of procedure ■

</div>

Recover External RAID Group

This function recovers the External RAID Groups in the error response state.
This function is available only if the Non-disruptive Storage Migration License has been registered.

The procedure to recover an External RAID Group is as follows:

Procedure

1 Select the External RAID Group that is to be recovered and click [Recover] in [Action].

> ▷ **Caution**
>
> • [Recover] cannot be clicked if the selected External RAID Group is not in the "✖ Broken" state.
> • If an error occurs in the access path to the External RAID Group, an error screen appears. Check the access path settings.

2 A confirmation screen appears. Click the [OK] button.

→ Recovery of the External RAID Group starts.

3 Click the [Done] button to return to the [External RAID Group] screen.

End of procedure

2 A confirmation screen appears. Click the [OK] button.

→ Recovery of the External RAID Group starts.

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6. Thin Provisioning Pool Management

This chapter describes Thin Provisioning Pool management.

When using functions in the Action area, select the desired function from the Action area that is displayed in the status display screen.
The functions in the Action area for Thin Provisioning can be performed from the following display functions:

Functions in the Action area for Thin Provisioning	Display function
Set Thin Provisioning	• Thin Provisioning Pool (Basic Information)
Create Thin Provisioning Pool	
Delete Thin Provisioning Pool	
Rename Thin Provisioning Pool	
Expand Thin Provisioning Pool	
Format Thin Provisioning Pool (All Area)	
Format Thin Provisioning Pool (Unformatted Area)	
Set Deduplication/Compression	
Modify Threshold Thin Provisioning Pool	• Threshold (Thin Provisioning Pool)
Modify Cache Parameters (Thin Provisioning Pool)	
Assign Eco-mode Schedule (Thin Provisioning Pool)	• Eco-mode Schedule (Thin Provisioning Pool)
Start Balancing Flexible Tier Pool	• Flexible Tier Pool (Basic Information)
Stop Balancing Flexible Tier Pool	• Flexible Tier Pool Detail (Basic)
	• Flexible Tier Pool Detail (Flexible Tier Sub Pool)

Set Thin Provisioning

This function enables or disables the use of the Thin Provisioning function and sets the maximum pool capacity. The maximum pool capacity is the maximum total capacity for TPPs and FTRPs that can be created in the ETERNUS DX/AF. The chunk size is determined by the specified maximum pool capacity.
Refer to "The maximum number of pools, maximum pool capacity, and determined chunk size for each model" (page 539) for details.

> ▷ **Caution**
>
> - Note that the Thin Provisioning function is not provided for the ETERNUS DX60 S4/DX100 S4/DX200 S4 1CM model and the ETERNUS DX60 S3/DX100 S3/DX200 S3 1CM model. In addition, the [Thin Provisioning] navigation is not displayed for these models.
> - If the maximum pool capacity is already being used with the controller firmware version earlier than V10L70, even if the maximum pool capacity is expanded with a controller firmware upgrade, additional pools cannot be created.
>   For example, if the ETERNUS DX8700 S3/DX8900 S3 is used and the total capacity of the existing pools is "2 PB" (chunk size = 21 MB), even if this function is used to expand the maximum pool capacity from "2 PB" (chunk size = 21 MB) to "4 PB" (chunk size = 42 MB), the capacity that can be used to create new pools is fixed to "0". If the controller firmware version is earlier than V10L70 and the use of the Thin Provisioning Pool capacity is expected to be larger than the current maximum pool capacity, update the controller firmware version to V10L70 or later, and then expand the maximum pool capacity as soon as possible. The capacity for pools that can be newly created in the ETERNUS DX/AF is displayed in the [Create Thin Provisioning Pool] screen. Refer to "Create Thin Provisioning Pool" (page 539) for details.
> - If the Virtual Volume function is enabled, the current state (enabled or disabled) of the Thin Provisioning function cannot be changed. To check whether the Virtual Volume function is enabled or disabled, use the [System] screen. Refer to "System (Basic Information)" (page 635) for details.
> - The FTRP capacity that can be used for VVOLs is different from the maximum pool capacity. Refer to "The maximum FTRP capacity that can be used as VVOLs" (page 537) for details.
> - The Thin Provisioning function cannot be disabled in the following conditions:
>   - TPPs exist in the ETERNUS DX/AF
>   - "TPV balancing" is selected for the Thin Provisioning allocation mode
>   - The Automated Storage Tiering feature is enabled (*1)
>   *1:   Enabling or disabling the Automated Storage Tiering feature is performed by using ETERNUS SF Storage Cruiser.
> - If the following conditions are all satisfied, the Thin Provisioning function cannot be enabled.
>   - The ETERNUS DX8700 S3 is used
>   - "GS License" has been registered in the ETERNUS DX (*1)
>   - The usable memory size is 8GB/CM
>   (or "Cache expansion License for DX8700 S3 GS(16GB to 32GB)" has not been registered (*1))
>   *1:   The registration status of "GS License" and "Cache expansion License" can be checked when logged in using a user account with the "Maintenance Operation" policy.
> - Note that the following pool capacity may not be available depending on the copy table size, the REC Buffer size, the total TFOV capacity (*1), and the registration of the Non-disruptive Storage Migration License.
>   - For the ETERNUS DX8700 S3/DX8900 S3
>   1.5 PB or larger
>   - For the ETERNUS DX600 S4, the ETERNUS DX600 S3, the ETERNUS AF650 S2, and the ETERNUS AF650
>   1024 TB or larger
>   *1:   The total TFOV capacity indicates the total capacity of the volumes that are used for the Storage Cluster function in an ETERNUS DX/AF. When the total TFOV capacity is expanded from the default capacity, the shared area in the cache memory is used. Refer to "Default TFOV capacity for each model" (page 537) for details.

> **Note**
>
> If "Disable" is selected for the Thin Provisioning function, make sure to change the Thin Provisioning allocation mode from "TPV balancing" to the default "TPP balancing" setting. Refer to "Setup Subsystem Parameters" (page 65) for details.

The maximum FTRP capacity that can be used as VVOLs

Model	The maximum FTRP capacity that can be used as VVOLs
ETERNUS DX100 S4/DX100 S3 ETERNUS DX200 S4/DX200 S3	256 TB
ETERNUS DX500 S4/DX500 S3	384 TB
ETERNUS DX600 S4/DX600 S3	1024 TB
ETERNUS DX8100 S3	128 TB
ETERNUS DX8700 S3 ETERNUS DX8900 S3	2 PB
ETERNUS AF250 S2/AF250	256 TB
ETERNUS AF650 S2/AF650	1024 TB
ETERNUS DX200F	256 TB

> **Caution**
>
> The actual available capacity that can be used as a VVOL is limited depending on whichever is smaller, the maximum FTRP capacity or the maximum pool capacity. For example, if the ETERNUS DX600 S3 is used and the maximum pool capacity is "128 TB", the actual capacity that can be used for VVOLs is 128 TB even if the maximum FTRP capacity that can be used for VVOLs is "1024 TB".

Default TFOV capacity for each model

Model	Default capacity
ETERNUS DX200 S4/DX200 S3	256 TB
ETERNUS DX500 S4/DX500 S3	384 TB
ETERNUS DX600 S4/DX600 S3	768 TB
ETERNUS DX8100 S3	128 TB
ETERNUS DX8700 S3 ETERNUS DX8900 S3	1 PB
ETERNUS AF250 S2/AF250	256 TB
ETERNUS AF650 S2/AF650	768 TB
ETERNUS DX200F	256 TB

For details on the parameters for this function, refer to "A. Set Thin Provisioning" (page 1202).
For the factory default settings for this function, refer to "B. Set Thin Provisioning" (page 1285).

The procedure to switch between "Enable" or "Disable" for the Thin Provisioning function and set the maximum pool capacity in the ETERNUS DX/AF are as follows:

Procedure

1 Click [Set Thin Provisioning] in [Action].

2 Select whether to enable or disable the Thin Provisioning function and specify the maximum pool capacity.
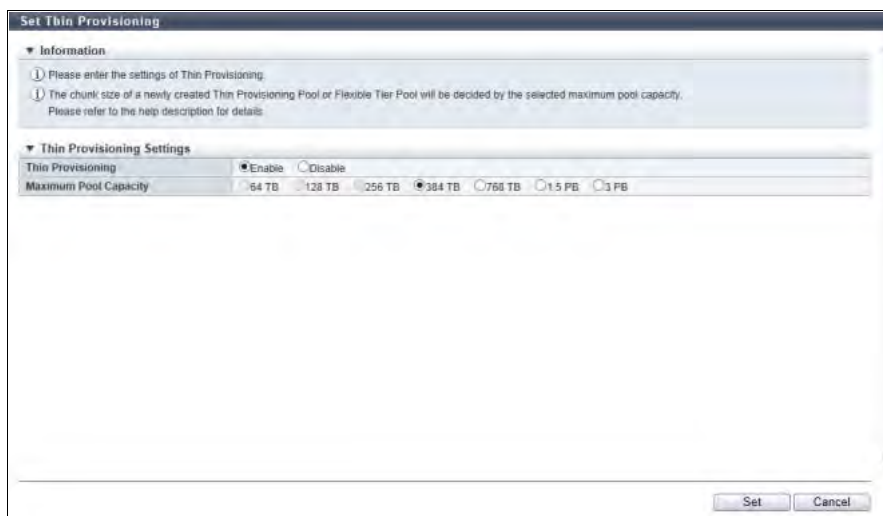
The main setting items are as follows.

● **Thin Provisioning Settings**

- Thin Provisioning
- Maximum Pool Capacity

▷ **Caution**

If the Virtual Volume function is being used and the chunk size is changed as a result of a maximum pool capacity expansion, a warning message related to the Virtual Volume function appears. Check the parameter settings.

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
→ The Thin Provisioning setting starts.

5 Click the [Done] button to return to the [Settings] screen.

End of procedure

Create Thin Provisioning Pool

This function creates a Thin Provisioning Pool.

The maximum number of pools, maximum pool capacity, and determined chunk size for each model

Model	Maximum Number of Pools (*1)	Maximum Pool Capacity (*2)			
ETERNUS DX60 S4/DX60 S3	48	32 TB, 64 TB, 128 TB	256 TB	512 TB	1024 TB
ETERNUS DX100 S4/DX100 S3	72	32 TB, 64 TB, 128 TB, 256 TB	512 TB	1024 TB	2 PB
ETERNUS DX200 S4/DX200 S3	132				
ETERNUS DX500 S4/DX500 S3	256	64 TB, 128 TB, 256 TB, 384 TB	768 TB	1.5 PB	3 PB
ETERNUS DX600 S4/DX600 S3	256	128 TB, 256 TB, 512 TB, 768 TB, 1024 TB	2 PB	4 PB	8 PB
ETERNUS DX8100 S3	24	64 TB, 128 TB	256 TB	512 TB	1024 TB
ETERNUS DX8700 S3	256	256 TB, 512 TB, 768 TB, 1024 TB, 1.5 PB, 2 PB	4 PB	8 PB	16 PB
ETERNUS DX8900 S3					
ETERNUS AF250 S2/AF250	24	32 TB, 64 TB, 128 TB, 256 TB	512 TB	1024 TB	2 PB
ETERNUS AF650 S2/AF650	96	128 TB, 256 TB, 512 TB, 768 TB, 1024 TB	2 PB	4 PB	8 PB
ETERNUS DX200F	12	32 TB, 64 TB, 128 TB, 256 TB	512 TB	1024 TB	2 PB
Determined chunk size (*3)		21 MB	42 MB	84 MB	168 MB

*1:   Up to 256 pools can be created. When the maximum installation number of drives of a model is 512 or less, the maximum number of pools is half the maximum installation number of drives. The maximum pool number is the maximum total number of TPPs and FTSPs that can be created in the ETERNUS DX/AF.

*2:   The maximum pool capacity is specified when "Enable" is selected for the Thin Provisioning function. Refer to "Set Thin Provisioning" (page 536) for details. The maximum pool capacity is the maximum total capacity for TPPs and FTRPs that can be created in the ETERNUS DX/AF.

*3:   Chunk size is a physical capacity that is assigned to virtual logical volumes created in TPPs and FTRPs when a write occurs from the host. The chunk size is determined according to the "Maximum Pool Capacity" of the ETERNUS DX/AF when a new TPP is created. The chunk size for the created TPP cannot be changed. The chunk size for each pool is displayed in the TPP list and the FTRP list.
If the controller firmware for the ETERNUS DX/AF is upgraded to V10L70 or later, the default chunk size (21 MB) is set.

The number of member drives in each RAID group

The number of member drives for each RAID level is listed in the following table.

RAID level	Number of member drives
High Performance (RAID1+0)	4, 8, 16, 24
High Capacity (RAID5)	4, 5, 7, 8, 9, 13
High Reliability (RAID6)	6, 8, 9, 10
High Reliability (RAID6-FR)	13, 17, 31
Mirroring (RAID1)	2
Striping (RAID0)	4

▷ **Caution**

- When creating TPPs, enable the Thin Provisioning function. Refer to "Set Thin Provisioning" (page 536) for details.
- For the ETERNUS DX60 S4/DX60 S3, SEDs cannot be used for configuring a TPP.
- The encryption function cannot be used for the ETERNUS DX60 S4/DX60 S3.
- When encryption mode is disabled, TPP encrypted by CM cannot be created.
- Once a TPP has been created, the encryption status cannot be changed.
- The chunk size is determined according to the "Maximum Pool Capacity" of the ETERNUS DX/AF when a new TPP is created. If TPPs with different chunk sizes exist in the ETERNUS DX/AF, the maximum pool capacity might not be used to create TPPs. Refer to "Set Thin Provisioning" (page 536) for details.
- If the error message "The process was aborted because it exceeds executable format size." appears, TPPs cannot be created. Reduce the "Thin Provisioning Pool Total Capacity" and re-execute this function.
- TPPs cannot be created in the following conditions:
  - When the maximum number of Thin Provisioning Pools are already registered in the ETERNUS DX/AF
  - When the maximum capacity of Thin Provisioning Pools are already registered in the ETERNUS DX/AF
  - When the resources for creating TPPs (such as the number of RAID groups, the number of volumes, etc.) are insufficient
    (When the maximum number of RAID groups or volumes already exists, TPPs cannot be created)
  - The control information for Thin Provisioning is being re-configured in the ETERNUS DX8700 S3/DX8900 S3 (*1)
  - *1: If the system message indicates a re-configuration, the control information for Thin Provisioning is being synchronized in each CM. Wait at least five minutes before performing this function again.

🔵 **N o t e**

- After a TPP is created, the TPP is formatted automatically. To check the progress of formatting ("Progress", "Estimated Time Left", and "Remaining Size"), refer to "Thin Provisioning Pool Detail (Basic)" (page 899). Click the TPP name to display the basic information.
- To expand the TPP capacity after a TPP is created, refer to "Expand Thin Provisioning Pool" (page 549).
- To rename the TPP after a TPP is created, refer to "Rename Thin Provisioning Pool" (page 548).
- To change the TPP threshold after a TPP is created, refer to "Modify Threshold Thin Provisioning Pool" (page 561).
- Deduplication, Compression, or both Deduplication and Compression can be enabled for a TPP when it is created. Refer to "Deduplication/Compression setting for TPPs" (page 540) for details.
- To check the current maximum pool capacity, refer to "Settings (Thin Provisioning)" (page 922).
- In the controller firmware versions earlier than V10L32, "Online SED" is displayed as "SED".

Deduplication/Compression setting for TPPs

The following two methods are available to set Deduplication/Compression for the TPPs.

- Setting Deduplication/Compression during a TPP creation (recommended)
  Create TPPs and perform the Deduplication/Compression setting with a single operation.
  Set the following parameters when creating TPPs.
  - Select "Automatic" for "Create Mode".
  - Enable "Deduplication", "Compression", or both.

  To set Deduplication/Compression during the creation of a TPP, a system configuration (including drives and internal resources) that allows the creation of at least two RAID groups in a TPP is required. An error occurs for this function if two RAID groups cannot be created. Refer to "Set Deduplication/Compression" (page 557) for other required conditions.

- Setting Deduplication/Compression after a TPP creation
  With this method, users can create TPPs according to the customer environment. (For example, a user can specify RAID groups that configure the target TPP.)
  Set the following parameters when creating TPPs.
    - Select "Manual" for "Create Mode".
    - If the chunk size of the TPPs is not "21 MB", select the "Deduplication/Compression Ready" checkbox in the "Chunk Size" field
    - Perform the Deduplication/Compression setting after a TPP is created.
      (Refer to "Set Deduplication/Compression" (page 557) for details.)

    The creation of at least two RAID groups in the TPP is recommended for setting Deduplication/Compression after the TPP is created.

To create a Deduplication/Compression target TPP, using the method described in "Setting Deduplication/Compression during a TPP creation" is recommended because the TPP creation and the Deduplication/Compression setting can both be performed with a single operation.

For details on the parameters for this function, refer to "A. Create Thin Provisioning Pool" (page 1204).
For the factory default settings for this function, refer to "B. Create Thin Provisioning Pool" (page 1285).
There are two methods to create a TPP: automatic drive selection and manual drive selection.

■ Automatically selecting drives to create TPPs

To create a new TPP automatically, select Drive Type and RAID Level, and input TPP capacity. The Controlling CM of the RAID groups that configure the TPP is determined automatically.

> ▷ **Caution**

The drives must be selected manually for the following cases.
- SSDs with an interface speed of 12Gbit/s (SSD-M/SSD-L) are installed in a high-density drive enclosure with an interface speed of 6Gbit/s.
  If drives are automatically selected, all the SSDs operate at 6Gbit/s for any of the following conditions.
    - SSDs in the 6Gbit/s high-density drive enclosures are selected
    - SSDs in both the 6Gbit/s high-density drive enclosures and other drive enclosures are selected
- Drives that satisfy all of the following conditions are installed in the ETERNUS DX/AF.
    - The drive types are the same
    - The drive capacities are the same
    - The sector format (AF-compliant/non-AF-compliant) is different

The procedure to create a TPP by selecting drives automatically is as follows:

Procedure

1   Click [Create] in [Action].

2 Select "Automatic" for "Create Mode" and specify the other parameters.

The main setting items are as follows.

● **New Thin Provisioning Pool**

• Name

● **Automatic Setting**

• Drive Type

• RAID Level

• Select Drives

• Thin Provisioning Pool Total Capacity

• Alarm

• Deduplication

• Compression

▷ **Caution**

• When using SSDs, the SSD types (SSD-M/SSD-L/SSD) cannot be specified. SSDs that are the same type and have the necessary capacity in a RAID group to create TPPs are selected. If the number of SSDs with the same type is insufficient for configuring a RAID group, a TPP is not created. In this case, reduce the total capacity of the TPP. If multiple RAID groups are created in a TPP, different SSD types may be used for the RAID groups. SSD types have no order of priority.
  When using SSD SEDs, the SSD types (SSD-M SED/SSD-L SED) cannot be specified. If "SSD SED" is selected, drives are operated in the same way as SSDs.

• If "High Performance (RAID1+0)" or "High Capacity (RAID5)" is selected for the RAID level, RAID groups cannot be created with drives that are 6TB or larger (except SSDs and SSD SEDs).

• If an error screen appears under the following conditions, check the parameter settings.
  - When the total value of TPP capacity to be created and existing pool capacity exceeds the maximum pool capacity for each model
  - When a TPP that meets the specified conditions (drive type, RAID level, and capacity that is equal to or larger than the specified value) cannot be created with the installed drives in the ETERNUS DX/AF

> 🔵 **N o t e**
>
> The maximum capacity that can be used to create new TPPs is displayed to the right of the setting field for "Thin Provisioning Pool Total Capacity" in the "Max: xx.xx [PB/TB/GB/MB]" format.

3 Click the [Create] button

4 A confirmation screen appears. Click the [OK] button.
→ Create Thin Provisioning Pool starts.

5 Click the [Done] button to return to the [Thin Provisioning Pool] screen.

End of procedure

■ Manually selecting drives to create TPPs

To create a new TPP manually, select Drive Type, RAID Level, and the drive that configures the TPP.

Requirements for selecting drives

- The conditions for RAID groups in the TPP are as follows:
  - The RAID level (High Performance (RAID1+0) / High Capacity (RAID5) / High Reliability (RAID6) / High Reliability (RAID6-FR) / Mirroring (RAID1) / Striping (RAID0)) must be the same
  - The number of member drives in the RAID group must be the same
  - The drive type (Online/Nearline/SSD/Online SED/Nearline SED/SSD SED) must be the same
    (If "Online" is selected for the drive type, "Online" type drives and "Nearline" type drives can be used in the same RAID group. However, using only "Online" type drives is recommended. If "Online SED" is selected for the drive type, "Online SED" type drives and "Nearline SED" type drives can be used in the same RAID group. However, using only "Online SED" type drives is recommended. This is because the available capacity and the access performance may be reduced when these drives are used in the same RAID group.)
  - When the RAID level is "High Performance (RAID1+0)" or "High Capacity (RAID5)", the drive must be smaller than 6TB (except SSDs and SSD SEDs)
- The recommended drive configuration of the RAID group in the TPP is the same as when manually creating RAID groups. Also, the drive layout conditions related to the RAID level is the same as when manually creating RAID groups. Refer to "Requirements for selecting drives" (page 511) in "Create RAID Group" for details.
- There are conditions for the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3 drive layout. Refer to "Conditions for the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3 drive layout" (page 508) for details. These conditions apply when the RAID level is "Mirroring (RAID1)", "High Performance (RAID1+0)", "High Capacity (RAID5)", "High Reliability (RAID6)", and "High Reliability (RAID6-FR)".
  Note that these conditions are not applied to other models.

The procedure to create a TPP by selecting drives manually is as follows:

Procedure

1 Click [Create] in [Action].

2 Select "Manual" for "Create Mode" and specify the other parameters.

The main setting items are as follows.

● **New Thin Provisioning Pool**

• Name

● **Manual Setting**

• Drive Type

• RAID Level

• Fast Recovery Configuration

• Alarm

• Chunk Size

> 🔵 **N o t e**
>
> The maximum capacity that can be used to create new TPPs is displayed in the "Thin Provisioning Pool Total Capacity" field in the "Max: xx.xx [PB/TB/GB/MB]" format.

3   Click the [Add] button.

→   The [Add RAID Group] screen is displayed.

4   Select the Controlling CM of the RAID group and select all the drives to be registered in the RAID group from the list or from the installation image.

■   Selecting drives from a list of the drives

Click the [Tabular] tab to select drives from the list. Only unused drives are displayed on the list.

The main setting items are as follows.
- Checkbox to select drives

■   Selecting drives from the installation location image

Click the [Graphic] tab to select drives from the drive installation image. The installation images of all the drives installed in the ETERNUS DX/AF are displayed. Checkboxes are displayed for unused drives.

The main setting items are as follows.
- DE selection list box
- Checkbox to select RAID groups

▷ **Caution**

- SSDs with an interface speed of 12Gbit/s (SSD-M/SSD-L) must be installed in a high-density drive enclosure with the same interface speed. When these SSDs are installed in a high-density drive enclosure with an interface speed of 6Gbit/s, the SSDs operate at 6Gbit/s.
- The drive capacity that is displayed for the SSD-L differs from the product's actual capacity. For example, the drive capacity of a "1.92TB SSD-L" is displayed as "2.00 TB".

5 Click the [OK] button.
→ The screen returns to the previous screen. The created RAID group is displayed in the RAID group list.

⬤ **N o t e**

- Click the [RAID Level] link in the RAID group list for the existing RAID group to perform the following operations.
  - The number of member drives can be checked. The drives with the checkbox selected in the displayed screen are the member of the RAID group.
  - The Controlling CM and configuration drives of the RAID group can be changed.
- Click the [Delete] button of the target RAID group area in the RAID group list to delete the newly added RAID group.

6 When creating multiple RAID groups that configure a TPP, repeat Step 3 through Step 5.

▷ **Caution**

If the total value of TPP capacity to be created and existing pool capacity exceeds the maximum pool capacity for each model, an error screen appears. Check the parameter settings.

7 After creating a RAID group that configures the TPP, click the [Create] button.

8 A confirmation screen appears. Click the [OK] button.
→ Create Thin Provisioning Pool starts.

9 Click the [Done] button to return to the [Thin Provisioning Pool] screen.

End of procedure

Delete Thin Provisioning Pool

This function deletes a Thin Provisioning Pool.

> ▷ **Caution**
>
> - TPPs that have volumes registered cannot be deleted. When deleting a TPP, delete the volumes in advance. To delete a volume, refer to "Delete Volume" (page 268).
> - TPPs cannot be deleted if Deduplication or Compression is enabled. When deleting TPPs, disable Deduplication and Compression for the relevant TPPs in advance. Refer to "Set Deduplication/Compression" (page 557) for details.

> ◉ **N o t e**
>
> - After deleting a TPP, all the RAID groups that configure the TPP are also deleted.
> - Use the [Thin Provisioning Pool] screen to check whether Deduplication or Compression is set for the relevant TPP. Refer to "Thin Provisioning Pool (Basic Information)" (page 896) for details.

The procedure to delete a Thin Provisioning Pool is as follows:

Procedure

1   Select the TPP to be deleted (multiple selections can be made) and click [Delete] in [Action].

2   A confirmation screen appears. Click the [OK] button.
→ Delete Thin Provisioning Pool starts.

3   Click the [Done] button to return to the [Thin Provisioning Pool] screen.

End of procedure

Rename Thin Provisioning Pool

This function changes a Thin Provisioning Pool name.
Multiple TPPs can be renamed with a single operation.

For details on the parameters for this function, refer to "A. Rename Thin Provisioning Pool" (page 1212).
For the factory default settings for this function, refer to "B. Rename Thin Provisioning Pool" (page 1286).

The procedure to rename TPP is as follows:

Procedure

1   Select the TPP to be renamed (multiple selections can be made) and click [Rename] in [Action].

2   Input the new TPP name and the suffix starting number (only when multiple TPPs are selected).
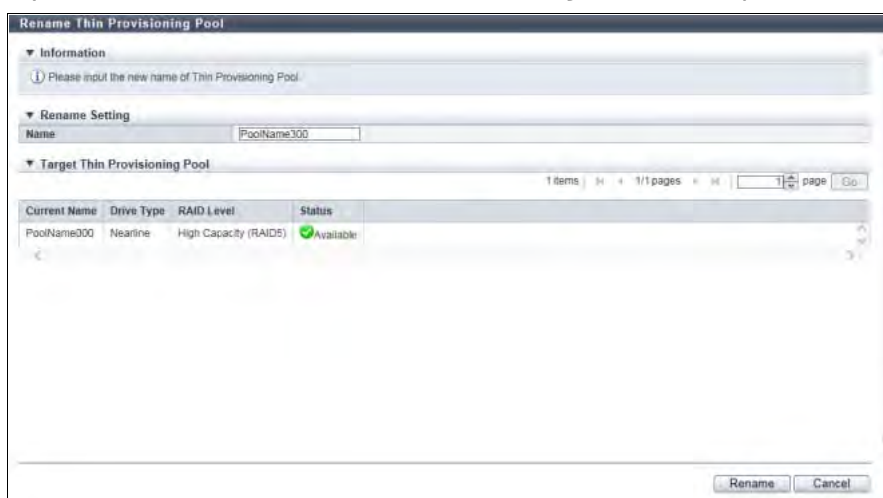
The main setting items are as follows.

● **Rename Setting**

- Name
- Start of Suffix

3   Click the [Rename] button

4   A confirmation screen appears. Click the [OK] button.
→ Rename Thin Provisioning Pool starts.

5   Click the [Done] button to return to the [Thin Provisioning Pool] screen.

End of procedure

Expand Thin Provisioning Pool

This function expands the capacity of a Thin Provisioning Pool.
Refer to <u>"The maximum number of pools, maximum pool capacity, and determined chunk size for each model"</u> <u>(page 539)</u> for details about the maximum number and capacity of pools for each model.

> **▷ Caution**
>
> - TPP capacity is expanded in units of RAID groups. The specifications for a RAID group (such as the RAID level, the drive type, and the number of member drives) that is to be added are the same as the existing RAID group.
> - The chunk size is determined according to the "Maximum Pool Capacity" of the ETERNUS DX/AF when a new TPP is created. If TPPs with different chunk sizes exist in the ETERNUS DX/AF, the maximum pool capacity might not be used to expand TPPs. Refer to <u>"Set Thin Provisioning" (page 536)</u> for details.
> - If the error message "The process was aborted because it exceeds executable format size." appears, TPPs cannot be expanded. Reduce the "Total Capacity after expand" and re-execute this function.
> - TPP capacity cannot be expanded in the following conditions:
>   - When the maximum capacity of TPPs are already registered in the ETERNUS DX/AF
>   - When resources for creating TPPs (such as the number of RAID groups and volumes) are insufficient (When the maximum number of RAID groups or volumes already exists, TPP cannot be expanded)
>   - The control information for Thin Provisioning is being re-configured in the ETERNUS DX8700 S3/DX8900 S3 (*1)
>
>   *1:   If the system message indicates a re-configuration, the control information for Thin Provisioning is being synchronized in each CM. Wait at least five minutes before performing this function again.

> **◉ N o t e**
>
> - After a TPP capacity is expanded, the expanded area of TPP is formatted automatically. To check the progress of formatting ("Progress", "Estimated Time Left", and "Remaining Size"), refer to <u>"Thin Provisioning Pool Detail</u> <u>(Basic)" (page 899)</u>. Click the TPP name to display the basic information.
> - If the RAID groups in the TPP are managed using the SED authentication key, register the RAID groups that are added to the relevant TPP in the key group of the same SED authentication key. Refer to <u>"Set Key Group (RAID</u> <u>Group)" (page 528)</u> for details.
> - To check the current maximum pool capacity, refer to <u>"Settings (Thin Provisioning)" (page 922)</u>.
> - In the controller firmware versions earlier than V10L32, "Online SED" is displayed as "SED".

For details on the parameters for this function, refer to <u>"A. Expand Thin Provisioning Pool" (page 1213)</u>.
For the factory default settings for this function, refer to <u>"B. Expand Thin Provisioning Pool" (page 1286)</u>.

There are two methods to expand a TPP: automatic drive selection and manual drive selection.

■ **Automatically selecting drives to expand a TPP**

> ▶ **Caution**
>
> The drives must be selected manually for the following cases.
> - SSDs with an interface speed of 12Gbit/s (SSD-M/SSD-L) are installed in a high-density drive enclosure with an interface speed of 6Gbit/s.
>   If drives are automatically selected, all the SSDs operate at 6Gbit/s for any of the following conditions.
>   - SSDs in the 6Gbit/s high-density drive enclosures are selected
>   - SSDs in both the 6Gbit/s high-density drive enclosures and other drive enclosures are selected
> - Drives that satisfy all of the following conditions are installed in the ETERNUS DX/AF.
>   - The drive types are the same
>   - The drive capacities are the same
>   - The sector format (AF-compliant/non-AF-compliant) is different

The procedure to expand a TPP by selecting drives automatically is as follows:

Procedure

1 Select the TPP to be expanded and click [Expand] in [Action].

2 Select "Automatic" for "Expand Mode" and specify the TPP capacity after expansion.

The main setting item is as follows.

● **Automatic Setting**
- Total Capacity after expand

▶ **Caution**

- When the TPP is configured with a drive type of SSD, SSDs with the same type (SSD-M/SSD-L/SSD) as the existing drives are selected. If RAID groups cannot be configured with SSDs of a relevant type, RAID groups are created in the ETERNUS DX/AF by selecting the most installed type among the SSDs with the same capacity. In this case, RAID groups with different SSD types exist in a TPP. Note that SSD types have no order of priority. If RAID groups cannot be created with any type of SSDs, TPP expansion is not available.
  When the TPP is configured with a drive type of SSD SED, SSD SEDs with the same type (SSD-M SED/SSD-L SED) as the existing drives are selected. "SSD SEDs" are operated in the same way as SSDs.
- When the RAID level is "High Performance (RAID1+0)" or "High Capacity (RAID5)", drives that are 6TB or larger (except SSDs and SSD SEDs) are not selected.
- If an error screen appears under the following conditions, check the parameter settings.
  - The total value of TPP capacity to be expanded and existing pool capacity exceeds the maximum pool capacity for each model
  - The TPP cannot be expanded over the specified capacity in the drive installed in the ETERNUS DX/AF

● **N o t e**

The maximum capacity that can be used to expand the TPP is displayed to the right of the setting field for "Total Capacity after expand" in the "Max: xx.xx [PB/TB/GB/MB]" format. "Total Capacity after expand" includes the current TPP capacity.

3 Click the [Expand] button.

4 A confirmation screen appears. Click the [OK] button.
→ Expand Thin Provisioning Pool starts.

5 Click the [Done] button to return to the [Thin Provisioning Pool] screen.

End of procedure

■ Manually selecting drives to expand a TPP

Select drives manually to expand the TPP. For the required conditions, refer to "Requirements for selecting drives" (page 543) in "Create Thin Provisioning Pool". For the recommended conditions, refer to "Requirements for selecting drives" (page 511) in "Create RAID Group".
Check the specifications of the existing RAID groups (number of member drives and drive type) in the TPP in advance. For details on how to check the specifications, refer to "Check the RAID group specification" (page 551).

● **N o t e**

The same Stripe Depth value as the existing RAID groups is applied for the newly added RAID group.

Check the RAID group specification

(1) From the TPP list in the [Thin Provisioning Pool (Basic Information)] screen, click the [No.] link or the [Name] link for the TPP to be expanded. Refer to "Thin Provisioning Pool (Basic Information)" (page 896) for details.

(2) The basic information of the TPP is displayed. Click the [RAID Group] tab to switch the display.

(3) The list of RAID groups that configure the TPP is displayed. Click the [No.] link or the [Name] link for the RAID group. Any RAID group can be specified because the RAID groups in the TPP have the same specifications.

(4) Click the [Drive] tab in the RAID group detail screen. Check the drive type and the number of member drives that configure the RAID group.

The procedure to expand a TPP by selecting drives manually is as follows:

Procedure

1   Select the TPP to be expanded and click [Expand] in [Action].

2   Select "Manual" for "Expand Mode".

3   Click the [Add] button.

> 🔵 **N o t e**
>
> The maximum capacity that can be used to expand the TPP is displayed in the "Total Capacity after expand" field in the "Max: xx.xx [PB/TB/GB/MB]" format. "Total Capacity after expand" includes the current TPP capacity.

→ The [Add RAID Group] screen is displayed.

4 Select the Controlling CM of the RAID group and select all the drives to be registered in the RAID group from the list or from the installation image.

■ Selecting drives from a list of the drives

Click the [Tabular] tab to select drives from the list. Only unused drives are displayed on the list.

The main setting items are as follows.
- Checkbox to select drives

■ Selecting drives from the installation location image

Click the [Graphic] tab to select drives from the drive installation image. The installation images of all the drives installed in the ETERNUS DX/AF are displayed. Checkboxes are displayed for unused drives.

The main setting items are as follows.
- DE selection list box
- Checkbox to select drives

> **Caution**

- SSDs with an interface speed of 12Gbit/s (SSD-M/SSD-L) must be installed in a high-density drive enclosure with the same interface speed. When these SSDs are installed in a high-density drive enclosure with an interface speed of 6Gbit/s, the SSDs operate at 6Gbit/s.
- The drive capacity that is displayed for the SSD-L differs from the product's actual capacity. For example, the drive capacity of a "1.92TB SSD-L" is displayed as "2.00 TB".

5 Click the [OK] button.
→ The screen returns to the previous screen. The added RAID group is displayed in the RAID group list.

> **N o t e**

- Click the [RAID Level] link in the RAID group list to change the Controlling CM and configuration drives of the newly added RAID group.
- Click the [Delete] button of the target RAID group area in the RAID group list to delete the newly added RAID group.

6 When creating multiple RAID groups, repeat Step 3 through Step 5.

> ▶ **Caution**
>
> If the total value of TPP capacity after expansion and existing pool capacity exceeds the maximum pool capacity for each model, an error screen appears. Check the parameter settings.

7 After creating a RAID group to be added, click the [Expand] button.
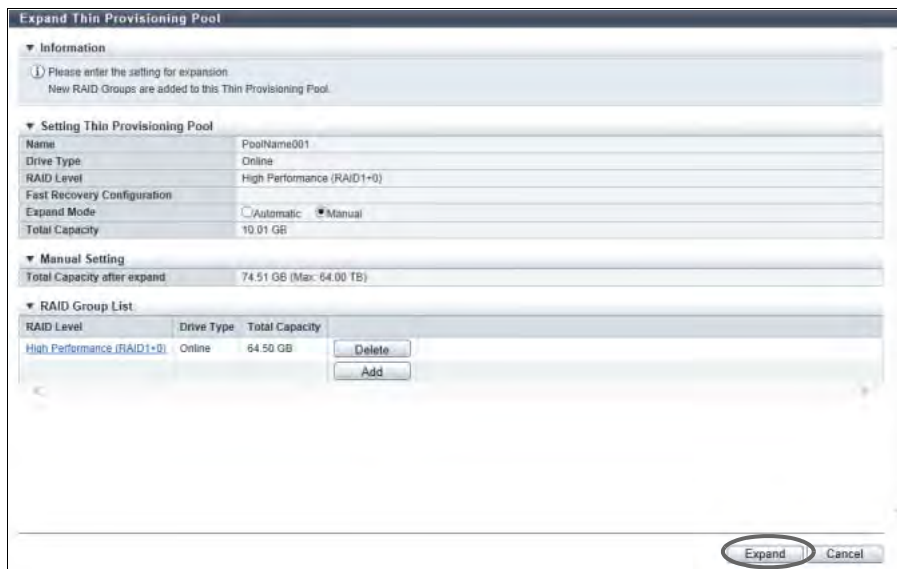
8 A confirmation screen appears. Click the [OK] button.
→ Expand Thin Provisioning Pool starts.

9 Click the [Done] button to return to the [Thin Provisioning Pool] screen.

End of procedure

Format Thin Provisioning Pool (All Area)

This function formats all of the areas in the Thin Provisioning Pool.

▷ **Caution**

- When formatting all area in the TPPs, data stored in the TPV in TPP will be deleted. Format TPV to use them again, after deleting data.
- If the target TPP includes a TPV that is performing one of the following operations, an error will stop the operation. Stop the relevant operation or wait until the operation is completed, and then format the TPP.
  - RAID migration
  - Balancing TPV
- This function cannot be used under the following conditions:
  - No TPPs can be formatted
  - The TPP includes a volume that is used for the Storage Cluster function
  - The control information for Thin Provisioning is being re-configured in the ETERNUS DX8700 S3/DX8900 S3 (*1)
  - *1: If the system message indicates a re-configuration, the control information for Thin Provisioning is being synchronized in each CM. Wait at least five minutes before performing this function again.

◉ **N o t e**

- TPPs in the " ✅ Available", " 🟠 Partially Readying", " 🟠 Readying", or " ⚠ Exposed" state can be formatted.
- To check the progress of formatting ("Progress", "Estimated Time Left", and "Remaining Size"), refer to "Thin Provisioning Pool Detail (Basic)" (page 899). Click the TPP name to display the basic information.
- To format a TPV, refer to "Format Volume" (page 272).
- When a TPP is created using the procedure in "Create Thin Provisioning Pool" (page 539), the TPP is formatted automatically. In this case, it is not necessary to format the TPP by using this function.

The procedure to format all of the areas in the Thin Provisioning Pool is as follows:

Procedure

1   Select the TPP that is to be formatted (multiple selections can be made) and click [Format All Area] in [Action].

2   A confirmation screen appears. Click the [OK] button.
→ Formatting of all area in the Thin Provisioning Pool starts.

3   Click the [Done] button to return to the [Thin Provisioning Pool] screen.

▷ **Caution**

To use a TPV in the TPP again after formatted with "All Area" selected for the mode, format the TPV.

End of procedure

Format Thin Provisioning Pool (Unformatted Area)

This function formats unformatted area in the Thin Provisioning Pool.

▷ **Caution**

This function cannot be used under the following conditions:
- No TPPs can be formatted
- The status of the TPPs that are to be formatted is "✅ Available".
- The TPP includes a volume that is used for the Storage Cluster function
- The control information for Thin Provisioning is being re-configured in the ETERNUS DX8700 S3/ DX8900 S3 (*1)

*1:   If the system message indicates a re-configuration, the control information for Thin Provisioning is being synchronized in each CM. Wait at least five minutes before performing this function again.

🔵 **N o t e**

- TPPs in the "🟡 Partially Readying" or "🟡 Readying" state can be formatted. Data stored in the TPVs of the target TPP are not deleted. The "Unformatted area" is a new area that is added to a TPP by the capacity expansion function.
- This function is only used when an error occurs during TPP capacity expansion and the expanded area cannot be formatted. When TPP capacity is successfully expanded, the TPP is automatically formatted. In this case, it is not necessary to format the TPP by using this function.
- To check the progress of formatting ("Progress", "Estimated Time Left", and "Remaining Size"), refer to <u>"Thin Provisioning Pool Detail (Basic)" (page 899)</u>. Click the TPP name to display the basic information.

The procedure to format an unformatted area in the Thin Provisioning Pool is as follows:

Procedure

1   Select the TPP to be formatted (multiple selections can be made) and click [Format Unformatted Area] in [Action].

2   A confirmation screen appears. Click the [OK] button.
→ Formatting of unformatted area in the Thin Provisioning Pool starts.

3   Click the [Done] button to return to the [Thin Provisioning Pool] screen.

End of procedure

Set Deduplication/Compression

This function enables or disables Deduplication/Compression for TPPs.
Deduplication and Compression can be set separately.
If Deduplication is enabled, the duplicated data blocks in a TPP are deleted. If Compression is enabled, the data blocks in a TPP are compressed.
Using this function can reduce the used area of the drive.

The following two methods are available to set Deduplication/Compression for the TPPs.

- Setting Deduplication/Compression during a TPP creation
  Create TPPs and perform the Deduplication/Compression setting with a single operation. Refer to for details.
  Using this procedure is recommended because the TPP creation and the Deduplication/Compression setting can be performed with a single operation.

- Setting Deduplication/Compression after a TPP creation
  Create TPPs for Deduplication/Compression (of which the chunk size is "21 MB") and then use this function to set Deduplication/Compression for the TPPs.

The maximum number of TPPs where Deduplication or Compression can be enabled

Model	Maximum number of TPPs
ETERNUS DX200 S4/DX200 S3	4
ETERNUS DX500 S4/DX500 S3	4
ETERNUS DX600 S4/DX600 S3	8
ETERNUS AF250 S2/AF250	4
ETERNUS AF650 S2/AF650	8

> ▷ **Caution**

- The following settings are required before executing this function. Note that this function is not displayed if the following settings are not performed.
  - Enable the Thin Provisioning function. Refer to for details.
  - Enable Deduplication/Compression for the ETERNUS DX/AF. Refer to for details.
- To enable Deduplication or Compression for TPPs, configuring the target TPPs with two or more RAID groups is recommended. If the target TPP only has one RAID group, expand the TPP so that it is configured with two or more RAID groups in advance. Refer to for details.
- If the I/O load in the ETERNUS DX/AF is high when the setting for Deduplication, Compression, or both (herein-after referred to as "Deduplication/Compression setting") are enabled for the TPPs, changing the setting may take time. In this case, enabling the Deduplication/Compression setting on one TPP at a time is recom-mended.
- To enable the Deduplication/Compression setting for the TPP, the free space within the TPP must be 4GB or larger.
- If the Deduplication/Compression setting for the TPP fails (or "Error" is displayed in the "Current Deduplication" field and/or the "Current Compression" field), the setting may be corrected by disabling the Deduplication/Compression setting and then re-enabling it.
- The Deduplication/Compression setting cannot be enabled or disabled when the TPP status is not
  " Available" or " Exposed".

- The Deduplication/Compression setting cannot be enabled for the selected TPPs in the following conditions.
  - The total number of existing TPPs where the Deduplication/Compression setting has already been enabled and the selected TPPs exceeds "The maximum number of TPPs where Deduplication or Compression can be enabled" (page 557).
  - The total number of existing volumes and Deduplication/Compression System Volumes (or a DEDUP_SYS Volume and DEDUP_MAP Volumes) that are to be created in the selected TPP exceeds the maximum number of volumes for each model.
    (Refer to "Creating Deduplication/Compression Volumes" (page 263) for details.)
  - The total capacity of existing volumes and the capacity of Deduplication/Compression System Volumes that are to be created in the selected TPP exceed the maximum pool capacity for each model. Refer to "Settings (Thin Provisioning)" (page 922) for details.
  - Eco-mode schedule is assigned to the selected TPPs.
- The Deduplication/Compression setting cannot be disabled for the selected TPPs in the following conditions.
  - Deduplication/Compression Volumes exist in the selected TPP.
    (To disable the setting, delete all the Deduplication/Compression Volumes in the relevant TPP in advance.)
  - The DEDUP_SYS Volume status in the relevant TPP is " Readying", " Not Ready", " Broken", or " Data Lost".

◉ N o t e

- If Deduplication or Compression is enabled when a TPP is created, skip this function.
- When the Deduplication/Compression setting for the TPP is enabled, Deduplication/Compression System Volumes are automatically created in the relevant TPP. Refer to "Volumes automatically created by enabling the Deduplication/Compression setting for TPPs" (page 558) for details.
- When the Deduplication/Compression setting for the TPP is disabled, Deduplication/Compression System Volumes are automatically deleted from the relevant TPP.
- Set a volume (or TPV) as a Deduplication/Compression target or as a non-Deduplication/Compression target during a volume creation. Refer to "Creating Deduplication/Compression Volumes" (page 263) for details.
- Use the [Thin Provisioning Pool] screen to check whether the Deduplication/Compression setting is enabled for the relevant TPP. Refer to "Thin Provisioning Pool (Basic Information)" (page 896) for details.

Volumes automatically created by enabling the Deduplication/Compression setting for TPPs

When the Deduplication/Compression setting for the TPP is enabled, the following volumes are automatically created in the relevant TPP.

- DEDUP_SYS Volume
  A volume to store data and meta data after the Deduplication/Compression process is complete. Refer to "Deduplication/Compression System Volume specifications" (page 559) for details.
- DEDUP_MAP Volume
  A volume to store the mapping tables for obtaining the physical location information of the DEDUP_SYS Volume from the volume numbers for Deduplication/Compression Volumes and the LBA. Refer to "Deduplication/Compression System Volume specifications" (page 559) for details.

Deduplication/Compression System Volume specifications

Item	DEDUP_SYS Volumes	DEDUP_MAP Volumes
Volume Type	TPV	
Usage	System	
Usage Details	Dedup System	Dedup Map
Number of Volumes	One per TPP	The number of volumes that are to be created varies depending on the number of RAID groups in the TPP (*1)
Volume Capacity (per volume)	8 TB (Default)	5.38 TB
Volume Expansion	Available (up to 128 TB)	N/A
Volume Name	Fixed to "$DEDUP_SYSx" (x: TPP number)	Fixed to "$DEDUP_x_y" (x: TPP number, y: serial number in the TPP (0 -))

*1:   The following number of volumes are created for each TPP that has the Deduplication/Compression setting enabled.
  - If one RAID group exists in the TPP, one volume is created.
    (Volumes are not added even if RAID groups are added in the TPP.)
  - If two or more RAID groups exist in the TPP, two volumes are created.

For details on the parameters for this function, refer to "A. Set Deduplication/Compression" (page 1214).
For the factory default settings for this function, refer to "B. Set Deduplication/Compression" (page 1287).

The procedure to enable Deduplication/Compression for TPPs is as follows:

Procedure

1 Select the TPP (multiple selections can be made) to configure the Deduplication/Compression setting and click [Set Deduplication/Compression] in [Action].

> **Caution**

[Set Deduplication/Compression] cannot be clicked under the following conditions.
- The number of selected TPPs exceeds the maximum number that can be set with Deduplication or Compression
- TPPs of which the chunk size is not "21 MB" are selected

2 Select whether to enable or disable "Deduplication" and "Compression".
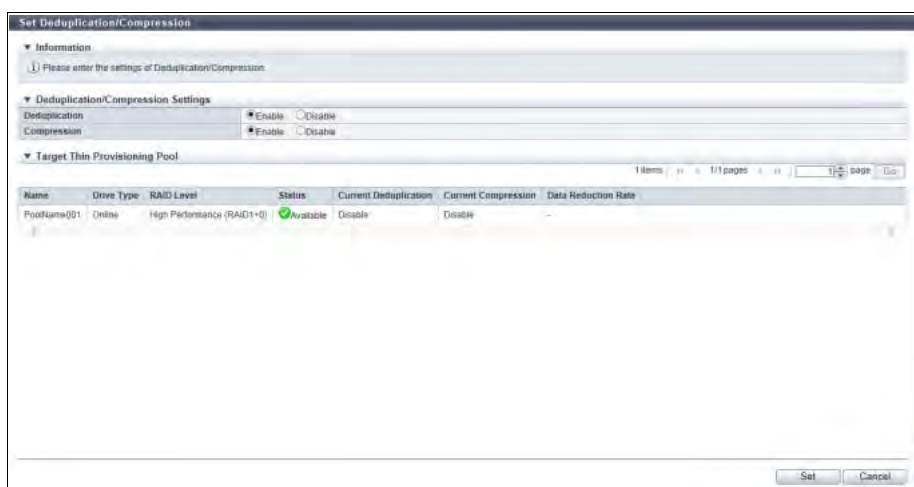
> ▶ **Caution**
>
> If an error screen appears under the following conditions, check the parameter settings.
> - The set number of TPPs for Deduplication/Compression exceeds the maximum value (when "Enable" is selected)
> - The total number of volumes exceeds the maximum value (when "Enable" is selected)
> - The total capacity of TPVs exceeds the maximum pool capacity (when "Enable" is selected)

3   Click the [Set] button.

4   A confirmation screen appears. Click the [OK] button.
→   The Deduplication/Compression setting starts.

5   Click the [Done] button to return to the [Thin Provisioning Pool] screen.

End of procedure ▪

Modify Threshold Thin Provisioning Pool

This function changes the threshold for monitoring the used capacity of Thin Provisioning Pool. There are two types of threshold: "Warning" and "Attention".

> **N o t e**
>
> - This function changes the threshold of a TPP that is created by using the procedure in "Create Thin Provisioning Pool" (page 539).
> - Using this function enables setting the same threshold to multiple TPPs with a single operation.
> - Changes in the usage status of a TPP can be notified. The following statuses can be notified. Refer to "Setup Event Notification" (page 155) for details.
>   - From " Normal" to " Attention"
>   - From " Normal" or " Attention" to " Warning"
>   - The TPP capacity is exhausted

For details on the parameters for this function, refer to "A. Modify Threshold Thin Provisioning Pool" (page 1215).
For the factory default settings for this function, refer to "B. Modify Threshold Thin Provisioning Pool" (page 1287).

The procedure to change the threshold of a TPP is as follows:

Procedure

1 Select the TPP for which the threshold is to be changed (multiple selections can be made) and click [Modify Threshold] in [Action].

2 Select a new threshold.

The main setting items are as follows.

● Threshold Setting

- Warning
- Attention

> **N o t e**
>
> - When changing a "Attention" threshold, select the checkbox and then specify a new threshold.
> - When omitting a "Attention" threshold, clear the checkbox.

3   Click the [Modify] button.

4   A confirmation screen appears. Click the [OK] button.
→ Modify Threshold starts.

5   Click the [Done] button to return to the [Threshold] screen.

End of procedure

Modify Cache Parameters (Thin Provisioning Pool)

This function changes the cache parameters of each TPP. Performance of the storage system varies depending on the cache hit rate. The ETERNUS DX/AF detects sequentiality when a host requests Read/Write. If sequentiality is detected when a Read request is issued, the cache hit rate is improved by reading the sequential data into the cache memory in advance. The characteristics of Read/Write requests from the host depends on the system. Performance of the storage system may improve by specifying a cache parameter that is suitable for the system that is being used.

The following parameter can be specified:
- Multi Writeback Count (MWC)
  Specify the number of processes that can be written back at the same time.

▷ **Caution**

If pinned data exists in the ETERNUS DX/AF, MWC cannot be configured.

🔵 **N o t e**

- The same cache parameter can be applied for multiple TPPs in a single operation.
- Cache parameters other than MWC are specified for each TPV. Refer to "Modify Cache Parameters" (page 315) for details.

For details on the parameters for this function, refer to "A. Modify Cache Parameters (Thin Provisioning Pool)" (page 1216).
For the factory default settings for this function, refer to "B. Modify Cache Parameters (Thin Provisioning Pool)" (page 1287).

The procedure to modify cache parameters is as follows:

Procedure

1 Select which TPP to change the cache parameters for (multiple selections can be made) and click [Modify Cache Parameters] in [Action].

2 Change the cache parameters.
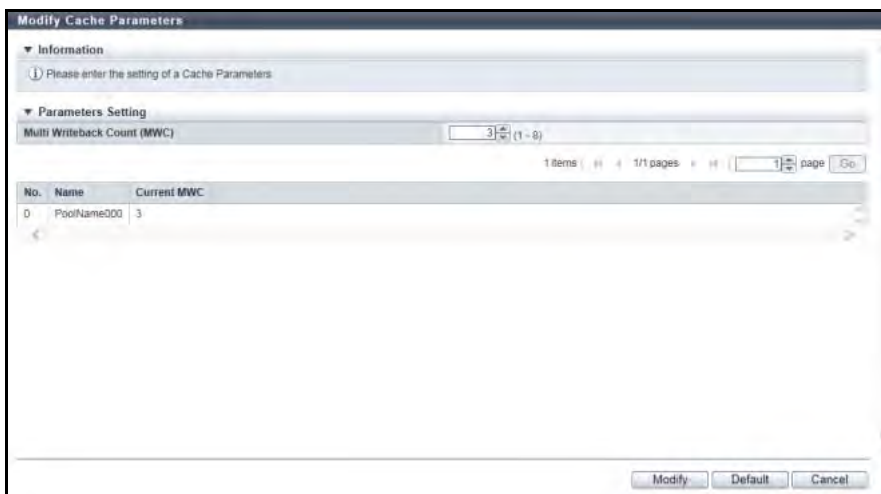
The main setting item is as follows.

● **Parameters Setting**

- Multi Writeback Count (MWC)

◉ **N o t e**

If the [Default] button is clicked before the [Modify] button, the default cache parameters are restored.

3 Click the [Modify] button.

4 A confirmation screen appears. Click the [OK] button.
   → The cache parameter modification starts.

5 Click the [Done] button to return to the [Threshold] screen.

End of procedure

Assign Eco-mode Schedule (Thin Provisioning Pool)

This function assigns the Eco-mode schedule to the TPPs and sets the Eco-mode action. Refer to "Specifications of the Eco-mode function" (page 525) for details about Eco-mode.

> ▷ **Caution**
>
> - This function cannot be used for TPPs under the following conditions:
>   - No volumes are created
>   - Configured by SSDs or SSD SEDs
>   - Deduplication/Compression is enabled
> - When using Eco-mode, make sure to set the time/date correctly. If the time/date of the ETERNUS DX S4/S3 series is wrong, processes used for stopping and starting the drive motor cannot be performed per the Eco-mode schedule.
> - When the "External" (drive motor management by the Storage Foundation Software ETERNUS SF) is selected, it can be changed to the Eco-mode schedule. But when the Eco-mode schedule is selected, it cannot be changed to "External".
> - If any of the following conditions occur during the Eco-mode scheduled time, the drive will be started even when the drive motor is inactive. The Eco-mode schedule is re-enabled when the conditions listed have finished. (*1)
>   - The RAID group status in the TPP is not " ✅ Available"
>   - Functions that change the TPP or the volume configuration is being performed
>   - Rebuild or copyback is being performed in the RAID groups that configure the target TPP
>   - Formatting is being performed in the TPP
>   - Formatting is being performed in the volumes registered in the TPP
>   - RAID migration is being performed in the volumes registered in the TPP
>   - Advanced Copy is being performed in the volume registered in the TPP (copy session status is not "Suspend" or the phase is not "Tracking")
>   - NAS system volumes exist in the TPP
>   - ODX Buffer volumes exist in the TPP
>   - During maintenance
>   - Disk diagnosis or RAID group diagnosis (diagnosing the RAID groups that configure the TPP) is being performed, or G-List is being exported
>   - A module error related to the access paths of the controller modules and drive is detected
> - If the server OS or software periodically accesses the ETERNUS DX, the drive motor may not stop even when the Eco-mode is enabled.(*1)
>   *1: This not only affects the motor stoppage, but includes the cutting of the drives power as well.

> ⬤ **N o t e**
>
> - Before applying Eco-mode for TPPs, use the procedure in "Modify Eco-mode General Setting" (page 94) to enable the Eco-mode setting for the ETERNUS DX S4/S3 series.
> - Set the Eco-mode schedule using the procedure in "Create Eco-mode Schedule" (page 95).
> - When the Eco-mode is set to TPP, the same Eco-mode schedule is assigned for all the RAID groups configuring the TPP.
> - When selecting multiple TPPs as the target of the Eco-mode, the same Eco-mode schedule can be assigned for all the selected TPPs.

For details on the parameters for this function, refer to "A. Assign Eco-mode Schedule (Thin Provisioning Pool)" (page 1216).
For the factory default settings for this function, refer to "B. Assign Eco-mode Schedule (Thin Provisioning Pool)" (page 1287).

The procedure to set the Eco-mode for Thin Provisioning Pool is as follows:

Procedure

1 Select the TPP to assign the Eco-mode schedule (multiple selections can be made) to and click [Assign Eco-mode] in [Action].

2 Select the Eco-mode schedule that is to be assigned and select the Eco-mode action.
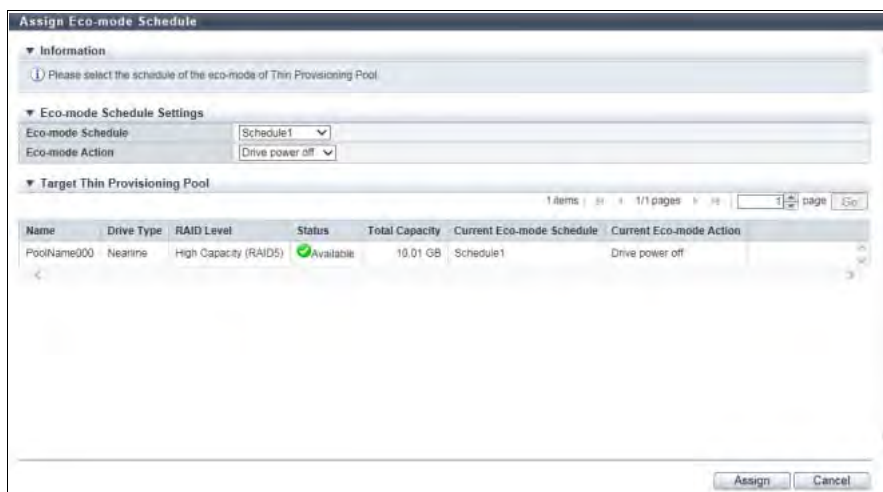
The main setting items are as follows.

● **Eco-mode Schedule Setting**

• Eco-mode Schedule
• Eco-mode Action

3 Click the [Assign] button.

4 A confirmation screen appears. Click the [OK] button.
→ Assigning of the Eco-mode schedule starts.

5 Click the [Done] button to return to the [Eco-mode Schedule] screen.

End of procedure

Start Balancing Flexible Tier Pool

This function starts Flexible Tier Pool (FTRP) balancing sessions.
The FTRP balancing function equalizes unevenly allocated physical area in the Flexible Tier Sub Pools (FTSPs) that configure an FTRP. By using this function, the physical allocated areas are reallocated equally among the RAID groups in the FTSPs. The I/O access to the FTV is distributed almost equally to the RAID groups in the FTSP.

Requirements for an FTRP to be balanced

- The status of the FTRP is "✅ Available", "🟠 Partially Readying", or "⚠ Exposed"
- Balancing of the selected FTRP is not being performed
- Free space, which can be used for balancing, exists in the FTSPs in the target FTRP

> ⯈ **Caution**

- Before balancing the FTRP, make sure that "Used Capacity" for all the FTSPs in the target FTRP is less than 50% of "Total Capacity". If this requirement is not satisfied and the capacity runs out, the FTRP balancing may not be complete. "Used Capacity" and "Total Capacity" for FTSP can be checked from the [Flexible Tier Pool Detail] screen ([Flexible Tier Sub Pool] tab).
  Refer to "Flexible Tier Sub Pool Detail (Basic)" (page 917) for details.
- Even after the FTRP balancing session is performed, the physical allocation between the FTVs and the FTSPs does not change.
- The FTRP balancing function extracts up to 32 balanceable FTVs (*1) that have a low balancing level from the selected FTRP and performs balancing sessions in the FTSPs. Note that FTVs are not extracted as balancing targets in certain conditions. For example, FTVs with a high balancing level, FTVs that are undergoing RAID migration, or FTVs that are undergoing capacity optimization.
  - *1: Up to 32 sessions, which include FTV balancing sessions, TPV balancing sessions, and RAID migration sessions, can be performed at the same time. An FTRP balancing session is performed in each FTRP. Note that the number of FTV balancing sessions that are performed at the same time cannot be specified.
- Balancing of FTVs in the following conditions is not available:
  - FTVs which capacity is less than 20GB
  - FTVs which used capacity is less than 10GB
  The FTV capacity can be checked in the [Flexible Tier Pool Detail (Volume)] screen. Refer to "Flexible Tier Pool Detail (Volume)" (page 916) for details.
- FTRP balancing cannot be started in the following conditions:
  - The Thin Provisioning function is disabled
  - The Automated Storage Tiering feature is disabled
  - The maximum number of volumes is already registered in the ETERNUS DX
  - The total number of TPV balancing sessions and RAID migration sessions that are running in the ETERNUS DX is 32
  - The total capacity for the TPV balancing sessions and the RAID migration sessions that are running in the ETERNUS DX is 128TB
  - The RAID group diagnosis is being performed in the ETERNUS DX
  - The disk diagnosis is being performed in the ETERNUS DX
  - Capacity optimization is being performed for all of the balancing target FTVs in the FTRP
  - ODX is being performed for all of the balancing target FTVs in the FTRP
- When FTRP balancing is performed, the used FTRP capacity may temporarily exceed the threshold. If the used capacity exceeds the threshold, "⚠ Attention" or "❌ Warning" is displayed in the "Used Status" field for the FTRP. The usage of the FTRPs is displayed in the [Flexible Tier Pool] screen. Refer to "Flexible Tier Pool (Basic Information)" (page 909) for details.

- This function cannot be used if the control information for Thin Provisioning is being re-configured in the ETERNUS DX8700 S3/DX8900 S3. (*1)

*1:   If the system message indicates a re-configuration, the control information for Thin Provisioning is being synchronized in each CM. Wait at least five minutes before performing this function again. If a work volume that has failed to be deleted is displayed in the volume list, delete the relevant volume.

🔵 **N o t e**

- FTRP balancing can be performed during the workload I/O.
- The balancing levels of FTRPs and FTSPs, and the progress of the FTRP balancing sessions can be checked. Refer to "Flexible Tier Pool (Basic Information)" (page 909), "Flexible Tier Pool Detail (Basic)" (page 912), and "Flexible Tier Pool Detail (Flexible Tier Sub Pool)" (page 914) for details.
- The progress of a balancing FTV can be checked in the [Volume Detail] screen. Refer to "Volume (Basic Information)" (page 775) for details.

The procedure to start balancing FTRP is as follows:

Procedure

1   Select the FTRP for which balancing is to be started and click [Start Balancing FTRP] in [Action].

2   A confirmation screen appears. Click the [OK] button.
→ FTRP balancing starts.

3   Click the [Done] button to return to the [Flexible Tier Pool] screen.

End of procedure

Stop Balancing Flexible Tier Pool

This function stops Flexible Tier Pool (FTRP) balancing sessions.

> ▷ **Caution**
>
> - This function cannot be used when no FTRPs are undergoing balancing or when no FTRP balancing that has stopped due to an error exists.
> - This function cannot be used when the specified FTRP balancing is already complete.

> ⬤ **N o t e**
>
> If FTRP balancing has stopped, the following conditions apply.
> - All of the balancing sessions that are currently being performed (*1) for the FTVs registered in the target FTRP are stopped. Even when balancing sessions are being stopped, FTVs that are not being balanced can be accessed normally.
> - Note that completed balancing processes for the FTVs in the target FTRP (*1) cannot be stopped (the physical allocation after the balancing process cannot be changed). FTVs that are balanced can be accessed normally.
>
> *1: When an FTRP balancing session is started, FTV balancing starts in the FTSPs. Refer to <u>"Start Balancing Flexible Tier Pool" (page 567)</u> for details.

The procedure to stop balancing FTRP is as follows:

Procedure

1 Select the FTRP for which balancing is to be stopped and click [Stop Balancing FTRP] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ FTRP balancing stops.

3 Click the [Done] button to return to the [Flexible Tier Pool] screen.

End of procedure

7. Advanced Copy Management

This chapter describes Advanced Copy management.

When using functions in the Action area, select the desired function from the Action area that is displayed in the status display screen.
The functions in the Action area for Advanced Copy can be performed from the following display functions:

Functions in the Action area for Advanced Copy	Display function
Start SnapOPC+	• Advanced Copy (Basic Information) • Advanced Copy (All Local Sessions) • SnapOPC+ in Local Copy
Stop Copy Session	• Advanced Copy (Basic Information) • Advanced Copy (All Local Sessions) • EC in Local Copy • OPC in Local Copy • QuickOPC in Local Copy • SnapOPC in Local Copy • SnapOPC+ in Local Copy • Monitor in Local Copy • Advanced Copy (All Remote Sessions) • REC in Remote Copy
Register Advanced Copy License	• Settings (Advanced Copy)
Delete Advanced Copy License	
Modify EC/OPC Priority	
Modify Copy Table Size	
Modify Copy Parameters	• Snap Data Pool in Settings (Advanced Copy)
REC Management	-
Export Storage Information	• Copy Path in Settings (Advanced Copy)
Set Copy Path	
Delete All Copy Path	
Export All Copy Path	
Measure Round Trip Time	
Modify REC Buffer	• REC Buffer in Settings (Advanced Copy)
Create REC Disk Buffer	• REC Disk Buffer in Settings (Advanced Copy)
Assign REC Disk Buffer	• REC Buffer in Settings (Advanced Copy)
Delete REC Disk Buffer	• REC Disk Buffer in Settings (Advanced Copy)
Format REC Disk Buffer	
Modify REC Multiplicity	• Copy Path in Settings (Advanced Copy)
Set REC Bandwidth Limit	
ODX Management	-
Enable ODX	• Settings (Advanced Copy)
Disable ODX	
Create ODX Buffer Volume	

Start SnapOPC+

This function is used to select the copy source volume and copy destination volume, and start a new SnapOPC+ copy session.

The maximum number of sessions and the maximum number of generations for each model

Model	The maximum number of sessions (per storage system)	The maximum number of generations (*1)
ETERNUS DX60 S4/DX60 S3	1024	512
ETERNUS DX100 S4/DX100 S3	1024 (2048) (*2)	
ETERNUS DX200 S4/DX200 S3	2048 (4096) (*2)	
ETERNUS DX500 S4/DX500 S3 ETERNUS DX600 S4/DX600 S3	8192	
ETERNUS DX8100 S3	8192	
ETERNUS DX8700 S3 ETERNUS DX8900 S3	32768	
ETERNUS AF250 S2/AF250	2048	
ETERNUS AF650 S2/AF650	8192	
ETERNUS DX200F	2048	

*1: The maximum number of generations for a SnapOPC+ from a single copy source volume.

*2: Values in parentheses indicate the number of sessions when "Expand Volume Mode" is "Enable". Refer to "Setup Subsystem Parameters" (page 65) for details.

Preparing copy destination volumes

To use SnapOPC+, the same number of volumes as there are generations is required for the copy destination. Create any of the following types of volumes in advance.

- SDV (SDPVs must be created as expansion areas)
- TPV
- FTV

If the volume type of the copy destination is SDV, SDVs must be used for all generations. If the volume type of the copy destination is TPV or FTV, a mixture of TPVs and FTVs is available. Use TPV or FTV for each generation.
To create SDVs, SDPVs, or TPVs, use the procedure in "Create Volume" (page 246). To create FTVs, use ETERNUS SF Storage Cruiser.

> **Caution**
>
> - Registering the license for the Advanced Copy function is required to start a SnapOPC+ session.
> - Only SnapOPC+ copy sessions that are performed in units of volumes can be created using ETERNUS Web GUI. To create Equivalent Copy (EC), One Point Copy (OPC), QuickOPC, SnapOPC, SnapOPC+ sessions using range selection, and REC sessions, use copy management software.
> - ODX Buffer volumes and Deduplication/Compression System Volumes cannot be specified as the copy source.
> - External Volumes (or volumes whose "Usage" is "Migration") cannot be specified as the copy source or copy destination.
> - SnapOPC+ cannot be started if the copy destination is a TPV for which Deduplication, Compression, or both are enabled.

> **◉ N o t e**
>
> For the ETERNUS DX100 S4/DX200 S4 and the ETERNUS DX100 S3/DX200 S3, the number of sessions can be increased by selecting "Enable" for "Expand Volume Mode". The "Expand Volume Mode" setting is available in the [Setup Subsystem Parameters] function. If the setting is changed, reboot the ETERNUS DX. If the ETERNUS DX is not rebooted after the setting is changed, SnapOPC+ cannot be started with the increased number of sessions. Refer to "Setup Subsystem Parameters" (page 65) for details.
> In addition, if the ETERNUS DX has not been rebooted, a system message appears in the [Overview] screen. Refer to "Overview" (page 24) for details.

The procedure to start the SnapOPC+ session is as follows:

Procedure

1   Click [Start SnapOPC+] in [Action].

2   Click the [Browse...] button in the "Source Volume" field.
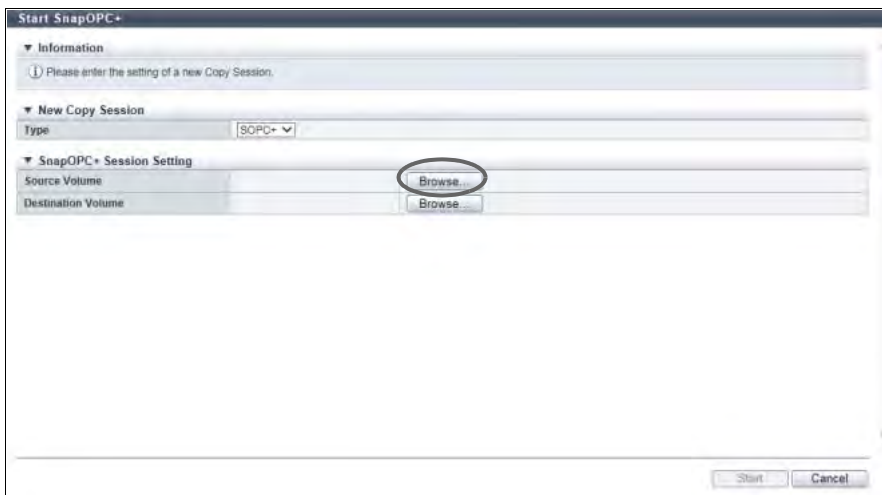
3   Select the radio button for the copy source volume to be used, and click the [OK] button.
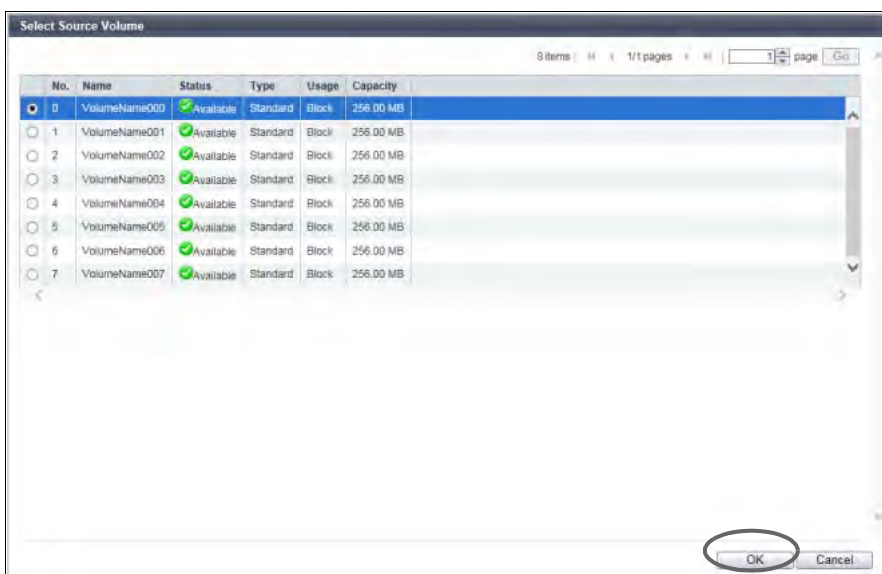
→   The display returns to the initial screen.

> **⬤ N o t e**
>
> - In a Unified Storage environment, volumes that are used for the SAN and backup volumes that are used in the NAS are displayed in the copy source volume list.
> - Volumes whose usage is "System" or "Migration" are not displayed in the copy source volume list.

4 Click the [Browse...] button in the "Destination Volume" field.
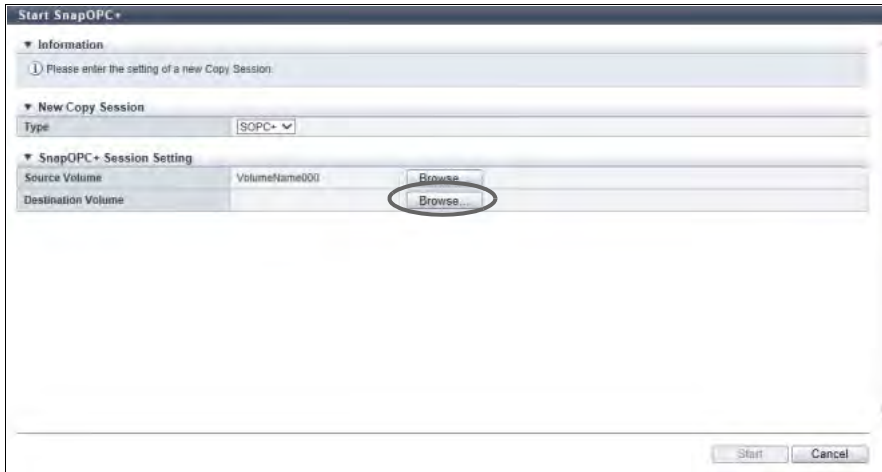
5 Select the radio button for the copy destination volume to be used, and click the [OK] button.
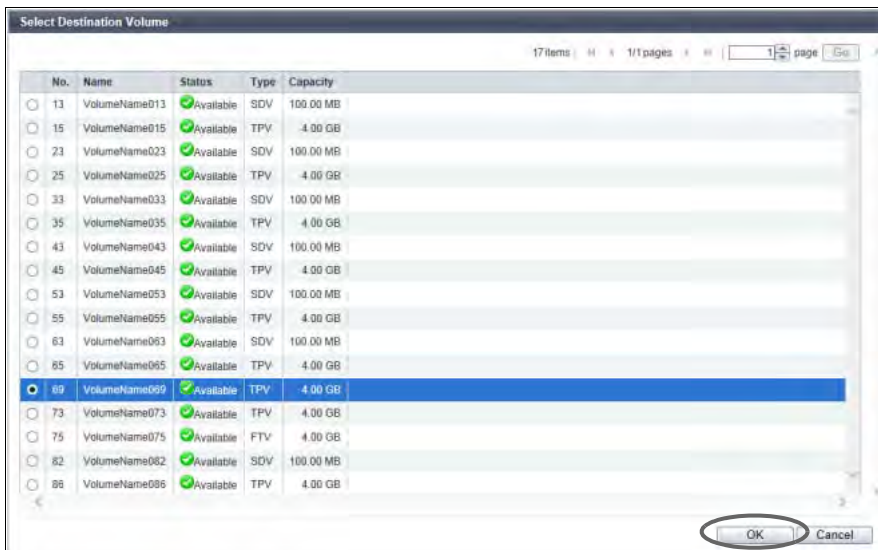
→ The display returns to the initial screen.

> **⬤ N o t e**
>
> Volumes whose usage is "Migration" are not displayed in the copy destination volume list.

6   Check the displayed contents, and click the [Start] button.
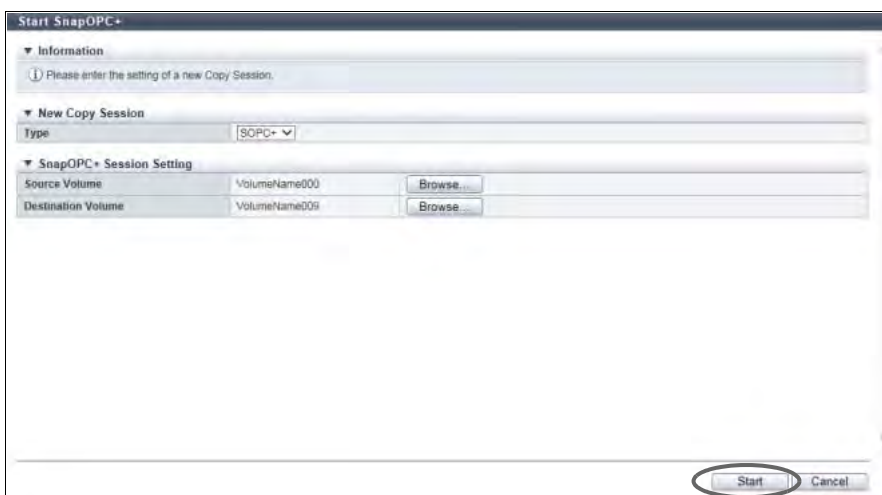
> ▶ **Caution**
>
> If an error screen appears under the following conditions, check the parameter settings.
> - When the SnapOPC+ started in the copy source volume exceeds the maximum number of generations per volume
> - When the SnapOPC+ started in the copy source volume exceeds the maximum number of copy sessions for the entire ETERNUS DX/AF

7   A confirmation screen appears. Click the [OK] button.
→ The SnapOPC+ session starts.

8   Click the [Done] button to return to the [Advanced Copy] screen.

End of procedure

Stop Copy Session

This function stops the selected copy session.
This function is used when a session cannot be stopped due to a host error or other causes.

> ▷ **Caution**
>
> - If one SnapOPC+ session is stopped, all the sessions started earlier than that session are also stopped.
> - If one SnapOPC+ session is stopped, an error occurs in all of the Restore OPC sessions that started earlier than the stopped session and these sessions are also stopped.
> - If a SnapOPC or SnapOPC+ session is stopped during a Restore OPC session, an error occurs in the Restore OPC session and the session is stopped.
> - Before stopping snapshot sessions or Fastclone sessions for VVOL, all the Virtual Volume sessions and Advanced Copy sessions that are specified for copy destination volumes of the target session must be deleted.

The procedure to stop a copy session is as follows:

Procedure

1 Select the copy session to be stopped (multiple selections can be made) and click [Stop Session] in [Action].

2 A confirmation screen appears. Click the [OK] button.
   → The selected copy session is stopped.

3 Click the [Done] button to return to the [Advanced Copy] screen.

End of procedure

Register Advanced Copy License

This function registers the Advanced Copy license for EC, OPC, QuickOPC, SnapOPC, SnapOPC+, and REC.
When this registration is complete successfully, the customer can use the Advanced Copy functions.

> 🔵 **N o t e**
>
> - When using ETERNUS SF AdvancedCopy Manager or ETERNUS SF Express, perform the required settings described in the documents that are supplied with ETERNUS SF AdvancedCopy Manager or ETERNUS SF Express.
> - The registration status of the Advanced Copy license can be checked. Refer to "Settings (Advanced Copy)" (page 944) for details.
> - Registering an Advanced Copy license is not required when using the ODX or XCOPY function, or when using copy functions with VVOLs.

For details on the parameters for this function, refer to "A. Register Advanced Copy License" (page 1217).
For the factory default settings for this function, refer to "B. Register Advanced Copy License" (page 1288).

The procedure to register an Advanced Copy license is as follows:

Procedure

1   Click [Register License] in [Action].

2   Select a registration method and input a license key.

■   For the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F

■ For the other models

The main setting items are as follows.

● **Registration Method**

- Registration Method
(for the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3,
the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F)

- License key

▶ **Caution**

Only when registering a paid license, the license key entry is required.

3 Click the [Register] button.

4 A confirmation screen appears. Click the [OK] button.
→ The Advanced Copy license registration is executed.

5 Click the [Done] button to return to the [Settings] screen.

End of procedure

Delete Advanced Copy License

This function deletes all of the Advanced Copy licenses registered in the ETERNUS DX/AF.

> ▷ **Caution**
>
> - Do not delete the Advanced Copy license when the Storage Cluster function is being used.
> - An Advanced Copy license cannot be deleted in the following conditions:
>   - The CM status is not normal
>   - A port with the RA mode or CA/RA mode exists
>   - SDVs or SDPVs are registered
>   - A volume that is Advanced Copy protected exists
>   - An Advanced Copy session (except for an ODX session, an XCOPY session, or a Virtual Volume session) exists
>   - An Advanced Copy table size has been configured
>   - An Advanced Copy path has been configured
>   - An REC Buffer has been configured
>   - An REC Disk Buffer has been created
> - If the Storage Cluster function is enabled but is not being used, the Advanced Copy license can be deleted under the following conditions.
>   - An Advanced Copy path has been configured
>   - A port with the RA mode or CA/RA mode exists
> - If the Unified Storage is enabled, the Advanced Copy license can also be deleted under the following conditions.
>   - A SnapOPC+ session for the snapshot function exists
>   - SDVs (only the snapshot destination SDVs) are registered
> - Rebooting the ETERNUS DX/AF is required after deleting an Advanced Copy license.

> ⬤ **N o t e**
>
> To check whether the Storage Cluster function is enabled or disabled, use the [System] screen. Refer to "System (Basic Information)" (page 635) for details.

The procedure to delete an Advanced Copy license is as follows:

Procedure

1 Click [Delete License] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ Deletion of an Advanced Copy license is executed.

3 Click the [Done] button to return to the [Settings] screen.

> ▷ **Caution**
>
> Rebooting the ETERNUS DX/AF is required after deleting an Advanced Copy license.

End of procedure

Modify EC/OPC Priority

This function sets the copy speed when using EC and OPC.
The EC/OPC speed is usually set in consideration of the host's I/O load and copy processing load. The set EC/OPC speed is applied not only for the next sessions, but also for existing sessions.

> ▶ **Caution**
>
> Registering the Advanced Copy function license or the Storage Cluster function license (*1) is required to use this function.
>
> *1: The Storage Cluster function license must be registered using ETERNUS SF Storage Cruiser.

> ● **N o t e**
>
> - EC includes both EC and REC.
>   Even though the REC priority is specified using the procedure in "Modify REC Multiplicity" (page 625), the EC/OPC priority values specified with this function are applied only when the REC satisfies both of the following conditions:
>   - When the connection method is "Direct"
>   - When the priority level is "Automatic"
>   Refer to "Set Copy Path" (page 589) for connection type settings.
>   Refer to "Modify REC Multiplicity" (page 625) for priority level settings.
> - OPC includes OPC, QuickOPC, SnapOPC, and SnapOPC+.
> - When "Automatic Priority" is selected for "EC/OPC Priority", the current priority level can be checked. Refer to "Settings (Advanced Copy)" (page 944) for details.

For details on the parameters for this function, refer to "A. Modify EC/OPC Priority" (page 1218).
For the factory default settings for this function, refer to "B. Modify EC/OPC Priority" (page 1288).

The procedure to modify the EC/OPC priority is as follows:

Procedure

1 Click [Modify EC/OPC Priority] in [Action].

2 Select the EC/OPC priority.
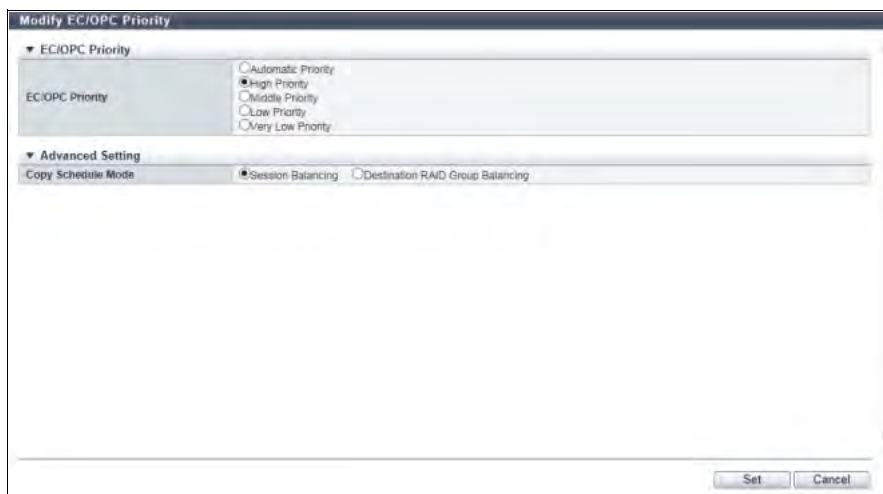
The main setting item is as follows.

● **EC/OPC Priority**

• EC/OPC Priority

🔵 **N o t e**

Click [Advanced Setting] to specify the copy schedule mode.

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
→ The selected EC/OPC priority is set.

5 Click the [Done] button to return to the [Settings] screen.

End of procedure

Modify Copy Table Size

This function sets the copy table size, which is used by the firmware for the ETERNUS DX/AF, on the CM cache memory. When the EC, OPC or REC function is in use, this copy table is used as the area that manages the progress of the copy.

▷ **Caution**

- Registering a license for the Advanced Copy function or the Unified Storage environment is required to use this function.
- When the copy table size is equal to 0MB, copy functions cannot be used. The initial (factory default) copy table size setting for the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, the ETERNUS AF650 S2, and the ETERNUS AF650 is 0MB. Modify the copy table size before using the copy function.
- Make sure to stop the copy session before reducing the copy table size. To check the copy session, refer to "Advanced Copy (Basic Information)" (page 924).
- Cache memory is not only used for copy tables, but also used for REC Buffers, the Thin Provisioning function (*1), the Storage Cluster function (*1), and the Non-disruptive Storage Migration function. Note that a copy table with the maximum capacity for each model cannot always be created depending on the following conditions.
  - Memory capacity in the ETERNUS DX/AF
  - REC Buffer size
  - Maximum pool capacity
  - Total TFOV capacity (*2)
  - License registration for the Non-disruptive Storage Migration function
  *1:   The shared area in the cache memory is used for the following conditions.
    - The maximum pool capacity for the ETERNUS DX8700 S3/DX8900 S3 is expanded to "1.5 PB" or larger
    - The maximum pool capacity for the ETERNUS DX600 S4, the ETERNUS DX600 S3, the ETERNUS AF650 S2, or the ETERNUS AF650 is expanded to "1024 TB" or larger
    - The total TFOV capacity (*2) has been expanded from the default capacity
      Refer to "Default TFOV capacity for each model" (page 537) for details.
  *2:   The total TFOV capacity indicates the total capacity of the volumes that are used for the Storage Cluster function in an ETERNUS DX/AF. To change the total TFOV capacity, use ETERNUS CLI or ETERNUS SF Storage Cruiser.
- If the copy table size is insufficient, an error occurs in the copy session. Make sure to specify the "Table Size Threshold" value to monitor the usage of the copy table in advance. The ETERNUS DX/AF reports the notification using the method specified in "Setup Event Notification" (page 155). When reporting, select the notification method in advance.
- Set the resolution as small as possible. When a large value is specified, the performance may be reduced. When unsure about whether the copy target area might be increased in future use, specify the maximum resolution.
- The same resolution must be used by both the copy source and copy destination storage systems for REC. If the resolution settings for the copy source and copy destination storage systems are different, REC cannot be performed. Note that the copy table sizes do not need to be the same. If different recommended resolutions are calculated for the copy source and copy destination storage systems, use whichever resolution is greater for both storage systems. If the resolution is changed, recalculate the copy table size setting for the storage system with the new resolution.

> 🔵 **N o t e**
>
> - Changes to the resolution setting are applied from the next session. For a copy session that is currently being performed, data is copied with the resolution that was specified when the session was started. To change the resolution of a copy session that is currently being performed, cancel the copy session and start again.
> - When the table size or the table size threshold is changed, the new value is applied immediately.
> - The current copy table size can be checked. Refer to "Settings (Advanced Copy)" (page 944) for details.
> - Setting the copy table size is not required when using the ODX or XCOPY function, or when using copy functions with VVOLs.

For details on the parameters for this function, refer to "A. Modify Copy Table Size" (page 1219).
For the factory default settings for this function, refer to "B. Modify Copy Table Size" (page 1289).

There are two methods to set the copy table size: manually and automatically.
The procedure to set the copy table size is as follows:

■ Manually setting the copy table size

Specify the copy table size manually.

Procedure

1 Click [Modify Copy Table Size] in [Action].

2 Specify each items.
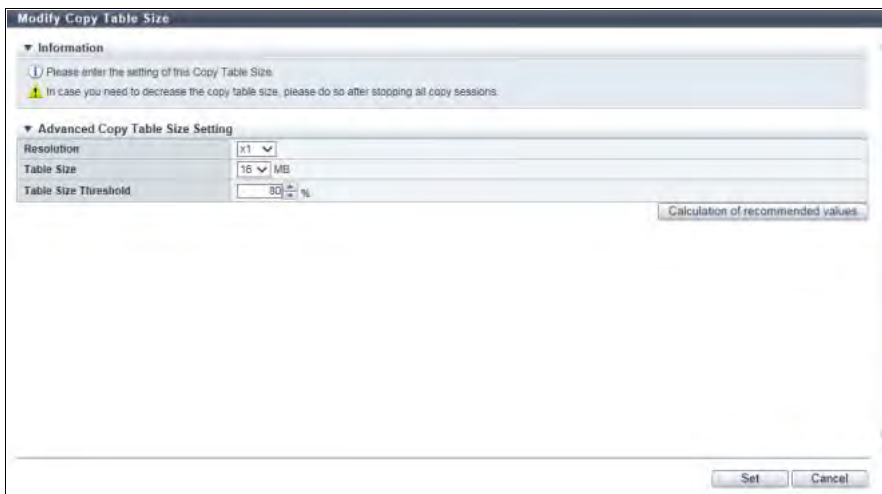
The main setting items are as follows.

⬤ Advanced Copy Table Size Setting

- Resolution
- Table Size (MB)
- Table Size Threshold (%)

> 🔵 **N o t e**
>
> Refer to "How to calculate the copy table size" (page 1221) for the setting parameters of "Resolution" and "Table Size".

3 Click the [Set] button.

4 A confirmation screen appears. Click the [OK] button.
→ Setting of the copy table size starts.

5 Click the [Done] button to return to the [Settings] screen.

End of procedure

■ **Automatically setting the copy table size**

Specify the copy table size automatically.

Procedure

1 Click [Modify Copy Table Size] in [Action].

2 Click the [Calculation of recommended values] button.
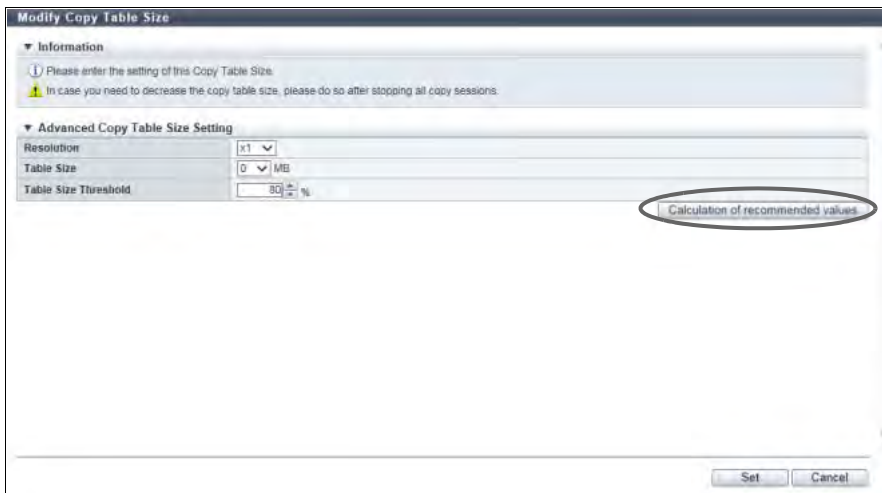
→ The [Calculation of recommended values] dialog box appears.

3 Input the necessary information.
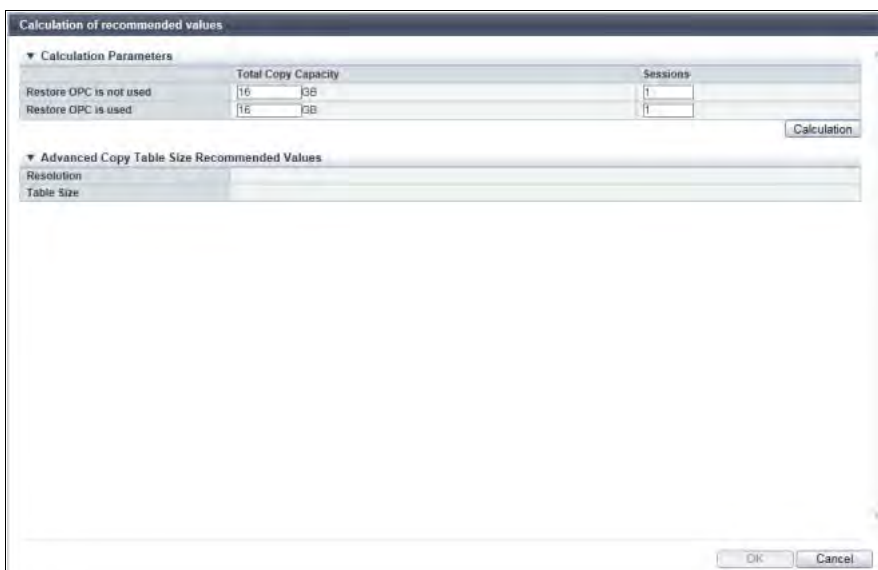
The main setting items are as follows.

● **Calculation Parameters**

- Total Copy Capacity (Restore OPC is not used)
- Total Copy Capacity (Restore OPC is used)
- Sessions (Restore OPC is not used)
- Sessions (Restore OPC is used)

4 Click the [Calculation] button.

→ "Resolution" and "Table Size" are automatically calculated.

5 Click the [OK] button.
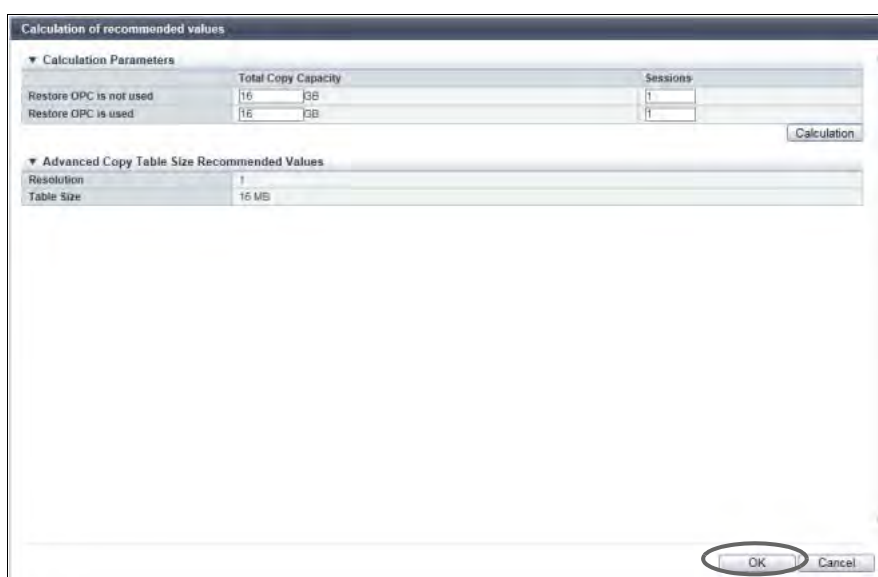
→ The calculated values are reflected to "Resolution" and "Table Size" in the "Advanced Copy Table Size Setting" field.

6 Click the [Set] button.
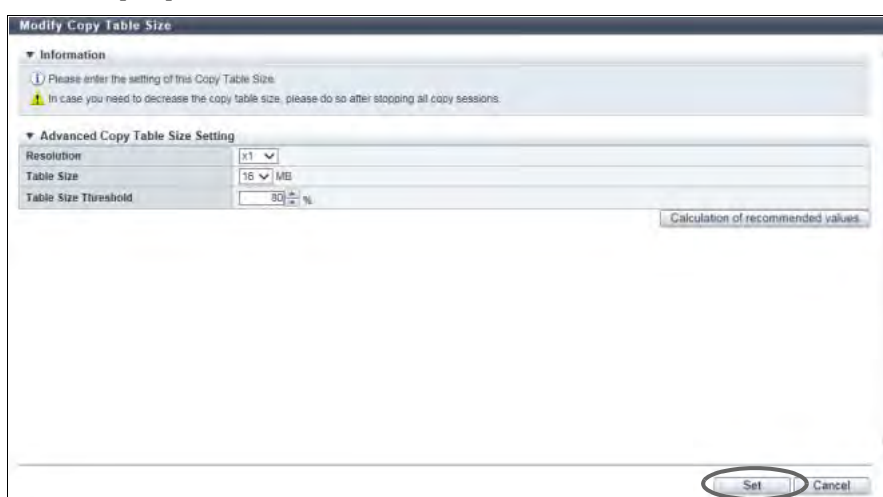
7 A confirmation screen appears. Click the [OK] button.
→ Setting of the copy table size starts.

8 Click the [Done] button to return to the [Settings] screen.

End of procedure

Modify Copy Parameters

This function specifies the threshold for the SDP usage ratio and sets an SDPE. If the SDP capacity is insufficient during a SnapOPC+ session, an error occurs and the relevant copy session and all the copy sessions that started earlier than the relevant session are stopped. This function is used to change the threshold and the SDPE.

▷ **Caution**

Registering a license for the Advanced Copy function or the Unified Storage environment is required to use this function.

● **N o t e**

- Threshold setting for the SDP
  - Automatically notifying the user when the SDP usage ratio exceeds the threshold can be set. To notify events, specify the notification method in advance. Refer to "Setup Event Notification" (page 155) for details.
  - If the threshold for multiple policies is satisfied at the same time, the ETERNUS DX/AF notifies of the highest policy level.
  - Notification of the shortage of SDP capacity is sent only once for each policy level. Even if the threshold is exceeded again within the 24 hours from the first notification, the ETERNUS DX/AF does not report that effect. After 24 hours has passed, the device sends a notification again.
- SDPE settings
  - The current capacities of the SDPEs and the SDP can be checked. Refer to "Snap Data Pool" (page 945) for details.
  - The maximum SDP capacity is determined by the SDPE. The maximum SDP capacity for each SDPE is described below. Note that the maximum SDP capacity varies depending on the maximum physical capacity of the drives in the ETERNUS DX/AF.

  The maximum SDP capacity for each SDPE

Model	SDPE	The maximum SDP capacity
ETERNUS DX60 S4/DX100 S4/DX200 S4 ETERNUS DX60 S3/DX100 S3/DX200 S3	1 GB	32 TB
	2 GB	64 TB
	4 GB	128 TB
ETERNUS DX500 S4/DX600 S4 ETERNUS DX500 S3/DX600 S3 ETERNUS DX8100 S3	1 GB	64 TB
	2 GB	128 TB
	4 GB	256 TB
ETERNUS DX8700 S3/DX8900 S3	1 GB	128 TB
	2 GB	256 TB
	4 GB	512 TB
ETERNUS AF250 S2 ETERNUS AF250	1 GB	32 TB
ETERNUS AF650 S2 ETERNUS AF650	1 GB	64 TB
	2 GB	128 TB
	4 GB	256 TB
ETERNUS DX200F	1 GB	32 TB

  - When an SDPE is changed during operation, the changed value is applied to the SDPEs for the SDPVs that are created. Note that values of the SDPEs for SDPVs that are already created and being used do not change. Determining the SDPEs before starting operations and not changing the SDPEs once operations start are recommended.

For details on the parameters for this function, refer to "A. Modify Copy Parameters" (page 1223).
For the factory default settings for this function, refer to "B. Modify Copy Parameters" (page 1290).

The procedure to modify copy parameters is as follows:

Procedure

1 Click [Modify Copy Parameters] in [Action].

2 Specify the threshold for each policy level.
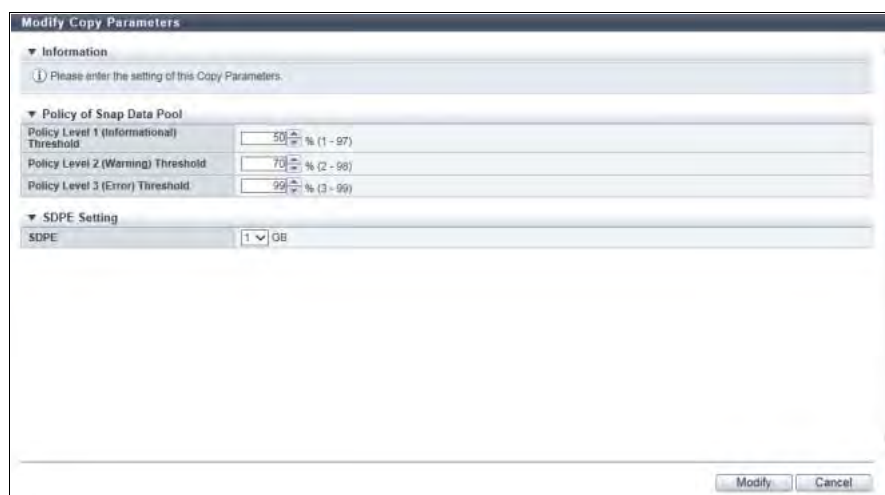
The main setting items are as follows.

● **Policy of Snap Data Pool**

- Policy Level 1 (Informational) Threshold
- Policy Level 2 (Warning) Threshold
- Policy Level 3 (Error) Threshold

● **SDPE Setting**

- SDPE

▷ **Caution**

If the magnitude relation is not "Threshold for a policy level 1" < "Threshold for policy level 2" < "Threshold for policy level 3", an error screen appears. If this occurs, check the parameter settings.

3 Click the [Modify] button.

4 A confirmation screen appears. Click the [OK] button.
→ The specified copy parameters are registered.

5 Click the [Done] button to return to the [Snap Data Pool] screen.

End of procedure

REC Management

This section describes REC management.

REC management provides the following functions:
- Export Storage Information
- Set Copy Path
- Delete All Copy Path
- Export All Copy Path
- Measure Round Trip Time
- Modify REC Buffer
- Create REC Disk Buffer
- Assign REC Disk Buffer
- Delete REC Disk Buffer
- Format REC Disk Buffer
- Modify REC Multiplicity
- Set REC Bandwidth Limit

Export Storage Information

This function exports the storage system information, and saves the information in a file.
The saved file can be used as storage system information when creating a copy path, so that manual registration of the storage system information will not be required.

▷ **Caution**

- Registering the Advanced Copy function license or the Storage Cluster function license is required to use this function.
- The bandwidth limit for a copy path cannot be exported.

The procedure to export the REC device information is as follows:

Procedure

1 Click [Export Storage Info] in [Action].

2 Click the [Export] button.
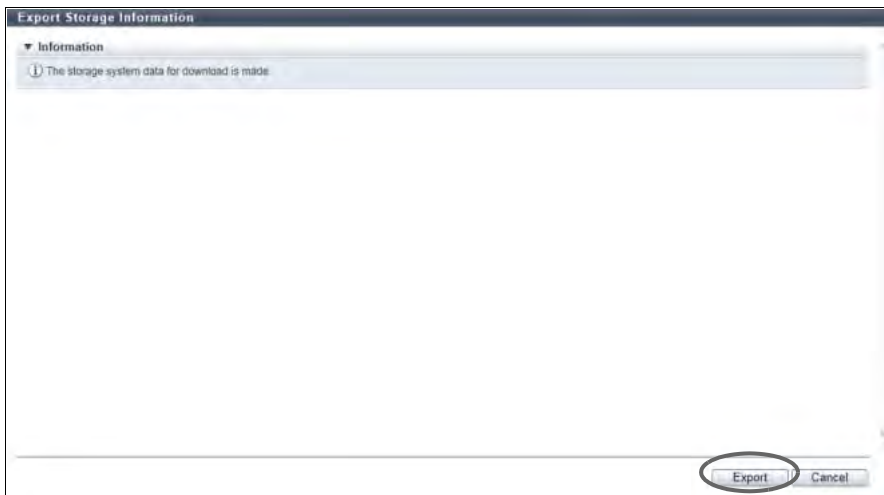
→ The storage system information, which has been registered in the ETERNUS DX/AF, is exported.
After the storage system information export has been finished, a screen to execute downloading the file is displayed.

3 Click the [Download] button.

→ A dialog box to download the file appears.

4 Save the storage system information file.
The default file name is "RecRAInfo_serial number for the ETERNUS DX/AF_YYYY-MM-DD_hh-mm-ss.bin".
(YYYY-MM-DD_hh-mm-ss: the date and time when the download screen (Step 3) is displayed.)

5 Click the [Close] button to return to the [Copy Path] screen.

End of procedure

Set Copy Path

This function sets copy path information between the ETERNUS storage systems required for performing REC using the wizard screen. Copy path information indicates the path (copy path and the storage system where the copy path is set) used for performing REC. Not only copy path information of the local storage system but also the information between remote storage systems can be created.

Storage systems that can be used as remote storage systems

- ETERNUS DX100 S4/DX200 S4
- ETERNUS DX500 S4/DX600 S4
- ETERNUS DX100 S3/DX200 S3
- ETERNUS DX500 S3/DX600 S3
- ETERNUS DX8100 S3/DX8700 S3/DX8900 S3
- ETERNUS AF250 S2
- ETERNUS AF650 S2
- ETERNUS AF250
- ETERNUS AF650
- ETERNUS DX200F
- ETERNUS DX90 S2
- ETERNUS DX410 S2/DX440 S2
- ETERNUS DX8100 S2/DX8700 S2
- ETERNUS DX90
- ETERNUS DX410/DX440/DX8100/DX8400/DX8700
- ETERNUS4000/ETERNUS8000
- ETERNUS6000

The maximum number of remote storage systems, paths, and ports

- Up to 16 remote storage systems can be connected from one storage system.
- Up to 8 copy paths can be created between a pair of storage systems.
- Up to 32 destination ports (FC-RA) can be connected from one port.
- Up to 16 destination ports (iSCSI-RA) can be connected from one port.

In this section, the storage system that is used to create copy paths is referred to as "local storage system" and the storage system that is connected to is referred to as a "remote storage system".

This function provides the following functions:

(1) Register Storage System Information

(2) Create Copy Path

(3) Apply Copy Path

(4) Save

(5) Set Bandwidth Limit

(6) Measure Round Trip Time

▷ **Caution**

- Registering the Advanced Copy function license or the Storage Cluster function license is required to use this function.
- Creating copy paths in the ETERNUS DX100 S3 is only available when the local storage system (the storage system where copy paths are created) is purchased outside Japan.
- To create copy path information between different generations of ETERNUS storage systems (such as ETERNUS DX600 S3 and ETERNUS DX440 S2), be sure to create the information on the newer model of ETERNUS storage system (ETERNUS DX600 S3 in the above example). The copy path creating function on an older model may not have a function to add the storage system information for newer models or the created path information file cannot be applied to newer models.

- When creating a copy path between the ETERNUS DX S4/S3 series (*1) with a controller firmware version V10L40 or later and the ETERNUS DX S3 series with the controller firmware versions earlier than V10L40, make sure to create the copy paths using the ETERNUS DX S4/S3 series that has a controller firmware version V10L40 or later.
- If the created path information and the path information in the ETERNUS storage system do not match and some of the copy paths to the ETERNUS storage system are not selected to be applied, the actual path information after the application does not correspond to the backed up path information file. Refer to "Specification for applying result" (page 1236) for details. Note that the backup path file corresponds to the downloaded path information file in the setting PC.
- Furthermore, note the following points for modifying the copy path information.
  - When adding new copy paths in the ETERNUS storage system where copy paths already exist, create path information files for all the copy paths including the existing paths. Refer to "Adding new copy paths" (page 1236) for details.
  - If the Box ID is changed after the copy path is set, REC will no longer run. After creating the copy path information with the new Box ID, apply the new copy path information to all the ETERNUS storage systems that have copy paths to the ETERNUS storage system for which the Box ID was changed.
  - Modifying copy path information in use may stop or otherwise affect operations. Confirm that REC is not in use before modifying the information. To check whether REC is in use, refer to the copy session list of Remote Copy.
- An REC between the following models is not supported.
  - When FC ports are used
    - ETERNUS DX S4 series (*2) and ETERNUS DX90
    - ETERNUS DX S4 series (*2) and ETERNUS DX410/DX440/DX8100/DX8400/DX8700
    - ETERNUS DX S4/S3 series (*1) and ETERNUS4000/ETERNUS8000
  - When iSCSI ports are used
    - ETERNUS DX S4/S3 series (*1) and ETERNUS DX90
    - ETERNUS DX S4/S3 series (*1) and ETERNUS DX410/DX440/DX8100/DX8400/DX8700

*1: Except the ETERNUS DX60 S4/DX60 S3.
*2: The target storage systems are the ETERNUS DX100 S4/DX200 S4, the ETERNUS DX500 S4/DX600 S4, and the ETERNUS AF250 S2/AF650 S2.

N o t e

- Only copy path information files created/saved with this function can be loaded with this function.
- The storage system information file that can be loaded by using this function is the file that can be obtained and downloaded from "Storage systems that can be used as remote storage systems" (page 590).
- Use the procedure in "Delete All Copy Path" (page 610) to delete the copy path information in the local storage system. The copy path information of the local storage system is initialized.
- The round trip time can be measured only between the local storage system and a remote storage system that has a physical path to the local storage system. When a copy path is created between remote storage systems, apply a copy path information file to the applicable storage system before measuring the round trip time.
- The round trip time can be measured only when the connection type is "Remote".
- To change the measured round trip time, use the procedure in "Measure Round Trip Time" (page 612).
- When the link speed is changed, use this function to create new copy paths with the changed link speed. After creating copy paths with the new link speed, apply the copy path information to both the copy source and the copy destination storage systems for which the link speed was changed.

For details on the parameters for this function, refer to "A. Set Copy Path" (page 1224).
For the factory default settings for this function, refer to "B. Set Copy Path" (page 1290).

The procedure to set an REC copy path is as follows:

Operation Mode Selection

In this screen, select the operation mode.

Procedure

1 Click [Set Copy Path] in [Action].

2 Select the operation mode.
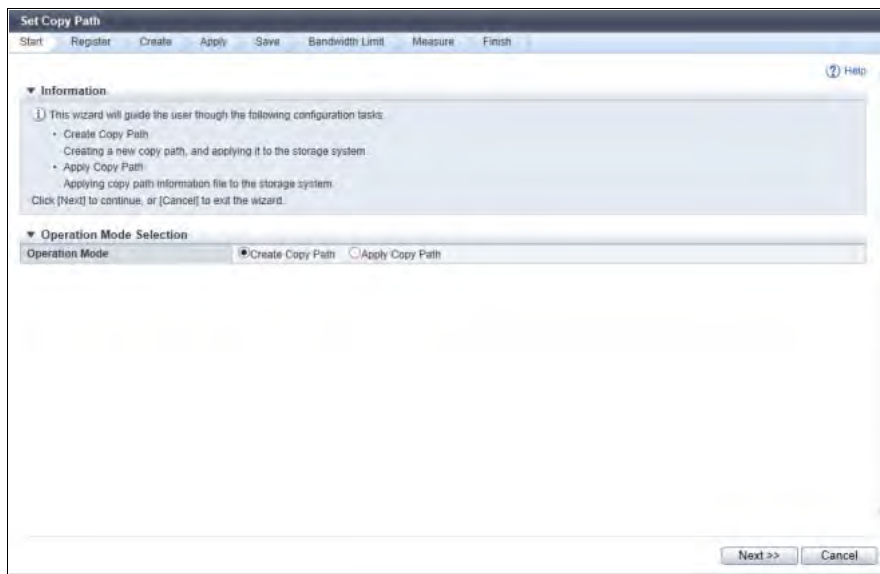
The main setting item is as follows.

● **Operation Mode Selection**

   • Operation Mode

3 Click the [Next >>] button.
   The displayed screen is different depending on the selected operation.

   ■ When selecting "Create Copy Path"

   The [Base Information Selection] screen appears. Proceed to "Register Storage System Information" (page 593).

   ■ When selecting "Apply Copy Path"

   The [Copy Path Information File Selection] screen appears. Proceed to "Select Copy Path Information" (page 601).

   End of procedure

Register Storage System Information

In this screen, register the storage system information to which the copy path is created.

> **Procedure**

1 Select a storage system information selection method in the [Base Information Selection] screen.
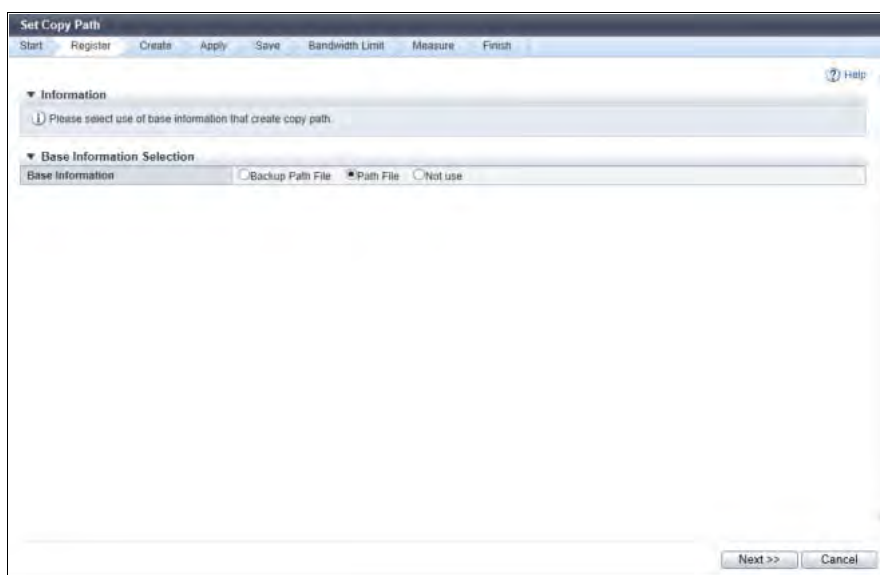
The main setting item is as follows.

● **Base Information Selection**

- Base Information

2 Click the [Next >>] button.
The displayed screen is different depending on the selected item.

■ When selecting "Backup Path File"

→ The [Check Registered Storage System Information] screen appears. Proceed to Step 5.

■ When selecting "Path File"

→ The [Copy Path Information File Selection] screen appears. Proceed to Step 3.

■ When selecting "Not use"

→ The [Storage System Information File Selection] screen appears. Proceed to Step 12.

3 Input the location where the copy path information file that to be used.
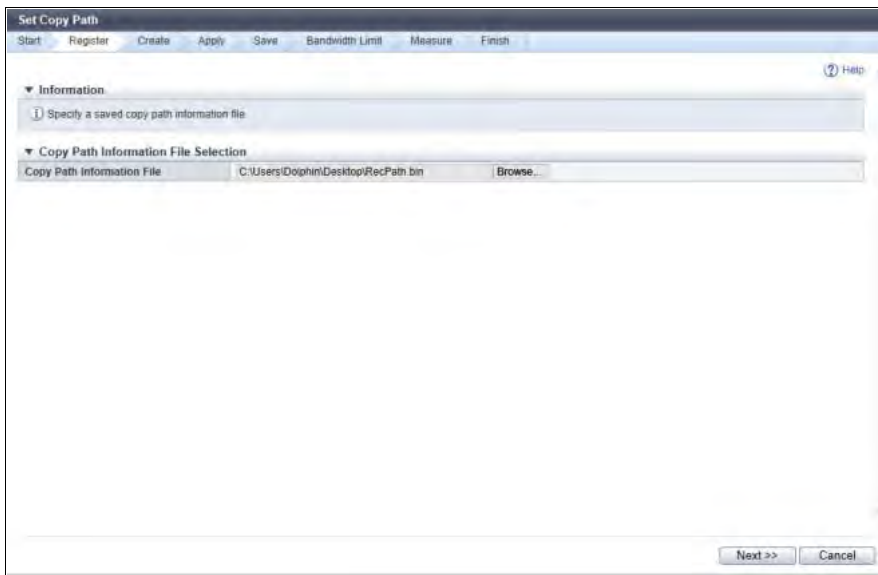
The main setting item is as follows.

● **Copy Path Information File Selection**

  • Copy Path Information File

4 Click the [Next >>] button.
→ The [Check Registered Storage System Information] screen appears.

5 Select a storage system to register the information (multiple selections can be made).
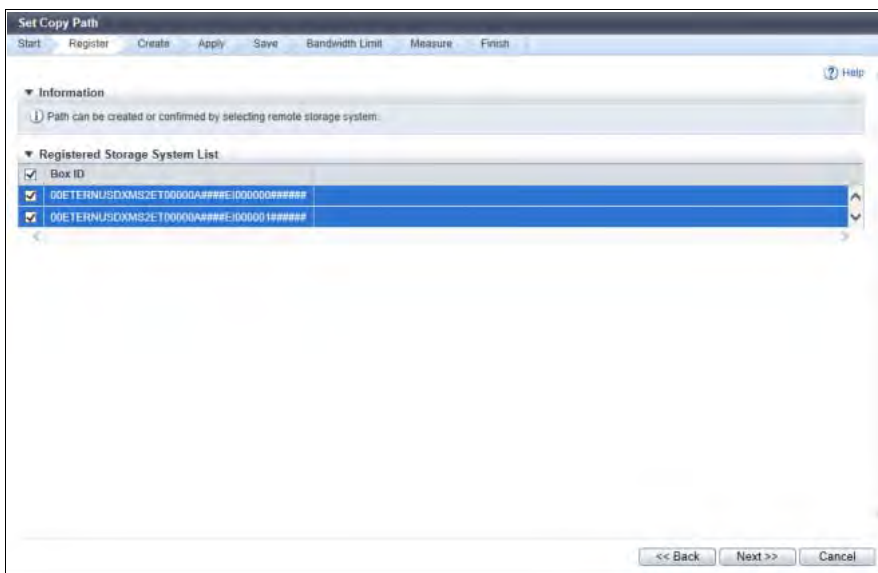
The main setting item is as follows.

● **Registered Storage System List**

  • Checkboxes for selecting a storage system

6 Click the [Next >>] button.

7   A confirmation screen appears. Click the [OK] button.

> ⬤ **N o t e**
>
> When no storage system to register the information is selected, the [Storage System Information File Selection] screen appears. Proceed to Step 12.

→ The [Storage System Configuration Setting] screen appears.

8   Perform the RA port and CA-RA port settings.

The main setting items are as follows.

● **Storage System Configuration Settings**
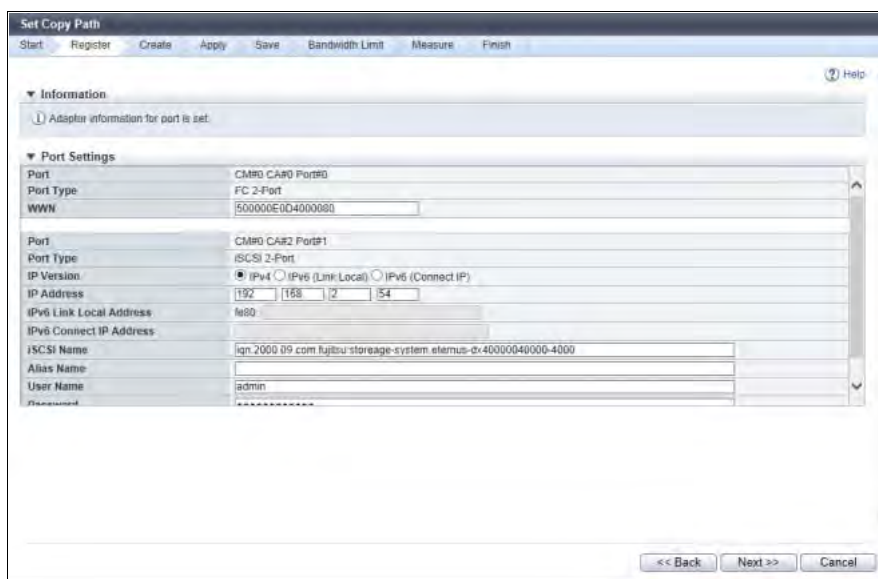
  • Port Type

  • Check to use as RA

  • Initiator / Target Setting

> ▶ **Caution**
>
> Regardless whether a copy path is applied or not, set all of the RA ports and CA/RA ports.

9   Click the [Next >>] button.
→ The [Port Settings] screen appears.

10 Perform the port settings.

The main setting items are as follows.

● **Port Settings**

- WWN
- IP Version
- IP Address
- IPv6 Link Local Address
- IPv6 Connect IP Address
- iSCSI Name
- Alias Name
- User Name
- Password

11 Click the [Next >>] button.
The displayed screen is different depending on the port setting state.

■ When a storage system for which port setting is not completed exists

   → The [Storage System Configuration Setting] screen appears again. Proceed to Step 8.

■ When port setting is completed for all the selected storage systems

   → The [Storage System Information File Selection] screen appears. Proceed to Step 12.

12 Specify whether to use the storage system information file.
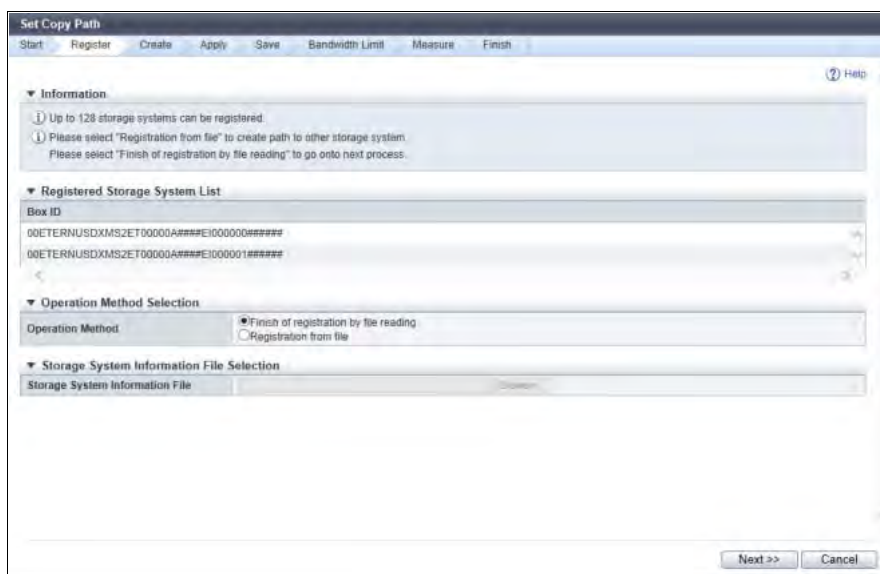
The main setting items are as follows.

● **Operation Method Selection**

   • Operation Method

● **Storage System Information File Selection**

   • Storage System Information File

13 Click the [Next >>] button.
The displayed screen is different depending on the port setting state.

■ When selecting "Registration from File"

   → The [Storage System Configuration Setting] screen appears. Proceed to Step 8.

■ When selecting "Finish of Registration by File Reading"

   → The [Storage System Information File Selection] screen appears. Proceed to Step 14.

14 Select whether to continue registration of storage system information.
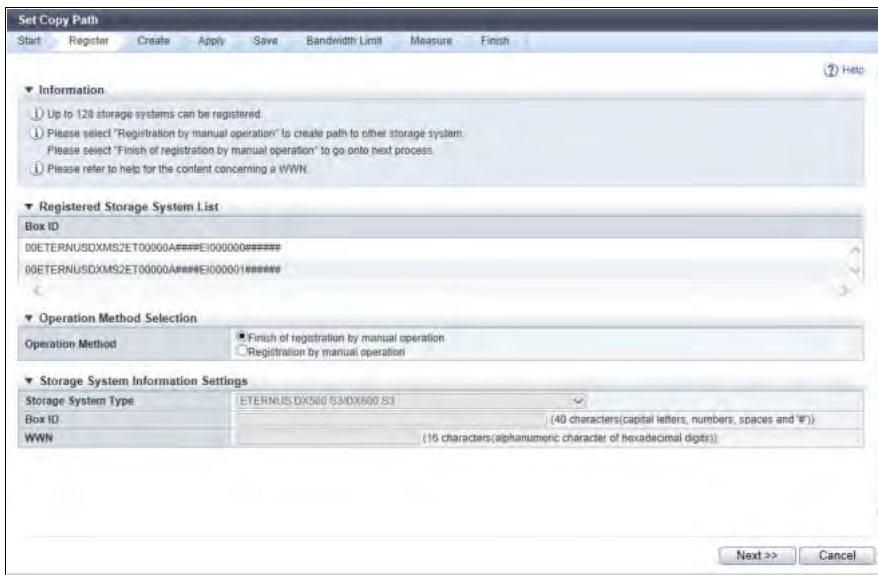
The main setting items are as follows.

● **Operation Method Selection**

• Operation Method

● **Storage System Information Setting**

• Storage System Type
• Box ID
• WWN

15 Click the [Next >>] button.
The displayed screen is different depending on the port setting state.

■ When selecting "Registration by manual operation"

→ The [Storage System Configuration Setting] screen appears again. Proceed to .

■ When selecting "Finish of Registration by File Reading"

→ The [Check Registered Storage System Information] screen appears. Proceed to .

16 Check the storage system information and click the [Next >>] button.
→ The [Copy Path Creation Storage System Selection] screen appears. Proceed to .

End of procedure

Create Copy Path

In this screen, set a copy path. Specify the Box ID of the target storage system in which the copy path is created, and set the line information between storage systems.

Procedure

1 Click the [Remote Storage System Box ID] link to create a copy path.
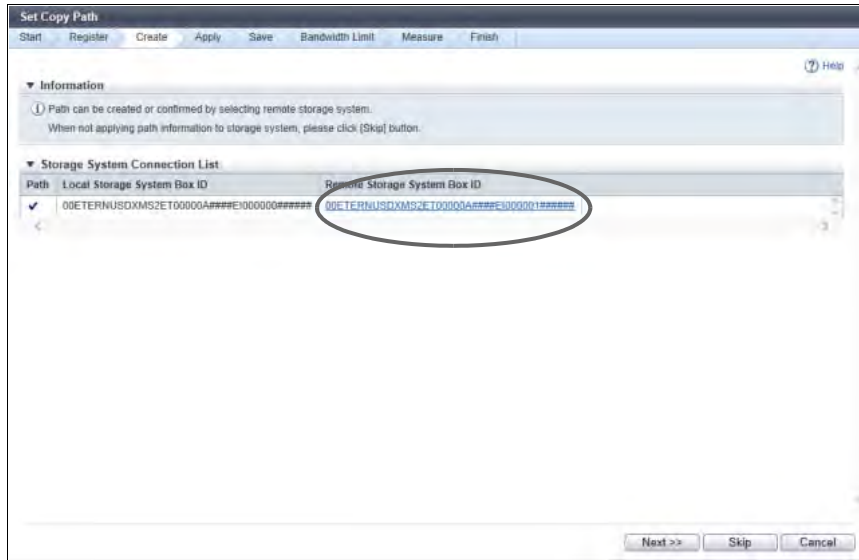
→ The [Copy Path Setting] dialog box appears.

2 Set a copy path in the [Copy Path Setting] dialog box.
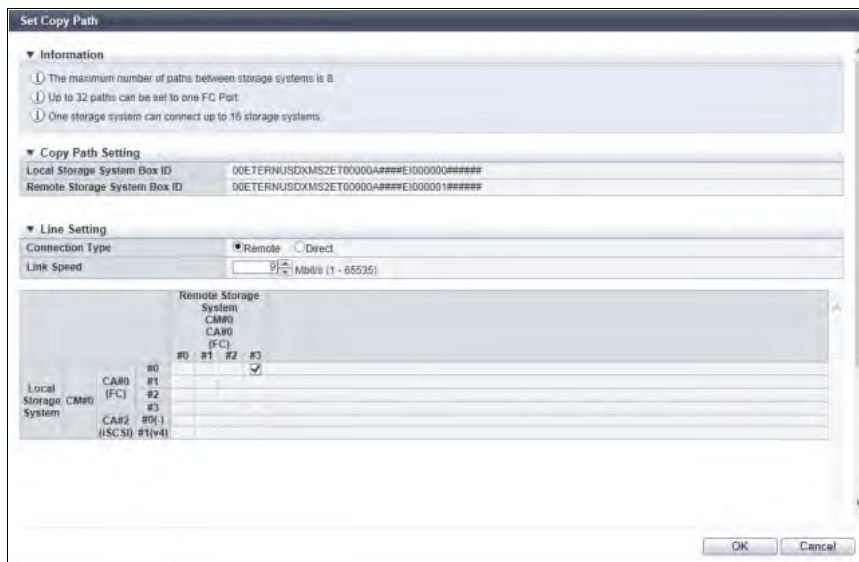
The main setting items are as follows.

● **Copy Path Setting**

• Line Setting

● **Line Setting**

• Connection Type
• Link Speed

3 Click the [OK] button.

→ The [Copy Path Creation Storage System Selection] screen appears.

4 Repeat Step 1 through Step 3 the same number of times as the number of storage systems to set copy paths.

> ▶ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
- The number of remote storage systems exceeds the maximum
- The number of paths per port exceeds the maximum

5 When setting a copy path is completed for all the storage systems, click the [Next >>] button.
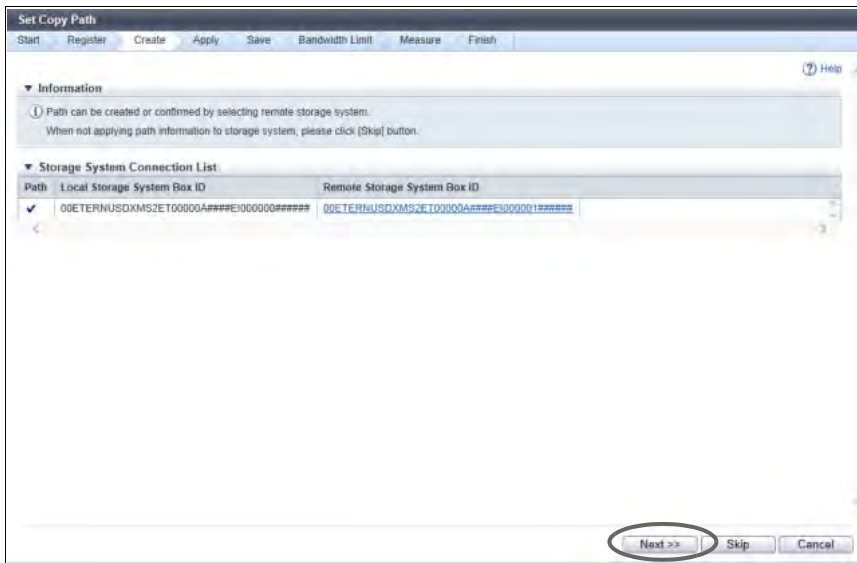
→ The [Storage System Connection List] screen appears. Proceed to "Apply Copy Path Information" (page 602).

> ⬤ **N o t e**

- Click the [Box ID] link in the [Storage System Connection List] screen to display the [Check Copy Path Information Setting] dialog box. Confirm the path information that is to be applied to the storage system.
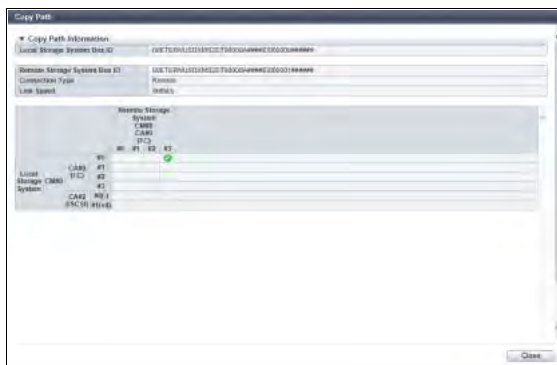
- If a path with normal status exists, the [Skip] button is displayed. Click the button to display the [Download File] screen. Proceed to "Select Copy Path Information" (page 601).

End of procedure

Select Copy Path Information

In this screen, select the copy path information file to be used.

> **N o t e**
>
> This setting is required only when "Apply Copy Path" is selected for "Operation Mode Selection" (page 592).

Procedure

1 Input the location where the copy path information file to be used is stored.
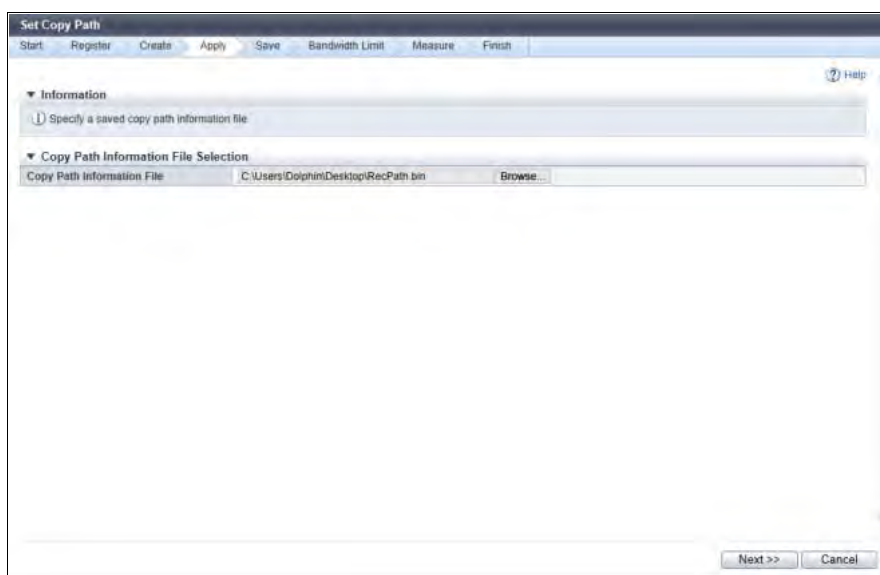
The main setting item is as follows.

● **Copy Path Information File Selection**

- Copy Path Information File

2 Click the [Next >>] button.
→ The [Storage System Connection List] screen appears. Proceed to "Apply Copy Path Information" (page 602).

> **N o t e**
>
> Click the [Box ID] link in the [Storage System Connection List] screen to display the [Check Copy Path Infor-
> mation Setting] dialog box. Confirm the path information that is to be applied to the storage system.
>
>
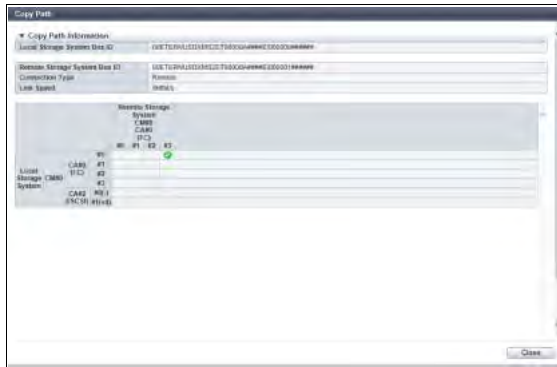
End of procedure

Apply Copy Path Information

In this screen, apply the copy path information.

Procedure

1 Confirm that the copy path is set between the storage systems.
The checkbox is only displayed when the path information that is created by this function does not match
the path information that is already applied. Select the checkbox for path information that is to be applied.

> **N o t e**
>
> When no paths that can be applied to the storage system exist, the [Download File] screen appears. Pro-
> ceed to "Save" (page 603)
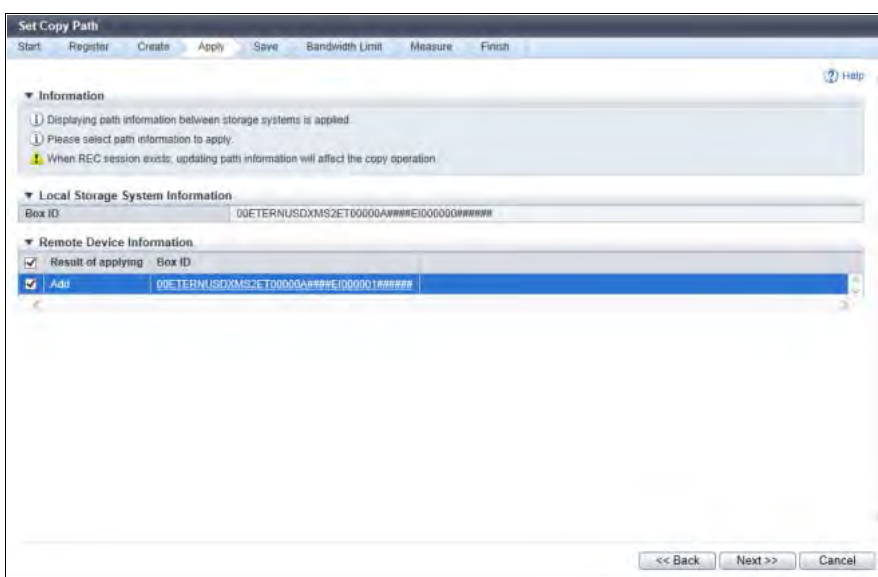
The main setting item is as follows.

● **Remote Device Information**

- Checkbox to select a Box ID

> ⚠ **Caution**
>
> If one of the following information does not match the local storage system configuration and the configu-
> ration in the copy path information file, the cause of the error is displayed in the [Result of applying]
> screen.
> - Port mode (when the local storage system is "CA" and the copy path information file is "RA")
> - Port type (FC, iSCSI, and iSCSI RA)
> - When the port type is "FC", the WWN information
> - When the port type is "iSCSI" or "iSCSI RA", the IP address information
> - When the port type is "iSCSI" or "iSCSI RA", the iSCSI name information

2 Click the [Next >>] button.

3 A confirmation screen appears. Click the [OK] button.
→ Application of the copy path information starts. After application is complete, the [Result of applying]
screen appears

4 Check the message and click the [Next >>] button.
Displayed screen varies depending on the operation mode that is selected in [Start] screen.

■ When "Create Copy Path" is selected

→ The [Download File] screen appears. Proceed to .

■ When "Apply Copy Path" is selected

- When the copy path information file is successfully applied
→ The [Set Bandwidth Limit] screen appears. Proceed to .
- When application of the copy path information file fails
→ The [Finish] screen appears. Click the [OK] button to display the [Finish Display] screen. Proceed to
.

End of procedure

Save

In this screen, save the copy path information that is created in the procedure in .

> 🔵 **N o t e**
>
> - The saved copy path information file can be applied to other ETERNUS storage systems.
> - Click the [Save] button for each model and save the copy path information file.

Procedure

1 Click the [Save] button to save the copy path information.
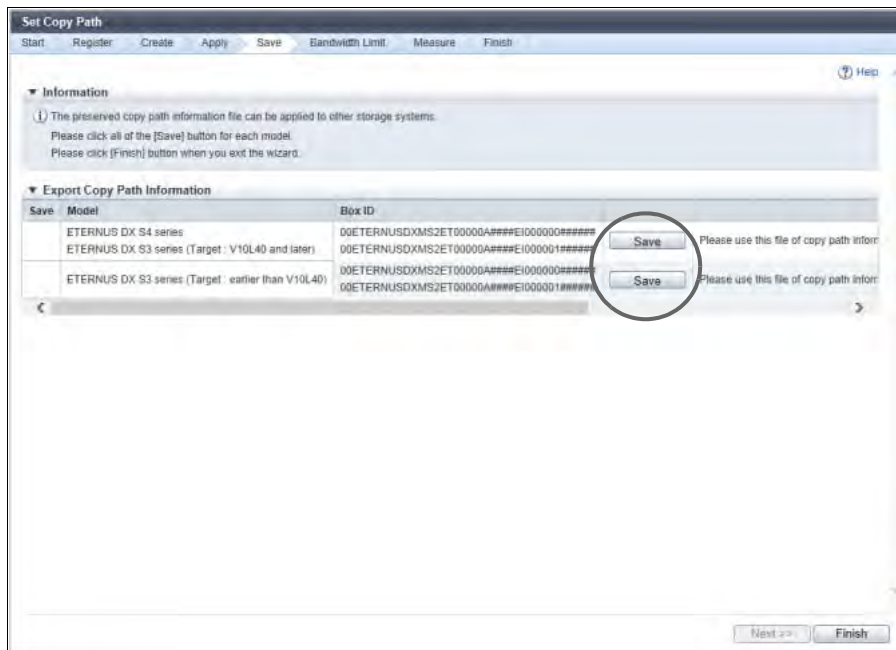
→ A dialog box to download the file appears.

> ▶ **Caution**
>
> - If all the controller firmware versions for the ETERNUS DX S4/S3 series in the copy path information file are "V10L40 and later", save the copy path information file of "ETERNUS DX S4 series ETERNUS DX S3 series (Target : V10L40 and later)". If all the controller firmware versions for the ETERNUS DX S3 series in the copy path information file are "earlier than V10L40", save the copy path information file of "ETER-NUS DX S3 series (Target : earlier than V10L40)". If the controller firmware versions in the copy path information file are both "V10L40 and later" and "earlier than V10L40", save both the copy path information files of "ETERNUS DX S4 series ETERNUS DX S3 series (Target : V10L40 and later)" and "ETERNUS DX S3 series (Target : earlier than V10L40)".
>   For the ETERNUS DX S4/S3 series with the controller firmware versions V10L40 and later, the copy path information file that is saved in the "ETERNUS DX S4 series ETERNUS DX S3 series (Target : V10L40 and later)" format must be applied. Similarly, for the ETERNUS DX S3 series with the controller firmware versions earlier than V10L40, the copy path information file that is saved in the "ETERNUS DX S3 series (Target : earlier than V10L40)" format must be applied.
> - To edit the copy path information file for the ETERNUS DX S4/S3 series using this function, use the copy path information file that was saved in the "ETERNUS DX S4 series ETERNUS DX S3 series (Target : V10L40 and later)" format. Note that this function cannot edit the copy path information file that is saved in the "ETERNUS DX S3 series (Target : earlier than V10L40)" format.

> 🔵 **N o t e**
>
> If the local storage system is an ETERNUS DX S4/S3 series, the following information is displayed even if there is no copy path information for the ETERNUS DX S4 series or the ETERNUS DX S3 series.
> - ETERNUS DX S4 series ETERNUS DX S3 series (Target : V10L40 and later)
> - ETERNUS DX S3 series (Target : earlier than V10L40)

2 Save the copy path information for each model.
The default file name depends on the model.
- For the ETERNUS DX/AF
  The default file name is "RecPath_serial number for the ETERNUS DX/AF_YYYY-MM-DD_hh-mm-ss.bin".
  (YYYY-MM-DD_hh-mm-ss: the date and time when the save screen (Step 1) is displayed.)
- For the other ETERNUS storage systems
  The default file name is "RecPathConvt_serial number for the ETERNUS storage system_YYYY-MM-DD_hh-mm-ss.bin". (YYYY-MM-DD_hh-mm-ss: the date and time when the save screen (Step 1) is displayed.)

3 Save the copy path information files for all of the models and click the [Next >>] button.

▷ **Caution**

If the [Finish] button is clicked, the created copy path information file is deleted even when the copy path information files for some of the models are not saved. Make sure to save all of the copy path information files.

◯ **N o t e**

When the created copy path information has not been applied or when the [Finish] button is clicked, the [End Confirmation] screen appears. Click the [OK] button to display the [Finish Display] screen. Proceed to "Finish" (page 609).
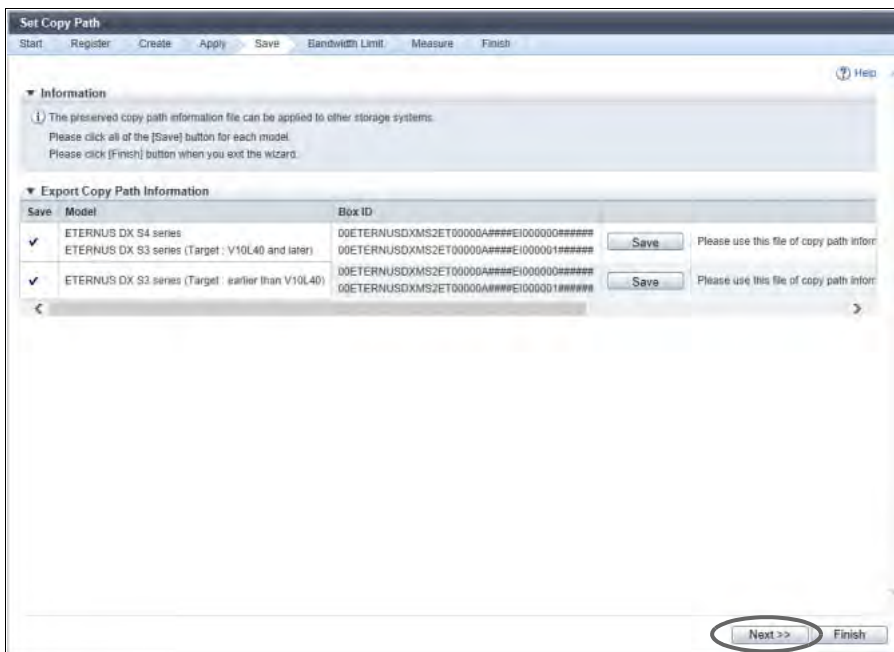
→ If the created path information has already been applied, the [Set Bandwidth Limit] screen appears. Proceed to "Set Bandwidth Limit" (page 605).

End of procedure

Set Bandwidth Limit

In this screen, set the bandwidth limit between the local and the remote storage systems.

◯ **N o t e**

If the bandwidth limit setting is not required, click the [Next >>] button. The [Measure Round Trip Time] screen appears. Proceed to "Measure Round Trip Time" (page 607).

Procedure

1 Select the remote storage system to set the bandwidth limit, and click the [Bandwidth Limit] link.
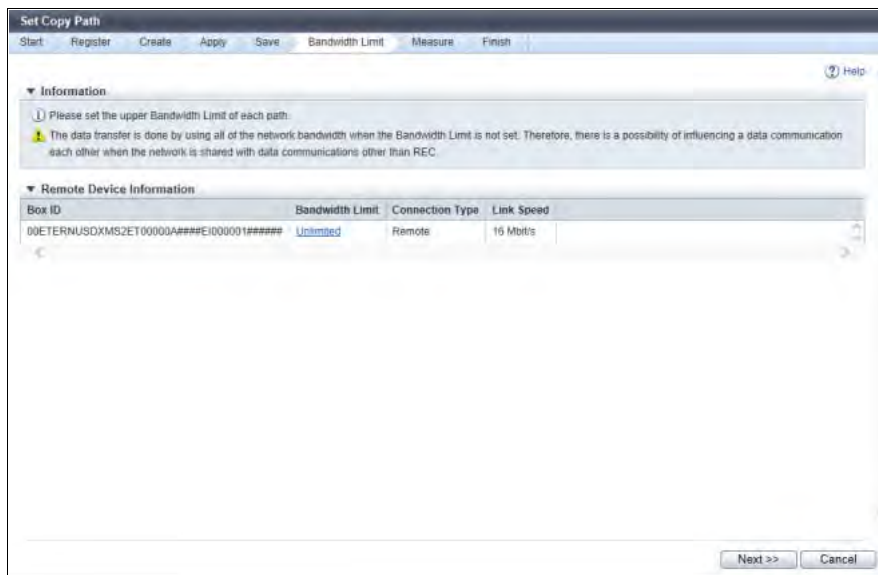
→ The [Set REC Bandwidth Limit] screen appears.

2 Set the detailed bandwidth limit information.
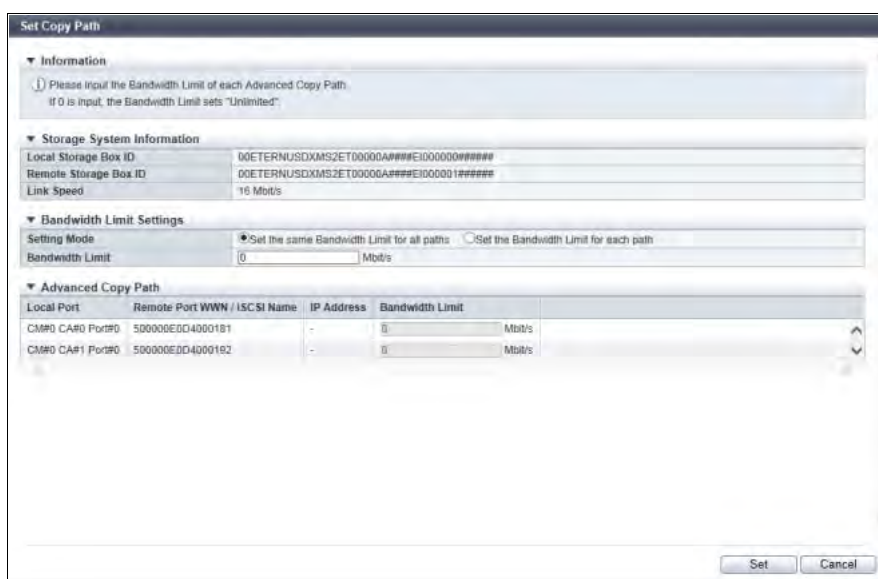
The main setting items are as follows.

● **Bandwidth Limit Settings**

• Setting Mode
• Bandwidth Limit

● **Advanced Copy Path**

• Bandwidth Limit

3   Click the [Set] button

4   A confirmation screen appears. Click the [OK] button.
         → The REC bandwidth limit setting starts.

5   Click the [Done] button.
         → Return to the [Set Bandwidth Limit] screen.

6   Click the [Next >>] button.
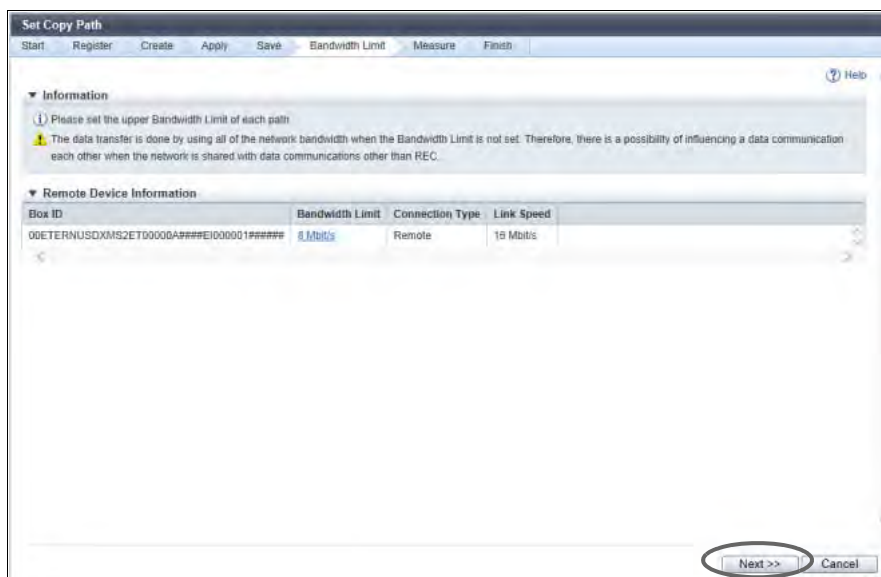
         → The [Measure Round Trip Time] screen. Proceed to "Measure Round Trip Time" (page 607).

<div align="right">

End of procedure
</div>

Measure Round Trip Time

In this screen, measure the round trip time between the local and remote storage systems.

> ▷ **Caution**

• Round trip times must be measured from a static state without sending data through the line.

• Before measuring the round trip time, set a physical line properly between the ETERNUS storage systems. When a line has an error, the round trip time cannot be measured correctly.

• Round trip times must be set for copy source and copy destination storage systems. Refer to "Measure Round Trip Time" (page 612) for details.

• It takes a maximum of 160 seconds to measure the round trip time.

Procedure

1 Select a remote storage system to measure the round trip time in the [Measure Round Trip Time] screen (multiple selections can be made).
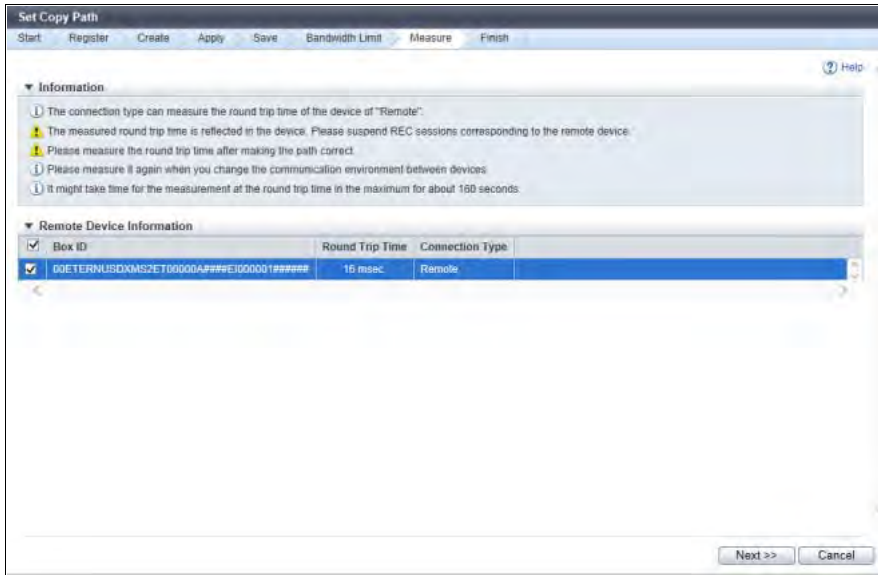
The main setting item is as follows.

● **Remote Device Information**

• Checkboxes for selecting a remote storage system

🔵 **N o t e**

If there are no remote storage systems that can measure the round trip time or when the connection type for all of the copy paths is "Direct", the [Finish Display] screen appears. Proceed to .

2 Click the [Next >>] button

3 A confirmation screen appears. Click the [OK] button.
   → Measurement of the round trip time starts. After measurement completes, the [Measure Round Trip Time Result] screen appears.

4 Check the measured round trip time, and click the [Next >>] button.
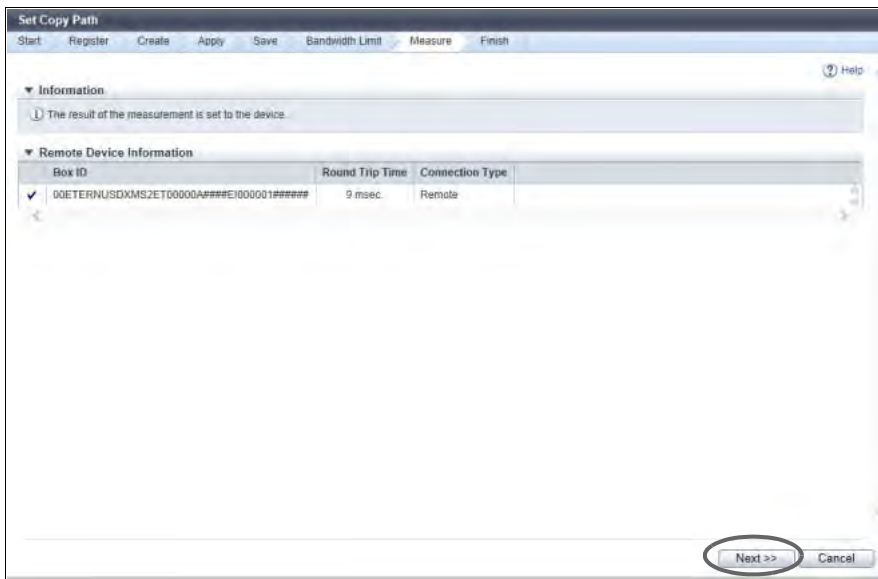
5 A confirmation screen appears. Click the [OK] button.

→ Setting of the round trip time starts. After completing the settings, the [Finish Display] screen appears. Proceed to .

End of procedure

Finish

The procedure to finish the copy path setting is as follows:

Procedure

1 Click the [Done] button.
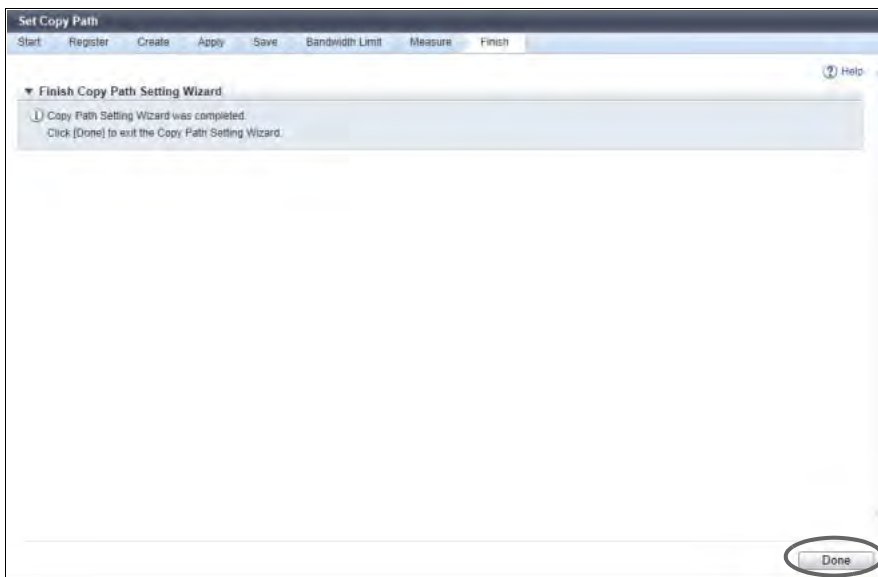
→ Returns to the [Copy Path] screen.

End of procedure

Delete All Copy Path

This function deletes all of the copy path information registered in the ETERNUS DX/AF.

▷ **Caution**

- Registering the Advanced Copy function license or the Storage Cluster function license is required to use this function.
- If an REC path, which is being used in an REC, was deleted, it may affect operations, such as the REC being stopped. Confirm that REC is not in use before modifying the information. To check if the REC is active, use the [Advanced Copy] screen. Refer to "Advanced Copy (Basic Information)" (page 924) for details.
- When deleting copy paths that are allocated with REC Buffers, make sure to delete the relevant REC Buffers and REC Disk Buffers.
- This function deletes all of the copy paths configured in the ETERNUS DX/AF. To delete some of the copy paths, refer to "Set Copy Path" (page 589).

◯ **N o t e**

The bandwidth limit for the path is also deleted when the copy path has been deleted.

The procedure to delete all of the copy paths is as follows:

Procedure

1 Click [Delete All Copy Path] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ Deletion of all the copy paths starts.

3 Click the [Done] button to return to the [Copy Path] screen.

End of procedure

Export All Copy Path

This function exports the copy path information registered in the ETERNUS DX/AF, and saves the information in a file.
The saved file can be used as path information when creating or changing a copy path, so that manual registration of the path information will not be required.

▷ **Caution**

- Registering the Advanced Copy function license or the Storage Cluster function license is required to use this function.
- A copy path information cannot be exported when it has not been registered in the ETERNUS DX/AF.
- The bandwidth limit for a copy path cannot be exported.

The procedure to export the copy path information is as follows:

Procedure

1 Click [Export All Copy Path] in [Action].

2 Click the [Export] button.

→ The copy path information, which has been registered in the ETERNUS DX/AF, is exported.
After the copy path information export has been finished, a screen to execute downloading the file is displayed.

3 Click the [Download] button.

→ A dialog box to download the file appears.

4 Save the copy path information file.
The default file name is "RecPath_serial number for the ETERNUS DX/AF_YYYY-MM-DD_hh-mm-ss.bin".
(YYYY-MM-DD_hh-mm-ss: the date and time when the download screen (Step 3) is displayed.)

5 Click the [Close] button to return to the [Copy Path] screen.

End of procedure

Measure Round Trip Time

This function measures the round trip time between the local and the remote storage systems.
"Round trip time" is the time taken to make a communication between two storage systems.
Only one remote storage system can be measured at a time.

▷ **Caution**

- Registering the Advanced Copy function license or the Storage Cluster function license is required to use this function.
- Round trip time can be measured only when the connection type is "Remote". Round trip time cannot be measured when the connection type is "Direct".
- Round trip times must be set for copy source and copy destination storage systems. Measure the round trip time after applying the copy path information to both the copy source and copy destination storage systems, and then set the results (measured value).
- Round trip time must be measured from a static state without sending data through the line. For example, if REC sessions exist between storage systems, set the REC session status to "✓ Suspend" before measuring.
- Make sure that the physical line is correctly configured between storage systems before measuring. When a line has an error, the round trip time cannot be measured correctly.
- If the path between storage systems is changed, measure the round trip time again.
- Round trip time measurement requires a maximum of 160 seconds.

For details on the parameters for this function, refer to "A. Measure Round Trip Time" (page 1240).

The procedure to measure the REC round trip time is as follows:

Procedure

1 Select the remote storage system that is connected by remote connection to measure the round trip time, and click [Get Round Trip Time] in [Action].

2 Click the [Measure] button.

→ Measurement of round trip time starts.

3   Change the "Round Trip Time (msec)" value if necessary.
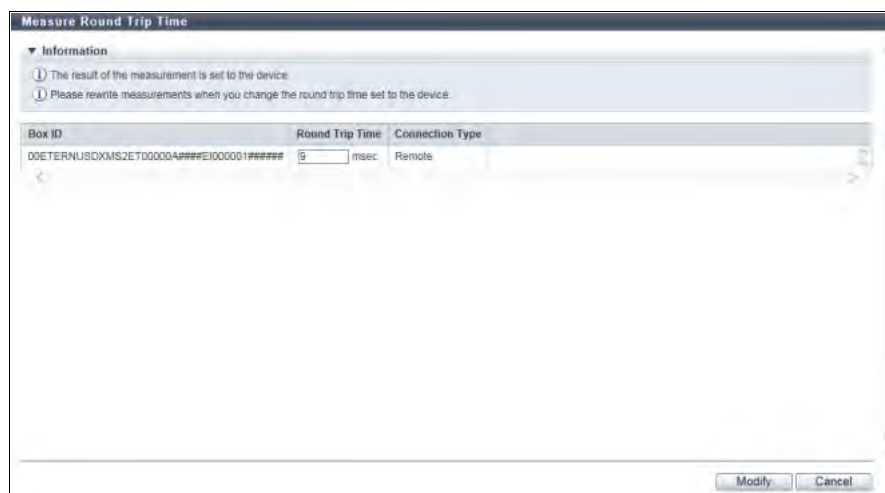
The main setting item is as follows.

● **Measure Round Trip Time**

• Round Trip Time (msec)

▷ **Caution**

If the round trip time has not been entered, the [Modify] button cannot be clicked.

4   Click the [Modify] button

5   A confirmation screen appears. Click the [OK] button.
→ The round trip time measurement result is updated in the ETERNUS DX/AF.

6   Click the [Done] button to return to the [Copy Path] screen.

End of procedure

Modify REC Buffer

This function sets parameters of the REC Buffer for copying data via the REC in Consistency mode.
The "Consistency mode" secures the order of data transfer to the remote device for all of the specified REC sessions.
This mode requires constant securement of the dedicated REC Buffer in the cache memory. Copying via REC Buffer
stores multiple REC session I/Os in the REC Buffer for a certain period of time, and copies in blocks.

REC Buffer specifications for each model

Model	Total size of all of the REC Buffers (per CM)	The maximum number of REC Buffers	The maximum size of a single REC Buffer
ETERNUS DX100 S4/DX100 S3	128 MB	1	128 MB
ETERNUS DX200 S4/DX200 S3	512 MB	4	512 MB
ETERNUS DX500 S4/DX500 S3 ETERNUS DX600 S4/DX600 S3 ETERNUS DX8100 S3 ETERNUS DX8700 S3 ETERNUS DX8900 S3	8192 MB	8	2048 MB
ETERNUS AF250 S2/AF250	512 MB	4	512 MB

Model	Total size of all of the REC Buffers (per CM)	The maximum number of REC Buffers	The maximum size of a single REC Buffer
ETERNUS AF650 S2/AF650	8192 MB	8	2048 MB
ETERNUS DX200F	512 MB	4	512 MB

▷ **Caution**

- Registering the license for the Advanced Copy function is required to set the REC Buffer.
- This function can only be used when the local storage system (the storage system that creates REC Buffers) supports REC.
- Perform REC Buffer settings in both the REC copy source and destination storage systems.
- When changing REC Buffers, suspend the sessions using the target REC Buffers.
- When deleting REC Buffers, stop the sessions using the target REC Buffers.
- This function cannot be used when the remote device and/or copy path have not been configured.
- Cache memory is not only used for REC Buffers, but also used for copy tables, the Thin Provisioning function (*1), the Storage Cluster function (*1), and the Non-disruptive Storage Migration function. Note that an REC Buffer with the maximum capacity for each model cannot always be created depending on the following conditions.
    - Memory capacity in the ETERNUS DX/AF
    - Copy table size
    - Maximum pool capacity
    - Total TFOV capacity (*2)
    - License registration for the Non-disruptive Storage Migration function
  *1:   The shared area in the cache memory is used for the following conditions.
        - The maximum pool capacity for the ETERNUS DX8700 S3/DX8900 S3 is expanded to "1.5 PB" or larger
        - The maximum pool capacity for the ETERNUS DX600 S4, the ETERNUS DX600 S3, the ETERNUS AF650 S2, or the ETERNUS AF650 is expanded to "1024 TB" or larger
        - The total TFOV capacity (*2) has been expanded from the default capacity
          Refer to "Default TFOV capacity for each model" (page 537) for details.
  *2:   The total TFOV capacity indicates the total capacity of the volumes that are used for the Storage Cluster function in an ETERNUS DX/AF. To change the total TFOV capacity, use ETERNUS CLI or ETERNUS SF Storage Cruiser.
- Because REC Buffers are duplicated between the CMs, the actual memory capacity is twice as large as the selected REC Buffer capacity.

🔵 **N o t e**

- Take REC reverse operation into consideration and specify the same values for the REC Buffers ("Forwarding Interval", "Monitoring Time", "HALT Wait Timer", "I/O Priority Mode", "Immediate HALT Mode", and "High Bandwidth Mode") in the copy source storage system and the copy destination storage system.
- When performing bidirectional data transfer, settings for "Send" and "Receive" REC Buffers in the ETERNUS DX/AF are required.
- If the usage of the REC Buffer to which the REC Disk Buffer has already been assigned is changed to "Unused", the REC Disk Buffer assignment will be cleared (the REC Disk Buffer itself will not be deleted)

For details on the parameters for this function, refer to "A. Modify REC Buffer" (page 1240).
For the factory default settings for this function, refer to "B. Modify REC Buffer" (page 1291).

■ **Adding a new REC Buffer**

The procedure to add a new REC Buffer is as follows:

Procedure

1   Select the target REC Buffers to be added (multiple selections can be made), and click the [Modify REC Buffer] in [Action].

2   Change the REC Buffer configurations.

The main setting items are as follows.

● **REC Buffer Setting List**

- Usage
- Remote Box ID
- Size
- Forwarding Interval
- Monitoring Time
- HALT Wait Timer

▷ **Caution**

If an error screen appears under the following conditions, check the parameter settings.
- The total size of REC Buffers is larger than the maximum capacity for each model
- The same remote Box ID has been selected both for "Send " and for "Receive" as its usage
- The usage of an REC Buffer is "Send" or "Receive", and its path to the remote Box ID has been deleted
- An REC Buffer, which has already been deleted ("???" is displayed in the "Remote Box ID" field), still exists
- The usage of an REC Buffer to which an REC Disk Buffer has already been assigned is changed to "Receive"
- When the setting contents of the REC Buffer has not been changed

> **Note**
>
> • The remote Box ID cannot be changed. To change the remote Box ID, first delete the corresponding group. Then, click [Modify REC Buffer] again to specify a new remote Box ID and other information in the corresponding group.
> • To change "I/O Priority Mode", "Immediate HALT Mode", or "High Bandwidth Mode", click "Advanced Setting".

3   Click the [Set] button

4   A confirmation screen appears. Click the [OK] button.
→ The REC Buffer settings starts.

5   Click the [Done] button to return to the [REC Buffer] screen.

End of procedure

■ Deleting an REC Buffer

The procedure to delete an REC Buffer is as follows:

> **Procedure**

1   Select the target REC Buffers to be deleted (multiple selections can be made), and click the [Modify REC Buffer] in [Action].

2   Select "Unused" for the usage of the REC Buffer.
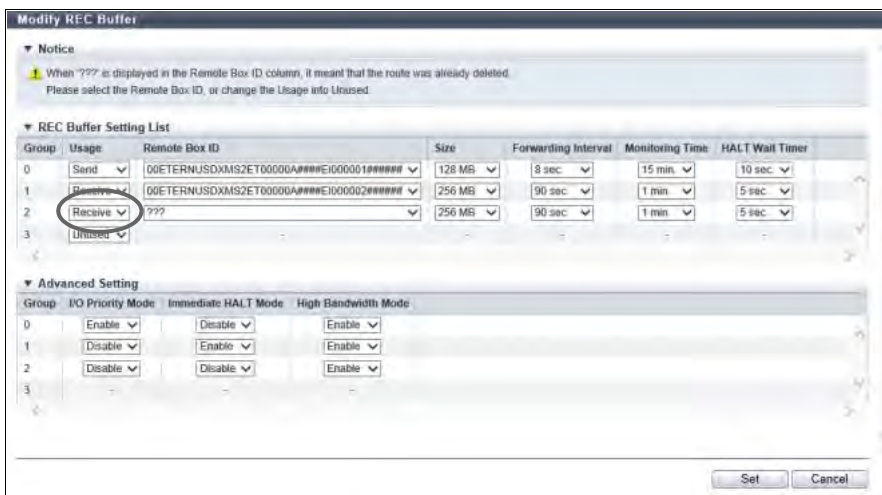
3   Click the [Set] button.

4   A confirmation screen appears. Click the [OK] button.
→ Deletion of an REC Buffer starts.

5   Click the [Done] button to return to the [REC Buffer] screen.

End of procedure

Create REC Disk Buffer

This function creates an REC Disk Buffer.
When using the REC Consistency mode, REC Buffer shortage may occur due to errors (such as a bad line). Note that the copy session status changes to " ❌ Halt" if the REC Buffer shortage extends past a certain period of time. The REC Disk Buffer is used for temporarily saving copy data to avoid these situations.

> **▷ Caution**

- Registering the license for the Advanced Copy feature is required to create an REC Disk Buffer.
- This function can only be used when the local storage system (the storage system that creates REC Disk Buffers) supports REC.
- When encryption mode is disabled, an encrypted REC Disk Buffer cannot be created by CM.
- In the following conditions, REC Disk Buffers cannot be created;
  - When multiple types of drives are combined in a single REC Disk Buffer
    Refer to "Drive combinations that can configure an REC Disk Buffer" (page 617) for details.
  - When resources for creating an REC Disk Buffer (such as the number of RAID groups and the number of volumes) are insufficient
    (When the maximum number of RAID groups or volumes is already registered in the ETERNUS DX/AF, a new REC Disk Buffer cannot be created.)

> **◉ N o t e**

- When the REC Disk Buffer creation process is complete, the REC Disk Buffer will be formatted automatically.
- When assigning multiple REC Disk Buffers to an REC Buffer, each REC Buffer has different conditions. Refer to "Assign REC Disk Buffer" (page 620) for details.

Drive combinations that can configure an REC Disk Buffer

	Online	Nearline	SSD	Online SED	Nearline SED	SSD SED
Online	OK	Not recommended	NG	NG	NG	NG
Nearline	Not recommended	OK	NG	NG	NG	NG
SSD	NG	NG	OK	NG	NG	NG
Online SED (*1)	NG	NG	NG	OK	Not recommended	NG
Nearline SED	NG	NG	NG	Not recommended	OK	NG
SSD SED	NG	NG	NG	NG	NG	OK

OK: REC Disk Buffers can be created
Not recommended: REC Disk Buffers can be created, but not a recommended configuration
NG: REC Disk Buffers cannot be created
*1: In the controller firmware versions earlier than V10L32, "Online SED" is displayed as "SED".

Requirements for selecting drives

- The requirements for a RAID group that is to be used as an REC Disk Buffer are as follows:
  - The number of member drives is four or eight
    (The RAID level for the REC Disk Buffer is RAID1+0(2+2) for four member drives or RAID1+0(4+4) for eight member drives.)
  - Do not combine different drive types (Online/Nearline/SSD/Online SED /Nearline SED/SSD SED)
    (Although "Online" type drives and "Nearline" type drives can be used in the same REC Disk Buffer, using only "Online" type drives or using only "Nearline" type drives is recommended. Also, "Online SED" type drives and "Nearline SED" type drives can be used in the same REC Disk Buffer, but using only "Online SED" type drives or using only "Nearline SED" type drives is recommended. This is because the available capacity and the access performance may be reduced when these drives are used in the same REC Disk Buffer.)
  - The drive size must be smaller than 6TB (except SSDs and SSD SEDs)
- The recommended drive configuration of the RAID group in the REC Disk Buffer is the same as when manually creating RAID groups. Also, the drive layout condition for "High Performance (RAID1+0)" is applied to the RAID group in the REC Disk Buffer. Refer to "Requirements for selecting drives" (page 511) in "Create RAID Group" for details.
- There are conditions for the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3 drive layout. Refer to "Conditions for the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3 drive layout" (page 508) for details. These conditions apply when the RAID level is "High Performance (RAID1+0)".
  Note that these conditions are not applied to other models.

For details on the parameters for this function, refer to "A. Create REC Disk Buffer" (page 1243).
For the factory default settings for this function, refer to "B. Create REC Disk Buffer" (page 1291).

The procedure to create an REC Disk Buffer is as follows:

Procedure

1 Click [Create REC Disk Buffer] in [Action].

2 Specify the REC Disk Buffer detailed information.
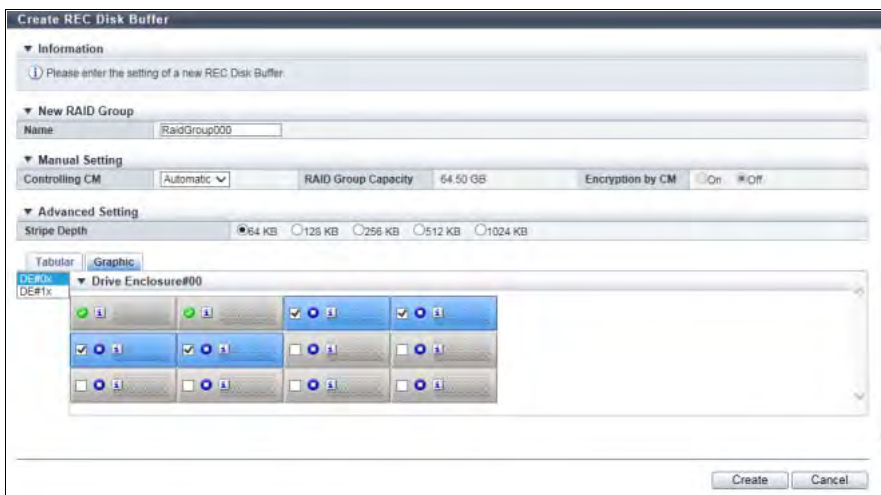
The main setting items are as follows.

● **New RAID Group**

- Name

3 Select drives from the list or the installation image.

■ When selecting drives from the list

Click the [Tabular] tab to select drives from the list.
Only unused drives are displayed on the list.
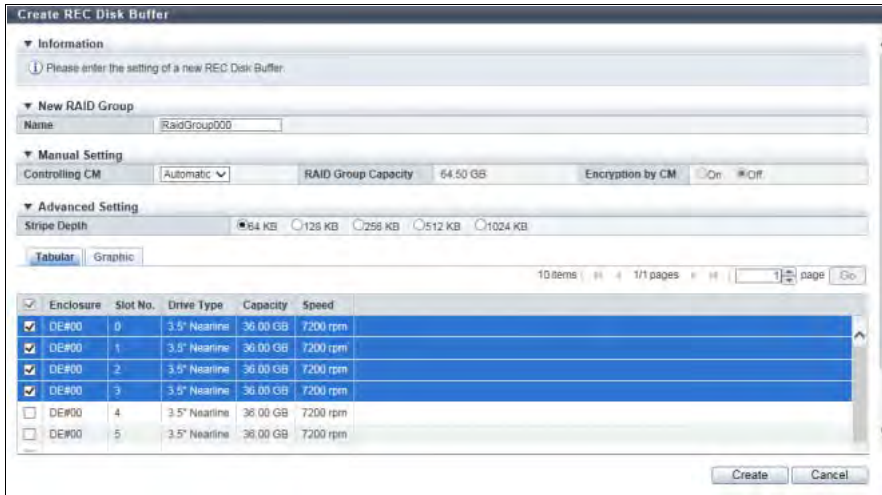
The main setting items are as follows.

- Checkbox to select drives

■ When selecting drives from the installation image

Click the [Graphic] tab to select drives from the drive installation image. The installation images of all the drives installed in the ETERNUS DX/AF are displayed. Checkboxes are displayed for unused drives.

The main setting items are as follows.

- DE selection list box
- Checkbox to select drives

> **Caution**

- SSDs with an interface speed of 12Gbit/s (SSD-M/SSD-L) must be installed in a high-density drive enclo-sure with the same interface speed. When these SSDs are installed in a high-density drive enclosure with an interface speed of 6Gbit/s, the SSDs operate at 6Gbit/s.
- The drive capacity that is displayed for the SSD-L differs from the product's actual capacity. For example, the drive capacity of a "1.92TB SSD-L" is displayed as "2.00 TB".

4   Click the [Create] button.

5   A confirmation screen appears. Click the [OK] button.
→ Creation of an REC Disk Buffer starts.

6   Click the [Done] button to return to the [REC Disk Buffer] screen.

<div align="right">End of procedure ▪</div>

Assign REC Disk Buffer

This function assigns an REC Disk Buffer to an REC Buffer. This function also deletes the assignment of the REC Disk Buffers.

Requirements for REC Buffers to assign REC Disk Buffers

- The usage of the REC Buffer must be "Send"
- The number of REC Disk Buffers that are to be assigned to a single REC Buffer must be one of the following numbers.
  - ETERNUS DX100 S4/DX100 S3
    One or two (but less than or equal to the number of CMs that are installed)
  - ETERNUS DX200 S4/DX200 S3
    One or two
  - ETERNUS DX500 S4/DX500 S3 and ETERNUS DX600 S4/DX600 S3
    One or two
  - ETERNUS DX8100 S3
    One or two
  - ETERNUS DX8700 S3
    One, two, or four (*1)
  - ETERNUS DX8900 S3
    One, two, four, or six (*1)
  - ETERNUS AF250 S2/AF250
    One or two
  - ETERNUS AF650 S2/AF650
    One or two
  - ETERNUS DX200F
    One or two
  - *1: The number of REC Disk Buffers must be less than or equal to the number of CMs that are installed.
- Requirements to assign multiple REC Disk Buffers to a single REC Buffer
  - The drive type (Online/Nearline/SSD/Online SED/Nearline SED/SSD SED) must be the same (*1)
  - The assigned REC Disk Buffers have the same number of drives (four or eight)
  - The assigned REC Disk Buffers have the same encryption status ("CM", "-", or "SED")
- Recommended conditions for assigning multiple REC Disk Buffers to a single REC Buffer
  - The assigned REC Disk Buffers have the same Stripe Depth (*2)
  - The assigned REC Disk Buffers have the same capacity (*3)
  - The SSD type (SSD-M/SSD-L/SSD/SSD-M SED/SSD-L SED) must be the same

*1:   Only assigning either "Online" or "Nearline" REC Disk Buffers is recommended. Also, only assigning either an "Online SED" or a "Nearline SED" REC Disk Buffers is recommended. This is because the available capacity and the access performance may be reduced when these REC Disk Buffers are assigned in the same REC Buffer.

*2:   If the Stripe Depth is different for the used REC Disk Buffers, access performance of the REC Disk Buffer may be affected.

*3:   When using REC Disk Buffers of different capacities, the smallest becomes the standard, and all other REC Disk Buffers are regarded as having the same capacity as the smallest REC Disk Buffer. In this case, the remaining REC Disk Buffer space will NOT be used.

> **Caution**
>
> - This function can only be used when the local storage system (the storage system that assigns REC Disk Buffers) supports REC.
> - A single REC Disk Buffer cannot be assigned to multiple REC Buffers.
> - When an REC that uses an REC Buffer is being performed, make sure to suspend the relevant REC session in advance.

> **N o t e**
>
> - When assigning REC Disk Buffers to REC Buffers, an REC Disk Buffer must be created in advance. Refer to "Create REC Disk Buffer" (page 617) for details.
> - The Stripe Depth for REC Disk Buffers can be checked from the [REC Disk Buffer Detail] screen. Refer to "REC Disk Buffer" (page 952) for details.

■ Assigning an additional REC Disk Buffer

The procedure to assign additional REC Disk Buffers to an REC Buffer is as follows:

Procedure

1 Select the REC Buffer, to which the REC Disk Buffer is to be assigned, and click [Assign REC Disk Buffer] in [Action].

2 Click the [Add] button.
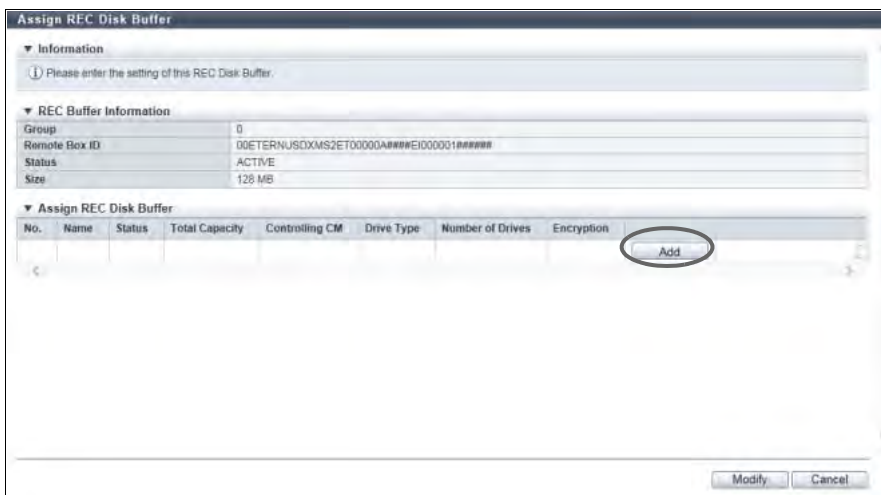
→ The [Select REC Disk Buffer] screen appears.

3 Select the checkbox for the additional REC Disk Buffer to be assigned, and click the [OK] button.

> **Caution**
>
> If an error screen appears under the following conditions, check the parameter settings.
> - No REC Disk Buffers, which satisfy the assignment requirements, are registered to the ETERNUS DX/AF
> - The number of REC Disk Buffers, which are assigned to an REC Buffer, exceeds the maximum number which the storage system model supports

> 🔵 **N o t e**
>
> For the "Drive Type" field, the drive type of the REC Disk Buffer is displayed.
> If multiple drive types are used in the REC Disk Buffer, the drive type is displayed as described below.
> - If only "Online" type drives are used or if both "Online" and "Nearline" type drives are used, "Online" is displayed.
> - If only "Online SED" type drives are used or if both "Online SED" and "Nearline SED" type drives are used, "Online SED" is displayed.
> - "SSD" is displayed regardless of the actual SSD type (SSD-M/SSD-L/SSD).
> - "SSD SED" is displayed regardless of the actual SSD type (SSD-M SED/SSD-L SED).
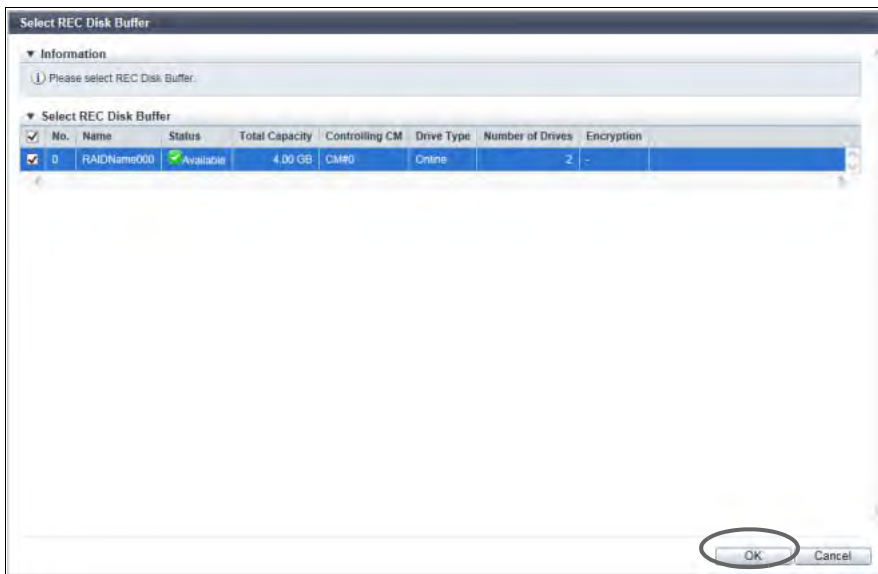
→ The selected REC Disk Buffer is added.

4 When the REC Disk Buffer assignment has been completed, click the [Modify] button.
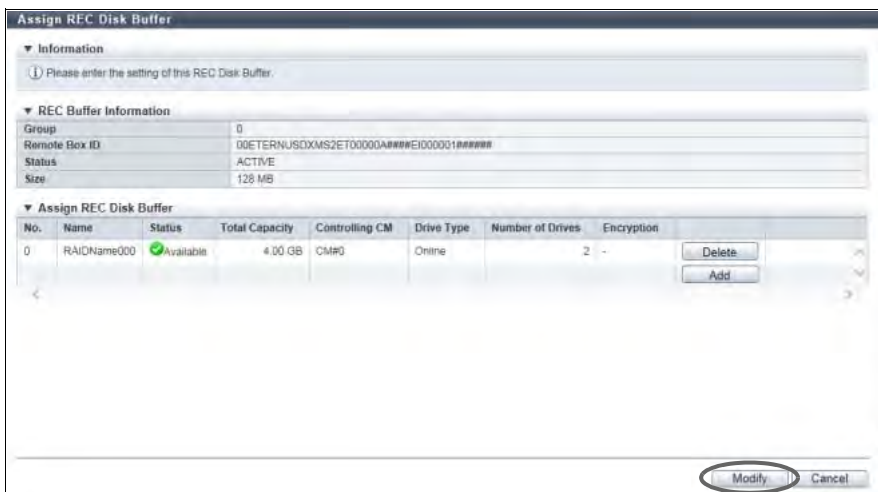
5 A confirmation screen appears. Click the [OK] button.
→ The REC Disk Buffer assignment starts.

6 Click the [Done] button to return to the [REC Buffer] screen.

End of procedure

■ **Deleting an REC Disk Buffer assignment**

The procedure to delete the assignment of the REC Disk Buffers from the REC Buffer is as follows:

Procedure

1 Select the REC Buffer to delete the assignment of the REC Disk Buffer, and click [Assign REC Disk Buffer] in [Action].

2 To delete the assignment of the REC Disk Buffer, click the [Delete] button for the target REC Disk Buffer (RAID group).
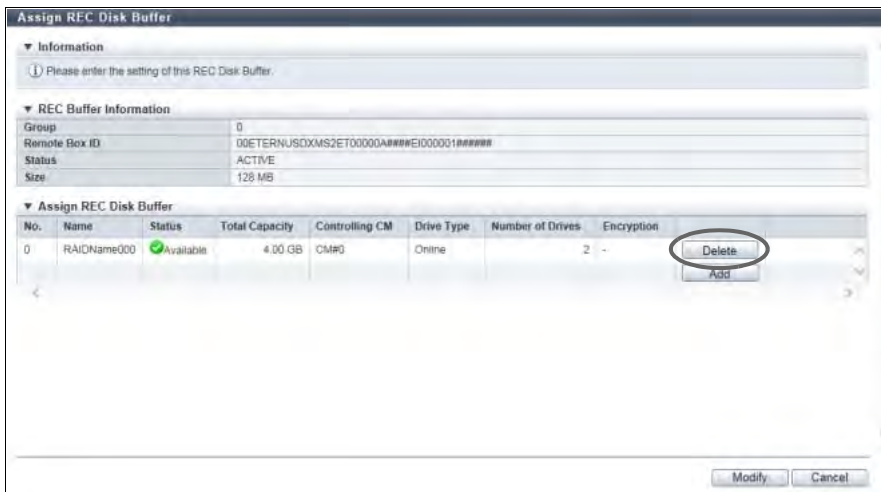
→ The selected REC Disk Buffer is deleted from the list.

3 Click the [Modify] button.
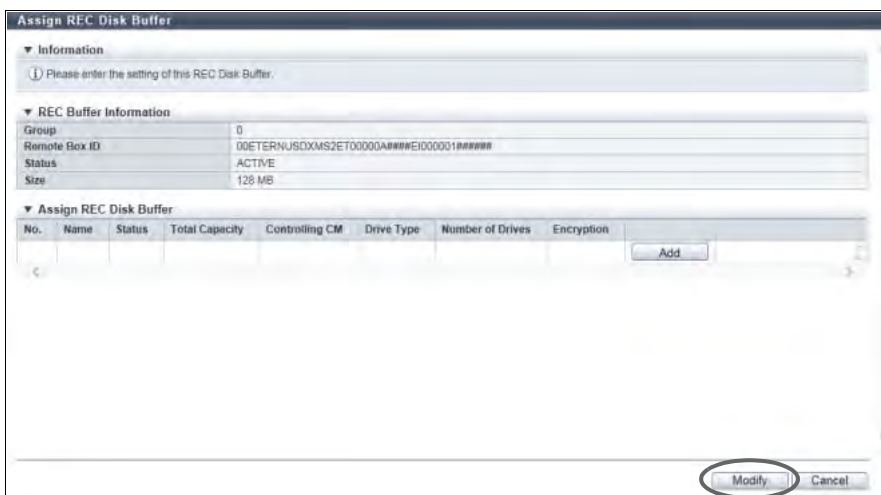
4 A confirmation screen appears. Click the [OK] button.
→ Deletion of an REC Disk Buffer starts.

5 Click the [Done] button to return to the [REC Buffer] screen.

End of procedure

Delete REC Disk Buffer

This function deletes an REC Disk Buffer.

▷ **Caution**

REC Disk Buffers that have been assigned to the REC Buffer cannot be deleted.

The procedure to delete an REC Disk Buffer is as follows:

Procedure

1 Select the REC Disk Buffer that is to be deleted (multiple selections can be made) and click the [Delete REC Disk Buffer] button in [Action].

2 A confirmation screen appears. Click the [OK] button.
   → Deletion of an REC Disk Buffer starts.

3 Click the [Done] button to return to the [REC Disk Buffer] screen.

End of procedure

Format REC Disk Buffer

This function formats an REC Disk Buffer.

▷ **Caution**

- If an in-use REC Disk Buffer is formatted, the data stored in the REC Disk Buffer will be deleted.
- The following REC Disk Buffers cannot be formatted:
   - The REC Disk Buffers without " ✅ Available" or " ✅ Readying" status
   - The REC Disk Buffer is blocked

🔵 **N o t e**

The newly created REC Disk Buffer will be formatted automatically. In this case, it is not necessary to format the REC Disk Buffer by using this function.

The procedure to format an REC Disk Buffer is as follows:

Procedure

1 Select the REC Disk Buffers to be formatted (multiple selections can be made), and click the [Format REC Disk Buffer] button in [Action].

2 A confirmation screen appears. Click the [OK] button.
   → Formatting of an REC Disk Buffer starts.

3 Click the [Done] button to return to the [REC Disk Buffer] screen.

End of procedure

Modify REC Multiplicity

This function specifies multiplicity or priority level when performing REC.
It is not necessary to change the default setting (Automatic) for normal use. This function can adjust the copy performance to give priority to REC over workload I/O or to reduce the affect on workload I/O.

When the local storage system and the remote storage system are connected by remote connection

- If "Automatic" is selected for the specification mode, REC is performed with the recommended multiplicity that is calculated by the obtained round trip time.
  If the round trip time is not measured, "***" is displayed in the "Recommended Multiplicity" field.
  To display the recommended multiplicity, use the procedure in "Measure Round Trip Time" (page 612).
- If "Manual" is selected for the specification mode, REC will be performed with the specified multiplicity.

When the local storage system and the remote storage system are connected by remote connection

- When the priority level is "Automatic", REC is performed using the priority level that is specified using the procedure in "Modify EC/OPC Priority" (page 579).
- When the priority level is from "1" to "8", REC is performed using the specified priority level.

> ▷ **Caution**

- Registering the Advanced Copy function license or the Storage Cluster function license is required to use this function.
- If "***" is displayed in the "Recommended Multiplicity" field of the Remote Box ID List, and "Automatic" has been selected for the specification mode, REC will not be performed with the appropriate multiplicity. To select "Automatic", measure the round trip time using the procedure in "Measure Round Trip Time" (page 612).
- If the path between local and remote storage systems has been changed, measure the round trip time and set the multiplicity again.

For details on the parameters for this function, refer to "A. Modify REC Multiplicity" (page 1245).
For the factory default settings for this function, refer to "B. Modify REC Multiplicity" (page 1291).

The procedure to modify REC multiplicity is as follows:

Procedure

1 Click the [Modify REC Multiplicity] in [Action].

2 Specify the multiplicity.

The main setting items are as follows.

● **Remote Box ID List**

- Priority Level
- Specification Mode
- Multiplicity

🔵 **N o t e**

Click [Advanced Setting] to specify the copy schedule mode.

3   Click the [Set] button

4   A confirmation screen appears. Click the [OK] button.
→   The REC multiplicity settings starts.

5   Click the [Done] button to return to the [Copy Path] screen.

End of procedure

Set REC Bandwidth Limit

This function sets the bandwidth limit for the Remote Copy path.

▷ **Caution**

Registering the Advanced Copy function license or the Storage Cluster function license is required to use this function.

🔵 **N o t e**

- This function enables the Initiator (copy source) to limit the bandwidth for sending data in the copy path. The bandwidth limit can be set for each path.
- The bandwidth limit setting is not included in the copy path information. Therefore, a bandwidth limit setting for the unchanged path remains even when a copy path was created after the copy path information had been changed.
- The bandwidth limit for the path is also deleted when the copy path has been deleted.

For details on the parameters for this function, refer to <u>"A. Set REC Bandwidth Limit" (page 1246)</u>.
For the factory default settings for this function, refer to <u>"B. Set REC Bandwidth Limit" (page 1292)</u>.

The procedure to set the REC bandwidth is as follows:

Procedure

1   Select the remote storage system to set the bandwidth limit, and click [Set REC Bandwidth Limit] in [Action].

2 Set the detailed bandwidth limit information.

The main setting items are as follows.

● **Bandwidth Limit Settings**

- Setting Mode
- Bandwidth Limit

● **Advanced Copy Path**

- Bandwidth Limit

3 Click the [Set] button

4 A confirmation screen appears. Click the [OK] button.
 → The REC bandwidth limit setting starts.

5 Click the [Done] button to return to the [Copy Path] screen.

End of procedure

ODX Management

This section describes ODX management.

ODX management provides the following functions:
- Enable ODX
- Disable ODX
- Create ODX Buffer Volume

Enable ODX

This function enables the ODX function.
This function supports ODX, which is provided for servers with "Windows Server 2012" or later. ODX is a function that offloads the load from data copying and migration to the storage system.

▷ **Caution**

- To start using the ODX function, the server must recognize that ODX is enabled in the ETERNUS DX/AF. After enabling ODX with this function, reboot the server.
- ODX requires dedicated volumes (ODX Buffer volumes) to save data before updating. An ODX Buffer volume can be created after ODX is enabled. Refer to "Create ODX Buffer Volume" (page 629) for details.
- The ETERNUS DX/AF does not support an Advanced Copy when the copy destination is a volume that is being used by the ODX function.
- The ODX function only supports copying within the same ETERNUS DX/AF. Copying to other storage systems is not supported.

⦿ **N o t e**

ODX does not require the registration of an Advanced Copy license and copy table size settings.

For the factory default settings for this function, refer to "B. ODX" (page 1292).

The procedure to enable the ODX function is as follows:

Procedure

1 Click [Enable ODX] in [Action].

2 A confirmation screen appears. Click the [OK] button.
→ Enabling of ODX starts.

3 Click the [Done] button to return to the [Settings] screen.

End of procedure ▪

Disable ODX

This function disables the ODX function.

▷ **Caution**

- To stop using the ODX function, the server must recognize that ODX is disabled in the ETERNUS DX/AF. After disabling ODX with this function, reboot the server.
- The ODX function cannot be disabled when an ODX Buffer volume exists in the ETERNUS DX/AF. Delete the ODX Buffer volume in advance. Refer to "Delete Volume" (page 268) for details.

For the factory default settings for this function, refer to "B. ODX" (page 1292).

The procedure to disable the ODX function is as follows:

Procedure

1 Click [Disable ODX] in [Action].

2 A confirmation screen appears. Click the [OK] button.
   → Disabling of ODX starts.

3 Click the [Done] button to return to the [Settings] screen.

End of procedure

Create ODX Buffer Volume

This function creates a dedicated volume for the ODX function.
ODX is a function that offloads the load from data copying and migration to the storage system. ODX copies data at the time when a copy request is received. If a Write command is issued for the copy source data, this function backs up the previous data in the area that is to be overwritten. An ODX Buffer volume is used to store the backup data at this time.
The ODX function is supported by "Windows Server 2012" or later.

ODX Buffer volume specification

- One ODX Buffer volume can be created in the ETERNUS DX/AF.
- The type of the ODX Buffer volume is "Standard", "TPV", or "FTV".
- The capacity of an ODX Buffer volume is 1GB - 1TB.

> **▶ Caution**
>
> - An ODX Buffer volume can be created when the ODX function is enabled.
> - The ODX Buffer volume must be created with the ODX function.
> - If the Thin Provisioning function is enabled, a "TPV" type ODX Buffer volume can be created.
> - When creating an "FTV" type ODX Buffer volume, use ETERNUS CLI. ETERNUS Web GUI cannot be used to create an "FTV" type ODX Buffer volume.
> - When encryption mode is disabled, an ODX Buffer volume encrypted by CM cannot be created. Note that when SEDs are not installed in the ETERNUS DX/AF, an ODX Buffer volume encrypted by SEDs cannot be created.
> - If the maximum number of volumes is already registered in the ETERNUS DX/AF, an ODX Buffer volume cannot be created. Refer to "Create Volume" (page 246) to check the maximum number of volumes for the ETERNUS DX/AF.
> - If the maximum capacity for TPVs or FTVs is already registered in the ETERNUS DX/AF, a "TPV" type ODX Buffer volume cannot be created. For the maximum capacity, refer to "Settings (Thin Provisioning)" (page 922) for details. The maximum capacity is the same as the maximum pool capacity.

> **◯ N o t e**
>
> - Only one ODX Buffer volume can be created in the ETERNUS DX/AF. Use the [Settings] screen to check whether an ODX Buffer volume is already created. Refer to "Settings (Advanced Copy)" (page 944) for details.
> - An existing ODX Buffer volume can be checked by using the "Forbid Advanced Copy" field in the [Volume] screen. Refer to "Volume (Basic Information)" (page 775) for details.
> - There are three types of ODX Buffer volumes: "Standard", "TPV", and "FTV". When creating an ODX Buffer volume in a RAID group, select "Standard" for the volume type. When creating an ODX Buffer volume in a TPP, select "Thin Provisioning" for the volume type. When creating an ODX Buffer volume in an FTRP, use ETERNUS CLI. The ODX Buffer volume type is independent of the copy source volume type or the copy destination volume type.
> - Even when the ODX Buffer volume capacity is insufficient, no error occurs in an ODX session that is already started. Windows Server suspends the use of ODX, and starts a normal copy process that uses Read and Write processes.
> - Monitoring the usage of an ODX Buffer volume is available. If insufficient capacity is detected, the ETERNUS DX/AF sends a notification. Refer to "Setup Event Notification" (page 155) for details. If the ODX Buffer volume capacity is frequently insufficient, the benefit of using the ODX function is lost. Expand the ODX Buffer volume capacity as required. Refer to "Expand Volume" (page 274), "Start RAID Migration" (page 296), or "Expand Thin Provisioning Volume" (page 281) for details.
> - An ODX Buffer volume can be deleted by using the same procedure as "Standard" and "TPV" type volumes if the ODX function is not used. Refer to "Delete Volume" (page 268) for details. To delete an "FTV" type ODX Buffer volume, use ETERNUS CLI.
> - The volume capacity that is required for an ODX Buffer volume varies depending on the server system configuration and the applications that are being used. When using the ODX function for normal file copying or file migration with Microsoft Windows Server, creating a 10GB ODX Buffer volume is recommended.
> - An ODX Buffer volume can be created by using the maximum free space that is available in a RAID group. Inputting the volume capacity is not required. "Standard" type volumes can be created using the maximum free space.

For details on the parameters for this function, refer to "A. Create ODX Buffer Volume" (page 1247).
For the factory default settings for this function, refer to "B. Create ODX Buffer Volume" (page 1292).

The procedure to create an ODX Buffer volume is as follows:

Procedure

1 Click [Create ODX Buffer Volume] in [Action].

2 Specify the detailed information of the ODX Buffer volume and select the RAID group or TPP in which the ODX Buffer volume is to be created.

The main setting items are as follows.

● **ODX Buffer Volume**

• Name

• Capacity

• Type

• Use all Largest Free Space

• Allocation

● **Target RAID Group/Thin Provisioning Pool**

• Radio button to select a RAID group (when "Type" is "Standard")

• Radio button to select a TPP (when "Type" is "Thin Provisioning")

> **N o t e**
>
> When using the maximum free space in the RAID group to create an ODX Buffer volume without specifying the capacity, select the "Enable" checkbox for "Use all Largest Free Space". A "Standard" type volume can be created using the maximum free space.

> **Caution**
>
> If an error screen appears under the following conditions, check the parameter settings.
> • The maximum number of volumes that can be created is exceeded
> • Free space in the RAID group is insufficient
> • LDE is being performed in the RAID group to which the ODX Buffer volume belongs
> • When the allocation mode is "Thick" and the free space in the TPP is insufficient

3 Click the [Create] button.

4 A confirmation screen appears. Click the [OK] button.
    → ODX Buffer volume creation starts.

5   Click the [Done] button to return to the [Settings] screen.

> ▷ **Caution**
>
> If the "Provisioned Capacity" (or the total logical capacity) of the volumes that exist within the TPP exceeds the total capacity of the TPP (or if the "Provisioned Rate" (or the capacity rate) exceeds "100 %") when ODX Buffer volumes (TPVs) are created, a warning message appears in the result screen. Check the TPP used state and add drives to expand the TPP capacity as required. Check the [Thin Provisioning Pool Detail] screen for "Provisioned Rate". Refer to <u>"Thin Provisioning Pool Detail (Basic)" (page 899)</u> for details.

End of procedure

Part 2   Operation

8. System Status

This chapter describes system management.
System status displays the status information of volumes.
System status screens can be displayed by clicking the following categories:

Category	System status screen
Storage system name	System (Basic Information)
Network	Network
Remote Support	REMCS
	AIS Connect
Root Certificate	Root Certificate
Key Management	Key Management
Key Group	Key Group
User Settings	Define Role
Eco-mode	Eco-mode
Event/Dump	Event/Dump
Audit Log	Audit Log
Firmware Maintenance	Firmware Maintenance
Storage Migration	Storage Migration
External Drives	External Drives
Utility	Utility
System Settings	System Settings

Detailed information of the system settings can be displayed from the following screen:

- Eco-mode Schedule Detail
- Path Group Detail Information
- External Drives Detail

System (Basic Information)

This function displays the system information and a list of users who are currently logged in.

> ▷ **Caution**

- If the message "Currently Network Configuration is set to factory default." is displayed in the system message field, the network environment settings for the MNT port must be performed. Use the [Setup Network Environment] function in the [Network] screen under the [System] navigation. Some functions are not available if the network environment settings are incomplete.
- If the message "Configuration was applied to storage system." is displayed in the system message field, the ETERNUS DX/AF must be rebooted. Any setting processes cannot be performed until the applied configuration information is enabled by rebooting the storage system.
- The "Login User" list is displayed only when a user account with the "User Management" policy is used to log in.
- The following login users are displayed:
  - Users who are logged in to the Master CM from ETERNUS Web GUI
  - Users who are logged in to the Slave CM from ETERNUS Web GUI
  - Users who are logged in to the Master CM from ETERNUS CLI or other software
    (Users who are logged in to the Slave CM from ETERNUS CLI or other software are not displayed.)

> 🔵 **N o t e**

- If the system message "Unified Storage license has been registered." is displayed, the unified upgrade must be performed. Note that "Maintenance Operation" policy is required to perform the unified upgrade.
- The storage system name is displayed at the top of the [System] navigation category.
  The "Storage System Name" is specified using the [Modify Storage System Name] function. Refer to "Modify Storage System Name" (page 60).
- Click the "Storage System Name" in the category again to display the latest information in the screen.

■ For the ETERNUS DX8700 S3/DX8900 S3

■ **For the other models**

The following items are displayed in the Main area:

● **System Information**

- Storage System Name
The name for the ETERNUS DX/AF is displayed.
By clicking this item, the [Storage] screen in the [Component] navigation is displayed.

- Model Name
The model name of the ETERNUS DX/AF is displayed.

- Unified Storage
The support status of the unified storage function is displayed. Refer to "Unified Storage" (page 28) in "Overview" for details.

- Deduplication/Compression
Whether the Deduplication/Compression function is enabled or disabled is displayed.
For the ETERNUS DX60 S4/DX100 S4, the ETERNUS DX60 S3/DX100 S3, and the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, this item is not displayed.

- Storage Cluster
If a license for the Storage Cluster function has already been registered, "Enable" is displayed. If the license is not registered, "Disable" is displayed.
If this item is enabled, the total TFOV capacity per storage system (or the total capacity of volumes that are used for the Storage Cluster function in an ETERNUS DX/AF) is displayed in the "Enable (total TFOV capacity)" format.
  - Enable (128 TB)
  - Enable (256 TB)
  - Enable (384 TB)
  - Enable (768 TB)
  - Enable (1 PB)
  - Enable (2 PB)
  - Enable (3 PB)
  - Enable (4 PB)
  - Enable (8 PB)
  - Enable (16 PB)
  - Disable

Note that ETERNUS Web GUI cannot be used to register a Storage Cluster license or to change the total TFOV capacity. To register the license, use ETERNUS SF Storage Cruiser. To change the total TFOV capacity, use ETERNUS CLI or ETERNUS SF Storage Cruiser (*1).
For the ETERNUS DX60 S4/DX60 S3, this item is not displayed.

*1: To change the total TFOV capacity with ETERNUS CLI, use the "max-tfo-capacity" parameter for the ETERNUS CLI command "set storage-cluster-license". To change the total TFOV capacity with ETERNUS SF Storage Cruiser, refer to the manuals provided with ETERNUS SF Storage Cruiser.

- Virtual Volume
Whether the Virtual Volume function is enabled or disabled is displayed.
The Virtual Volume function cannot be set with ETERNUS Web GUI. To set the Virtual Volume function, use ETERNUS SF Storage Cruiser.
For the ETERNUS DX60 S4/DX60 S3, this item is not displayed.

- Non-disruptive Storage Migration License
The registration status of the Non-disruptive Storage Migration License is displayed.
  - Registered
  - Unregistered

- Serial Number
The serial number of the ETERNUS DX/AF is displayed.

- WWN
The WWN of the ETERNUS DX/AF is displayed.

- Firmware Version
The current controller firmware version is displayed.
  - VxxLyy-zzzz (Vxx: Version, Lyy: Level, zzzz: Release number)

- Status
General status (detail) of the ETERNUS DX/AF is displayed. Refer to "Storage System General Status" (page 1372) for details.

- Cache Mode
The current status and the factor of the cache are displayed. The normal status is "Write Back Mode".
Refer to "Cache Mode" (page 29) in "Overview" for details.
  - Write Back Mode
  - Write Through (Pinned Data)
  - Write Through (Battery)
  - Write Through (Maintenance)
  - Write Through (1CM)

- Remote Support
The Remote Support status (REMCS or AIS Connect) is displayed. If the Remote Support is not set, a "-" (hyphen) is displayed. Refer to "Remote Support" (page 29) in "Overview" for details.
  - Operating
  - Maintenance in Progress
  - Stopped

- Operation Mode
The operation mode is displayed.
  - Normal
    The ETERNUS DX/AF is in operation.
  - Maintenance Mode
    The ETERNUS DX/AF is under maintenance.

- Connecting Module
The CM to which ETERNUS Web GUI is connected is displayed.

● Login User

- Interface
  The interface type for users who are logged in is displayed.
    - GUI
      Users logged in via ETERNUS Web GUI or users logged in via ETERNUS Web GUI from the AIS Connect server
    - CLI
      Users logged in via ETERNUS CLI or users logged in via ETERNUS CLI from the AIS Connect server
    - SOFT
      Users logged in from software.
      "SOFT" is displayed in the following conditions:
        - When users log in from software with the default "Software" role via CLI
        - When users log in using SMI-S via software
        - When users log in from software using Dynamic LUN Mirroring (DLM) via CLI

- Session ID
  An identification number for users who are logged in is displayed. A session ID is obtained for each login and released with each logout. Because the session ID is obtained discretely, the same session ID is not used even if the same user logs in again. ETERNUS Web GUI uses session IDs between 1 - 999 and ETERNUS CLI (including when the interface is "SOFT") uses session IDs from 10001 onwards. In a Unified Storage environment, ETERNUS Web GUI uses session IDs from 10001 onwards for internal processes in the same way as ETERNUS CLI. An "*" (asterisk) is added on top of the current user's (your) session ID.
    - 0 - 65535
    - For the current user's (your) session: * xxxxx (xxxxx: 0 - 65535)

- User ID
  The user name (user ID) for a user who is logged in is displayed. When the interface is "SOFT" (SMI-S or DLM), a "-" (hyphen) is displayed. A "-" (hyphen) is also displayed for internal process sessions of ETERNUS Web GUI in a Unified Storage environment.

- Role
  The user role for a user who is logged in is displayed. A "-" (hyphen) is displayed for internal process sessions of ETERNUS Web GUI in a Unified Storage environment.
    - Monitor
    - Admin
    - StorageAdmin
    - AccountAdmin
    - SecurityAdmin
    - Maintainer
    - Software
    - Custom role

- Login Date
  The login date and time are displayed.
    - YYYY-MM-DD hh:mm:ss (YYYY: Year (2001 - 2037), MM: Month (01 - 12), DD: Date (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))

- Lock
  If a logged in user is updating data that is managed by the ETERNUS DX/AF, "Yes" is displayed. If a user is not updating data, "No" is displayed. When "Yes" is displayed for a user, other users with "No" displayed cannot update data.
  Note that multiple users cannot update data that is managed by the ETERNUS DX/AF at the same time. The storage system is exclusively used by a user who is updating the data. The exclusion is released when the updating is complete.

● Login User

- IP Address
  The IP address for a user who is logged in is displayed. If an AIS Connect server is used to log in, "AIS Connect Server" is displayed. When the interface is "SOFT" (SMI-S or DLM), a "-" (hyphen) is displayed. A "-" (hyphen) is also displayed for internal process sessions of ETERNUS Web GUI in a Unified Storage environment.
  - For IPv4 address
    - xxx.xxx.xxx.xxx
      xxx: 0 - 255 (decimal)
  - For IPv6 address
    - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
      xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
      Refer to "IPv6 Address Notation" (page 828) for details.

Network

This function displays the network environment of each port in the ETERNUS DX/AF.

⚠ **Caution**

- If the message "Currently Network Configuration is set to factory default." is displayed in the system message field, the network environment settings for the MNT port must be performed. Perform the [Setup Network Environment] function in [Action]. Some functions are not available if the network environment settings are incomplete. Refer to "Setup Network Environment" (page 114) for details.
- Click the [🔄] icon to display the latest screen. Note that after changing the firewall setting and returning to this screen, it takes approximately 10 seconds to update the display contents. Wait at least 10 seconds and click the [🔄] icon or click [Network] in the category to display the [Network] screen again.

■ **IPv4 Settings**

The network setting information is displayed.
The SNMP Information, the E-Mail Information, and the SSL Version Information are displayed under the network setting information.

The following items are displayed in the Main area:

- Port
  The port type is displayed.
  - For the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F
    MNT and RMT
  - For the other models
    MNT, RMT, and FST

- Speed and Duplex
  The transfer speed and the communication method are displayed.
  - Auto-negotiation
  - 1Gbit/s
  - 100Mbit/s Half
  - 100Mbit/s Full
  - 10Mbit/s Half
  - 10Mbit/s Full

- **Master IP Address**
  The IP address of the Master CM, which has been specified to the port, is displayed.
  If not specified, the field is blank.

- **Slave IP Address**
  The IP address of the Slave CM, which has been specified to the port, is displayed.
  This item is not displayed for the 1CM model.
  If not specified, the field is blank.

- **Subnet Mask**
  The Subnet Mask, which has been specified to the port, is displayed.
  If not specified, the field is blank.

● **SNMP Information**

- **SNMP Function**
  Whether the SNMP function is enabled or disabled is displayed.

● **E-Mail Information**

- **Notification E-Mail**
  Whether the E-mail notification is enabled or disabled is displayed.

● **SSL Version Information**

- Protocol
  - HTTPS (GUI)
    Whether the SSL version (TLS1.0/TLS1.1/TLS1.2) corresponding to the HTTPS (ETERNUS Web GUI) protocol is enabled or disabled in the ETERNUS DX/AF is displayed (*1).
    The SSL version setting (enabled or disabled) is applied to all LAN ports (MNT/RMT/FST).
  - HTTPS (SMI-S)
    Whether the SSL version (TLS1.0/TLS1.1/TLS1.2) corresponding to the HTTPS (SMI-S) protocol is enabled or disabled in the ETERNUS DX/AF is displayed (*1).
    The SSL version setting (enabled or disabled) is applied to all LAN ports (MNT/RMT/FST).
  - Maintenance-Secure
    Whether the SSL version (TLS1.0/TLS1.1/TLS1.2) corresponding to the Maintenance-Secure protocol is enabled or disabled in the ETERNUS DX/AF is displayed (*1).
    The SSL version setting (enabled or disabled) is applied to all LAN ports (MNT/RMT/FST).

*1: When the SSL version is enabled, " ✔ " is displayed. If the SSL version is disabled, the field is blank.

■ IPv6 Settings

The network setting information is displayed.
The SNMP Information, the E-Mail Information, and the SSL Version Information are displayed under the network setting information.

The following items are displayed in the Main area:

- Port
  The port type is displayed.
    - For the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F
      MNT and RMT
    - For the other models
      MNT, RMT, and FST

- Speed and Duplex
  The transfer speed and the communication method are displayed.
    - Auto-negotiation
    - 1Gbit/s
    - 100Mbit/s Half
    - 100Mbit/s Full
    - 10Mbit/s Half
    - 10Mbit/s Full

- Master IP Link Local Address
  The link local address of the Master CM, which has been specified to the port, is displayed.
  If not specified or when the port type is "FST", the field is blank.

- Master Connect IP Address
  The connect IP address of the Master CM, which has been specified to the port, is displayed.
  "Master Connect IP Address" corresponds to "Master IP Address" for IPv4.
  If not specified or when the port type is "FST", the field is blank.

- Slave IP Link Local Address
  The link local address of the Slave CM, which has been specified to the port, is displayed.
  This item is not displayed for the 1CM model.
  If not specified or when the port type is "FST", the field is blank.

- Slave Connect IP Address
  The connect IP address of the Slave CM, which has been specified to the port, is displayed.
  "Slave Connect IP Address" corresponds to "Slave IP Address" for IPv4.
  This item is not displayed for the 1CM model.
  If not specified or when the port type is "FST", the field is blank.

- Length of Subnet Prefix
  The prefix length for the connect IP address is displayed between 3 - 128 (unit: bit).
  "Length of Subnet Prefix" corresponds to "Subnet Mask" for IPv4.
  If not specified or when the port type is "FST", the field is blank.

● **SNMP Information**

- SNMP Function
  Whether the SNMP function is enabled or disabled is displayed.

● **E-Mail Information**

- Notification E-Mail
  Whether the E-mail notification is enabled or disabled is displayed.

● **SSL Version Information**

- Protocol
  Refer to "Protocol" (page 641) in "IPv4 Settings" for details.
  - HTTPS (GUI)
  - HTTPS (SMI-S)
  - Maintenance-Secure

■ **Firewall**

The Firewall setting information is displayed.
The SNMP Information, the E-Mail Information, and the SSL Version Information are displayed under the Firewall setting information.

The following items are displayed in the Main area:

- Port
  The port type is displayed.
  - For the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F
    MNT and RMT
  - For the other models
    MNT, RMT, and FST

● **Acceptable Protocol**

- HTTP
  Whether the HTTP connection is enabled or disabled is displayed. (*1)

- HTTPS
  Whether the HTTPS connection is enabled or disabled is displayed. (*1)

- Telnet
  Whether the Telnet connection is enabled or disabled is displayed. (*1)

- SSH
  Whether the SSH connection is enabled or disabled is displayed. (*1)

- ICMP
  Whether the Internet Control Message Protocol (ICMP) connection is enabled or disabled is displayed. (*1)

- Maintenance-Secure
  Whether the Maintenance-Secure connection is enabled or disabled is displayed. (*1)

- SNMP
  Whether the SNMP connection is enabled or disabled is displayed. (*1)

- RCIL
  Whether the Remote Cabinet Interface over LAN (RCIL) connection is enabled or disabled is displayed. (*1)
  Whether RCIL is enabled or disabled is only displayed for the MNT port. The RMT port and the FST port are always disabled.

- ETERNUS DX Discovery
  Whether the ETERNUS DX Discovery connection is enabled or disabled is displayed. (*1)
  The ETERNUS DX Discovery is a port to connect ETERNUS DX/AF storage systems in the network by using the Remote Installation function.
  Whether ETERNUS DX Discovery is enabled or disabled is only displayed for the MNT port. The RMT port and the FST port are always disabled.

*1: When the SNMP connection is enabled, " ✔ " is displayed. If the SNMP connection is disabled, the field is blank.

● **SNMP Information**

- SNMP Function
  Whether the SNMP function is enabled or disabled is displayed.

● **E-Mail Information**

- Notification E-Mail
  Whether the E-mail notification is enabled or disabled is displayed.

● **SSL Version Information**

- Protocol
  Refer to <u>"Protocol" (page 641)</u> in <u>"IPv4 Settings"</u> for details.
  - HTTPS (GUI)
  - HTTPS (SMI-S)
  - Maintenance-Secure

● **SSL Version Information**

- Protocol
  Refer to <u>"Protocol" (page 641)</u> in <u>"IPv4 Settings"</u> for details.

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Remote Support

This function displays the set state for the Remote Support function (REMCS or AIS Connect).

> ⬤ **N o t e**
>
> - When only REMCS is available, the [REMCS] screen appears. Refer to "REMCS" (page 646) for details.
> - When only AIS Connect is available, the [AIS Connect] screen appears. Refer to "AIS Connect" (page 648) for details.
> - When both REMCS and AIS Connect are available, setting information for REMCS and AIS Connect are displayed.
>   - Click [REMCS] in the category and display the [REMCS] screen to perform the REMCS actions. Refer to "REMCS" (page 646) for details.
>   - Click [AIS Connect] in the category and display the [AIS Connect] screen to perform the AIS Connect actions. Refer to "AIS Connect" (page 648) for details.

REMCS

This function displays the Remote Support function settings and the operation status in the ETERNUS DX/AF.

> ▷ **Caution**
>
> REMCS and AIS Connect cannot be used at the same time. REMCS can be specified or restarted when AIS Connect is disabled. Refer to "Setup AIS Connect Environment" (page 209) for details.

■ Support Information

The following items are displayed in the Main area:

- Customer Information Setup
  Whether or not the customer information has been specified at the REMCS center is displayed.

- Communication Environment Setup
  Whether or not the communication environment information has been specified at the REMCS center is displayed.

- Support Status
  The Remote Support status is displayed.
  - "-" (hyphen)
    The Remote Support is not operating.
  - Operating
    The Remote Support is operating.
  - Maintenance in Progress
    The ETERNUS DX/AF is under maintenance. When the operation to complete maintenance is performed, the status returns to "Operating".
  - Stopped
    The Remote Support has temporarily been stopped. Use the procedure in "Stop/Restart Remote Support" (page 207) to restart the Remote Support and return to the "Operating" state.

  If the support status is "Operating" or "Maintenance in Progress", one of the messages below appears in parentheses based on the Remote Support operating status.
  - Controller Firmware Download in Progress
  - Termination of Controller Firmware Download in Progress
  - Controller Firmware Upgrade in Progress
  - Log Collection in Progress

- Controller Firmware Version
  The current controller firmware version is displayed.
  - VxxLyy-zzzz (Vxx: Version, Lyy: Level, zzzz: Release number)

- Automatic Firmware Upgrade
  Whether the automatic firmware upgrade is enabled or disabled is displayed. This item is not displayed in a Unified Storage environment.
  - "-" (hyphen)
    The Remote Support is not operating.
  - Enable Download schedule
    The automatic firmware upgrade is enabled. Receive controller firmware according to the download schedule.
  - Disable
    The automatic firmware upgrade is disabled.

- Automatic Firmware upgrade (with activation on next power cycle)
  Whether or not to execute the controller firmware application, after controller firmware download has been completed, is displayed. This item is not displayed in a Unified Storage environment.
  - "-" (hyphen)
    The Remote Support is not operating.
  - Enable
    Execute the controller firmware application after controller firmware download is complete. The downloaded controller firmware will be changed to the controller firmware which will be enabled at the next startup.
  - Disable
    Do not execute the controller firmware application after controller firmware download is complete.

- Automatic Log Transmission
  Whether the automatic log transmission is enabled or disabled when an error occurs is displayed.
  - "-" (hyphen)
    The Remote Support is not operating.
  - Enable
    The automatic log transmission is enabled. The internal log of the ETERNUS DX/AF is automatically sent to the REMCS center when an error occurs.
  - Disable
    The automatic log transmission is disabled.

- Periodic Log Transmission
  Whether the periodical log transmission is enabled or disabled is displayed.
  - "-" (hyphen)
    The Remote Support is not operating.
  - Enable Transmission schedule
    The periodical log transmission is enabled. The internal log of the ETERNUS DX/AF is automatically sent to the REMCS center according to the transmission schedule.
  - Disable
    The periodical log transmission is disabled.

■ Event Information

In this screen, ten latest pieces of event information are displayed.

The following items are displayed in the Main area:

- Date
  The date and time when the Remote Support events occurred, are displayed.
  - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Date (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))
- Event
  The Remote Support event is displayed.

AIS Connect

This function displays the setting information for AIS Connect.
The AIS Connect function can be used to monitor or control multiple ETERNUS DX/AF storage systems from a remote server (AIS Connect server).

> **Caution**

REMCS and AIS Connect cannot be used at the same time. AIS Connect can be specified or restarted when REMCS is disabled. When REMCS is used, suspend the REMCS function, and then enable the AIS Connect function. Refer to "Stop/Restart Remote Support" (page 207) for details.

> **Note**

Use ETERNUS CLI to set "Service Contract Responsibility (Country Code : Country Name)". Note that the "Maintenance Operation" policy is required to set this item.

The following items are displayed in the Main area:

● AIS Connect Environment

- AIS Connect
  Whether the AIS Connect function is enabled or disabled is displayed.
  When "Country of Installation (Country Code : Country Name)" has been set, the [Open remote service conditions] link is displayed. Click this item to display the consent form regarding the handling of personal information.

- Country of Installation (Country Code : Country Name)
  The shipment destination (storage system location) is displayed in "Country Code : Country Name" format.
  If not specified, "Not Selected" is displayed.

- Service Contract Responsibility (Country Code : Country Name)
  The country in which the support office for the ETERNUS DX/AF is located is displayed in "Country Code : Country Name" format.

  > **Caution**

  This item is not displayed when "Service Contract Responsibility (Country Code : Country Name)" is not specified from ETERNUS CLI.

- Use LAN Port
  The LAN port that is used for communication with the AIS Connect server is displayed.
  - MNT
  - RMT

- SSL Server Certification
  Whether the SSL server certification is used (Use) or not (Not Use) is displayed.

- Automatic Log Transmission
  Whether the automatic log transmission is enabled or disabled when an error occurs is displayed.
  When "Automatic Log Transmission" is enabled, the ETERNUS DX/AF automatically sends logs to the AIS Connect server when a fail event (error level or warning level) occurs.

- **Proxy Server**
  The IPv4 address or the Fully Qualified Domain Name (FQDN) of the proxy server is displayed. If the proxy server is not specified, the field is blank.
  - IPv4 address
    xxx.xxx.xxx.xxx
    xxx: 0 - 255 (decimal)
  - FQDN
    Up to 63 alphanumeric characters and symbols

- **Port No.**
  The port number for the proxy server is displayed. If the proxy server is not specified, the field is blank.

- **Connection Type**
  The communication method for the proxy server is displayed. If the proxy server is not specified, the field is blank.
  - HTTP
  - SOCKS

- **User Name**
  The user name for proxy server authentication is displayed. If the proxy server is not specified, the field is blank.

● **Remote Session Permission**

- **Remote Session**
  Whether to permit or forbid a remote session from the AIS Connect server is displayed.

- **Session Timeout**
  The timeout value for a remote session connection is displayed. If the timeout limit is not specified, "Unlimited" is displayed.
  If the time exceeds the specified value without a remote session connection, remote session permission is disabled and the set state changes to "Forbid".

Root Certificate

This function displays the root certificate that is used for SSL communication with the AIS Connect server.

▷ **Caution**

If multiple certificates are included in the root certificate file, up to 6 issuer names and their validity periods are displayed.

⬤ **N o t e**

- The root certificate that is registered in the ETERNUS DX/AF is displayed by default. When the root certificate is updated, only the latest certificate is displayed. For details on how to update the root certificate, refer to "Import Root Certificate" (page 214).
- The root certificate is only used for authentication with the AIS Connect server.

The following items are displayed in the Main area:

● **Trusted Root Certification Authorities**

- Issuer Name
  The issuer name for the root certificate is displayed.

- Valid From
  The start date and time of the root certificate validity period is displayed.
    - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Date (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))

- Valid To
  The end date and time of the root certificate validity period is displayed.
    - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Date (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))

Key Management

This function displays the setting parameters for the key server.
In this section, the SED authentication key is referred to as "key".
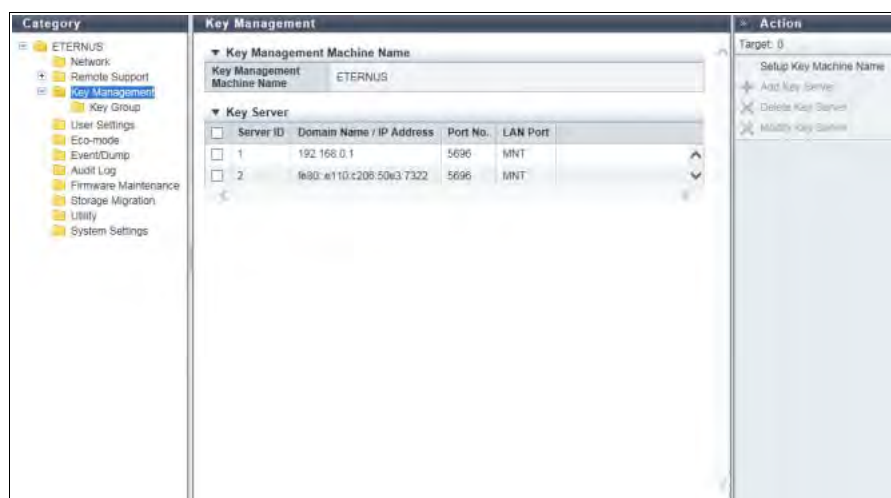
The following items are displayed in the Main area:

● Key Management Machine Name

• Key Management Machine Name
The name of the device that is connected to the key server is displayed. If the key management device name is not specified, the field is blank.

● Key Server

• Server ID
The key server ID is displayed.

• Domain Name / IP Address
The domain name (Fully Qualified Domain Name: FQDN) or the IP address for the key server is displayed.
Note that the IPv6 address is displayed as an abbreviation. Refer to "IPv6 Address Notation" (page 828) for details.

• Port No.
The port number that is used to communicate with the key server is displayed.

• LAN Port
The LAN port that is used to communicate with the key server is displayed.
  - MNT
  - RMT

Key Group

This function displays the key information that is used for a key group and the SSL/Key Management Interoperability Protocol (KMIP) certificate information.
The key group combines all of the RAID groups that use the same key.

> 🔵 **N o t e**
>
> The RAID groups that are registered in the key group can be checked by using the [SED Key Group] screen. Refer to for details.

The following items are displayed in the Main area:

● Key Group

- Name
  The key group name is displayed. If no key groups are created, the field is blank.
  The key group name corresponds to "Serial Number", which is managed in the key server.

- Storage System Group Name
  The storage system group name is displayed. If no key groups are created, the field is blank.
  The storage system group combines the key management device (Key Management Machine) name that is managed by the user with the key groups. The storage system group name corresponds to "Device Group Name", which is managed in the key server. Note that "ETERNUS_DX" is specified as the factory default storage system group name when "ETERNUS SF KM" (key management software) is shipped.

- Key Status
  The key status is displayed. If no key groups are created, the field is blank.
  Refer to for details.

- Security Level
The security level for the key group is displayed. If no key groups are created, the field is blank.
"Security Level" indicates the handling level when application of the SED key to the target RAID group fails. If the key for the relevant RAID group cannot be obtained from the key server due to a communication error and the SEDs that configure the RAID group are changed to hot spares or changed to new SEDs due to failure or maintenance, the ETERNUS DX/AF performs operations according to the selected security level.
  - High
  Rebuilding to hot spares for which the key cannot be changed after SED failure is not performed. The RAID group loses its redundancy (" ⚠ Exposed", " ⚠ Partially Exposed" (only for High Reliability (RAID6)), " ⚠ Exposed (Fast)" (only for High Reliability (RAID6-FR)), or " ⚠ Partially Exposed (Fast)" (only for High Reliability (RAID6-FR))).
  When SED maintenance is being performed, replacing a SED with a new SED for which the key cannot be changed does not complete successfully. If this action is performed, the status of the new SED changes to " ❌ Not Exist".
  When communication between the key server and the ETERNUS DX/AF returns to normal and the key can be obtained, the SED status changes to normal. Rebuilding to the SED for which the status changed to normal is performed after the key is changed. Note that "Modifying" may be displayed for the key status for few minutes even though the SED key has already changed. After changing the key, maintenance of the SEDs is complete.
  - Low
  Rebuilding or maintenance is performed by using the common key if changing of the key in the key server fails due to a network error.

Even if the security level is changed from "High" to "Low", the rebuilding process does not start immediately after the level is changed. Rebuilding processes start after the ETERNUS DX/AF recognizes that changing of the security level and the key is complete.

- Recovery Mode
The recovery mode for the key group is displayed. If no key groups are created, the field is blank.
The recovery mode is a method to recover locked (*1) RAID groups or SEDs after communication with the key server is resolved. For RAID groups in locked status, " ❌ SED Locked" is displayed. For SEDs in locked status, " ❌ Not Exist" is displayed.
*1: A blocked status that occurs when the key of the RAID groups cannot be obtained.
  - Automatic
  This mode recovers locked RAID groups or SEDs when the communication error with the key server is resolved.
  - Manual
  Use the [Recovery SED] function of ETERNUS Web GUI to recover the locked RAID groups or SEDs when the communication error with the key server is resolved.

- Key Expiration Date
The key expiration date is displayed. If no key groups are created, the field is blank.
When the key has expired, a new key is obtained from the key server and automatically applied in place of the expired key.
Note that the display contents for this item changes as follows:
  - When the key status is "Modifying", the expiration date before the key was replaced is displayed.
  - When the key status is "Unregistered Server Certificate", "No SSL Certificate", "Network Error", "Not Acquired", or "Key Server Error", a "-" (hyphen) is displayed.
    - YYYY-MM-DD (YYYY: Year (AD), MM: Month (01 - 12), DD: Date (01 - 31))

- Master Server
  - Server ID
    The key server ID for the master server is displayed. If no key group is created or if no master server is specified, the field is blank.
  - Domain Name / IP Address
    The domain name (FQDN) or the IP address of the master server is displayed. If no key groups are created or if no master server is specified, the field is blank.
    Note that the IPv6 address is displayed as an abbreviation. Refer to <u>"IPv6 Address Notation" (page 828)</u> for details.
  - Status
    The master server status is displayed. If no key group is created or if no master server is specified, the field is blank. Refer to <u>"Key Server Status" (page 1378)</u> for details.

- Slave Server
  - Server ID
    The key server ID of the slave server is displayed. If no key group is created or if no slave server is specified, the field is blank.
  - Domain Name / IP Address
    The domain name (FQDN) or the IP address of the slave server is displayed. If no key group is created or if no slave server is specified, the field is blank.
    Note that the IPv6 address is displayed as an abbreviation. Refer to <u>"IPv6 Address Notation" (page 828)</u> for details.
  - Status
    The slave server status is displayed. If no key group is created or if no slave server is specified, the field is blank. Refer to <u>"Key Server Status" (page 1378)</u> for details.

● SSL / KMIP Certificate

- Issuer Name
  The certificate authority name that issues the SSL / KMIP certificate is displayed. If the certificate is not imported, the field is blank.

- Subject Name
  The name of the destination to which the SSL / KMIP certificate is issued is displayed. If the certificate is not imported, the field is blank.

- Valid From
  The start date and time of the SSL / KMIP certificate validity period is displayed. If the certificate is not imported, the field is blank.
  - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Date (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))

- Valid To
  The end date and time of the SSL / KMIP certificate validity period is displayed. If the certificate is not imported, the field is blank.
  - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Date (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))

- Serial Number
  The serial number for the SSL / KMIP certificate is displayed. If the certificate is not imported, the field is blank. When created, the serial number is combined with the issuer name, which is a unique number in the certificate authority.

Define Role

The registered custom roles in the ETERNUS DX/AF are displayed.
A custom role is a role created by the user in combination of policies, in addition to the default roles.
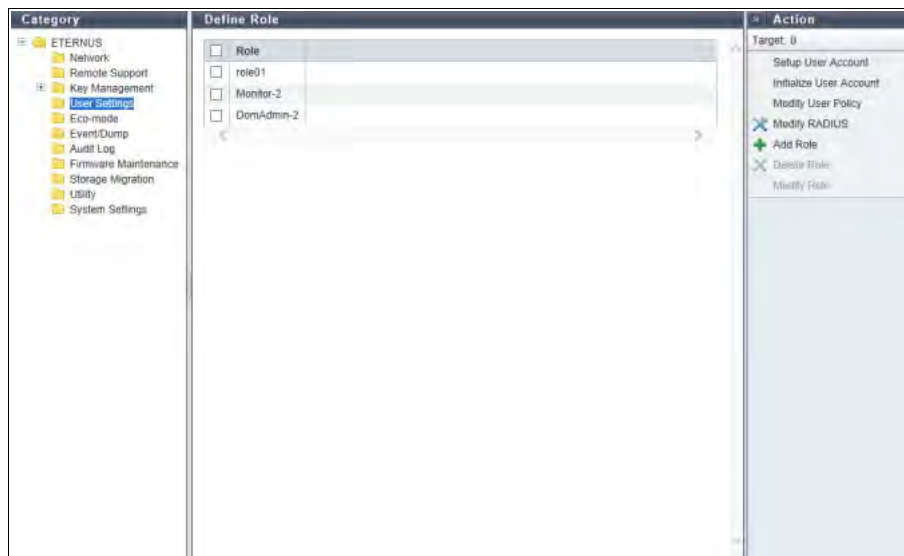
The following items are displayed in the Main area:

- Role
  The custom role name is displayed.

Eco-mode

A list of the Eco-mode setting state and the Eco-mode schedule that is registered in the ETERNUS DX are displayed. The Eco-mode function schedules the drive operating time in compliance with Massive Arrays of Idle Disks (MAID). This function saves power by stopping the drive motors or turning off the drives power outside of the scheduled operating time period.
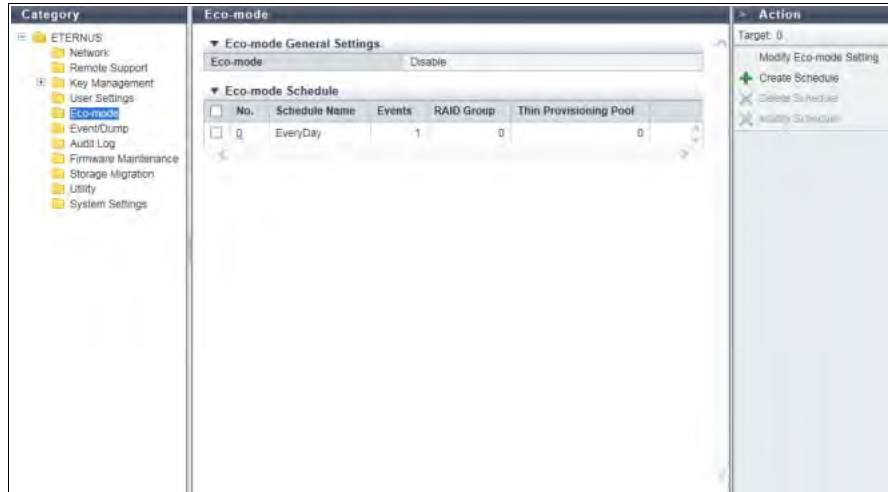
The following items are displayed in the Main area:

● **Eco-mode General Settings**

• Eco-mode
The Eco-mode setting (enabled or disabled) for all of the ETERNUS DX storage systems is displayed.

● **Eco-mode Schedule**

• No.
The schedule number is displayed.
By clicking this link, "Eco-mode Schedule Detail" (page 658) is displayed.
If the Eco-mode is controlled with the Storage Foundation Software ETERNUS SF, a "-" (hyphen) is displayed.

• Schedule Name
The schedule name is displayed.
If the Eco-mode is controlled with Storage Foundation Software ETERNUS SF, "External" is displayed.

• Events
The number of events that are registered in the schedule is displayed.
If the Eco-mode is controlled with the Storage Foundation Software ETERNUS SF, a "-" (hyphen) is displayed.

• RAID Group
The number of RAID groups for which the schedule is allocated to is displayed.

• Thin Provisioning Pool
The number of Thin Provisioning Pools for which the schedule is allocated to is displayed.

Eco-mode Schedule Detail

In this screen, the detailed information of an Eco-mode schedule is displayed.

The following items are displayed in the Main area:

● **Schedule**

- No.
The schedule number is displayed.

- Schedule Name
The schedule name is displayed.

● **Event List**

- Event
The detailed event information is displayed.

- From Time
The time at which the event application is started is displayed.
  - hh:mm (hh: Hour, mm: Minute)

- To Time
The time at which the event application is stopped is displayed.
  - hh:mm (hh: Hour, mm: Minute)

Event/Dump

This function records and displays the event history of the ETERNUS DX/AF as an event log.

Audit Log

This function displays the audit log information.
An audit log records not only operations that are performed by a user, but also how the ETERNUS DX/AF operates for these operations. The audit log function that is provided with the ETERNUS DX/AF transfers the following information to external servers; when an operation is performed, who performed the operation, where the operation was performed, the details of the operation, and the results of the operation.

> ▶ **Caution**
>
> When the [Enable Audit Log] function is executed, "Enable" is displayed for "Audit Log" in the "Audit Log Information" field even if an external server is not specified. Specify the external server to which the audit log is sent. Refer to "Setup Audit Log" (page 168) for details.

> 🔵 **N o t e**
>
> Except for the functions that are listed below, the audit log collects all of the information for operations (including logging in and logging out) that are performed via ETERNUS Web GUI and ETERNUS CLI (including when the interface is "SOFT" (*1)).
> - Export Cache Parameters
> - Export Performance Information
> - Send SNMP Trap Test
> - Create Key/CSR
> - Download Template File for Storage Migration Settings
> - Backup Configuration
> - Get G-List (*2)
> - All of the display functions (e.g. displaying the volume list or displaying of the RAID group list)
>
> *1:   Refer to "System (Basic Information)" (page 635) for details.
> *2:   Operations that can be performed when logged in using a user account with the "Maintenance Operation" policy.

The following items are displayed in the Main area:

- Audit Log
  Whether the audit log function is enabled or disabled is displayed.

Firmware Maintenance

This function performs the maintenance operation for the firmware that is managed in the ETERNUS DX/AF. Firmware maintenance is performed to update the firmware version. The firmware can be applied after being registered in the BUD of the CM.

▷ **Caution**

- When the application schedule for the controller firmware is being reserved, the following occurs.
  - The warning message ""Apply Controller Firmware" is scheduled." is displayed.
  - The [Apply Controller Firmware] function is automatically started at the date and time that are displayed in the information field according to the application mode that is used. When the application mode is "Update & Reboot", the ETERNUS DX/AF is automatically rebooted after the controller firmware is applied.
  - [Apply Firmware] is not displayed in [Action].
- If an application schedule for the controller firmware is not reserved, the [Delete Firmware Schedule] function is not displayed in [Action].
- If the message which indicates that the controller firmware application has been reserved disappears before the reserved date, the reservation may be canceled automatically. In this case, reserve the application schedule for the controller firmware again. Refer to "Apply Controller Firmware" (page 216) for details.

The following items are displayed in the Main area:

- Current Firmware Version
  The current controller firmware version is displayed.
  - VxxLyy-zzzz (Vxx: Version, Lyy: Level, zzzz: Release number)

- Firmware Version after Restart
  The controller firmware version after the next power on is displayed.
  - VxxLyy-zzzz (Vxx: Version, Lyy: Level, zzzz: Release number)

Storage Migration

This function displays the setting and progress of Storage Migration.
Storage Migration is the function for migrating data by connecting other storage systems (migration source) and the ETERNUS DX/AF (migration destination). Data migration is possible regardless of the server and the OS, and without using server resources.

▷ **Caution**

- When performing a Storage Migration, confirm that there is no access from the host to the migration source volume.
- The requirements for access from the host to the destination volumes varies depending on the operation mode.
    - For "Migration & Host IO", Storage Migration can be performed even if host access exists in the migration destination volume after a migration is started.
    - For "Migration", "Migration + Quick Compare", or "Quick Compare", perform a Storage Migration without access from the host to the destination volume.
    - For "Migration + Full Compare" or "Full Compare", perform a Storage Migration without access from the host to any volume in the destination storage system.
- The path groups must be deleted after the data migration is complete. If the operation mode is "Migration & Host IO", the ETERNUS DX/AF is in one of the following conditions until the path groups are deleted.
    - The host I/O response is reduced.
    - If the migration path is blocked, the host I/O may stop.
- Do not perform the following operations when there are Storage Migration paths (hereinafter referred to as "path group") established.
    - Configuration of an Advanced Copy destination to the migration destination volume
    - Configuration of an Advanced Copy destination to the migration source volume
    - Formatting of the destination volume
    - RAID diagnosis in the RAID group to which the destination volume belongs
    - Disk diagnosis of the disk drives in the RAID group to which the destination volume belongs
    - CM hot expansion on the destination storage system
    - Memory hot expansion on the destination storage system
- The path groups must be deleted after the data migration is complete. The following operations are not available before path groups are deleted:
    - Hot controller firmware upgrade is being performed in the destination storage system
    - Eco-mode schedule setting of the RAID group to which the destination volume belongs
    - Eco-mode schedule setting of the TPP to which the destination volume belongs
    - Capacity expansion of the RAID group to which the destination volume belongs
    - RAID migration of the destination volume
    - Encryption of the destination volume
    - Capacity expansion of the destination volume
    - Deletion of the destination volume
    - Port mode modification of the destination FC-Initiator port
    - Port parameter setting of the destination FC-Initiator port
    - Reduction of the CA to which the destination FC-Initiator port belongs

> **◉ N o t e**
>
> - To start Storage Migration, refer to "Start Storage Migration" (page 181).
> - A started Storage Migration can be suspended, stopped, and restarted in volume units on the [Path Group Detail Information] screen. Refer to "Suspend Storage Migration" (page 189), "Stop Storage Migration" (page 190), or "Restart Storage Migration" (page 188) for details.

The following items are displayed in the Main area:

- Path Group
  The path group number is displayed. Click this item to display "Path Group Detail Information" (page 664).
  A path group combines the paths for data migration into a group for each source storage system. The paths from a single source storage system to the local (destination) storage system constitute a path group.

- Vendor ID
  The manufacturer name of the source storage system to which the path is created is displayed.
  An inconvertible code is displayed as "*".

- Product ID
  The product name of the source storage system to which the path is created is displayed.
  An inconvertible code is displayed as "*".

- Serial Number
  The serial number of the source storage system to which the path is established is displayed.
  An inconvertible code is displayed as "*".

- Progress
  The progress of Storage Migration for the path group is displayed.

- Status
  The general status of Storage Migration for the path group is displayed.

  - ✅ Complete
    All Storage Migration operations have completed normally.

  - ❌ Error
    There are one or more LUNs that do not exist in the migration source volume, or there are one or more volumes for which Storage Migration failed due to error (displayed in red characters).

  - ⏹ Stop
    Storage Migration has been stopped or suspended for one or more volumes (all other volumes have completed Storage Migration normally), or Storage Migration of all the volumes has been stopped or suspended.

- ✅ Normal
  Other than above.

The status display priority order is "❌ Error" > "✅ Normal" > "🔵 Stop" > "✅ Complete".

Path Group Detail Information

In this screen, the detailed information of a path group is displayed.
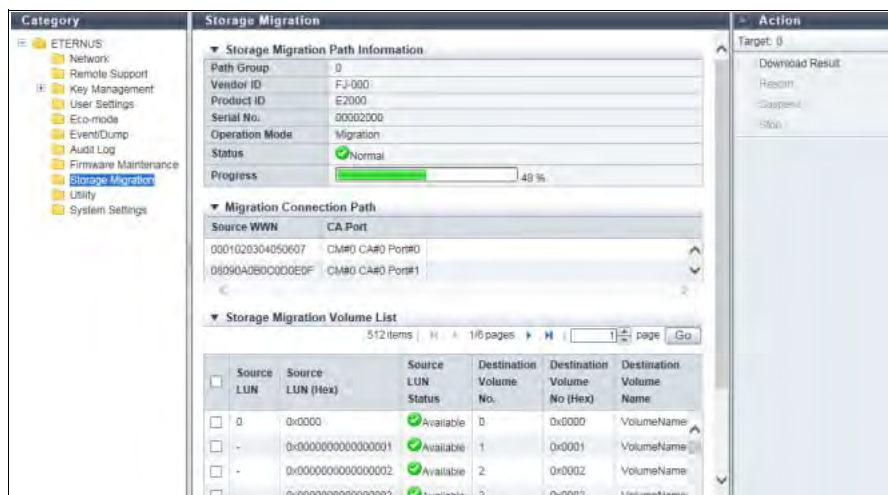
The following items are displayed in the Main area:

> ⬤ **N o t e**
>
> Items displayed in this screen vary depending on whether the previous screen is the [Storage Migration] screen or the [Start Storage Migration] screen. When the previous screen is the [Storage Migration] screen, the progress of Storage Migration is checked. When the previous screen is the [Start Storage Migration] screen, the start status of Storage Migration is checked.

● Storage Migration Path Information

- Path Group
  The path group number is displayed.

- Vendor ID
  The manufacturer name of the source storage system to which the path is created is displayed.
  An inconvertible code is displayed as "*".

- Product ID
  The product name of the source storage system to which the path is created is displayed.
  An inconvertible code is displayed as "*".

- Serial Number
  The serial number of the source storage system to which the path is established is displayed.
  An inconvertible code is displayed as "*".

- Operation Mode
  The operation mode for the path group is displayed.
  When the operation mode setting is omitted, "Migration" is displayed.
  - Migration
    Data migration from the source storage system to the destination storage system is performed.

- Migration + Quick Compare
Data migration from the source storage system to the destination storage system and a data comparison of source LUNs and destination volumes are performed. "Quick Compare" compares data in a part of the volume area. "Migration + Quick Compare" consecutively executes "data migration" and "data comparison" for each volume.

- Migration + Full Compare
Data migration from the source storage system to the destination storage system and a data comparison of source LUNs and destination volumes are performed. "Full Compare" compares data in entire volume area. "Migration + Full Compare" consecutively executes "data migration" and "data comparison" for each volume.

- Quick Compare
A data comparison of source LUNs and destination volumes is performed. "Quick Compare" compares data in a part of the volume area.

- Full Compare
A data comparison of source LUNs and destination volumes is performed. "Full Compare" compares data.

- Migration & Host IO
Data migration from the source storage system to the destination storage system is performed. Stop the operation only when switching the host connection to the migration destination storage system. This enables continued host access to the migration destination volume during the data migration.

- Status
The general status of Storage Migration for the path group is displayed.
This item is displayed only when the previous screen is the [Storage Migration] screen.

  - ✅ Complete

  - ❌ Error

  - ⏹ Stop

  - ✅ Normal

- Progress
The progress of Storage Migration for the path group is displayed.
This item is displayed only when the previous screen is the [Storage Migration] screen.

● Migration Connection Path

- Source WWN
The WWN for the source FC-CA port is displayed.

- CA Port
The location information (x: CE number, y: CM number, z: CA number, w: Port number) of the destination FC-Initiator is displayed.

  - For the ETERNUS DX8700 S3/DX8900 S3
  CE#x CM#y CA#z Port#w

  - For the other models
  CM#y CA#z Port#w

● Storage Migration Volume List

- Source LUN
The source LUN is displayed in decimal number.
Source LUNs are displayed with decimal numbers if the source LUNs are specified with decimal numbers when Storage Migration setting files are created. Source LUNs are also displayed with decimal numbers if the source LUNs satisfy the conditions for being specified with decimal numbers. If the source LUNs do not satisfy the conditions for being specified with decimal numbers, a "-" (hyphen) is displayed. Refer to "Download Template File for Storage Migration Settings" (page 186) for details.

- Source LUN (Hex)
The source LUN is displayed in hexadecimal number.

- Source LUN Status
  The status of the source LUN is displayed.

  - 🟢 Available
    The source LUN can be used

  - ❌ Not Available
    The source LUN cannot be used

  - ❌ Not Exist
    The source LUN does not exist

- Destination Volume No.
  The destination volume number is displayed in decimal number.

- Destination Volume No (Hex)
  The destination volume number is displayed in hexadecimal number.

- Destination Volume Name
  The destination volume name is displayed.

- Capacity
  The destination volume capacity is displayed.

- Migration Status
  The data migration status is displayed.
  This item is displayed only when the previous screen is the [Storage Migration] screen.
  - Initial
    Initial state
  - Waiting
    Awaiting migration
  - Running
    Migrating
  - Normal End
    Normally completed
  - Suspend
    In suspension
  - Stop
    Stopped
  - Error (xxx)
    (xxx) indicates the error factor.
  - "-" (hyphen)
    Does not exist in the source LUN (the LUN status is "Not Exist").

  ▷ **Caution**

  If "Waiting" is displayed, the data migration does not start automatically. Restart the data migration manually.

- Progress
  The data transfer progress is displayed.
  This item is displayed only when the previous screen is the [Storage Migration] screen.

- Start Time
- End Time
  The start and end times of data migration are displayed.
  This item is displayed only when the previous screen is the [Storage Migration] screen.
  - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Date (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))

The start and end times are displayed as shown below depending on the migration status.

Migration status	Start time	End time
Initial	The start time is not displayed.	Blank
Waiting		
Running	The migration start time is displayed.	
Normal End		The migration end time is displayed.
Suspend		The time when migration suspends is displayed.
Stop		The time when migration stops is displayed.
Error (xxx)		The time when migration stops due to error is displayed.

▷ **Caution**

- When Storage Migration is restarted when its migration status is "Suspend" or "Error", data migration restarts from the point of suspension. In this case, the start time is not changed.
- When Storage Migration is restarted when its migration status is "Stop", data migration of the LUN is started over from scratch. The start time is changed to the migration restart time.

- Error Location
  The storage system in which a data migration error occurs is displayed.
  If no error is occurred, a "-" (hyphen) is displayed.
  This item is displayed only when the previous screen is the [Storage Migration] screen.
  - Source
    Migration source storage system
  - Destination
    Local (migration destination) storage system

- Result
  When the source LUN and destination volume are in normal status, the "Result" field is blank.
  An error message is displayed when an error is detected in the source LUN or destination volume.
  This item is displayed only when the previous screen is the [Start Storage Migration] screen.

External Drives

This function displays the External Drive list.
This function is displayed only if the Non-disruptive Storage Migration License has been registered.

> ▷ **Caution**
>
> Creating an External Drive is required in advance. Refer to "Create External Drive" (page 192) for details.

The following items are displayed in the Main area:

- No.
  The External Drive number is displayed. The External Drive number is allocated when an External Drive is created from the smallest unused decimal number in ascending order. Click this item to display "External Drives Detail" (page 669).

- Status
  The External Drive status is displayed. When the status is normal, " ✅ Available" or " ⬛ Available" is displayed.
  Refer to "External Drive Status" (page 1377) for details.

- Usage
  The usage of the External Drive is displayed.
  - Migration
    An External Drive that is used for data migrations.

- External LU Information
  Whether the External Drive inherits the "External LU Information" is displayed.
  If "External LU Information" is inherited, "Inherited" is displayed.
  If "External LU Information" is not inherited, a "-" (hyphen) is displayed.

- Capacity
  The capacity of the External Drive is displayed.

- Serial No.
  The serial number of the external storage system is displayed.

- UID
  The identifier (storage system name) that identifies the External Drive from the host is displayed.

- Vendor ID
  The manufacturer name of the external storage system is displayed.

- Product ID
  The product name of the external storage system is displayed.

- LUN Addressing
  The format type of the LUN Addressing that is set for the External Drive is displayed.
  If LUN Addressing is not "PRHL" or "FLAT", a "-" (hyphen) is displayed.
  - PRHL
  - FLAT

- LUN
  The volume number (host LUN) of the External Drive is displayed.
  - If the LUN Addressing is "PRHL" or "FLAT"
    0 - 4095 (decimal)
  - For the other conditions
    Volume number (16-digit hexadecimal)

Filter setting

Filter	Description
Status	Select the External Drive status that is to be displayed.
Capacity	Input the capacity of the External Drives that are to be displayed and select the units of capacity. If the capacity of the External Drive is not used for filtering, leave this item blank or specify "0".

External Drives Detail

Click the [No.] link in the "External Drives" (page 668) to display the detailed information of the target External Drive.

The following items are displayed in the Main area:

- Status
  The External Drive status is displayed. Refer to "External Drive Status" (page 1377) for details.
  When the status is normal, " Available" or " Available" is displayed.

- Usage
  The usage of the External Drive is displayed.

- External LU Information
  Whether the External Drive inherits the "External LU Information" is displayed.
  If "External LU Information" is inherited, "Inherited" is displayed.
  If "External LU Information" is not inherited, a "-" (hyphen) is displayed.

- Capacity
  The capacity of the External Drive is displayed.
  In addition, the capacity is displayed in "bytes" within parentheses.

- Serial No.
  The serial number of the external storage system is displayed.

- UID
  The identifier (storage system name) that identifies the External Drive from the host is displayed.

- Vendor ID
  The manufacturer name of the external storage system is displayed.

- Product ID
  The product name of the external storage system is displayed.

- LUN Addressing
  The format type of the LUN Addressing that is set for the External Drive is displayed.
  If LUN Addressing is not "PRHL" (Peripheral device addressing) or "FLAT" (Flat space addressing), a "-" (hyphen) is displayed.
  - PRHL
  - FLAT

- LUN
  The volume number (host LUN) of the External Drive is displayed.

- Connection Path
  Target WWN : Initiator Port
  The connection path information between the external storage system and the local storage system is separated with a ":" (colon) and displayed in the "xx : yy" format.
  For "xx", the WWN for the FC port in the external storage system is displayed. For "yy", the location information of the FC-Initiator port in the local storage system (x: CE number, y: CM number, z: CA number, w: Port number) is displayed.
  - For the ETERNUS DX8700 S3/DX8900 S3
    CE#x CM#y CA#z Port#w
  - For the other models
    CM#y CA#z Port#w

  If storage systems are connected with multiple paths, multiple connection path information is displayed.

Utility

Descriptions on the actions that can be started from the [Utility] screen are displayed.

System Settings

This function displays the system setting information.

The following items are displayed in the Main area:

- Storage System Name
  The name for the ETERNUS DX/AF is displayed.

- Date
  The date and time when the event occurs are displayed.
  - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Date (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))

- Box ID
  The Box ID is displayed.
  Box ID is the information to be used for application software to define the remote storage system. The initial Box ID is a device ID that is created by combining device information (series name, model, serial number, etc.).

- Encryption Mode
  The encryption mode setting is displayed.
  - For controller firmware versions "V10L50-3000", "V10L52-3000", and "V10L53" and later
    - Fujitsu Original Encryption
    - AES-128
    - AES-256
    - Disable
  - For controller firmware versions other than the above
    - Fujitsu Original Encryption
    - AES
    - Disable

- SMI-S
  The current SMI-S setting is displayed.
  If the SMI-S stops due to an error, "Error" is displayed for this item. In this case, the SMI-S functions are not available. Contact your maintenance engineer.
  - Enable
  - Disable
  - Error

> ▷ **Caution**

> When enabling or disabling of the SMI-S is being performed, the [Setup SMI-S Environment] action cannot be clicked.

- SMI-S Performance Information
  The setting status for the SMI-S performance information response is displayed.
  If the SMI-S stops due to an error, a "-" (hyphen) is displayed for this item.
  - Enable
  - Disable

- SED Authentication Key
  Whether the SED authentication key has been "Registered" or "Not Registered" is displayed.

- Disk Drive Patrol
  Whether the Disk Drive Patrol function is enabled or disabled is displayed.

- Extreme Cache Mode
  The selected EXC mode is displayed.
  For the ETERNUS DX60 S4, the ETERNUS DX60 S3, the ETERNUS DX8100 S3, the ETERNUS AF250 S2/AF650 S2, the ETERNUS AF250/AF650, and the ETERNUS DX200F, this item is not displayed.
  - Extreme Cache
  - Extreme Cache Pool
  - Extreme Cache Pool (Expanded)
  - Not Used

- Extreme Cache Memory Size
  The specified capacity (GB) of the EXC is displayed.
  A "-" (hyphen) is displayed when the Extreme Cache mode is "Not Used".
  For the ETERNUS DX60 S4, the ETERNUS DX60 S3, the ETERNUS DX8100 S3, the ETERNUS AF250 S2/AF650 S2, the ETERNUS AF250/AF650, and the ETERNUS DX200F, this item is not displayed.
  The following Extreme Cache memory size is displayed according to the Extreme Cache mode.

Model	Extreme Cache Mode	
	Extreme Cache (EXC)	Extreme Cache Pool (EXCP) or Extreme Cache Pool (Expanded) (*1)
ETERNUS DX100 S4/DX200 S4	N/A	The total value of the EXCP memory size for each CM
ETERNUS DX100 S3/DX200 S3		
ETERNUS DX500 S4/DX600 S4	The specified EXC memory size in the ETERNUS DX	
ETERNUS DX500 S3/DX600 S3		
ETERNUS DX8700 S3/DX8900 S3	The total value of the EXC memory size for each CM	

*1:　The target of "Extreme Cache Pool (Expanded)" is the ETERNUS DX100 S4/DX200 S4.

9. Component Status

Component status displays the status information of volumes.
Component status screens can be displayed by clicking the following categories:

Category	Component status screen
Storage system name	Storage (Basic Information)
Controller Enclosure	Controller Enclosure
Controller Module	Controller Module
Performance	Performance (CM)
Error Statistics	Port Error Statistics (for the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F)
Channel Adapter	Channel Adapter
Performance	Performance (CA)
Battery (BBU)	Battery (BBU)
PCIe Flash Module	PCIe Flash Module
Performance	Performance (PCIe Flash Module)
Bootup and Utility Device	Bootup and Utility Device
Power Supply Unit	Power Supply Unit (CE)
Battery (BTU/BCU)	Battery (BTU/BCU)
Frontend Enclosure	Frontend Enclosure
Frontend Router	Frontend Router
Service Controller	Service Controller
FE Power Supply Unit	Power Supply Unit (FE)
FAN Unit	FAN Unit
Operation Panel	Operation Panel
Drive Enclosure	Drive Enclosure
I/O Module	I/O Module
Error Statistics	Port Error Statistics
Power Supply Unit	Power Supply Unit (DE)
Fan Expander Module	Fan Expander Module
Drives	Drives
Performance	Performance (Drive)
Error Statistics	Drive Error Statistics

Detailed information of the components can be displayed from the following screens:
- Controller Enclosure Detail
- Controller Module Detail
- Channel Adapter Detail
- PCIe Flash Module Detail
- PSU/CPSU (CE) Detail
- Frontend Router Detail
- Service Controller Detail
- FE Power Supply Unit Detail
- FAN Unit Detail
- Drive Enclosure Detail
- I/O Module Detail

- Power Supply Unit (DE) Detail
- Fan Expander Module Detail
- Drive Detail
- Bootup and Utility Device Detail
- SAS Cable Detail
- Frontend Cable Detail
- Management Cable Detail
- Port Detail

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Storage (Basic Information)

The general information for the ETERNUS DX/AF is displayed.

■ Summary

● For the ETERNUS DX8700 S3/DX8900 S3

● For the other models

The following items are displayed in the Main area:

- Storage System Name
  The name of the ETERNUS DX/AF is displayed.

- Model Name
  The model name of the ETERNUS DX/AF is displayed.

- Serial Number
  The serial number of the ETERNUS DX/AF is displayed.

- Device Identification Number
  The identification number of the ETERNUS DX/AF is displayed.

- Status
The general status of the ETERNUS DX/AF is displayed. Refer to "Storage System General Status (Detail)" (page 1372) for details.

- Battery
The battery charge level is displayed.
When the battery charge level is 90% or more, "Full Charge" is displayed. When the battery charge level is less than 90%, "xx%" is displayed.
For the ETERNUS DX8700 S3/DX8900 S3, the lowest battery charge level among all CEs is displayed. Click this item to display the [Controller Enclosure] screen. Refer to "Controller Enclosure" (page 681) for details.
This item is displayed for the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, the ETERNUS AF650 S2, and the ETERNUS AF650.

- Operation Mode
The operation mode is displayed.
  - Normal
  The ETERNUS DX/AF is operating.
  - Maintenance Mode
  The ETERNUS DX/AF is under maintenance.

- Model Upgrade
Whether the model upgrade is possible or not is displayed. When this item is not displayed, the model upgrade is not possible.
  - Not Upgraded
  A model upgrade has not been performed yet.
  - Upgraded
  A model upgrade has been performed.

■ View

● For the ETERNUS DX60 S4 or the ETERNUS DX60 S3

● **For the ETERNUS DX100 S4/DX200 S4, the ETERNUS DX500 S4/DX600 S4 (DE#00 - DE#17),
the ETERNUS DX100 S3/DX200 S3, the ETERNUS DX500 S3/DX600 S3 (DE#00 - DE#17),
the ETERNUS DX8100 S3, the ETERNUS AF650 S2, or the ETERNUS AF650**
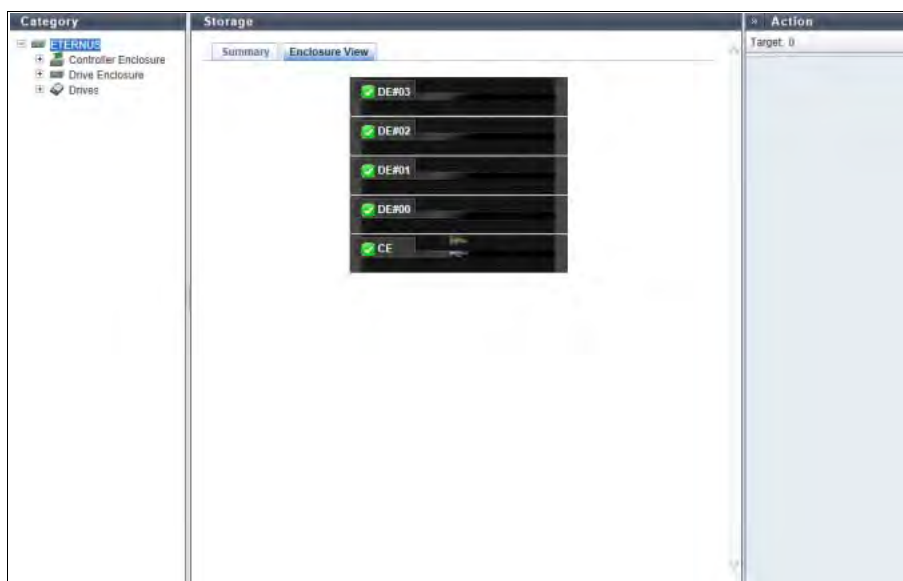
● **For the ETERNUS DX500 S4/DX600 S4 (DE#00 - DE#1A)
or the ETERNUS DX500 S3/DX600 S3 (DE#00 - DE#1A)**

● **For the ETERNUS DX8700 S3/DX8900 S3 (CE/FE)**

● **For the ETERNUS DX8700 S3/DX8900 S3 (DE#xx)**

● **For the ETERNUS AF250 S2 or the ETERNUS AF250**
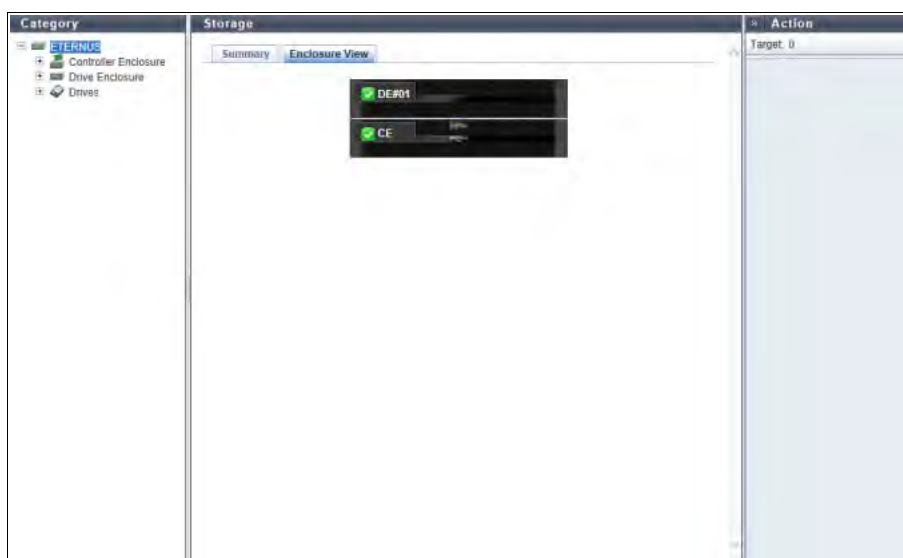
● **For the ETERNUS DX200F**
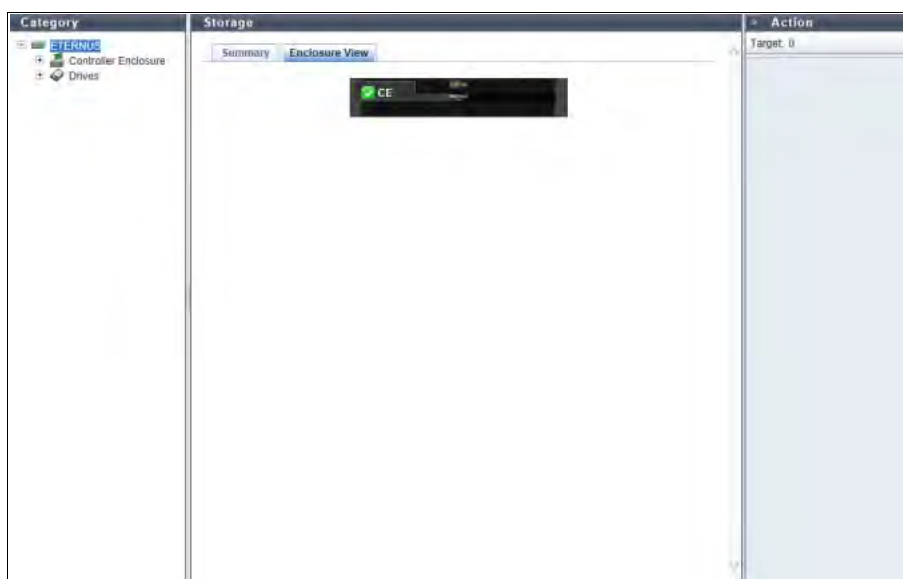
The following items are displayed in the Main area:

- Storage system image
  The front view of the enclosures that are installed in the ETERNUS DX/AF is displayed. The enclosure statuses are displayed with icons. Refer to "Component Status" (page 1376) for details.
  For the ETERNUS DX/AF other than the ETERNUS DX8700 S3/DX8900 S3, click the [CE] link to display "Controller Enclosure Detail" (page 710).
  For the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, and the ETERNUS DX8100 S3, click the [DE] link to display "Drive Enclosure Detail" (page 738).
  For the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS AF650 S2, and the ETERNUS AF650, specify the range for the DEs and then click a DE to display "Drive Enclosure Detail" (page 738).
  For the ETERNUS DX8700 S3/DX8900 S3, the [CE/FE] button and the [DE#xx] button are displayed.
  By clicking the [CE/FE] button, the CE#x (x: CE number) and the [FE] screen is displayed. By clicking the CE#x, "Controller Enclosure Detail" (page 710) is displayed. By clicking the FE, "Frontend Enclosure" (page 696) is displayed.
  By clicking the [DE#xx] button, the DEs in the relevant range are displayed. By clicking the DE#xx, "Drive Enclosure Detail" (page 738) is displayed.

Controller Enclosure

The CE information is displayed.
This function is displayed for the ETERNUS DX8700 S3/DX8900 S3.

> **N o t e**
>
> For the ETERNUS DX/AF other than the ETERNUS DX8700 S3/DX8900 S3, clicking "Controller Enclosure" in the category displays "Controller Enclosure Detail" (page 710).

The following items are displayed in the Main area:

- **Enclosure**
  The CE number is displayed. By clicking this item, "Controller Enclosure Detail" (page 710) is displayed.

- **Status**
  The CE status is displayed. Refer to "Component Status" (page 1376) for details.

- **Charge Rate**
  The battery charge level for CE is displayed.
  When the battery charge level is 90% or more, "Full Charge" is displayed. When the battery charge level is less than 90%, "xx%" is displayed.

- **Cache Mode**
  The current status and the factor of the cache are displayed. The normal status is "Write Back Mode".
  Refer to "Cache Mode" (page 29) in "Overview" for details.
  - Write Back Mode
  - Write Through (Pinned Data)
  - Write Through (Battery)
  - Write Through (Maintenance)
  - Write Through (1CM)

Controller Module

The CM information is displayed.

■ For the ETERNUS DX8700 S3/DX8900 S3

■ For the other models

The following items are displayed in the Main area:

- Enclosure
  The CE number is displayed. By clicking this item, "Controller Enclosure Detail" (page 710) is displayed.
  This item is displayed for the ETERNUS DX8700 S3/DX8900 S3.

- CM
  The CM number is displayed. By clicking this item, "Controller Module Detail" (page 718) is displayed.

- Status
  The CM status is displayed. Refer to "Component Status" (page 1376) for details.

Performance (CM)

The CM performance information is displayed.

> **Note**
>
> - Performance information is obtained when performance monitoring is operated from ETERNUS Web GUI, ETERNUS CLI, or any other monitoring software. Refer to "Start/Stop Performance Monitoring" (page 90) for details on how to start performance monitoring with ETERNUS Web GUI.
> - The interval for acquiring performance information can be specified when starting the monitoring. When using ETERNUS Web GUI, the default interval is 30 seconds.
> - The average performance values during the specified interval are displayed.

■ For the ETERNUS DX8700 S3/DX8900 S3

■ For the other models

The following items are displayed in the Main area:

- Enclosure
  The CE number is displayed.
  This item is displayed for the ETERNUS DX8700 S3/DX8900 S3.

- CM
  The CM number is displayed.

- Busy Rate
The CPU busy rate is displayed.

- Copy Remainder Count
The remaining capacity of the copy session is displayed.
"Copy Remainder Count" is displayed for each Controlling CM in the RAID group to which the copy source volume belongs.

Port Error Statistics (for the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F)

The total number of errors for ports is displayed.
An increasing number of errors in the information is used to notify early replacement for warning status components. This can also be used as analysis information when performance is reduced.

⭕ **N o t e**

- This function is available for the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F. For the other models, refer to .
- Errors that occur in the SAS transmission line are detected in CM and recovered by retries. Note that detecting an error is not an immediate cause of data failure.

The following items are displayed in the Main area:

- Enclosure
Controller Enclosure that has ports is displayed.

- Expander
The chip installation location that is targeted by the port error detection is displayed.

- Port No.
The port number that is targeted by the port error detection is displayed.

- Phy No.
The Phy number of the port that is targeted by the port error detection is displayed.

- Status
The Phy status is displayed.
  - Link Up
  - Link Down
  - N/A

- Invalid Dword
The number of Invalid Dword occurrences is displayed.
Refer to "Invalid Dword" (page 704) in "Port Error Statistics".

- Disparity Error
The number of Disparity Error occurrences is displayed.
Refer to "Disparity Error" (page 704) in "Port Error Statistics".

- Loss of Dword Synchronization
The number of Loss of Dword Synchronization occurrences is displayed.
Refer to "Loss of Dword Synchronization" (page 704) in "Port Error Statistics".

- Phy Reset Problem
The number of Phy Reset Problem occurrences is displayed.
Refer to "Phy Reset Problem" (page 704) in "Port Error Statistics".

Filter setting

Filter	Description
Expander	Select the installation location of the chip that is to be displayed.

Channel Adapter

The information of all the CAs registered in the ETERNUS DX/AF is displayed.

■ For the ETERNUS DX8700 S3/DX8900 S3

■ **For the other models**

The following items are displayed in the Main area:

- Enclosure
  The CE number is displayed. By clicking this item, "Controller Enclosure Detail" (page 710) is displayed.
  This item is displayed for the ETERNUS DX8700 S3/DX8900 S3.

- CM
  The CM number is displayed. By clicking this item, "Controller Module Detail" (page 718) is displayed.

- CA
  The CA number is displayed. By clicking this item, "Channel Adapter Detail" (page 722) is displayed.

- Type
  The CA type is displayed.
  The display items in this filed vary depending on the storage system model.
  - 32G-FC 2port, 16G-FC 4port, 16G-FC 2port, 8G-FC 4port, 8G-FC 2port
  - 10G-iSCSI 2port, 10G Base-T iSCSI 2port, 1G-iSCSI 2port
  - 12G-SAS 2port, 6G-SAS 2port
  - 10G-FCoE 2port
  - 10G-NAS 2port, 1G-NAS 4port

  > **Ｎ ｏ ｔ ｅ**
  >
  > Note that a 1-port type CA for the ETERNUS DX60 S4/DX100 S4 and the ETERNUS DX60 S3/DX100 S3 is dis-
  > played as "2port" (for 8G-FC, "8G-FC 2port" is displayed). Similarly, a 2-port type CA (1G-NAS) is displayed as
  > "1G-NAS 4port". Available ports can be checked in the [Internal Parts] tab of the [Channel Adapter Detail]
  > screen. The [Add Channel Adapter Port] function is displayed in the action field only when a 1-port type CA or
  > a 2-port type CA is installed in the ETERNUS DX. Refer to "Channel Adapter Detail" (page 722) for details. Note
  > that 1-port type CAs and 2-port type CAs are not available in some regions.

- Status
  The CA status is displayed. Refer to "Component Status" (page 1376) for details.

Performance (CA)

The CA port performance information is displayed.
Refer to "Note" in "Performance (CM)" (page 683) for the acquisition requirements and specifications of the performance information.

> ⊳ **Caution**

When the port mode is "Initiator", the CA port performance is not displayed.

■ **For the ETERNUS DX8700 S3/DX8900 S3**

■ **For the other models**

The following items are displayed in the Main area:

- **Enclosure**
  The CE number is displayed.
  This item is displayed for the ETERNUS DX8700 S3/DX8900 S3.

- **CM**
  The CM number is displayed.

- **CA**
  The CA number is displayed.

- Port
  The port number is displayed.

- Port Mode
  The port mode is displayed.
    - CA
    - RA
    - CA/RA

- Read IOPS
  The number of reads per second is displayed.

- Write IOPS
  The number of writes per second is displayed.

- Read Throughput
  The amount of data that is read per second is displayed.

- Write Throughput
  The amount of data that is written per second is displayed.

Battery (BBU)

This function displays the Battery Backup Unit (BBU) information.
This function is displayed for the ETERNUS DX60 S4/DX100 S4/DX200 S4 and the ETERNUS AF250 S2.

The following items are displayed in the Main area:

- BBU
  The BBU number is displayed.

- Status
  The BBU status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The BBU status code is displayed.

- Error Code
  The BBU error code is displayed.

- Charge Rate
The BBU charge level is displayed.
When the battery charge level is 90% or more, "Full Charge" is displayed. When the battery charge level is less than 90%, "xx%" is displayed.

- Expiration Date
The BBU expiration date is displayed.

PCIe Flash Module

This function displays the PFM information.

> ▷ **Caution**

If a PFM is not available for reading and writing, "❌ Error" is displayed for the status. If this occurs, replace the PFM. Note that PFMs can be replaced by a maintenance engineer who has the "Maintenance Operation" policy.

> 🔵 **N o t e**

- PFMs can be installed in the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, and the ETERNUS DX8700 S3/DX8900 S3.
- If the PFM capacity in each CM for the ETERNUS DX500 S4/DX600 S4 or the ETERNUS DX500 S3/DX600 S3 does not match, the EXC memory size that can be used for the CM is reduced to the smallest capacity.
- For the ETERNUS DX8700 S3/DX8900 S3, the PFM capacity in each CM is used as an EXC memory size.

■ For the ETERNUS DX8700 S3/DX8900 S3

■ **For the other models**

The following items are displayed in the Main area:

- Enclosure
The CE number is displayed.
This item is displayed for the ETERNUS DX8700 S3/DX8900 S3.

- PFM
The PFM number is displayed. Click this item to display "PCIe Flash Module Detail" (page 726).

- Type
The PFM type is displayed

- Capacity
The PFM capacity is displayed.

- Status
The PFM status is displayed. Refer to "Component Status" (page 1376) for details.

- Health
The lifetime information of the PFM is displayed.
  - 100% - 6%
    The PFM is available.
  - 5% - 1%

    " ⚠ Warning" is displayed as the status.
    The PFM is approaching its end of life.
  - 0%

    " ❌ Error" is displayed as the status.
    Reading from or writing to the PFM is not available.

Performance (PCIe Flash Module)

This screen displays the performance information of the PFM.
Refer to "Note" in "Performance (CM)" (page 683) for the acquisition requirements and specifications of the performance information.

■ For the ETERNUS DX8700 S3/DX8900 S3

■ For the other models

The following items are displayed in the Main area:

- Enclosure
  The CE number is displayed.
  This item is displayed for the ETERNUS DX8700 S3/DX8900 S3.

- PFM
  The PFM number is displayed.

- Busy Rate
  When performance monitoring has started, the busy rate of the PFM is displayed with a bar and a numerical number. If performance monitoring has stopped, "0%" is displayed for the busy rate.

Bootup and Utility Device

The BUD information is displayed.
This function is displayed for the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3.

■ For the ETERNUS DX8100 S3

■ For the ETERNUS DX8700 S3/DX8900 S3

The following items are displayed in the Main area:

- Enclosure
  The CE number is displayed.
  This item is displayed for the ETERNUS DX8700 S3/DX8900 S3.

- BUD
  The BUD number is displayed. Click this item to display "Bootup and Utility Device Detail" (page 752).

- Status
  The BUD status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The status code of BUD is displayed.

- Error Code
  The error code of BUD is displayed.

Power Supply Unit (CE)

The Power Supply Unit (PSU) information for a CE is displayed.

■ For the ETERNUS DX8700 S3/DX8900 S3

■ For the other models

The following items are displayed in the Main area:

- **Enclosure**
  The enclosure where the PSU or the Controller Enclosure Power Supply Unit (CPSU) is installed is displayed.
  For the ETERNUS DX8700 S3/DX8900 S3, the CE number is displayed.

- **PSU**
  The PSU number is displayed. Click this item to display "PSU/CPSU (CE) Detail" (page 728).
  This item is displayed for the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F.

- **CPSU**
  The CPSU number is displayed. Click this item to display "PSU/CPSU (CE) Detail" (page 728).
  This item is displayed for the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, the ETERNUS AF650 S2, and the ETERNUS AF650.

- **Status**
  The PSU status or the CPSU status is displayed. Refer to "Component Status" (page 1376) for details.

Battery (BTU/BCU)

The information of the Battery Unit (BTU) and the Battery Charger Unit (BCU) is displayed.
This function is displayed for the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, the ETERNUS AF650 S2, and the ETERNUS AF650.

● BTU

- For the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS DX8100 S3, the ETERNUS AF650 S2, and the ETERNUS AF650

- For the ETERNUS DX8700 S3/DX8900 S3

The following items are displayed in the Main area:

- - Enclosure
    The CE number is displayed.
    This item is displayed for the ETERNUS DX8700 S3/DX8900 S3.

- - Component
    The BTU number is displayed.

- - Status
    The BTU status is displayed. Refer to "Component Status" (page 1376) for details.

- - Status Code
    The BTU status code is displayed.

- - Error Code
    The BTU error code is displayed.

- Charge Rate
The BTU charge rate is displayed.
When the battery charge level is 90% or more, "Full Charge" is displayed. When the battery charge level is less than 90%, "xx%" is displayed.

- Expiration Date
The expiration date for the BTU is displayed.

● **BCU**

- For the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS DX8100 S3, the ETERNUS AF650 S2, and the ETERNUS AF650
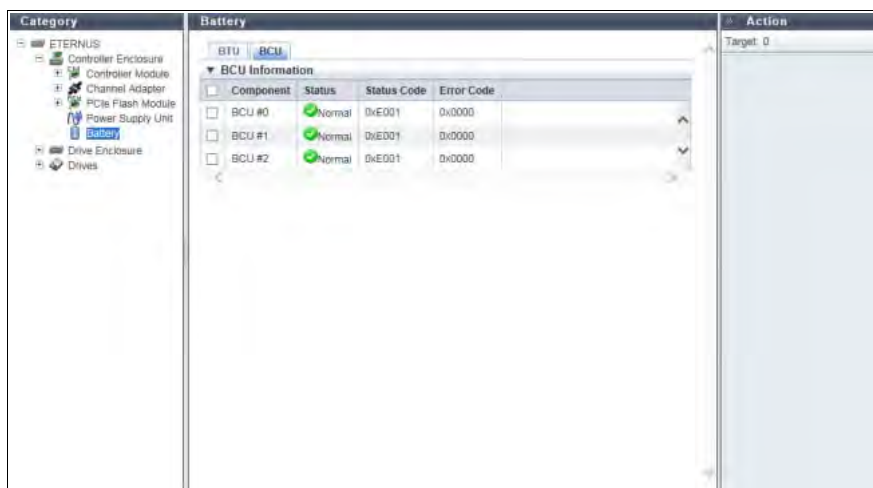
- For the ETERNUS DX8700 S3/DX8900 S3
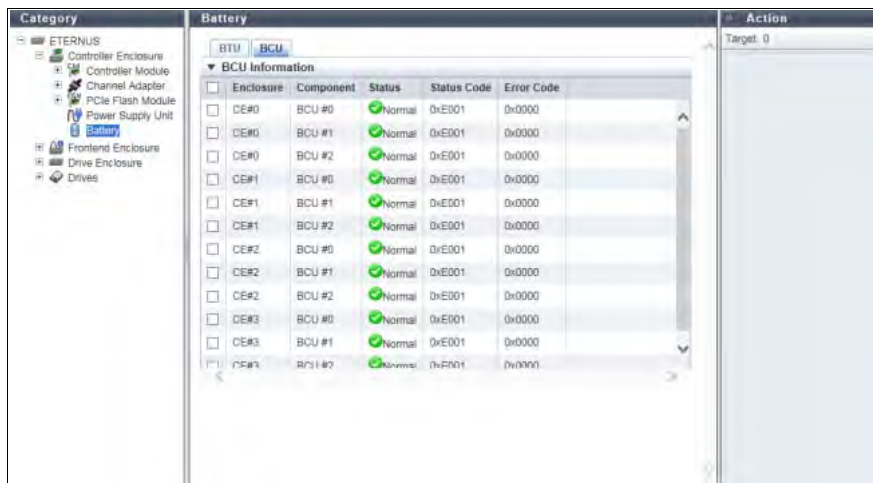
The following items are displayed in the Main area:

- Enclosure
The CE number is displayed.
This item is displayed for the ETERNUS DX8700 S3/DX8900 S3.

- Component
The BCU number is displayed.

- Status
The BCU status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
The BCU status code is displayed.

- Error Code
The BCU error code is displayed.

Frontend Enclosure

The FE information is displayed.
This function is displayed for the ETERNUS DX8700 S3/DX8900 S3.

■ Summary

The following items are displayed in the Main area:

- Location
  The installation location of the thermal sensor is displayed.
  - Intake Temp
  - Exhaust Temp

- Status
  The thermal sensor status is displayed.

- Error Code
  The error code of the thermal sensor is displayed.

- Sensor 1
  For the "Intake Temp" field, temperature of the SVC#0 is displayed in Celsius (C) and in Fahrenheit (F).
  If the thermal information is not available due to problem such as a sensor failure, a "-" (hyphen) is displayed.
  For the "Exhaust Temp" field, a "-" (hyphen) is usually displayed.

- Sensor 2
  For the "Intake Temp" field, temperature of the SVC#1 is displayed in Celsius (C) and in Fahrenheit (F).
  If the thermal information is not available due to problem such as a sensor failure, a "-" (hyphen) is displayed.
  For the "Exhaust Temp" field, a "-" (hyphen) is usually displayed.

■ **Front View**
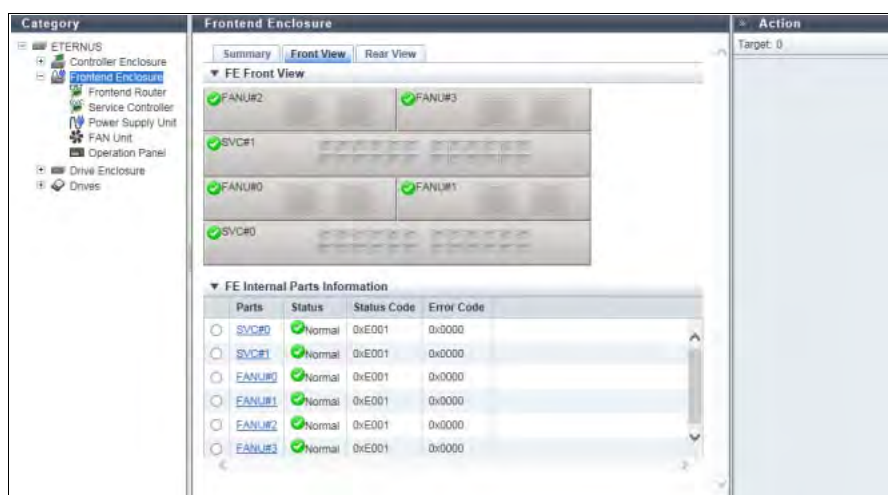
The following items are displayed in the Main area:

- Storage system image
  The front view of the FE that is installed in the ETERNUS DX is displayed.
  The Service Controller (SVC) status and the FAN Unit (FANU) status are indicated by icons. Refer to "Component Status" (page 1376) for details.
  By clicking the SVC number, "Service Controller Detail" (page 732) is displayed.
  By clicking the FANU number, "FAN Unit Detail" (page 736) is displayed.

- Parts
  The SVC number and the FANU number are displayed.
  By clicking the SVC number, "Service Controller Detail" (page 732) is displayed.
  By clicking the FANU number, "FAN Unit Detail" (page 736) is displayed.

- Status
  The status of each component is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The status code of each component is displayed.

- Error Code
  The error code of each component is displayed.

■ **Rear View**

The following items are displayed in the Main area:

- Storage system image
  The rear view of the FE that is installed in the ETERNUS DX is displayed.
  The Frontend Router (FRT) status and the FE Power Supply Unit (FPSU) status are indicated by icons. Refer to "Component Status" (page 1376) for details.
  By clicking the FRT number, "Frontend Router Detail" (page 730) is displayed.
  By clicking the FPSU number, "FE Power Supply Unit Detail" (page 734) is displayed.

- Parts
  The FRT number and the FPSU number are displayed.
  By clicking the FRT number, "Frontend Router Detail" (page 730) is displayed.
  By clicking the FPSU number, "FE Power Supply Unit Detail" (page 734) is displayed.

- Status
  The status of each component is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The status code of each component is displayed.

- Error Code
  The error code of each component is displayed.

Frontend Router

The FRT information is displayed.
This function is displayed for the ETERNUS DX8700 S3/DX8900 S3.

The following items are displayed in the Main area:

- Status
  The FRT number is displayed. Click this item to display "Frontend Router Detail" (page 730).

- Status
  The FRT status is displayed. Refer to "Component Status" (page 1376) for details.

Service Controller

The SVC information is displayed.
This function is displayed for the ETERNUS DX8700 S3/DX8900 S3.
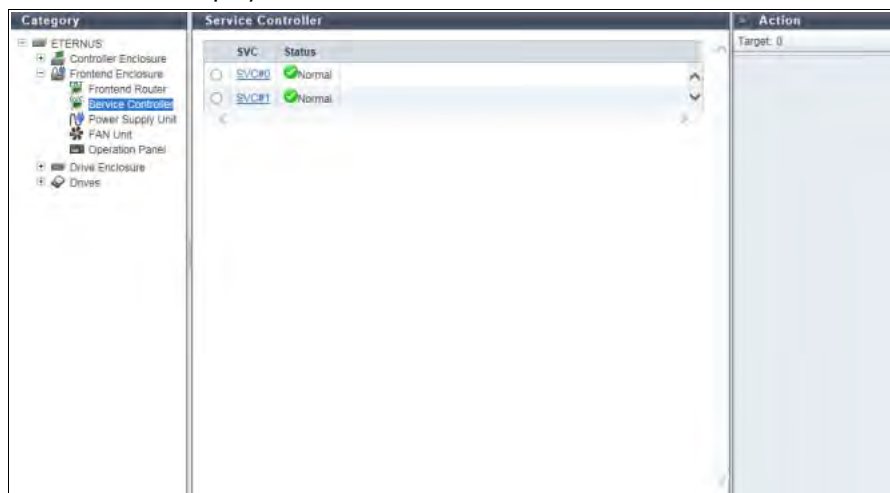
The following items are displayed in the Main area:

- SVC
  The SVC number is displayed. Click this item to display "Service Controller Detail" (page 732).

- Status
  The SVC status is displayed. Refer to "Component Status" (page 1376) for details.

Power Supply Unit (FE)

The information of PSU for FE is displayed.
This function is displayed for the ETERNUS DX8700 S3/DX8900 S3.

The following items are displayed in the Main area:

- Enclosure
  The enclosure where the FPSU is installed is displayed.

- FPSU
  The FPSU number is displayed. Click this item to display "FE Power Supply Unit Detail" (page 734).

- Status
  The FPSU status is displayed. Refer to "Component Status" (page 1376) for details.

FAN Unit

The FANU information is displayed.
This function is displayed for the ETERNUS DX8700 S3/DX8900 S3.

The following items are displayed in the Main area:

- FANU
  The FANU number is displayed. Click this item to display "FAN Unit Detail" (page 736).

- Status
  The FANU status is displayed. Click this item to display "Component Status" (page 1376).

Operation Panel

The Operation Panel (OPNL) information is displayed.
This function is displayed for the ETERNUS DX8700 S3/DX8900 S3.

■ Summary

The following items are displayed in the Main area:

- Location
  The OPNL is displayed.

- Status
  The OPNL status is displayed. Refer to ["Component Status" (page 1376)](#) for details.

- Status Code
  The OPNL status code is displayed.

- Error Code
  The OPNL error code is displayed.

- Part Number
  The part number of the OPNL is displayed.

- Serial Number
  The serial number of the OPNL is displayed.

- Hardware Revision
  The hardware version of the OPNL is displayed.

Drive Enclosure

The DE information is displayed.

The following items are displayed in the Main area:

- Enclosure
  The DE number is displayed. Click this item to display "Drive Enclosure Detail" (page 738).

- Status
  The DE status is displayed. Refer to "Component Status" (page 1376) for details.

- Type
  The DE type is displayed.
  The DE type indicates the drive size and the maximum number of drives that can be installed.

I/O Module

The I/O Module (IOM) information is displayed.

The following items are displayed in the Main area:

- Enclosure
  The enclosure where the IOM is installed is displayed.

- IOM
  The IOM number is displayed. Click this item to display "I/O Module Detail" (page 742).

- Status
  The IOM status is displayed. Refer to "Component Status" (page 1376) for details.

Filter setting

The filter setting is displayed for the ETERNUS DX8700 S3/DX8900 S3.

Filter	Description
Enclosure	Select the DE that is to be displayed.
Status	Select the IOM status that is to be displayed.

Port Error Statistics

The total number of errors for CM expander and DE IOM ports is displayed.
An increasing number of errors in the information is used to notify early replacement for warning status compo-
nents. This can also be used as analysis information when performance is reduced.

> **N o t e**
>
> Errors that occur in the SAS transmission line are detected in CM and recovered by retries. Note that detecting an
> error is not an immediate cause of data failure.
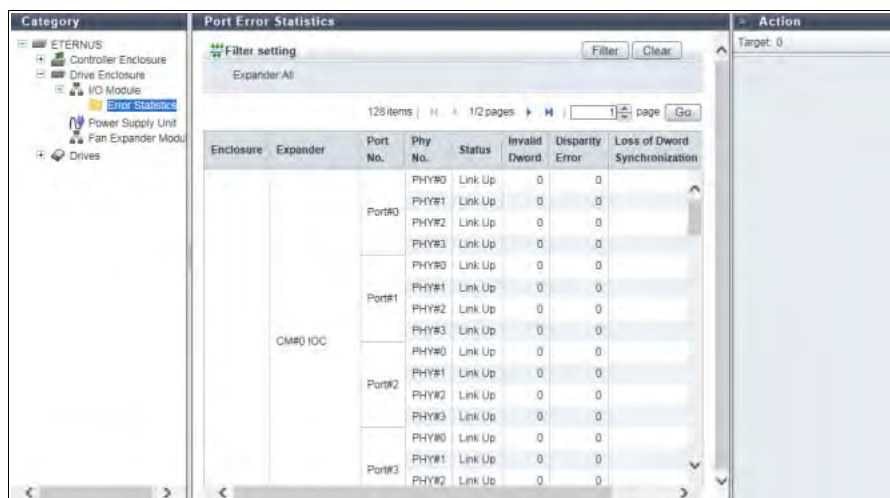
The following items are displayed in the Main area:

- Enclosure
  Enclosures (Controller Enclosure, Drive Enclosure) that have ports are displayed.

- Expander
  The chip installation location that is targeted by the port error detection is displayed.

- Port No.
  The port number that is targeted by the port error detection is displayed.

- Phy No.
  The Phy number of the port that is targeted by the port error detection is displayed.

- Status
  The Phy status is displayed.
  - Link Up
  - Link Down
  - N/A

- Invalid Dword
  The number of Invalid Dword occurrences is displayed.
  "Invalid Dword" indicates an error in the SAS transmission line. The SAS interface encodes 8-bit to 10-bit to improve the transmission error ratio. This error is detected when the SAS interface fails encoding.

- Disparity Error
  The number of Disparity Error occurrences is displayed.
  "Disparity Error" indicates an error in the SAS transmission line. The SAS interface encodes 8-bit to 10-bit to improve the transmission error ratio. This error is detected when the SAS interface fails encoding.

- Loss of Dword Synchronization
  The number of Loss of Dword Synchronization occurrences is displayed.
  "Loss of Dword Synchronization" indicates that the SAS interface failed encoding and the SAS link synchronization is broken.

- Phy Reset Problem
  The number of Phy Reset Problem occurrences is displayed.
  "Phy Reset Problem" is detected when resetting and recovering the port in which an error occurred.

Filter setting

Filter	Description
Expander	Select the installation location of the chip that is to be displayed.

Power Supply Unit (DE)

The PSU information for a DE is displayed.

The following items are displayed in the Main area:

- Enclosure
  The enclosure where the PSU is installed is displayed.

- PSU
  The PSU number is displayed. Click this item to display <u>"Power Supply Unit (DE) Detail" (page 744)</u>.

- Status
  The PSU status is displayed. Refer to "Component Status" (page 1376) for details.

Fan Expander Module

This function displays the Fan Expander Module (FEM) information.
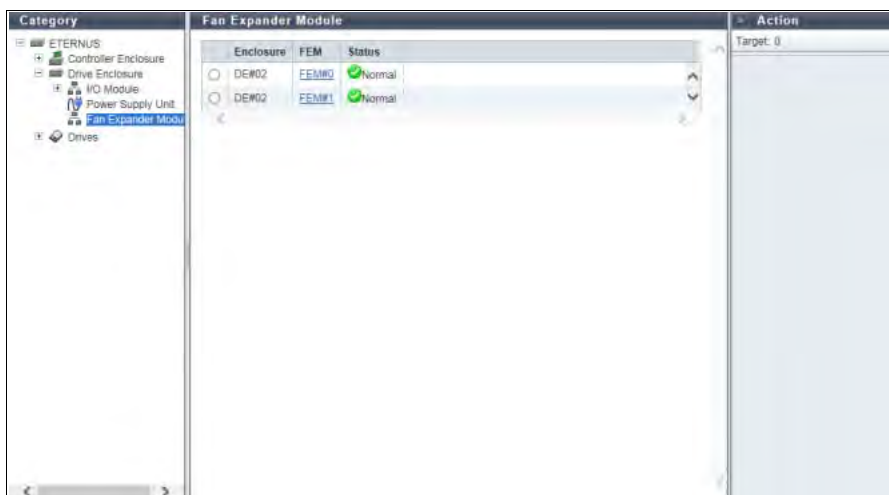
The following items are displayed in the Main area:

- Enclosure
  The drive enclosure number is displayed.

- FEM
  The FEM number is displayed. Click this item to display "Fan Expander Module Detail" (page 746).

- Status
  The FEM status is displayed. Refer to "Component Status" (page 1376) for details.

Drives

The drive information is displayed.

The following items are displayed in the Main area:

- Enclosure
  The enclosure where the drive is installed is displayed.

- Slot No.
  The slot number of the enclosure where the drive is installed is displayed. Click this item to display "Drive Detail" (page 748).

- Status
  The drive status is displayed. Refer to "Drive Status" (page 1377) for details.

- Capacity
  The capacity of the drive is displayed.

> ▶ Caution
>
> The drive capacity that is displayed for the SSD-L differs from the product's actual capacity. For example, the drive capacity of a "1.92TB SSD-L" is displayed as "2.00 TB".

- Speed
  The drive speed is displayed. For SSD or SSD SED, a "-" (hyphen) is displayed.
  - 15000 rpm
  - 10000 rpm
  - 7200 rpm

- Type
  The drive type is displayed in combination with the following.
  - Drive size
    - For 2.5-inch drives
      2.5"
    - For 3.5-inch drives
      3.5"
  - Drive type
    - For SAS disks
      Online

- For Nearline SAS disks
  Nearline
- For SSDs, the following items are displayed depending on the SSD type
  - For SSD-Ms (12 Gbit/s) (*1)
    SSD-M
  - For SSD-Ls (12 Gbit/s) (*1)
    SSD-L
  - For SSDs (6 Gbit/s) (*1)
    SSD

Note that "SED" is also displayed for self encrypting drives and "AF" is also displayed for Advanced Format compliant drives.

*1: The displayed item varies depending on the interface speed (bandwidth) or the capacity of the reserved space. Unless otherwise specified, this manual refers to "SSD-M", "SSD-L", and "SSD" collectively as "SSD". In addition, there may be cases when "SSD SED" is used as a collective term for self encrypting drives (SSD-M, SSD-L, SSD).

- Usage
  The usage of the drive is displayed.
  - For a drive that is used for user data or an unused drive
    Data
  - For a drive that is registered as a Global Hot Spare
    Global Hot Spare
  - For a drive that is registered as a Dedicated Hot Spare
    Dedicated Hot Spare

- RAID Group
  When the drive belongs to a RAID group, the RAID group number and the RAID group name are displayed. However, if the drive usage is "Dedicated Hot Spare", the RAID group number and the RAID group name are displayed even when the drive is not used as a Hot Spare. Click this item to display the [RAID Group Detail] screen. When the usage is not "Dedicated Hot Spare" and the drive is not registered in a RAID group, a "-" (hyphen) is displayed.

- Health
  The drive lifetime information is displayed between 0% - 100%. As the lifetime of the drive is reduced, the health level of the drive is decreased.
  A "-" (hyphen) is displayed in the following conditions:
  - The drive is neither "SSD" nor "SSD SED"
  - Data sanitization is in progress
  - The lifetime information cannot be obtained

Filter setting

Filter	Description
Enclosure	Select the enclosure in which the target drive is installed.
Slot No.	Specify the slot number of the drive that is to be displayed. When not using the slot number for filtering, leave this item blank.
Status	Select the drive status that is to be displayed.
Capacity	Specify the capacity of the drive that is to be displayed. When not using the drive capacity for filtering, specify "0".
Type	Select the drive type that is to be displayed.
Usage	Select the usage of the drive that is to be displayed.

Performance (Drive)

The drive performance information is displayed.
Refer to "Note" in "Performance (CM)" (page 683) for the acquisition requirements and specifications of the performance information.

The following items are displayed in the Main area:

- Enclosure
  The enclosure where the drive is installed is displayed.

- Slot No.
  The slot number of the enclosure where the drive is installed is displayed.

- Busy Rate
  The busy rate of the drive is displayed with a bar and a numerical number. When a drive is in the " ⊗ Broken" or
  " ⊗ Not Supported" state, a "-" (hyphen) is displayed.

Filter setting

Filter	Description
Enclosure	Select the enclosure in which the target drive is installed.
Slot No.	Specify the slot number of the drive that is to be displayed. When not using the slot number for filtering, leave this item blank.
Minimum Busy Rate	Specify the minimum busy rate for the drive that is to be displayed. The drives with a busy rate that exceeds the specified minimum busy rate are displayed. When not using the minimum busy rate for filtering, leave this item blank.

Drive Error Statistics

The total number of drive errors is displayed.
An increasing number of disk errors can be used as a sign for the early replacement of warning components or as information to analyze performance when performance is reduced.
Any unnecessary drive error information can be deleted.

The following items are displayed in the Main area:

- Enclosure
  The enclosure where the drive is installed is displayed.

- Slot No.
  The slot number of the enclosure where the drive is installed is displayed.

- Port No.
  The drive port number is displayed.

- Media Error
  The number of Media Error occurrences is displayed.

- Drive Error
  The number of Drive Error occurrences is displayed.

- Drive Recovered Error
  The number of Drive Recovered Error occurrences is displayed.

- S.M.A.R.T. Event
  The number of S.M.A.R.T. Event occurrences is displayed.

- I/O Timeout
  The number of I/O Timeout occurrences is displayed.

- Link Error
  The number of Link Error occurrences is displayed.

- Check Code Error
  The number of Check Code Error occurrences is displayed.

Controller Enclosure Detail

The detailed CE information is displayed.

■ Summary

● For the ETERNUS DX8700 S3/DX8900 S3

● For the other models

The following items are displayed in the Main area:

- Charge Rate
  The battery charge level for CE is displayed.
  When the battery charge level is 90% or more, "Full Charge" is displayed. When the battery charge level is less than 90%, "xx%" is displayed.
  This item is displayed for the ETERNUS DX8700 S3/DX8900 S3.

- Cache Mode
  The current status and the factor of the cache are displayed.
  This item is displayed for the ETERNUS DX8700 S3/DX8900 S3.
  - Write Back Mode
  - Write Through (Pinned Data)
  - Write Through (Battery)

- Write Through (Maintenance)
- Write Through (1CM)

- **Serial Number**
  The serial number of the CE is displayed.

- **Other Information**
  Additional information for the CE is displayed.

- **Location**
  The installation location of the thermal sensor is displayed.
  - Intake Temp
  - Exhaust Temp

- **Status**
  The status of thermal sensor is displayed.

- **Error Code**
  The error code for the thermal sensor is displayed.

- **Sensor 1**
  The temperature of CM#0 is displayed in Celsius (C) and in Fahrenheit (F).
  If the thermal information is not available due to problem such as a sensor failure, a "-" (hyphen) is displayed.

- **Sensor 2**
  The temperature of CM#1 is displayed in Celsius (C) and in Fahrenheit (F).
  If the thermal information is not available due to problem such as a sensor failure, a "-" (hyphen) is displayed.

■ Front View

The image that is displayed in this screen varies depending on the storage system model.

● For the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F
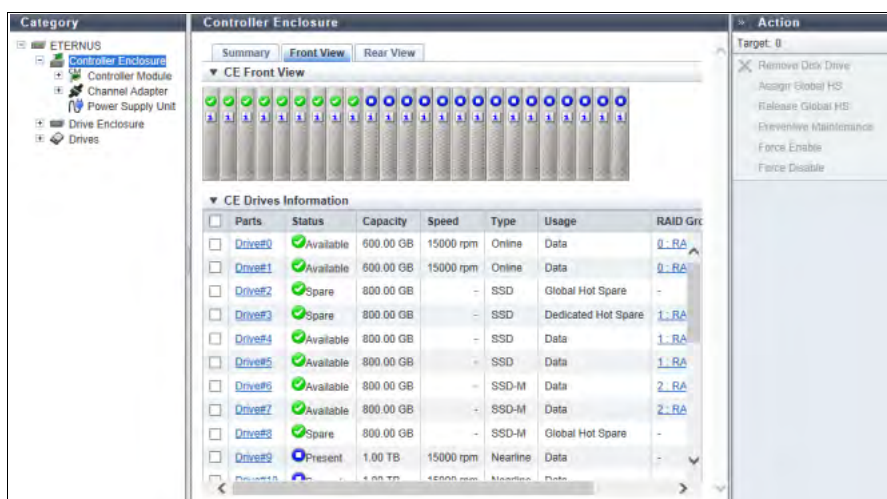
The following items are displayed in the Main area:

- Storage system image
  The front view of the CE that is installed in the ETERNUS DX/AF is displayed. The number of drives that can be installed for each CE type is as follows:
  - 2.5" CEs
    24 drives (24 drives are lined up horizontally)

- 3.5" CEs
    12 drives (3 drives are lined up vertically and 4 drives are lined up horizontally)
  - When no drives are installed
    Blank
  The drive status is displayed with an icon. Refer to "Component Status" (page 1376) for details.
  By clicking the drive image, "Drive Detail" (page 748) is displayed.
- Parts
  The drive number is displayed. Click this item to display "Drive Detail" (page 748).
- Status
  The drive status is displayed. Refer to "Drive Status" (page 1377) for details.
- Capacity
  The capacity of the drive is displayed.

> ▶ **Caution**

> The drive capacity that is displayed for the SSD-L differs from the product's actual capacity. For example, the drive capacity of a "1.92TB SSD-L" is displayed as "2.00 TB".

- Speed
  The drive speed is displayed. For SSD or SSD SED, a "-" (hyphen) is displayed.
  - 15000 rpm
  - 10000 rpm
  - 7200 rpm
- Type
  The drive type is displayed in combination with the following.
  - For SAS disks
    Online
  - For Nearline SAS disks
    Nearline
  - For SSDs, the following items are displayed depending on the SSD type
    - For SSD-Ms (12 Gbit/s) (*1)
      SSD-M
    - For SSD-Ls (12 Gbit/s) (*1)
      SSD-L
    - For SSDs (6 Gbit/s) (*1)
      SSD

  Note that "SED" is also displayed for self encrypting drives and "AF" is also displayed for Advanced Format compliant drives.

  *1: The displayed item varies depending on the interface speed (bandwidth) or the capacity of the reserved space. Unless otherwise specified, this manual refers to "SSD-M", "SSD-L", and "SSD" collectively as "SSD". In addition, there may be cases when "SSD SED" is used as a collective term for self encrypting drives (SSD-M, SSD-L, SSD).

- Usage
  The usage of the drive is displayed.
  Refer to "Usage" (page 707) in "Drives" for details.
  - Data
  - Global Hot Spare
  - Dedicated Hot Spare
- RAID Group
  When the drive belongs to a RAID group, the RAID group number and the RAID group name are displayed.
  Refer to "RAID Group" (page 707) in "Drives" for details.

- Health
  The drive lifetime information is displayed between 0% - 100%. Refer to "Health" (page 707) in "Drives" for details.

● **For the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS AF650 S2, and the ETERNUS AF650**

The following items are displayed in the Main area:

- Storage system image
  The front view of the CE that is installed in the ETERNUS DX/AF is displayed.
  The PFM status and the BBU status are indicated by icons. Refer to "Component Status" (page 1376) for details.
  By clicking the PFM number, "PCIe Flash Module Detail" (page 726) is displayed.
  By clicking the BBU number, "Battery (BTU/BCU)" (page 694) is displayed.

- Parts
  The PFM number, the BTU number, and the BCU number are displayed.
  By clicking the PFM number, "PCIe Flash Module Detail" (page 726) is displayed.
  By clicking the BTU number, "Battery (BTU/BCU)" (page 694) is displayed.
  By clicking the BCU number, "Battery (BTU/BCU)" (page 694) is displayed.

- Status
  The status of each component is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The status code of each component is displayed.

- Error Code
  The error code of each component is displayed.

● **For the ETERNUS DX8100 S3**

The following items are displayed in the Main area:

- Storage system image
  The front view of the CE that is installed in the ETERNUS DX is displayed.
  The BBU status is displayed with an icon. Refer to "Component Status" (page 1376) for details.
  By clicking the BBU number, "Battery (BTU/BCU)" (page 694) is displayed.

- Parts
  The BTU number and the BCU number are displayed
  By clicking the BTU number, "Battery (BTU/BCU)" (page 694) is displayed.
  By clicking the BCU number, "Battery (BTU/BCU)" (page 694) is displayed.

- Status
  The status of each component is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The status code of each component is displayed.

- Error Code
  The error code of each component is displayed.

● **For the ETERNUS DX8700 S3/DX8900 S3**

The following items are displayed in the Main area:

- Storage system image
  The front view of the CE that is installed in the ETERNUS DX is displayed.
  The PFM status, the BBU status, and the BUD status are displayed with an icon. Refer to "Component Status" (page 1376) for details.
  By clicking the PFM number, "PCIe Flash Module Detail" (page 726) is displayed.
  By clicking the BBU number, "Battery (BTU/BCU)" (page 694) is displayed.
  By clicking the BUD number, "Bootup and Utility Device Detail" (page 752) is displayed.

- Parts
  The PFM number, the BTU number, the BCU number, and the BUD number are displayed
  By clicking the PFM number, "PCIe Flash Module Detail" (page 726) is displayed.
  By clicking the BTU number, "Battery (BTU/BCU)" (page 694) is displayed.
  By clicking the BCU number, "Battery (BTU/BCU)" (page 694) is displayed.
  By clicking the BUD number, "Bootup and Utility Device Detail" (page 752) is displayed.

- Status
  The status of each component is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The status code of each component is displayed.

- Error Code
  The error code of each component is displayed.

■ Rear View

The image that is displayed in this screen varies depending on the storage system model.

● For the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F
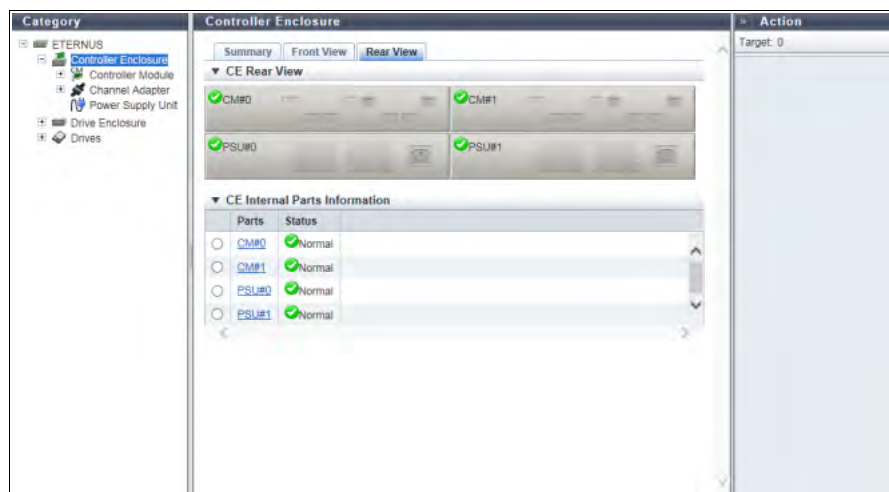
The following items are displayed in the Main area:

- Storage system image
  The rear view of the CE that is installed in the ETERNUS DX/AF is displayed.
  The CM status and the PSU status are displayed with icons.
  By clicking the CM number, "Controller Module Detail" (page 718) is displayed.
  By clicking the PSU number, "PSU/CPSU (CE) Detail" (page 728) is displayed.

- Parts
  The CM number and the PSU number is displayed.
  By clicking the CM number, "Controller Module Detail" (page 718) is displayed.
  By clicking the PSU number, "PSU/CPSU (CE) Detail" (page 728) is displayed.

- Status
  The status of each component is displayed. Refer to "Component Status" (page 1376) for details.

● **For the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS DX8700 S3/DX8900 S3, the ETERNUS AF650 S2, and the ETERNUS AF650**

The following items are displayed in the Main area:

- Storage system image
  The rear view of the CE that is installed in the ETERNUS DX/AF is displayed.
  The CM status, the CA status, and the CPSU status are displayed with icons.
  By clicking the CM number, "Controller Module Detail" (page 718) is displayed.
  By clicking the CA number, "Channel Adapter Detail" (page 722) is displayed.
  By clicking the CPSU number, "PSU/CPSU (CE) Detail" (page 728) is displayed.

- Parts
  The CM number, the CA number, and the CPSU number is displayed.
  By clicking the CM number, "Controller Module Detail" (page 718) is displayed.
  By clicking the CA number, "Channel Adapter Detail" (page 722) is displayed.
  By clicking the CPSU number, "PSU/CPSU (CE) Detail" (page 728) is displayed.

- Status
  The status of each component is displayed. Refer to "Component Status" (page 1376) for details.

● **For the ETERNUS DX8100 S3**
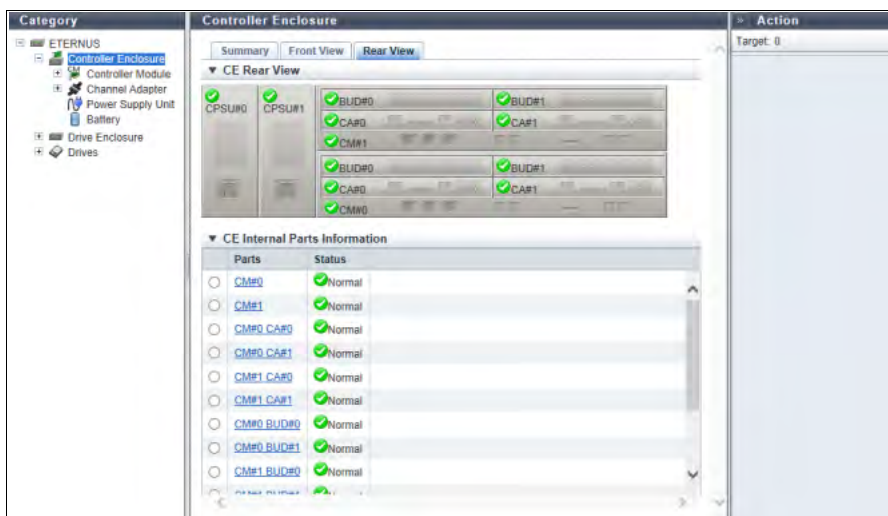
The following items are displayed in the Main area:

- Storage system image
  The rear view of the CE that is installed in the ETERNUS DX is displayed.
  The CM status, the CA status, BUD status, and the CPSU status are displayed with icons.
  By clicking the CM number, "Controller Module Detail" (page 718) is displayed.
  By clicking the CA number, "Channel Adapter Detail" (page 722) is displayed.
  By clicking the BUD number, "Bootup and Utility Device Detail" (page 752) is displayed.
  By clicking the CPSU number, "PSU/CPSU (CE) Detail" (page 728) is displayed.

- Parts
  The CM number, the CA number, the BUD number, and the CPSU number is displayed.
  By clicking the CM number, "Controller Module Detail" (page 718) is displayed.
  By clicking the CA number, "Channel Adapter Detail" (page 722) is displayed.
  By clicking the BUD number, "Bootup and Utility Device Detail" (page 752) is displayed.
  By clicking the CPSU number, "PSU/CPSU (CE) Detail" (page 728) is displayed.

- Status
  The status of each component is displayed. Refer to "Component Status" (page 1376) for details.

Controller Module Detail

The detailed CM information is displayed.

■ Summary

● For the ETERNUS DX8700 S3/DX8900 S3

● For the other models

The following items are displayed in the Main area:

- Location
  The CM number is displayed.

- Status
  The CM status is displayed. Refer to "Component Status" (page 1376) for details.

> **N o t e**
>
> In the Unified Storage environment, " Maintenance" is displayed until a NAS system volume is created. The
> CM status changes to " Normal" after a NAS user volume is created and the NAS system volume is gener-
> ated.

- Memory Size
  The cache memory capacity of the CM is displayed.

- Part Number
  The port number of the CM is displayed.

- Serial Number
  The serial number of the CM is displayed.

- Hardware Revision
  The hardware version of the CM is displayed.

- MAC Address (MNT)
  The MAC address of the MNT Port is displayed.

- MAC Address (RMT)
  The MAC address of the RMT Port is displayed.

- MAC Address (FST)
  The MAC address of the FST Port is displayed.
  This item is displayed for the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3,
  the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, the ETERNUS AF650 S2, and the ETERNUS AF650.

- Active EC
  The EC number of the currently running firmware is displayed.

- Next EC
  The EC number of the firmware that is to be run at the next power-on is displayed.

- CPU#n Clock
  The clock frequency of CPU#0 or CPU#1 is displayed.

- CPU#n Status
  The status of CPU#0 or CPU#1 is displayed. Refer to "Component Status" (page 1376) for details.

- CPU#n Status Code
  The status code of CPU#0 or CPU#1 is displayed.

- CPU#n Error Code
  The error code of CPU#0 or CPU#1 is displayed.

■ Internal Parts

● For the ETERNUS DX8700 S3/DX8900 S3

● **For the other models**

The following items are displayed in the Main area:

- Parts
  The component name and the component number are displayed.
  A link is displayed when the "Parts" is "SAS Cable". Click this link to display "SAS Cable Detail" (page 754).
  The following items are displayed for the ETERNUS DX8700 S3/DX8900 S3.
    - A link is displayed when the "Parts" is "Frontend Cable". Click this link to display "Frontend Cable Detail" (page 755).
    - A link is displayed when the "Parts" is "Management Cable". Click this link to display "Management Cable Detail" (page 756).
    - A link is displayed when the "Parts" is "BUD". Click this link to display "Bootup and Utility Device Detail" (page 752).

- Status
  The component status is displayed. Refer to "Component Status" (page 1376) for details.

- Error Code
  The component error code is displayed.

- Notes
  Remarks are displayed.
    - When "Parts" is "Memory", the memory capacity is displayed.
    - When "Parts" is "SCU", the voltage information is displayed (for the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250, and the ETERNUS DX200F).
    - When "Parts" is "BBU", the battery charge level is displayed (for the ETERNUS DX60 S4/DX100 S4/DX200 S4 and the ETERNUS AF250 S2). When the battery charge level is 90% or more, "Full Charge" is displayed. When the battery charge level is less than 90%, "xx%" is displayed.
    - When "Parts" is "SATA SSD Controller", the firmware version of the currently running EC is displayed (for the ETERNUS DX100 S4/DX200 S4, the ETERNUS DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F).

■ View

● For the ETERNUS DX8700 S3/DX8900 S3
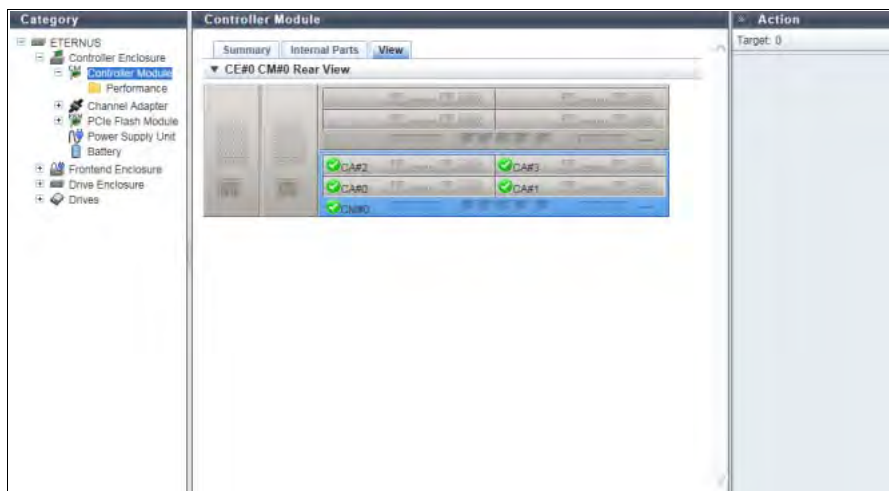
● For the other models

The following items are displayed in the Main area:

• Storage system image
The rear view of the CE that is installed in the ETERNUS DX/AF is displayed.
Components that are not the target CM are grayed out.
The CM status is displayed with an icon. Refer to "Component Status" (page 1376) for display items.

Channel Adapter Detail

The detailed information for the Channel Adapter is displayed.

■ Summary

● For the ETERNUS DX8700 S3/DX8900 S3

● For the other models

The following items are displayed in the Main area:

- Location
  The CA installation location is displayed.

- CA Type
  The CA type is displayed.
  The display items in this field vary depending on the storage system model.
  - 32G-FC 2port, 16G-FC 4port, 16G-FC 2port, 8G-FC 4port, 8G-FC 2port
  - 10G-iSCSI 2port, 10G Base-T iSCSI 2port, 1G-iSCSI 2port
  - 12G-SAS 2port, 6G-SAS 2port

- 10G-FCoE 2port
- 10G-NAS 2port, 1G-NAS 4port

> **● N o t e**
>
> Note that a 1-port type CA for the ETERNUS DX60 S4/DX100 S4 and the ETERNUS DX60 S3/DX100 S3 is displayed as "2port" (for 8G-FC, "8G-FC 2port" is displayed). Similarly, a 2-port type CA (1G-NAS) is displayed as "1G-NAS 4port". Available ports can be checked in the [Internal Parts] tab. Note that 1-port type CAs and 2-port type CAs are not available in some regions.

- Status
  The CA status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The CA status code is displayed.

- Part Number
  The part number of the CA is displayed.

- Serial Number
  The serial number of the CA is displayed.

- Hardware Revision
  The hardware version of the CA is displayed.

- Chip#n Status
  The status of Chip#0 or Chip#1 is displayed. Refer to "Component Status" (page 1376) for details.

- Chip#n Status Code
  The status code of Chip#0 or Chip#1 is displayed.

- Chip#n Error Code
  The error code of Chip#0 or Chip#1 is displayed.

- Chip#n Active EC
  A "-" (hyphen) is displayed.

- Chip#n Next EC
  A "-" (hyphen) is displayed.

● **CM#x CA#y Port Information**

The detailed information of all the ports is displayed. Refer to "FC port" (page 757), "iSCSI port" (page 762), "SAS Port" (page 766), "FCoE port" (page 767), or "NAS port" (page 769) for display contents.

■ **Internal Parts**

● **For the ETERNUS DX8700 S3/DX8900 S3**
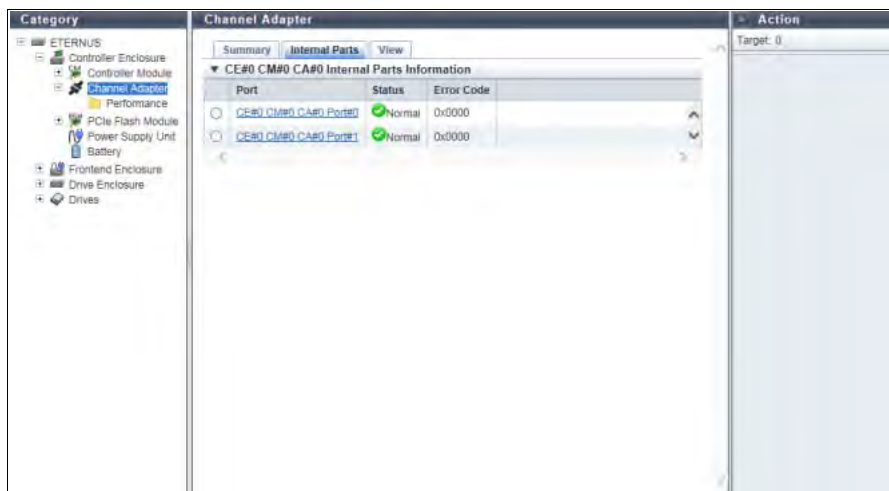
● **For the other models**

The following items are displayed in the Main area:

- Port
  The CA port number is displayed. Click this item to display "Port Detail" (page 757).

- Status
  The CA port status is displayed. Refer to "Component Status" (page 1376) for details.

- Error Code
  The CA port error code is displayed.
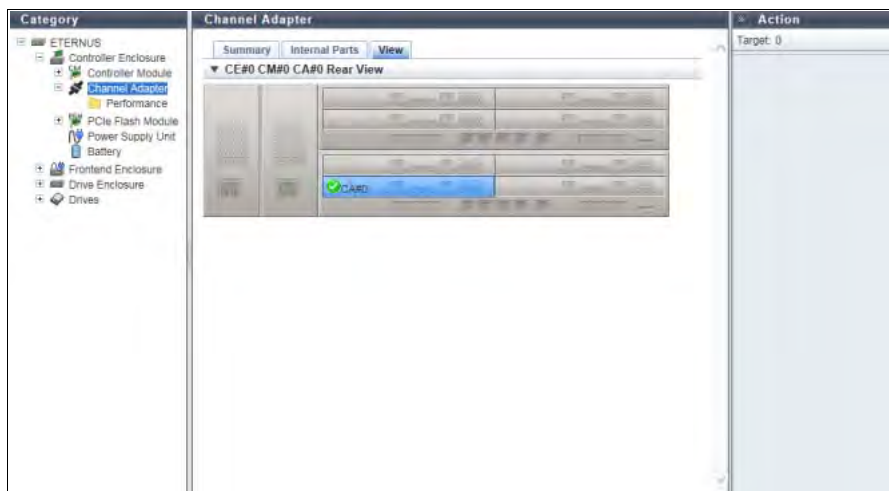
■ View

● For the ETERNUS DX8700 S3/DX8900 S3

● For the other models

The following items are displayed in the Main area:

- Storage system image
  The rear view of the CE that is installed in the ETERNUS DX/AF is displayed.
  Components that are not the target CA are grayed out.
  The CA status is displayed with an icon. Refer to "Component Status" (page 1376) for details.

PCIe Flash Module Detail

The detailed information for the PFM is displayed.

■ Summary

● For the ETERNUS DX8700 S3/DX8900 S3

● For the other models

The following items are displayed in the Main area:

- Location
  The installation location of the PFM is displayed.

- Type
  The PFM type is displayed.

- Capacity
  The PFM capacity is displayed.

- Status
  The PFM status is displayed. Refer to "Component Status" (page 1376) for details.

- Health
  The lifetime information of the PFM is displayed.

- Status Code
  The PFM status code is displayed.

- Error Code
  The PFM error code is displayed.

- Part Number
  The part number of the PFM is displayed.

- Serial No.
  The serial number of the PFM is displayed.

- Hardware Revision
  The hardware version of the PFM is displayed.

■ View

● For the ETERNUS DX8700 S3/DX8900 S3

● For the other models

The following items are displayed in the Main area:

- Storage system image
  The front view of the CEs (CMs) that are installed in the ETERNUS DX is displayed.
  Components that are not the target PFM are grayed out.
  The PFM status is displayed with an icon. Refer to "Component Status" (page 1376) for details.

PSU/CPSU (CE) Detail

The detailed information for the PSU or the CPSU is displayed.
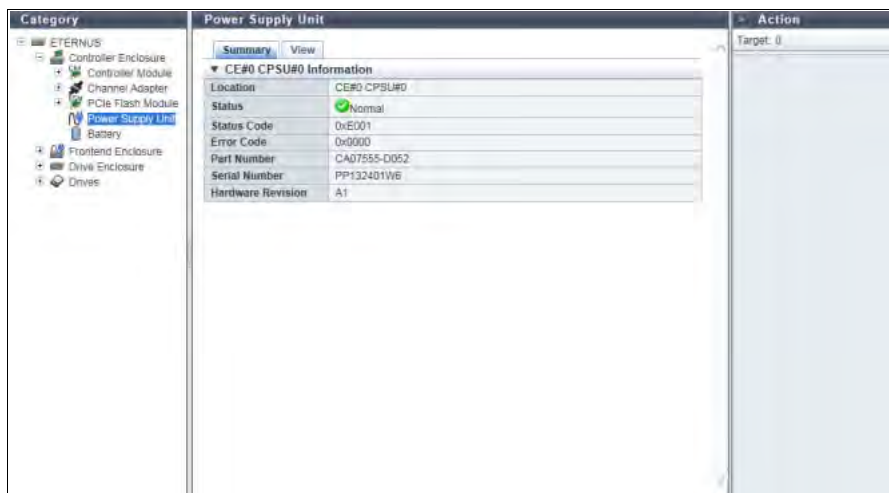
■ Summary

● For the ETERNUS DX8700 S3/DX8900 S3

● For the other models

The following items are displayed in the Main area:

- Location
  The installation location of the PSU or the CPSU is displayed.
  For the ETERNUS DX8700 S3/DX8900 S3, the CE number is displayed.

- Status
  The PSU status or the CPSU status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The status code of PSU or CPSU is displayed.

- Error Code
  The error code of PSU or CPSU is displayed.

- Part Number
  The part number of PSU or CPSU is displayed.

- Serial Number
  The serial number of PSU or CPSU is displayed.

- Hardware Revision
  The hardware version of PSU or CPSU is displayed.

■ View
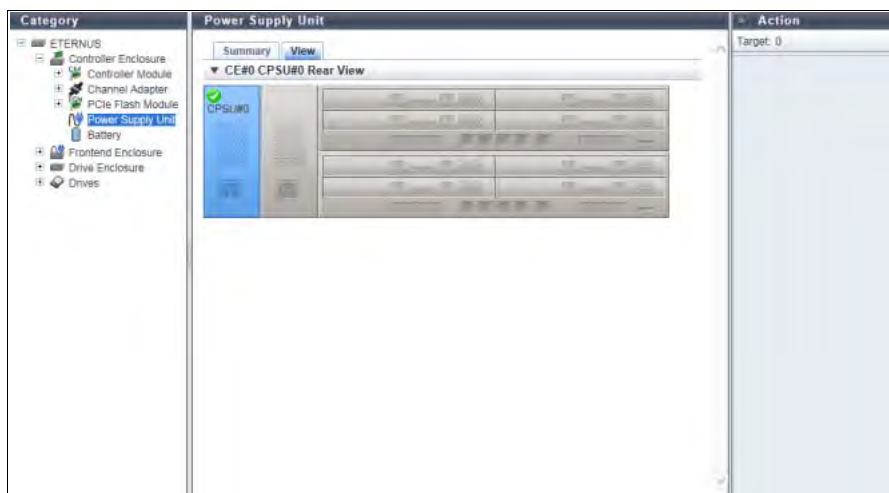
● For the ETERNUS DX8700 S3/DX8900 S3

● For the other models

The following items are displayed in the Main area:

- Storage system image
  The rear view of the CE that is installed in the ETERNUS DX/AF is displayed.
  Components that are not the target PSU or CPSU are grayed out.
  The PSU status or the CPSU status is displayed with an icon. Refer to "Component Status" (page 1376) for details.

Frontend Router Detail

The detailed information for the FRT is displayed.

■ Summary

The following items are displayed in the Main area:

- Location
  The FRT number is displayed.

- Status
  The FRT status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The FRT status code is displayed.

- Error Code
  The FRT error code is displayed.

- Part Number
  The part number of the FRT is displayed.

- Serial No.
  The serial number of the FRT is displayed.

- Hardware Revision
  The hardware version of the FRT is displayed.

■ **Internal Parts**
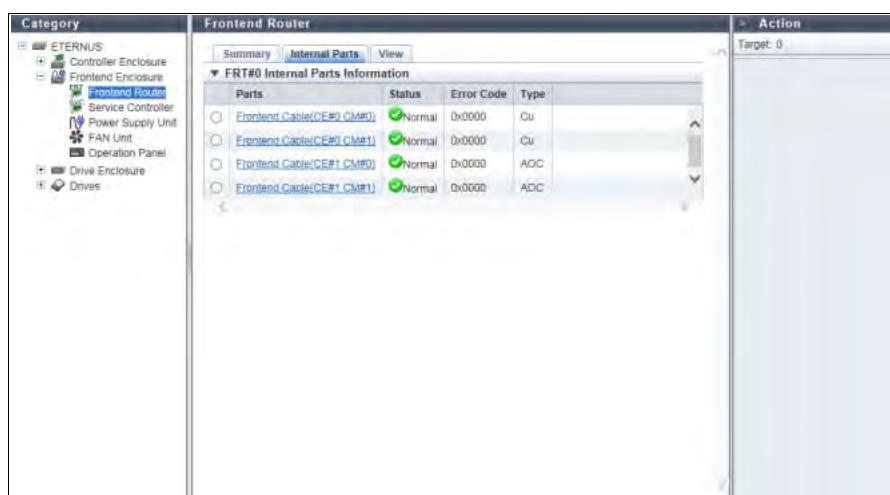
The following items are displayed in the Main area:

- Parts
  Information for the Frontend cable that connects between the CM and FRT is displayed. Click this item to display
  "Frontend Cable Detail" (page 755).

- Status
  The Frontend cable status is displayed. Refer to "Component Status" (page 1376) for details.

- Error Code
  The Frontend cable error code is displayed.

- Type
  The Frontend cable type is displayed.
    - "Cu" is displayed when the connection cable between CM and FRT is a Frontend electric cable.
    - "AOC (Active Optical Cable)" is displayed when the connection cable between CM and FRT is a Frontend opti-
      cal cable.

■ **View**
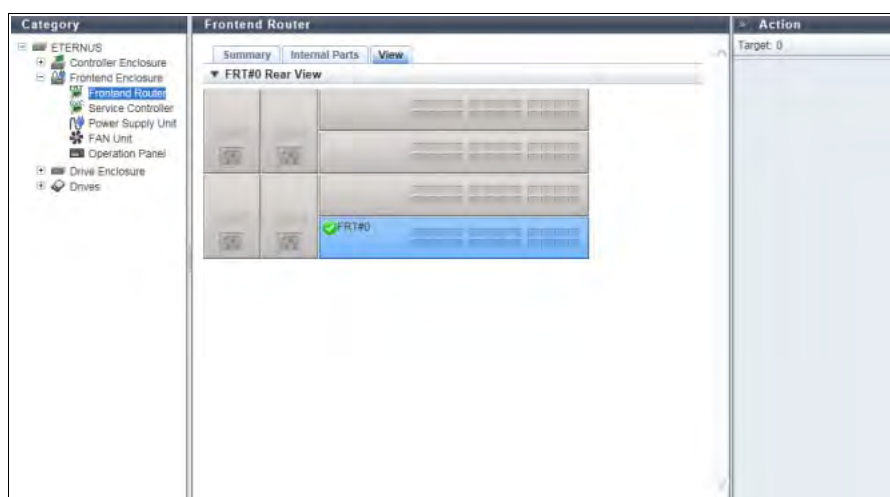
The following items are displayed in the Main area:

- Storage system image
  The rear view of the FE that is installed in the ETERNUS DX/AF is displayed.
  Components that are not the target FRT are grayed out.
  The FRT status is displayed with an icon. Refer to "Component Status" (page 1376) for details.

Service Controller Detail

The detailed information for the SVC is displayed.

■ Summary

The following items are displayed in the Main area:

- Location
  The SVC number is displayed.

- Status
  The SVC status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The SVC status code is displayed.

- Error Code
  The SVC error code is displayed.

- Part Number
  The part number of the SVC is displayed.

- Serial No.
  The serial number of the SVC is displayed.

- Hardware Revision
  The hardware version of the SVC is displayed.

- Active EC
  The EC number of the current controller firmware is displayed.

- Next EC
  The EC number of the controller firmware that is to be run at the next power-on is displayed.

- Firmware Version
  The current controller firmware version is displayed.

■ Internal Parts

The following items are displayed in the Main area:

- Parts
  Information for the Management cable that connects between the CM and SVC is displayed. Click this item to display "Management Cable Detail" (page 756).

- Status
  The Management cable status is displayed. Refer to "Component Status" (page 1376) for details.

- Error Code
  The Management cable error code is displayed.
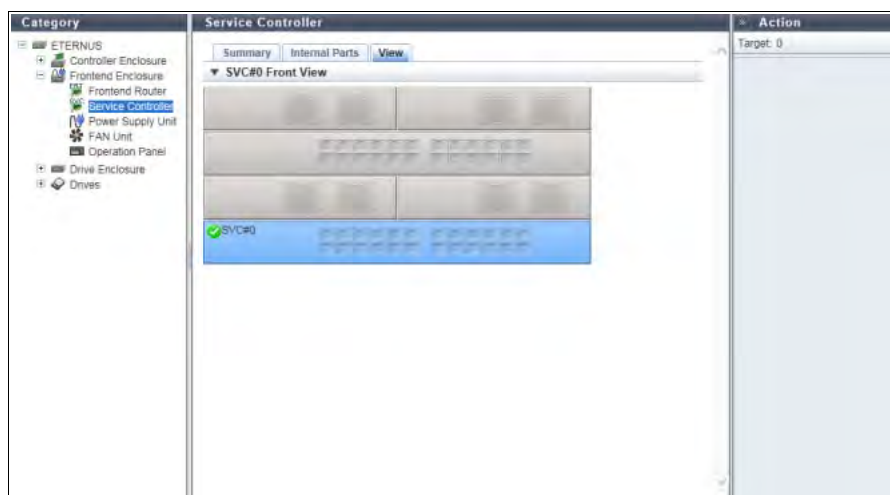
■ View

The following items are displayed in the Main area:

- Storage system image
  The front view of the FE that is installed in the ETERNUS DX is displayed.
  Components that are not the target SVC are grayed out.
  The SVC status is displayed with an icon. Refer to "Component Status" (page 1376) for details.

FE Power Supply Unit Detail

The detailed information for the FPSU is displayed.

■ Summary

The following items are displayed in the Main area:

- Location
  The installation location of the FPSU is displayed.

- Status
  The FPSU status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The FPSU status code is displayed.

- Error Code
  The FPSU error code is displayed.

- Part Number
  The part number of the FPSU is displayed.

- Serial No.
  The serial number of the FPSU is displayed.

- Hardware Revision
  The hardware version of the FPSU is displayed.

■ View
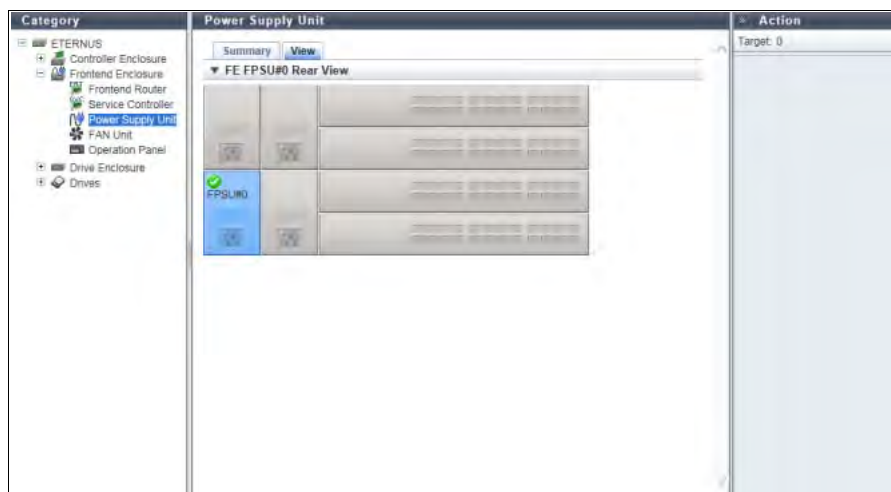
The following items are displayed in the Main area:

- Storage system image
  The rear view of the FE that is installed in the ETERNUS DX is displayed.
  Components that are not the target FPSU are grayed out.
  The FPSU status is displayed with an icon. Refer to <u>"Component Status" (page 1376)</u> for details.

FAN Unit Detail

The detailed information for the FANU is displayed.

■ Summary

The following items are displayed in the Main area:

- Location
  The FANU number is displayed.

- Status
  The FANU status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The FANU status code is displayed.

- Error Code
  The FANU error code is displayed.

- Part Number
  The part number of the FANU is displayed.

- Serial No.
  The serial number of the FANU is displayed.

- Hardware Revision
  The hardware version of the FANU is displayed.

■ View
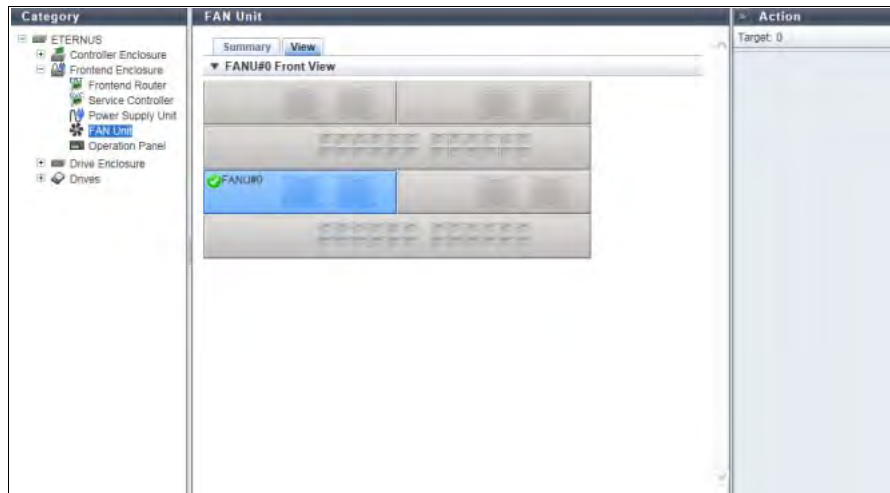
The following items are displayed in the Main area:

- Storage system image
  The front view of the FE that is installed in the ETERNUS DX is displayed.
  Components that are not the target FANU are grayed out.
  The FANU status is displayed with an icon. Refer to "Component Status" (page 1376) for details.

Drive Enclosure Detail

The detailed information of the DE is displayed.

■ Summary
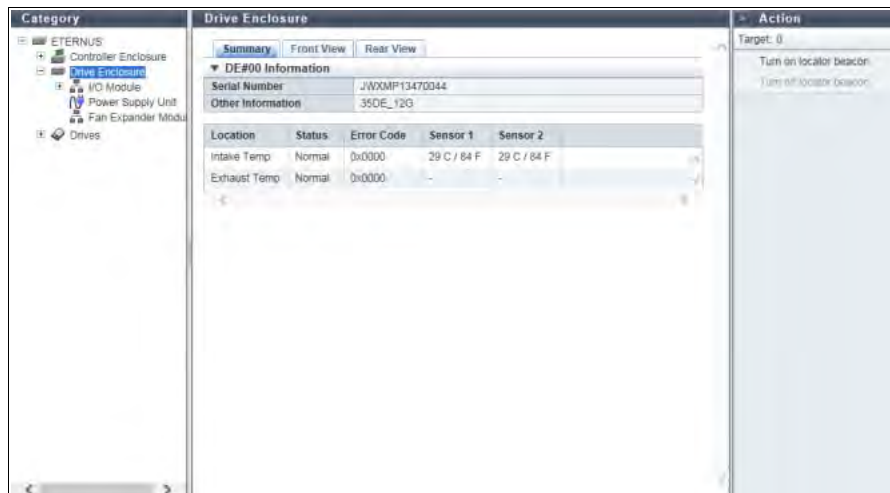
The following items are displayed in the Main area:

- Serial Number
  The serial number of the DE is displayed.

- Other Information
  Additional information for the DE is displayed.

- Location
  The installation location of the thermal sensor is displayed.
    - Intake Temp
    - Exhaust Temp

- Status
  The thermal sensor status is displayed.

- Error Code
  The error code for the thermal sensor is displayed.

- Sensor 1
  For the "Intake Temp" field, temperature of the IOM#0 is displayed in Celsius (C) and in Fahrenheit (F). If the thermal information is not available due to problem such as a sensor failure, a "-" (hyphen) is displayed.
  For the "Exhaust Temp" field, a "-" (hyphen) is usually displayed.

- Sensor 2
  For the "Intake Temp" field, temperature of the IOM#1 is displayed in Celsius (C) and in Fahrenheit (F). If the thermal information is not available due to problem such as a sensor failure, a "-" (hyphen) is displayed.
  For the "Exhaust Temp" field, a "-" (hyphen) is usually displayed.
  This item is not displayed when the ETERNUS DX is a 1CM model.

■ Front View

● For 2.5" DEs

● For 3.5" DEs

● For 3.5" high density DEs

The following items are displayed in the Main area:

- Storage system image
  The front view of the DEs that are installed in the ETERNUS DX/AF is displayed. The number of drives that can be installed for each DE type is as follows:
  - 2.5" DEs
    24 drives (24drives are lined up horizontally)
  - 3.5" DEs
    12 drives (3 drives are lined up vertically and 4 drives are lined up horizontally)
  - 3.5" high density DEs
    60 drives (5 drives are lined up vertically and 12 drives are lined up horizontally)
  - When no drives are installed
    Blank
  The drive status is displayed with an icon. Refer to "Component Status" (page 1376) for details.
  Click this item to display "Drive Detail" (page 748).

- Parts
  The drive number is displayed.
  By clicking this item, "Drive Detail" (page 748) is displayed.

- Status
  The drive status is displayed. Refer to "Component Status" (page 1376) for details.

- Capacity
  The capacity of the drive is displayed.

> ▷ **Caution**
>
> The drive capacity that is displayed for the SSD-L differs from the product's actual capacity. For example, the drive capacity of a "1.92TB SSD-L" is displayed as "2.00 TB".

- Speed
  The drive speed is displayed. For SSD or SSD SED, a "-" (hyphen) is displayed.
  - 15000 rpm
  - 10000 rpm
  - 7200 rpm

- Type
  The drive type is displayed in combination with the following.
  - For SAS disks
    Online
  - For Nearline SAS disks
    Nearline
  - For SSDs, the following items are displayed depending on the SSD type
    - For SSD-Ms (12 Gbit/s) (*1)
      SSD-M
    - For SSD-Ls (12 Gbit/s) (*1)
      SSD-L
    - For SSDs (6 Gbit/s) (*1)
      SSD

  Note that "SED" is also displayed for self encrypting drives and "AF" is also displayed for Advanced Format compliant drives.
  *1: The displayed item varies depending on the interface speed (bandwidth) or the capacity of the reserved space. Unless otherwise specified, this manual refers to "SSD-M", "SSD-L", and "SSD" collectively as "SSD". In addition, there may be cases when "SSD SED" is used as a collective term for self encrypting drives (SSD-M, SSD-L, SSD).

- Usage
The usage of the drive is displayed. Refer to "Usage" (page 707) in "Drives" for details.
  - Data
  - Global Hot Spare
  - Dedicated Hot Spare

- RAID Group
When the drive belongs to a RAID group, the RAID group number and the RAID group name are displayed. Refer to "RAID Group" (page 707) in "Drives" for details.

- Health
The drive lifetime information is displayed between 0% - 100%. Refer to "Health" (page 707) in "Drives" for details.

■ Rear View

The following items are displayed in the Main area:

- Storage system image
The rear view of the DE that is installed in the ETERNUS DX/AF is displayed.
The status of the IOM, the PSU, and the FEM are displayed with icons. Refer to "Component Status" (page 1376) for details.
By clicking the IOM number, "I/O Module Detail" (page 742) is displayed.
By clicking the PSU number, "Power Supply Unit (DE) Detail" (page 744) is displayed.
By clicking the FEM number, "Fan Expander Module Detail" (page 746) is displayed.

- Parts
The IOM number, the PSU number, or the FEM number is displayed.
By clicking the IOM number, "I/O Module Detail" (page 742) is displayed.
By clicking the PSU number, "Power Supply Unit (DE) Detail" (page 744) is displayed.
By clicking the FEM number, "Fan Expander Module Detail" (page 746) is displayed.

- Status
The status of IOM, PSU, or FEM is displayed. Refer to "Component Status" (page 1376) for details.

I/O Module Detail

The detailed information of IOM is displayed.

■ Summary

The following items are displayed in the Main area:

- Status
  The IOM status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The IOM status code is displayed.

- Error Code
  The IOM error code is displayed.

- WWN
  The IOM WWN is displayed.

- Part Number
  The part number of the IOM is displayed.

- Serial Number
  The serial number of the IOM is displayed.

- Firmware Version
  The current controller firmware version is displayed.

- Hardware Revision
  The hardware version of the IOM is displayed.

■ **Internal Parts**

The following items are displayed in the Main area:

- Parts
The internal parts of the IOM are displayed. A link is displayed when the part is "SAS Cable". Click this item to display "SAS Cable Detail" (page 754). When the part is a high density DE, "IOM FEM Port#y" (y: 0, 1) is displayed.

- Status
The internal parts status of the IOM is displayed. Refer to "Component Status" (page 1376) for details.

- Error Code
The error code for the internal parts of the IOM is displayed.

■ **View**
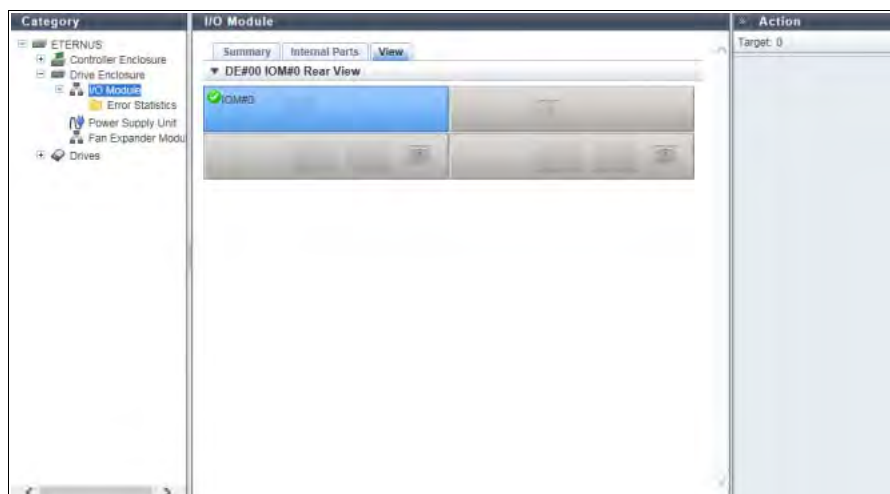
The following items are displayed in the Main area:

- Storage system image
The rear view of the DE that is installed in the ETERNUS DX/AF is displayed.
Components that are not the target IOM are grayed out.
The IOM status is displayed with an icon. Refer to "Component Status" (page 1376) for details.

Power Supply Unit (DE) Detail

The detailed information of PSU is displayed.

■ Summary

The following items are displayed in the Main area:

- Location
  The installation location of PSU is displayed.

- Status
  The PSU status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The PSU status code is displayed.

- Error Code
  The PSU error code is displayed.

- Part Number
  The part number of the PSU is displayed.

- Serial Number
  The serial number of the PSU is displayed.

- Hardware Revision
  The hardware version of the PSU is displayed.

■ **View**
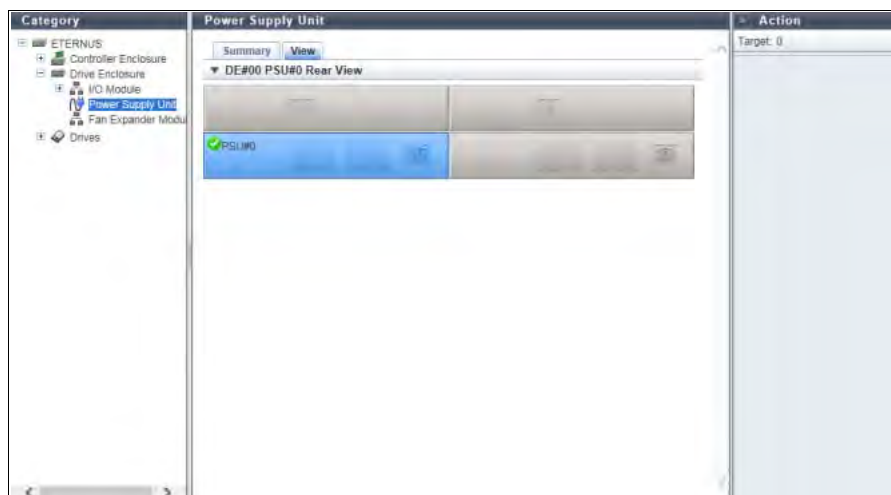
The following items are displayed in the Main area:

- Storage system image
  The rear view of the DE that is installed in the ETERNUS DX/AF is displayed.
  Components that are not the target PSU are grayed out.
  The PSU status is displayed with an icon. Refer to "Component Status" (page 1376) for details.

Fan Expander Module Detail

The detailed information of FEM is displayed.

## ■ Summary

The following items are displayed in the Main area:

- Location
  The location information of the FEM is displayed.

- Status
  The FEM status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The FEM status code is displayed

- Part Number
  The part number of the FEM is displayed.

- Serial No.
  The serial number of the FEM is displayed.

- Hardware Revision
  The hardware version of the FEM is displayed.

- EXP#n Status
  The status of FEM Expander#n (n=0,1) is displayed. Refer to "Component Status" (page 1376) for details.

- EXP#n Status Code
  The status code of FEM Expander#n (n=0,1) is displayed.

- EXP#n Error Code
  The error code of FEM Expander#n (n=0,1) is displayed.

- EXP#n WWN
  The WWN of FEM Expander#n (n=0,1) is displayed.

- EXP#n Active EC
  The EC number of Expander#n (n=0,1) that is currently running is displayed.

- EXP#n Next EC
  The EC number of FEM Expander#n (n=0,1) that is to be run after the next power-on is displayed.

- EXP#n Firmware Version
  The revision number of the firmware that is currently running in FEM Expander#n (n=0,1) is displayed.

■ Internal Parts

The following items are displayed in the Main area:

- Parts
  The component information is displayed.

- Status
  The component status is displayed. Refer to "Component Status" (page 1376) for details.

- Error Code
  The component error code is displayed.
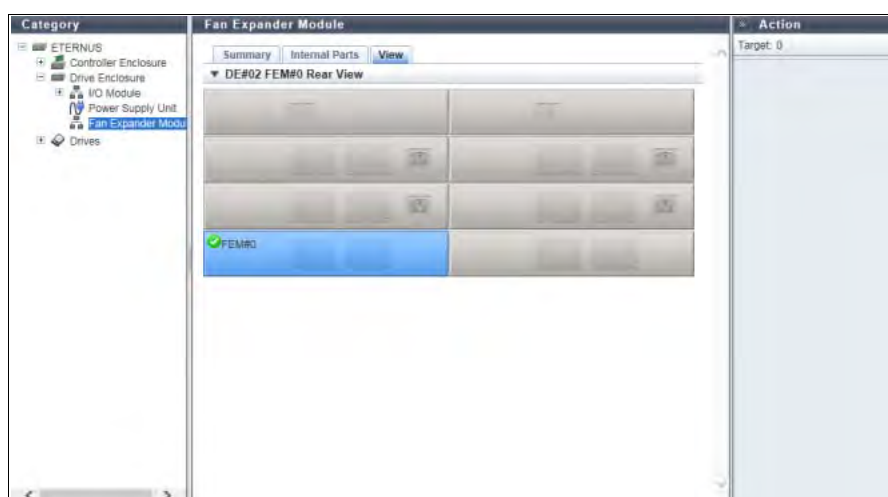
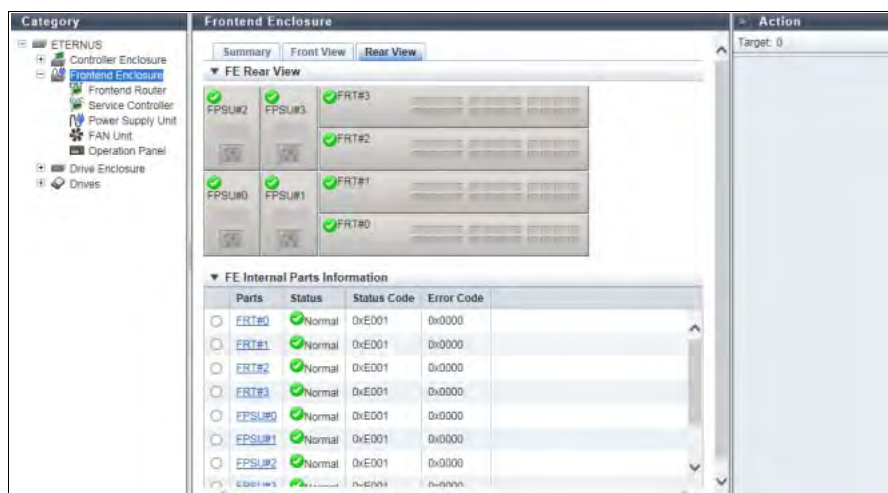## ■ View

The following items are displayed in the Main area:

- Storage system image
  The rear view of the DE that is installed in the ETERNUS DX is displayed.
  Components that are not the target FEM are grayed out.
  The FEM status is displayed with an icon. Refer to "Component Status" (page 1376) for details.

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Drive Detail

The detailed information of the drive is displayed.

■ Summary

The following items are displayed in the Main area:

- Location
  The detailed information of the drive is displayed.

- Status
  The drive status is displayed. Refer to "Drive Status" (page 1377) for details.

- Status Code
  The drive status code is displayed.

- Error Code
  The drive error code is displayed.

- Capacity
  The capacity of the drive is displayed.

  > **Caution**

  The drive capacity that is displayed for the SSD-L differs from the product's actual capacity. For example, the drive capacity of a "1.92TB SSD-L" is displayed as "2.00 TB".

- Type
  The drive type is displayed. Refer to "Type" (page 706) in "Drives" for details.

- Speed
  The drive speed is displayed. For SSD or SSD SED, a "-" (hyphen) is displayed.
  - 15000 rpm
  - 10000 rpm
  - 7200 rpm

- Health
  The drive lifetime information is displayed between 0% - 100%. As the lifetime of the drive is reduced, the health level of the drive is decreased. This item is displayed when the drive type is "SSD" and "SSD SED".
  A "-" (hyphen) is displayed in the following conditions:
  - Data sanitization is in progress
  - The lifetime information cannot be obtained

- **Usage**
  The usage of the drive is displayed. Refer to "Usage" (page 707) in "Drives" for details.
  - Data
  - Global Hot Spare
  - Dedicated Hot Spare

- **RAID Group**
  When the drive belongs to a RAID group, the RAID group number and the RAID group name are displayed. Refer to "RAID Group" (page 707) in "Drives" for details.

- **Motor Status**
  The drive motor status is displayed.
  - Active
    The drive motors are activated.
  - In the Boot Process
    The drive motors are starting up.
  - Idle
    The drive motors are stopped.
  - In the Stop Process
    The drive motors are being stopped.
  - Power off
    The drive power is being turned off.

- **Rebuild/Copyback Progress**
  When rebuild or copyback is being performed, the progress rate is displayed.
  When rebuild or copyback is being performed, the progress rate is displayed.

- **Patrol**
  - Total completed passes
    The current total number of completed disk drive patrol cycles is displayed. "Completed passes" indicates the number of times the disk patrol for all of the target drives is complete.

    > **Caution**

    If the device configuration has been changed using the [Apply Configuration] function, the patrol progress information (total completed passes, progress with current pass, and completed passes since last power on) returns to the default settings.

  - Progress with current pass
    The progress rate of the currently running disk drive patrol process is displayed.
    If the patrol is not operating for reasons such as a drive failure or a drive being formatted, a "-" (hyphen) is displayed.

  - Completed passes since last Power On
    The current total number of completed disk drive patrol cycles since the last power on is displayed.

    > **Caution**

    "Completed passes since last Power On" may be cleared when the Controller Firmware is applied, or due to a CM failure.

- **Vendor ID**
  The drive manufacturer name is displayed.

- **Product ID**
  The drive manufacturer name is displayed.

- **Serial Number**
  The serial number of the drive is displayed.

- WWN
  The drive WWN is displayed.

- Firmware Version
  The drive firmware version is displayed.

■ View

● For 2.5" DEs
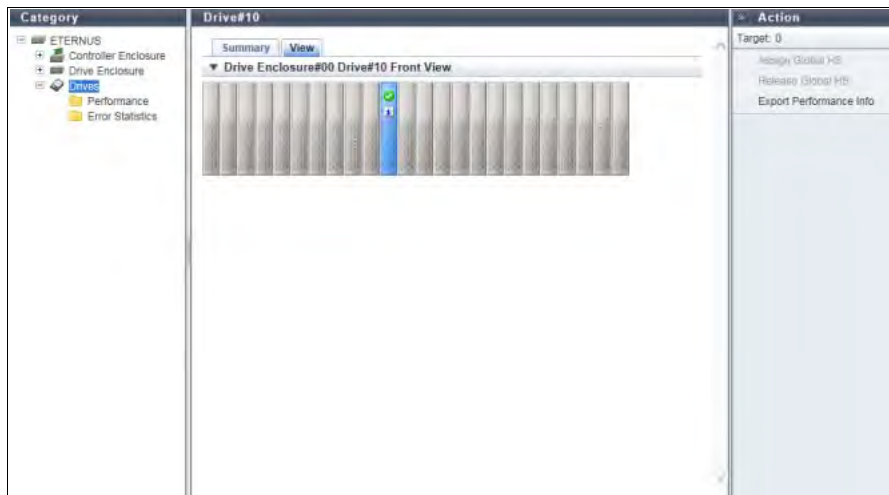
● For 3.5" DEs
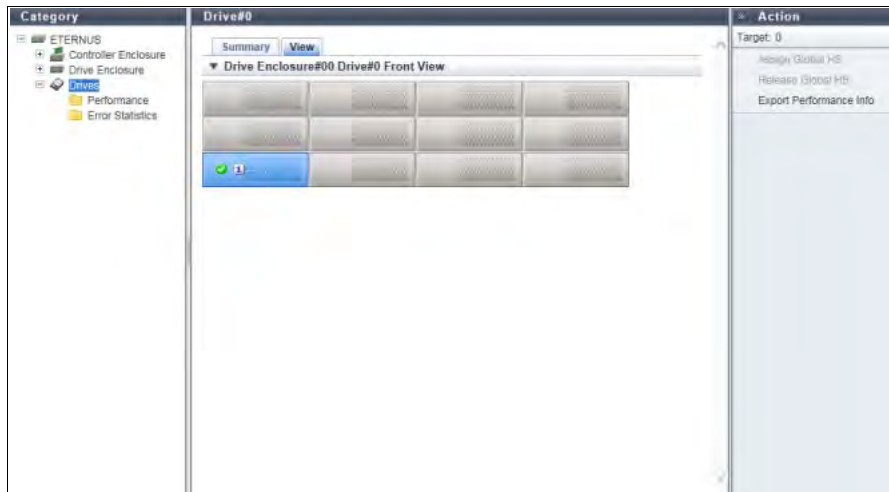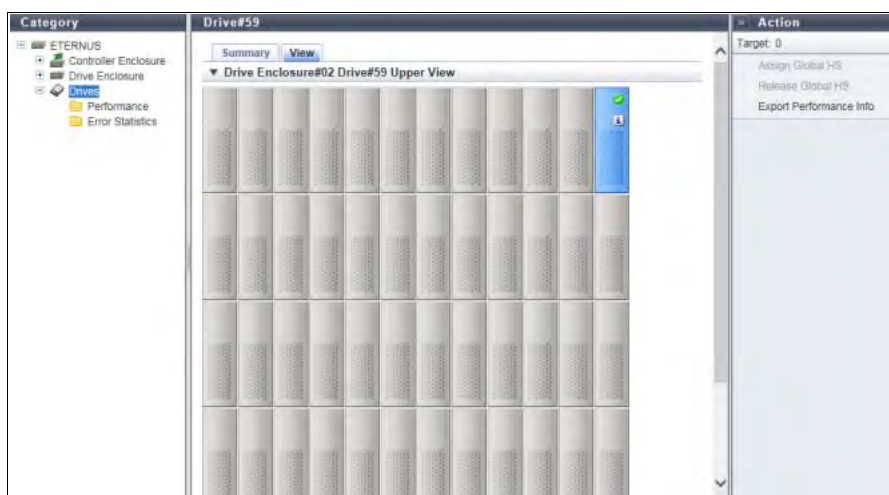
● **For 3.5" high density DEs**

The following items are displayed in the Main area:

- Storage system image
  The front view of the DEs that are installed in the ETERNUS DX/AF is displayed. The number of drives that can be installed for each DE type is as follows:
  - 2.5" DEs
    24 drives (24drives are lined up horizontally)
  - 3.5" DEs
    12 drives (3 drives are lined up vertically and 4 drives are lined up horizontally)
  - 3.5" high density DEs
     60 drives (5 drives are lined up vertically and 12 drives are lined up horizontally)
  - When no drives are installed
    Blank
  Drives that are not selected in the [Drives] screen are grayed out.
  The drive status is displayed with an icon. Refer to "Component Status" (page 1376) for details.

Bootup and Utility Device Detail

The detailed information for the BUD is displayed.
This function is displayed for the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3.
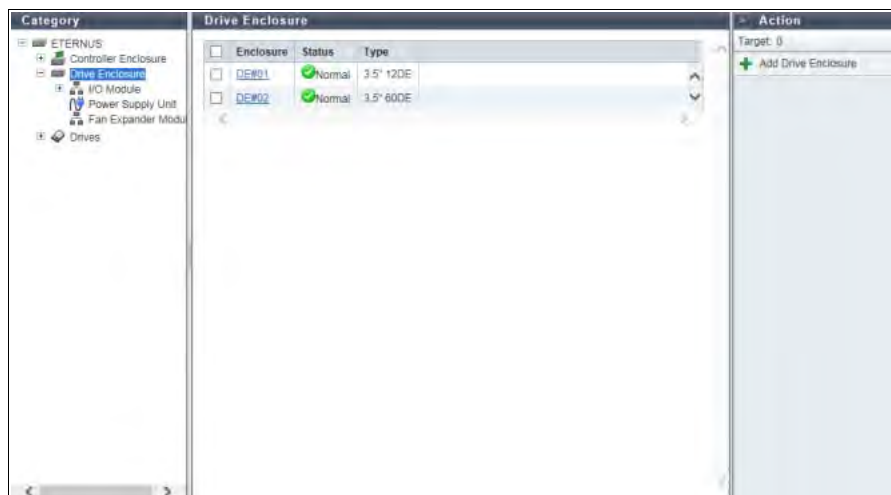
■ Summary
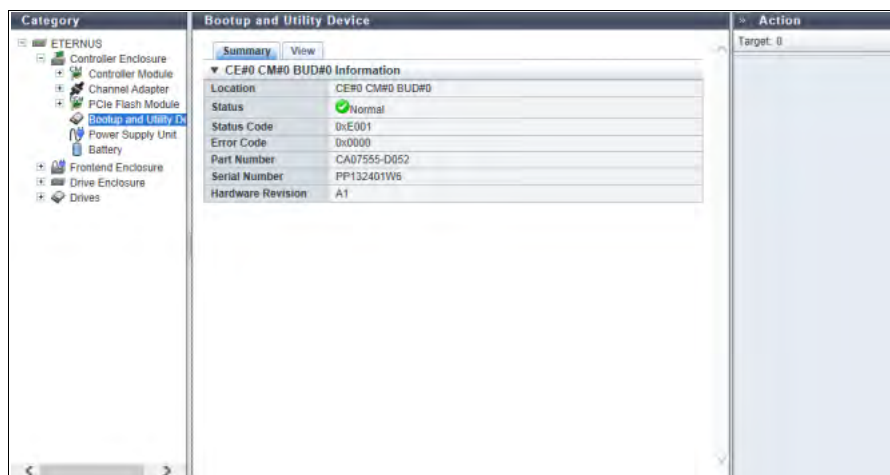
The following items are displayed in the Main area:

- Location
  The BUD number is displayed.

- Status
  The BUD status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The BUD status code is displayed.

- Error Code
  The BUD error code is displayed.

- Part Number
  The part number of the BUD is displayed.

- Serial No.
  The serial number of the BUD is displayed.

- Hardware Revision
  The hardware version of the BUD is displayed.

■ View

The following items are displayed in the Main area:

- Storage system image
  The front view of the CE that is installed in the ETERNUS DX is displayed.
  Components that are not the target BUD are grayed out.
  The BUD status is displayed with an icon. Refer to "Component Status" (page 1376) for details.

SAS Cable Detail

The detailed information of the SAS cable is displayed.

The following items are displayed in the Main area:

- Status
  The SAS cable status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The SAS cable status code is displayed.

- Error Code
  The SAS cable error code is displayed.

Frontend Cable Detail

The detailed information of the Frontend cable is displayed.
This function is displayed for the ETERNUS DX8700 S3/DX8900 S3.

■ Summary

The following items are displayed in the Main area:

- Status
  The Frontend cable status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The Frontend cable status code is displayed.

- Error Code
  The Frontend cable error code is displayed.

- Type
  The Frontend cable type is displayed.
    - "Cu" is displayed when the connection cable between the CM-FRT is a Frontend electric cable.
    - "AOC" is displayed when the connection cable between the CM-FRT is a Frontend optical cable.

- Part Number
  The part number of the Frontend cable is displayed.

- Serial Number
  The serial number of the Frontend cable is displayed.

- Hardware Revision
  The hardware version of the Frontend cable is displayed.
  If the hardware version cannot be obtained, the field is blank.

Management Cable Detail

The detailed information of the Management cable is displayed.
This function is displayed for the ETERNUS DX8700 S3/DX8900 S3.

■ Summary

The following items are displayed in the Main area:

- Status
  The Management cable status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The Management cable status code is displayed.

- Error Code
  The Management cable error code is displayed.

Port Detail

The detailed information of the port is displayed.

Display items vary depending on the port type ("FC port" (page 757), "iSCSI port" (page 762), "SAS Port" (page 766), "FCoE port" (page 767), or "NAS port" (page 769)).

■ Summary

● FC port

The detailed FC port information is displayed.

The following items are displayed in the Main area:

■ CE#x CM#y CA#z Port#w Information (for the ETERNUS DX8700 S/DX8900 S3) or
CM#y CA#z Port#w Information (for the other models)

- Location
The location information (x: CE number, y: CM number, z: CA number, w: Port number) of the port is displayed.
  • For the ETERNUS DX8700 S3/DX8900 S3
    CE#x CM#y CA#z Port#w
  • For the other models
    CM#y CA#z Port#w

- Port Mode
The port mode is displayed.
  • CA
  • RA
  • CA/RA
  • Initiator

- Status
The port status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
The port status code is displayed.

- Error Code
The port error code is displayed.

- Type
  The type of the port is displayed.

  - 8G FC

  - 16G FC

  - 32G FC

- Connection
  The connection type of the port is displayed.

  - Fabric
    A connection type that enables simultaneous communication among multiple nodes through a Fibre Channel switch. This connection type can also be used for a direct connection when "Transfer Rate" is "16 Gbit/s" or more.

  - FC-AL
    A connection type that connects multiple nodes in a loop.

- Loop ID
  If the connection type of the target port is "FC-AL", the Loop ID is displayed.
  When the Loop ID is manually specified, the ID that is to be set for the port is displayed in hexadecimal.
  When the Loop ID is automatically specified, "Ascending" or "Descending" is displayed.
  When the "Connection" is "Fabric", a "-" (hyphen) is displayed.

- Class
  The service class of the port (fixed to "Class3") is displayed.

- Transfer Rate
  The transfer speed of the port is displayed.
  If the status is " Unknown", a "-" (hyphen) is displayed.

  - Auto-negotiation

  - 4 Gbit/s

  - 8 Gbit/s

  - 16 Gbit/s

  - 32 Gbit/s

- Link Status
  The link status of the port is displayed.
  If the status is " Unknown", a "-" (hyphen) is displayed.

  - Link Down

  - 4 Gbit/s Link Up

  - 8 Gbit/s Link Up

  - 16 Gbit/s Link Up

  - 32 Gbit/s Link Up

- WWN
  The WWN of the port is displayed.
  This item is displayed when the port mode is "CA", "RA", or "CA/RA".
  If the port mode is "Initiator", the display status varies according to the screen. A "-" (hyphen) is displayed for the CM#x CA#y port information in the [Channel Adapter Detail] screen. This item is not displayed in the [Port Detail] screen.

- WWN (Port Name)
  The World Wide Port Name (WWPN) of the port is displayed.
  This item is displayed when the port mode is "Initiator".
  If the port mode is not "Initiator", the display status varies according to the screen. A "-" (hyphen) is displayed for the CM#x CA#y port information in the [Channel Adapter Detail] screen. This item is not displayed in the [Port Detail] screen.

- WWN (Node Name)
  The World Wide Node Name (WWNN) of the port is displayed.
  This item is displayed when the port mode is "Initiator".
  If the port mode is not "Initiator", the display status varies according to the screen. A "-" (hyphen) is displayed for the CM#x CA#y port information in the [Channel Adapter Detail] screen. This item is not displayed in the [Port Detail] screen.

- Affinity Mode
  The affinity mode of the port is displayed.
  - ON
  - OFF

- TFO Transfer Mode
  Whether the TFO transfer mode is enabled or disabled for the target port is displayed.
  A "-" (hyphen) is displayed when the port mode is "CA" or "Initiator".
  This item is displayed only when "Enable" is selected for the Storage Cluster function.

- TFO WWN Mode
  When the port is being used by the Storage Cluster function, "Custom" is displayed if WWN has been changed, and "Default" is displayed if no changes have been made.
  A "-" (hyphen) is displayed when the port mode is "RA", "CA/RA", or "Initiator".
  This item is displayed only when "Enable" is selected for the Storage Cluster function.
  - Custom
  - Default

- TFO Port
  When the port is being used by the Storage Cluster function, "Used" is displayed, and "Unused" is displayed when the port is not used.
  This item is displayed only when "Enable" is selected for the Storage Cluster function.
  - Used
  - Unused

- FC Frame Size
  The frame size of the port is displayed.
  - 512 byte
  - 1024 byte
  - 2048 byte

- Part Number
  The part number of the port is displayed.
  If the part number cannot be acquired, a "-" (hyphen) is displayed.

- Serial Number
  The serial number of the port is displayed.
  If the serial number cannot be acquired, a "-" (hyphen) is displayed.

- Hardware Revision
  The hardware version of the port is displayed.
  If the hardware version cannot be acquired, a "-" (hyphen) is displayed.

- SFP Type
  The SFP type of the port is displayed.
  If an SFP is not installed, "Unmount" is displayed.
  - SFP+(SMF)
    8G LongWave
  - SFP+(MMF)
    8G SFP+
  - 16G SFP+(SMF)
    16G LongWave
  - 16G SFP+(MMF)
    16G SFP+

- 32G SFP+(MMF)
  32G SFP+
- Unknown
  SFP type other than above

- Temperature
  The real time temperature of the SFP in the port is displayed in Celsius (C) and in Fahrenheit (F).
   When the information cannot be obtained, a "-" (hyphen) is displayed.
  - x C / y F (x: -128.00 to 128.00, y: -198.40 to 262.40)

- Voltage
  The real time voltage of the SFP in the port is displayed.
  When the information cannot be obtained, a "-" (hyphen) is displayed.
  - x V (x: 0.00 to 6.55)

- Current
  The real time current of the SFP in the port is displayed.
  When the information cannot be obtained, a "-" (hyphen) is displayed.
  - x mA (x: 0.00 to 131.00)

- TX Power
  The real time transmission power of the SFP in the port is displayed.
  When the information cannot be obtained, a "-" (hyphen) is displayed.
  - x mW (x: 0.00 to 6.55)

- RX Power
  The real time received power of the SFP in the port is displayed.
  When the information cannot be obtained, a "-" (hyphen) is displayed.
  - x mW (x: 0.00 to 6.55)

🔵 **N o t e**

"Temperature", "Voltage", "Current", "TX Power", and "RX Power" are displayed as the CM#x CA#y port information in "Channel Adapter Detail" (page 722). In this screen, "Sensor Information" is displayed.

■ Sensor Information

The real time and threshold values (Low/High) for the temperature, voltage, current, transmission power, and received power are displayed in the Sensor Information. The target components for this information are FC that have SFPs from which information can be obtained. When the information cannot be obtained, a "-" (hyphen) is displayed.

🔵 **N o t e**

- An SFP is regarded as being in Warning status when the real time value is lower than the Warning threshold (Low) and higher than the Alarm threshold (Low).
- An SFP is regarded as being in Warning status when the real time value is higher than the Warning threshold (High) and lower than the Alarm threshold (High).
- An SFP is regarded as being in Alarm status when the real time value is lower than the Alarm threshold (Low) or higher than the Alarm threshold (High).

- Temperature
  - Present
    The real time temperature of the SFP in the port is displayed.
    - x C / y F (x: -128.00 to 128.00, y: -198.40 to 262.40)

  - Warning
    - Low or High
      The Warning threshold (Low/High) for the temperature of the SFP in the port is displayed.
      - x C / y F (x: -128.00 to 128.00, y: -198.40 to 262.40)

- Alarm
  - Low or High
    The Alarm threshold (Low/High) for the temperature of the SFP in the port is displayed.
    - x C / y F (x: -128.00 to 128.00, y: -198.40 to 262.40)

- Voltage
  - Present
    The real time voltage of the SFP in the port is displayed.
    - x V (x: 0.00 to 6.55)

  - Warning
    - Low or High
      The Warning threshold (Low/High) for the voltage of the SFP in the port is displayed.
      - x V (x: 0.00 to 6.55)

  - Alarm
    - Low or High
      The Alarm threshold (Low/High) for the voltage of the SFP in the port is displayed.
      - x V (x: 0.00 to 6.55)

- Current
  - Present
    The real time current of the SFP in the port is displayed.
    - x mA (x: 0.00 to 131.00)

  - Warning
    - Low or High
      The Warning threshold (Low/High) for the current of the SFP in the port is displayed.
      - x mA (x: 0.00 to 131.00)

  - Alarm
    - Low or High
      The Alarm threshold (Low/High) for the current of the SFP in the port is displayed.
      - x mA (x: 0.00 to 131.00)

- TX Power
  - Present
    The real time transmission power of the SFP in the port is displayed.
    - x mW (x: 0.00 to 6.55)

  - Warning
    - Low or High
      The Warning threshold (Low/High) for the transmission power of the SFP in the port is displayed.
      - x mW (x: 0.00 to 6.55)

  - Alarm
    - Low or High
      The Alarm threshold (Low/High) for the transmission power of the SFP in the port is displayed.
      - x mW (x: 0.00 to 6.55)

- RX Power
  - Present
    The real time received power of the SFP in the port is displayed.
    - x mW (x: 0.00 to 6.55)

- Warning
  - Low or High
    The Warning threshold (Low/High) for the received power of the SFP in the port is displayed.
    - x mW (x: 0.00 to 6.55)

- Alarm
  - Low or High
    The Alarm threshold (Low/High) for the received power of the SFP in the port is displayed.
    - x mW (x: 0.00 to 6.55)

● **iSCSI port**

The detailed iSCSI port information is displayed.

The following items are displayed in the Main area:

■ CE#x CM#y CA#z Port#w Information (for the ETERNUS DX8700 S/DX8900 S3) or
CM#y CA#z Port#w Information (for the other models)

- Location
  The location information (x: CE number, y: CM number, z: CA number, w: Port number) of the port is displayed.
  - For the ETERNUS DX8700 S3/DX8900 S3
    CE#x CM#y CA#z Port#w
  - For the other models
    CM#y CA#z Port#w

- Port Mode
  The port mode is displayed.
  - CA
  - RA
  - CA/RA

- Status
  The port status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The port status code is displayed.

- Error Code
  The port error code is displayed.

- Type
  The type of the port is displayed.
  - 1G iSCSI
  - 10G iSCSI
  - 10G Base-T iSCSI

- Multiple VLAN
  Whether the Multiple VLAN is enabled or disabled for the port is displayed. A "-" (hyphen) is displayed when the port mode is "RA".

- Number of IP Addresses
  The number of IP addresses that are registered in the port is displayed. In this field, the total number of IP addresses (one basic IP address and the IP addresses that are specified by using Multiple VLAN (up to 15)) is displayed. "1" is displayed when the port mode is "RA" or when "Multiple VLAN" is disabled.

- Transfer Rate
  The transfer speed of the port is displayed.
  If the status is "   Unknown", a "-" (hyphen) is displayed.
  - Auto-negotiation
  - 100Mbit/s
  - 1Gbit/s
  - 10Gbit/s

- Link Status
  The link status of the port is displayed.
  If the status is "   Unknown", a "-" (hyphen) is displayed.
  - Link Down
  - 100Mbit/s Link Up
  - 1Gbit/s Link Up
  - 10Gbit/s Link Up

- iSCSI Name
  The iSCSI name is displayed.

- iSCSI Alias Name
  The iSCSI Alias name is displayed.

- iSCSI IP Address
  The IPv4 address of the iSCSI is displayed.
  If not specified, a "-" (hyphen) is displayed.

- iSCSI Subnet Mask
  The subnet mask of the iSCSI is displayed.
  If not specified, a "-" (hyphen) is displayed.

- iSCSI Gateway
  The IPv4 address of the iSCSI gateway is displayed.
  If not specified, a "-" (hyphen) is displayed.

- iSCSI IPv6 Link Local Address
  The IPv6 link local address of the iSCSI is displayed.
  Note that the IPv6 address is displayed as an abbreviation. If not specified, a "-" (hyphen) is displayed.
  - IPv6 address
    fe80::xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
    Refer to for details.

- iSCSI IPv6 Connect IP Address
  The IPv6 connect IP address of the iSCSI is displayed.
  Note that the IPv6 address is displayed as an abbreviation. If not specified, a "-" (hyphen) is displayed.
  - IPv6 address
    xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
    Refer to "IPv6 Address Notation" (page 828) for details.

- iSCSI IPv6 Gateway
  The gateway IPv6 address of the target port is displayed.
  Note that the IPv6 address is displayed as an abbreviation. If not specified, a "-" (hyphen) is displayed.
  - IPv6 address
    xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
    Refer to "IPv6 Address Notation" (page 828) for details.

- VLAN ID
  The VLAN ID of the port is displayed.
  If the VLAN ID is not specified, a "-" (hyphen) is displayed.

- Affinity Mode
  The affinity mode of the port is displayed.
  - ON
  - OFF

- TFO Transfer Mode
  Whether the TFO transfer mode is enabled or disabled for the port is displayed.
  A "-" (hyphen) is displayed when the port mode is "CA".
  This item is displayed only when "Enable" is selected for the Storage Cluster function.

- TFO Port
  When the port is being used by the Storage Cluster function, "Used" is displayed, and "Unused" is displayed when the port is not used.
  This item is displayed only when "Enable" is selected for the Storage Cluster function.
  - Used
  - Unused

- Bandwidth Limit
  A "-" (hyphen) is displayed for this item.

- MTU Size
  The Maximum Transmission Unit (MTU) size for iSCSI is displayed.
  When the port mode is "CA", a "-" (hyphen) is displayed.

- CHAP
  The Challenge Handshake Authentication Protocol (CHAP) authentication status is displayed.
  - When the "Port Mode" is "CA" or "RA": "ON" or "OFF"
  - When the "Port Mode" is "CA/RA": x / y
    x: CHAP authentication status for the CA port ("ON" or "OFF")
    y: CHAP authentication status for the RA port ("ON" or "OFF")

- MAC Address
  The MAC address of the port is displayed.

- Part Number
  The part number of the port is displayed.
  If the part number cannot be acquired, a "-" (hyphen) is displayed.

- Serial Number
  The serial number of the port is displayed.
  If the serial number cannot be acquired, a "-" (hyphen) is displayed.

- Hardware Revision
  The hardware version of the port is displayed.
  If the hardware version cannot be acquired, a "-" (hyphen) is displayed.

- SFP Type
  When the "Type" is "10G iSCSI", the SFP type of the port is displayed.
  If an SFP is not installed, "Unmount" is displayed.
  If the "Type" is not "10G iSCSI", the display status varies according to the screen. A "-" (hyphen) is displayed
  for the CM#x CA#y port information in the [Channel Adapter Detail] screen. This item is not displayed in the
  [Port Detail] screen.
    • SFP+
    • SFP+ Copper
    • Unknown

⦿ **N o t e**

When the "Type" is "10G iSCSI", the temperature, voltage, current, transmission power, and received power for
the SFP in the port are displayed.
Refer to "FC port" (page 757) for display items.

■ Sensor Information

The real time and threshold values (Low/High) for the temperature, voltage, current, transmission power,
and received power are displayed in the Sensor Information. The target components for this information are
10G iSCSI that have SFPs from which information can be obtained. When the information cannot be
obtained, a "-" (hyphen) is displayed. Refer to "Sensor Information" (page 760) for details.

■ Additional IP Address Information #x (x: 1 - 15)

When "Multiple VLAN" is enabled, the IP address information (up to 15 IP addresses) that is registered in the
port is displayed.

- VLAN ID
  The VLAN ID of the port is displayed between 0 - 4095.
  If not specified, a "-" (hyphen) is displayed.

- iSCSI IP Address
  The IPv4 address of the iSCSI port is displayed.
  If not specified, a "-" (hyphen) is displayed.

- iSCSI Subnet Mask
  The subnet mask of the iSCSI port is displayed.
  If not specified, a "-" (hyphen) is displayed.

- iSCSI Gateway
  The gateway IPv4 address of the iSCSI port is displayed.
  If not specified, a "-" (hyphen) is displayed.

- iSCSI IPv6 Link Local Address
  The IPv6 link local address of the iSCSI port is displayed.
  Note that the IPv6 address is displayed as an abbreviation.
  If not specified, a "-" (hyphen) is displayed.
    • IPv6 address
      fe80::xxxx:xxxx:xxxx:xxxx
      xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
      Refer to "IPv6 Address Notation" (page 828) for details.

- iSCSI IPv6 Connect IP Address
  The IPv6 connect IP address of the iSCSI port is displayed.
  Note that the IPv6 address is displayed as an abbreviation.
  If not specified, a "-" (hyphen) is displayed.
    • IPv6 address
      xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
      xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
      Refer to "IPv6 Address Notation" (page 828) for details.

- iSCSI IPv6 Gateway
The gateway IPv6 address of the iSCSI port is displayed.
Note that the IPv6 address is displayed as an abbreviation.
If not specified, a "-" (hyphen) is displayed.
  • IPv6 address
    xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
    Refer to "IPv6 Address Notation" (page 828) for details.

● **SAS Port**

The detailed SAS port information is displayed.
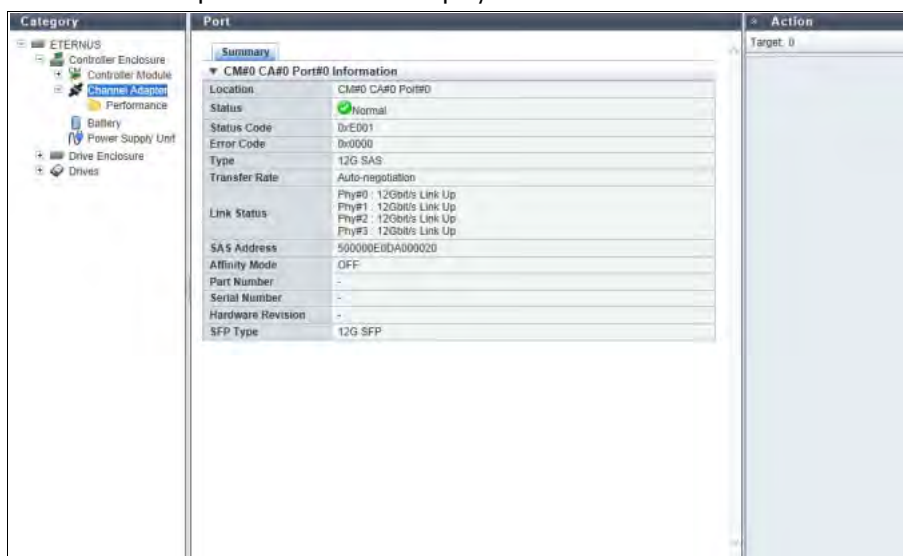
The following items are displayed in the Main area:

■ CM#x CA#y Port#z Information

- Location
The location information of the port is displayed.
  • CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)

- Status
The port status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
The port status code is displayed.

- Error Code
The port error code is displayed.

- Type
The type of the port is displayed.
  • 6G SAS
  • 12G SAS

- Transfer Rate
The transfer speed of the port is displayed.
If the status is " Unknown", a "-" (hyphen) is displayed.
  • Auto-negotiation
  • 1.5Gbit/s
  • 3Gbit/s
  • 6Gbit/s
  • 12Gbit/s

- Link Status
  The link status for each Phy is displayed.
  If the status is " ⊘ Unknown", a "-" (hyphen) is displayed.

  - Phy#0 - 3:x
    "x" indicates one of the following statuses:

    - Link Down
    - 1.5Gbit/s Link Up
    - 3Gbit/s Link Up
    - 6Gbit/s Link Up
    - 12Gbit/s Link Up

- SAS Address
  The SAS address of the port is displayed.
  If not specified, a "-" (hyphen) is displayed.

- Affinity Mode
  The affinity mode of the port is displayed.

  - ON
  - OFF

- Part Number
  The part number of the port is displayed.
  If the part number cannot be acquired, a "-" (hyphen) is displayed.

- Serial Number
  The serial number of the port is displayed.
  If the serial number cannot be acquired, a "-" (hyphen) is displayed.

- Hardware Revision
  The hardware version of the port is displayed.
  If the hardware version cannot be acquired, a "-" (hyphen) is displayed.

- SFP Type
  The SFP type of the port is displayed.
  If an SFP is not installed, "Unmount" is displayed.
  This item is displayed when the port type is "12G SAS".

  - 12G SFP
  - Unknown

● **FCoE port**

The detailed FCoE port information is displayed.

The following items are displayed in the Main area:

■ CE#x CM#y CA#z Port#w Information (for the ETERNUS DX8700 S/DX8900 S3) or
  CM#y CA#z Port#w Information (for the other models)

- Location
  The location information (x: CE number, y: CM number, z: CA number, w: Port number) of the port is displayed.
  - For the ETERNUS DX8700 S3/DX8900 S3
    CE#x CM#y CA#z Port#w
  - For the other models
    CM#y CA#z Port#w

- Port Mode
  The port mode (fixed to "CA") is displayed.

- Status
  The port status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The port status code is displayed.

- Error Code
  The port error code is displayed.

- Type
  The type of the port (fixed to "FCoE") is displayed.

- Connection
  The connection type of the port is displayed.
  - Fabric
    A connection type that enables simultaneous communication among multiple nodes through a Fibre Channel switch.
  - FC-AL
    A connection type that connects multiple nodes in a loop.

- Transfer Rate
  The transfer speed of the port (fixed to "10 Gbit/s") is displayed.
  If the status is "⊘ Unknown", a "-" (hyphen) is displayed.

- Link Status
  The link status of the port is displayed.
  If the status is "⊘ Unknown", a "-" (hyphen) is displayed.
  - Link Down
  - 10Gbit/s Link Up

- WWN
  The WWN of the port is displayed.

- Affinity Mode
  The affinity mode of the port is displayed.
  - ON
  - OFF

- FC Frame Size
  The frame size of the port is displayed.
  - 512 byte
  - 1024 byte
  - 2048 byte

- VLAN ID
  The VLAN ID is displayed.
  When the VLAN ID is manually specified, the VLAN ID is displayed between 0 - 4095.
  When the VLAN ID is automatically specified, "Automatic" is displayed.

- Fabric Name
  The fabric name (WWN for FCoE) is displayed.
  When the fabric name is manually specified, the specified fabric name is displayed.
  When the fabric name is automatically specified, "Automatic" is displayed.

- MAC Address
  The MAC address of the port is displayed.

- Part Number
  The part number of the port is displayed.
  If the part number cannot be acquired, a "-" (hyphen) is displayed.

- Serial Number
  The serial number of the port is displayed.
  If the serial number cannot be acquired, a "-" (hyphen) is displayed.

- Hardware Revision
  The hardware version of the port is displayed.
  If the hardware version cannot be acquired, a "-" (hyphen) is displayed.

- SFP Type
  The SFP type of the port is displayed.
  If an SFP is not installed, "Unmount" is displayed.

  - SFP+

  - SFP+ Copper

  - Unknown

> ◯ **N o t e**
>
> The temperature, voltage, current, transmission power, and received power for the SFP in the port are displayed. Refer to "FC port" (page 757) for display items.

■ Sensor Information

The real time and threshold values (Low/High) for the temperature, voltage, current, transmission power, and received power are displayed in the Sensor Information. The target components for this information are FCoE that have SFPs from which information can be obtained. When the information cannot be obtained, a "-" (hyphen) is displayed. Refer to "Sensor Information" (page 760) for details.

● **NAS port**

The detailed NAS port information is displayed.

The following items are displayed in the Main area:

■ CM#x CA#y Port#z Information

- Location
  The location information of the port is displayed.
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)

- Port Mode
  The port mode (fixed to "CA") is displayed.

- Status
  The port status is displayed. Refer to "Component Status" (page 1376) for details.

- Status Code
  The port status code is displayed.

- Error Code
  The port error code is displayed.

- Type
  The type of the port is displayed.
  - 10G NAS
  - 1G NAS

- Redundancy
  The connection type of the port is displayed. When the connection type is "Active-Active" or "Active-Standby", the "Redundant Port" information is displayed.
  - Active-Active
    Combine the ports in both of the CMs and configure the redundant ports. For this configuration, the ports of both CMs can be used at any time.
  - Active-Standby
    Combine the ports in both of the CMs and configure the redundant ports. For this configuration, one port remains in standby status.
  - Single
    Use only for the ports in the CM that are not redundant.

- Redundant Port
  The installation locations of the ports that are configured for redundancy with the target port are displayed. When redundancy is configured for each bonding port, all of the related ports are displayed. A "-" (hyphen) is displayed when "Redundancy" is "Single".
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)

- Failover Status
  The failover status of the multipath is displayed.
  A "-" (hyphen) is displayed when the multipath is not set (or when "Redundancy" is "Single").
  - Normal
    The multipath setting between the "Location" port and "Redundant Port" is in a normal state.
  - CM#x CA#y Port#z is currently inactive
    The multipath between the "Location" port and "Redundant Port" is set, but the "CM#x CA#y Port#z" port is not used.

- Port Bonding Mode
  The bonding mode for the port is displayed.
  - Master
    The representative port among the ports that configure the bonding port. The IP address of the bonding port is assigned to the master port.
  - Member
    Ports that configure the bonding port.

- Bonding Master Port
  The installation location of the master port, which is a member of the ports that configure the bonding port, is displayed.
  If the bonding port is not configured, a "-" (hyphen) is displayed.
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)

- Bonding Port
  The installation locations of all the member ports that configure the bonding port is displayed.
  If the bonding port is not configured, a "-" (hyphen) is displayed.
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)

- Number of VLAN IP Addresses
  The number of VLAN IP addresses for the port is displayed.
  If VLAN is not set, "0" is displayed.

- Transfer Rate
  The transfer speed of the port is displayed.
  If the status is " Unknown", a "-" (hyphen) is displayed.
  - Auto-negotiation
  - 100 Mbit/s
  - 1 Gbit/s
  - 10 Gbit/s

- Link Status
  The link status of the port is displayed.
  If the status is " Unknown", a "-" (hyphen) is displayed.
  - Link Down
  - 10Mbit/s Full Duplex Link Up
  - 10Mbit/s Half Duplex Link Up
  - 100Mbit/s Full Duplex Link Up
  - 100Mbit/s Half Duplex Link Up
  - 1Gbit/s Full Duplex Link Up
  - 1Gbit/s Half Duplex Link Up
  - 10Gbit/s Full Duplex Link Up
  - 10Gbit/s Half Duplex Link Up

- IP Address
  An IPv4 address without VLAN IDs is displayed.
  If not specified, a "-" (hyphen) is displayed.

- Subnet Mask
  An IPv4 subnet mask without VLAN IDs is displayed.
  If not specified, a "-" (hyphen) is displayed.

- Gateway Address
  An IPv4 address for the gateway without VLAN IDs is displayed.
  If not specified, a "-" (hyphen) is displayed.

- IPv6 Link Local Address
  An IPv6 link local address without VLAN IDs is displayed.
  Note that the IPv6 address is displayed as an abbreviation. If not specified, a "-" (hyphen) is displayed.
  - IPv6 address
    fe80::xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
    Refer to for details.

- IPv6 Connect IP Address
  An IPv6 connect IP address without VLAN IDs is displayed.
  Note that the IPv6 address is displayed as an abbreviation. If not specified, a "-" (hyphen) is displayed.
    • IPv6 address
      xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
      xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
      Refer to "IPv6 Address Notation" (page 828) for details.

- IPv6 Gateway Address
  An IPv6 address for the gateway without VLAN IDs is displayed.
  Note that the IPv6 address is displayed as an abbreviation. If not specified, a "-" (hyphen) is displayed.
    • IPv6 address
      xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
      xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
      Refer to "IPv6 Address Notation" (page 828) for details.

- MTU Size
  The MTU size is displayed.
  A "-" (hyphen) is displayed when the MTU size is "0".

- MAC Address
  The MAC address of the port is displayed.

- Part Number
  The part number of the port is displayed.
  If the part number cannot be acquired, a "-" (hyphen) is displayed.

- Serial Number
  The serial number of the port is displayed.
  If the serial number cannot be acquired, a "-" (hyphen) is displayed.

- Hardware Revision
  The hardware version of the port is displayed. If the hardware version cannot be acquired, a "-" (hyphen) is displayed.

- SFP Type
  When the port type is "10G NAS", SFP type in the port is displayed.
  If an SFP is not installed, "Unmount" is displayed.
  If the "Type" is not "10G NAS", the display status varies according to the screen. This item is not displayed in the [Port Detail] screen.
    • SFP+
    • SFP+ Copper
    • Unknown

> ◯ **N o t e**
>
> When the "Type" is "10G NAS", the temperature, voltage, current, transmission power, and received power for the SFP in the port are displayed.
> Refer to "FC port" (page 757) for display items.

■ Sensor Information

The real time and threshold values (Low/High) for the temperature, voltage, current, transmission power, and received power are displayed in the Sensor Information. The target components for this information are 10G NAS that have SFPs from which information can be obtained. When the information cannot be obtained, a "-" (hyphen) is displayed. Refer to "Sensor Information" (page 760) for details.

■ Additional VLAN IP Address

- **VLAN ID**
  The VLAN ID of the NAS port is displayed between 1 - 4094.

- **IP Address (*1)**
  The IPv4 address of the NAS port is displayed.
  If not specified, a "-" (hyphen) is displayed.

- **Subnet Mask (*1)**
  The subnet mask of the NAS port is displayed.
  If not specified, a "-" (hyphen) is displayed.

- **Gateway Address (*1)**
  The gateway IPv4 address of the NAS port is displayed.
  If not specified, a "-" (hyphen) is displayed.

- **IPv6 Link Local Address (*1)**
  The IPv6 link local address of the NAS port is displayed.
  Note that the IPv6 address is displayed as an abbreviation. If not specified, a "-" (hyphen) is displayed.
  - IPv6 address
    fe80::xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
    Refer to <u>"IPv6 Address Notation" (page 828)</u> for details.

- **IPv6 Connect IP Address (*1)**
  The IPv6 connect IP address of the NAS port is displayed.
  Note that the IPv6 address is displayed as an abbreviation. If not specified, a "-" (hyphen) is displayed.
  - IPv6 address
    xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
    Refer to <u>"IPv6 Address Notation" (page 828)</u> for details.

- **IPv6 Gateway Address (*1)**
  The gateway IPv6 address of the NAS port is displayed.
  Note that the IPv6 address is displayed as an abbreviation. If not specified, a "-" (hyphen) is displayed.
  - IPv6 address
    xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
    Refer to <u>"IPv6 Address Notation" (page 828)</u> for details.

*1:　This item is displayed for all of the VLAN settings.

10. Volume Status

Volume status displays the status information of volumes.
Volume status screens can be displayed by clicking the following categories:

Category	Volume status screen
Volume	Volume (Basic Information)
Performance (Host I/O)	Performance (Host I/O)
Performance (QoS)	Performance (QoS)
Performance (Advanced Copy)	Performance (Advanced Copy)
LUN Group	LUN Group
Reservation	Reservation
Pinned Data	Pinned Data
Bad Sector	Bad Sector
Balancing Thin Provisioning Volume	Balancing Thin Provisioning Volume
Snapshot	Snapshot

Detailed information of the volumes can be displayed from the following screens:

- Volume Detail (Basic)
- Volume Detail (Reservation)
- Volume Detail (Pinned Data)
- Volume Detail (Balancing TPV)
- Volume Detail (Used RAID Group)
- Volume Detail (Snapshot)

Volume (Basic Information)

This function displays the basic information of volumes.

> ▷ **Caution**
>
> The display process for the volume list may be delayed for a maximum of two minutes while a meta cache redistribution is being performed for NAS volumes (NAS user volumes or NAS backup volumes).

> ◯ **N o t e**
>
> In this section, "volumes" include "External Volumes" if differentiation is not specifically required. Refer to "External Volume specification" (page 781) for details.

■ When no External Volumes are created

■ When External Volumes are created

The following items are displayed in the Main area:

- No.
  The volume number is displayed.
  During volume creation, the volume number can be allocated automatically or specified manually. When the volume number is allocated automatically, the volume number is allocated from the smallest unused decimal number in ascending order. Click this item to display "Volume Detail (Basic)" (page 802).

- Name
  The volume name is displayed. Click this item to display "Volume Detail (Basic)" (page 802).

- Status
  The volume status is displayed. When the volume status is normal, " ✅ Available" is displayed. Refer to "Volume Status" (page 1373) for detailed information of volume status.

- Type
  The volume type is displayed.
  - Standard
    Standard volumes are the most commonly used volumes that are created in RAID groups or External RAID Groups.
    A standard volume is used for normal usage, such as file systems and databases. The server recognizes it as a single logical unit.
  - WSV
    WSV is a volume that is created by concatenating distributed areas in from 2 to 64 RAID groups. Processing speed is fast because data access is distributed.
  - TPV
    TPV is a virtual volume that is created in a Thin Provisioning Pool area. When data is being written to a TPV from the server, the drives are allocated in specified size units.
  - FTV
    FTV is a virtual volume that is created in an FTRP. This volume is a target volume for layering. Data is automatically redistributed in small block units according to the access frequency. The FTV is created by ETERNUS CLI or ETERNUS SF Storage Cruiser.
  - SDV
    SDV is an area that is used as the copy destination for a SnapOPC/SnapOPC+. For a SnapOPC, SDVs are created for each copy destination. For a SnapOPC+, SDVs are created for each generation of the copy destination.
  - SDPV
    SDPV is a volume that is used to configure SDP areas. The SDP capacity equals the total capacity of the SDPVs. A volume is supplied from a SDP when the amount of updates exceeds the capacity of the SDV.
  - Temporary
    Temporary is a volume that is created when a capacity expansion using the LUN Concatenation function is performed. If the capacity expansion fails, "Temporary" is displayed in the volume list.

- Usage
  The usage of the volume is displayed.
  - Block
    The volumes that are used for the SAN.
  - Block/Dedup
    The Deduplication/Compression Volumes.
  - File
    The volumes that are used for the NAS.
  - System
    The volumes that are used for management information.
    The system volumes described below. Refer to "Usage Details" (page 807) in "Volume Detail (Basic)" for details.
    - System volumes for the NAS system
    - System volumes for the Virtual Volume function
    - Deduplication/Compression System Volumes
  - Migration
    An External Volume that is used for data migrations.

- Capacity
The volume capacity is displayed.
The capacity is displayed in units of "MB", "GB", or "TB". Even when volumes are created in units of "MB", if the volume capacity exceeds 1023.99MB, the capacity is displayed in units of "GB". If the volume capacity exceeds 1023.99GB, the capacity is displayed in units of "TB". The capacity is rounded off to two decimal places.
When the volume type is "SDV", the virtual capacity is displayed. The virtual capacity indicates the capacity that is secured automatically when creating SDVs (24 (MB) + copy source volume capacity x 0.1%).

- RAID Group/TPP/FRTP No.
The following number is displayed:
  - If the type is "WSV"
  The RAID group number to which the representative volume (*1) belongs is displayed.
    *1: A volume for WSV, which is created by concatenating multiple RAID groups with striping, that belongs to the RAID group that is first in the concatenation order.
  - If the type is "TPV"
  The TPP number to which the volume belongs is displayed.
  - If the type is "FTV"
  The FTRP number to which the volume belongs is displayed.
  - If the type is "Standard" and "Usage" is "Migration"
  The External RAID Group number to which the External Volume belongs is displayed.
  - If the type is not one of the types listed above
  The RAID group number to which the volume belongs is displayed.

- RAID Group/TPP/FTRP Name
The following name is displayed:
  - If the type is "WSV"
  The RAID group name to which the representative volume belongs is displayed.
  - If the type is "TPV"
  The TPP name to which the volume belongs is displayed.
  - If the type is "FTV"
  The FTRP name to which the volume belongs is displayed.
  - If the type is "Standard" and "Usage" is "Migration"
  The External RAID Group name to which the External Volume belongs is displayed.
  - If the type is not one of the types listed above
  The RAID group name to which the volume belongs is displayed.

- Encryption
The encryption status is displayed.
For the ETERNUS DX60 S4/DX60 S3, this item is not displayed.
  - CM
  A volume that is encrypted by CM
  - "-" (hyphen)
  A volume that is not encrypted (plain text volume)
  - SED
  A volume that is encrypted by SED

- UID
The Universal Identifier (UID) is displayed.
The UID is an identifier (storage system name) to specify a volume from the open system server. The UID status is displayed in the "UID Mode" field.
A "-" (hyphen) is displayed for the Deduplication/Compression System Volume.

> ● **N o t e**
>
> - For External Volumes that inherit the External LU Information, the UID of the External Volumes is displayed. For External Volumes that do not inherit the External LU Information, the UID that is assigned by the ETERNUS DX/AF (local storage system) is displayed.
> - If the External LU Information is deleted, the UID that is assigned by the ETERNUS DX/AF is displayed. Refer to "Delete External LU Information" (page 333) for details.

- UID Mode
  The UID status is displayed.
  A "-" (hyphen) is displayed for the Deduplication/Compression System Volume.
  - Default
    This status is displayed for the following volumes.
    - Volumes that are created with the ETERNUS DX/AF
    - Volumes that do not inherit the External LU Information (*1)
  - Custom
    This status is displayed for one of the following volumes.
    - Volumes where the UIDs that are changed with the "set volume" ETERNUS CLI command are applied
    - Volumes that are used for the Storage Cluster function
  - External
    This status is displayed for volumes that inherit the External LU Information (*1).
  - *1: This status is displayed for volumes before, during, and after a data migration of the Non-disruptive Storage Migration.

> ● **N o t e**
>
> If the External LU Information is deleted, this item is changed from "External" to "Default". Refer to "Delete External LU Information" (page 333) for details.

- Process
  A process that is being performed for the volume is displayed. If multiple processes are currently being performed, the processes are separated with a ":" (colon) and displayed in the "xx:yy:zz" format. "Encrypting", "Formatting", "Migrating", or "Balancing" is displayed as "xx". "Optimizing Capacity", "Reserved Optimizing Capacity", "Automatic Stop", or "Manual Stop" is displayed as "yy". "Optimizing Capacity" or "Reserved Optimizing Capacity" is displayed as "zz".
  Note that "Automatic Stop" and "Manual Stop" are displayed only if the Non-disruptive Storage Migration License has been registered.
  If no process is being performed, a "-" (hyphen) is displayed.
  - Encrypting
    Volume encryption is being performed.
  - Formatting
    Formatting is being performed.
  - Migrating
    RAID migration is being performed.
  - Balancing
    TPV balancing or FTRP balancing is being performed.
  - Optimizing Capacity
    Capacity optimization (*1) is being performed in a TPV or an FTV.
  - Reserved Optimizing Capacity
    Capacity optimization is being reserved (*2) for a TPV or an FTV.
  - Automatic Stop
    The data synchronization between the migration source volume and the migration destination volume is automatically stopped.

- Manual Stop
  The data synchronization between the migration source volume and the migration destination volume is manually stopped.
*1:   "Capacity Optimization" is a function that releases the allocated physical area when data in the physical area that is allocated to a TPV or an FTV is filled with zeros.
*2:   If "Start Optimizing TPV/FTV Capacity after migration" is enabled for the RAID migration function, the migration source volume is reserved for capacity optimization.

> 🔵 **N o t e**
>
> If "Automatic Stop" or "Manual Stop" is selected for "Data Sync after Migration" when starting a data migration for Non-disruptive Storage Migration using the [Start RAID Migration] function, "Migrating : Automatic Stop" or "Migrating : Manual Stop" is displayed for "Process" of the migration source volume.
> If "Manual Stop" is selected, "Migrating : Manual Stop" is displayed during a data synchronization between the migration source volume and the migration destination volume even if the migration has been completed.

- Forbid Advanced Copy
  The protection status of the volume or the volume attribute (such as mirroring reservation) is displayed.
  "No" is displayed for the Deduplication/Compression System Volume.
    - Yes
      The volume is protected. The volume cannot be used as a copy destination volume.
    - No
      The volume is not protected. The volume can be used as a copy destination volume.
    - DLM
      An attribute that is to be set to a volume being created as the REC copy destination by the Dynamic LUN Mirroring function regardless of whether the volume is protected. If this attribute is displayed, the volume might be the one that is left in the storage system due to unsuccessful creation.
    - ODX
      An ODX Buffer volume. ODX Buffer volumes cannot be protected.

- Storage Cluster
  When the volume is being used by the Storage Cluster function, "Enable" is displayed. When no volumes are used for the Storage Cluster function, "Disable" is displayed.
  This item is displayed only when "Enable" is selected for the Storage Cluster function.

- Virtual Volume
  When the volume is being used by the Virtual Volume function, "Enable" is displayed. When no volumes are used by the Virtual Volume function, "Disable" is displayed.
  For $VVOL_META, "Disable" is displayed even if the relevant volume is being used by the Virtual Volume function. "$VVOL_META" is a system volume that is used for storing the management information (metadata) of the Virtual Volume function.
  This item is displayed only when "Enable" is selected for the Virtual Volume function.

- Allocation
  The allocation method for the volume is displayed.
  A "-" (hyphen) is displayed when the volume type is other than "TPV" or "FTV".
    - Thin
      Physical area is allocated to the target area of the volume when a write I/O is received.
    - Thick
      Physical area is allocated to the whole area of the volume when volumes are created.

- Used Capacity
  The used capacity (physically allocated capacity) of volume is displayed with "MB", "GB", or "TB".
  A "-" (hyphen) is displayed in the following conditions:
    - The volume type is not "TPV" or "FTV"
    - Deduplication/Compression Volumes (*1)

*1: The used capacity of the Deduplication/Compression Volumes in the TPP can be determined by checking the used capacity of the DEDUP_SYS Volume that is created in the TPP. The used capacity of the DEDUP_SYS Volume approximately corresponds to the total used capacity of the Deduplication/Compression Volumes in the relevant TPP.

- Used Rate
  The volume utilization is displayed between 0% - 100%.

  Used Rate = Used Capacity / Capacity

  A "-" (hyphen) is displayed in the following conditions:
    - The volume type is not "TPV" or "FTV"
    - Deduplication/Compression Volumes (*1)

    *1: The used rate of the Deduplication/Compression Volumes in the TPP can be determined by checking the used rate of the DEDUP_SYS Volume that is created in the TPP. The used rate of the DEDUP_SYS Volume approximately corresponds to the total used rate of the Deduplication/Compression Volumes in the relevant TPP. Note that the data reduction rate for the TPP due to the Deduplication/Compression function can be checked in the [Thin Provisioning Pool] screen. Refer to for details.

- Threshold
  The threshold for monitoring the volume utilization is displayed between 1% - 100%.
  If the "Used Rate" value exceeds the "Threshold", a Host Sense Key Code Qualifier is notified.
  A "-" (hyphen) is displayed in the following conditions:
    - The volume type is not "TPV" or "FTV"
    - Deduplication/Compression Volumes or Deduplication/Compression System Volumes

  🔵 **N o t e**

  - The threshold for TPPs can be checked in the [Threshold] screen. Refer to for details.
  - The threshold for FTRPs can be checked in the [Flexible Tier Pool] screen. Refer to for details.

- External LU Information
  Whether the volume inherits the External LU Information (*1) is displayed.
  This item displays "Inherited" for External Volumes that inherit the External LU information while the usage is "Migration" (if a data migration has not been performed or if a data migration is being performed).
  A "-" (hyphen) is displayed for the following volumes.
    - Volumes that have inherited the External LU Information if a data migration has already been performed
    - External Volumes that do not inherit the External LU Information
    - Volumes of which the External LU Information is deleted
    - Volumes (or volumes created in RAID groups)
  This item is displayed only if the Non-disruptive Storage Migration License has been registered.

  *1: External Drive identification information (such as UIDs, vendor IDs, and product IDs) that is used to access volumes from the host. For volumes that inherit the identification information and volumes that transfer the identification information to the relevant volumes, the host recognizes them as the same volumes.

External Volume specification

Volumes in the external storage system (External Drives) that transfer the External LU Information (*1) and are managed as volumes in the local storage system. The volume type is "Standard".
For the Non-disruptive Storage Migration function, the External Volume corresponds to the migration source volume. In the [Volume] screen, the External Volumes are displayed as volumes whose "Usage" is "Migration". The [Delete], [Rename], and [Start RAID Migration] actions are available for External Volumes before the data migration. The following operations are not available before the data migration is complete:

- Format, expansion, and encryption of External Volumes
- Storage Migration that uses External Volumes as migration destinations (online Storage Migration/offline Storage Migration)
- Advanced Copy that uses External Volumes as copy sources or copy destinations

After the data migration is completed, External Volumes can be handled equivalently to normal volumes (or volumes created in RAID groups). However, volumes that inherit the "External LU Information" cannot be used for the Storage Cluster function.

*1: External Drive identification information (such as UIDs, vendor IDs, and product IDs) that is used to access volumes from the host. For volumes that inherit the identification information and volumes that transfer the identification information to the relevant volumes, the host recognizes them as the same volumes.

Filter setting

Filter	Description
Name	Input the volume name that is to be displayed. When not using the volume name for filtering, leave this item blank.
Status	Select the volume status that is to be displayed.
Type	Select the volume type that is to be displayed.
Usage	Select the usage of the volume that is to be displayed.
Encryption	Select the encryption status of the volume that is to be displayed. For the ETERNUS DX60 S4/DX60 S3, this item is not displayed.
UID Mode	Select the UID status of the volume that is to be displayed.
Process	Select which current process for the volume is to be displayed. "Automatic Stop" and "Manual Stop" are displayed only if the Non-disruptive Storage Migration License has been registered.
Storage Cluster	Select the Storage Cluster function usage status for the volume that is to be displayed. This item is displayed only when "Enable" is selected for the Storage Cluster function.
Virtual Volume	Select the Virtual Volume function usage status for the volume that is to be displayed. This item is displayed only when "Enable" is selected for the Virtual Volume function.
Allocation	Select the allocation method of the volume that is to be displayed.

Performance (Host I/O)

This function displays the performance information of the volumes for Host I/O.
Refer to "Note" in "Performance (CM)" (page 683) for the acquisition requirements and specifications of the performance information.

> **N o t e**
> - When the performance monitoring function is stopped, "0" is displayed as the performance information.
> - This function displays the parameters that are set in the [Modify Cache Parameters] function (Cache Page Capacity, PL, FP, MWC, PSDC, SDDC, SS, SDS, and SPMC).
> - This function displays the parameter (ALUA) that is set in the [Set ALUA] function.
> - In this section, "volumes" include "External Volumes" if differentiation is not specifically required. Refer to "External Volume specification" (page 781) for details.

The following items are displayed in the Main area:
- No.
  The volume number is displayed. Click this item to display the [Volume Detail] screen.
- Name
  The volume name is displayed. Click this item to display the [Volume Detail] screen.

- Type
  The volume type is displayed.
    - Standard
    - WSV
    - TPV
    - FTV
    - SDV
    - SDPV
    - Temporary

- Usage
  The usage of the volume is displayed.
    - Block
      The volumes that are used for the SAN.
    - Block/Dedup
      The Deduplication/Compression Volumes.
    - File
      The volumes that are used for the NAS.

- System
The volumes that are used for management information.
Refer to "Usage Details" (page 807) in "Volume Detail (Basic)" for details.
- Migration
An External Volume that is used for data migrations.

- Read IOPS
The read count per second is displayed.

- Write IOPS
The write count per second is displayed.

- Read Throughput
The amount of transferred data that is read per second is displayed.

- Write Throughput
The amount of transferred data that is written per second is displayed.

- Read Response Time
The average read response time per host I/O is displayed.

- Write Response Time
The average write response time per host I/O is displayed.

- Read Processing Time
The average read processing time per host I/O is displayed.
This item is displayed only when the controller firmware version V10L4x or later is used.

- Write Processing Time
The average write processing time per host I/O is displayed.
This item is displayed only when the controller firmware version V10L4x or later is used.

- Read Cache Hit Rate
The cache hit rate (for read) is displayed.

- Write Cache Hit Rate
The cache hit rate (for write) is displayed.

- Prefetch Cache Hit Rate
The cache hit rate (for prefetch) is displayed.

- Extreme Cache Cache Hit Rate
The cache hit rate of EXC for read I/O is displayed.
This item is displayed when EXC or EXCP is enabled for the ETERNUS DX. A "-" (hyphen) is displayed for volumes where EXC and EXCP are disabled. Enabling or disabling EXC for the volume can be performed with ETERNUS CLI or ETERNUS SF Storage Cruiser. Enabling or disabling EXCP for the volume can be performed with ETERNUS Web GUI. Refer to "Modify Cache Parameters" (page 315) for details.
The mode (Extreme Cache or Extreme Cache Pool) that is being used for the ETERNUS DX is displayed in the [System Settings] screen. Refer to "System Settings" (page 672) for details.

🔵 **N o t e**

A "-" (hyphen) is usually displayed for the following volumes:
- Volume type is "SDV" or "SDPV"
- Volumes that are created in a RAID group or a TPP configured with SSDs or SSD SEDs
- ODX Buffer volumes

- Cache Page Capacity
  The cache page capacity is displayed.
  When the cache page capacity is "-" (hyphen), there is no limit for the cache capacity.
  A "-" (hyphen) is displayed when the volume type is "TPV", "FTV", or "WSV". Note that a "-" (hyphen) is displayed for a "Standard" type volume that is concatenated by the LUN concatenation function.

- PL
  The prefetch limit is displayed. If PL is "0", prefetch is not performed.

- FP
  The selected usage for the Force Prefetch Mode, which performs forcible prefetching for cache, is displayed.
  - ON
    Perform prefetch even if the sequential characteristics of the data access is not detected.
  - OFF
    Perform prefetch only when the sequential characteristics of the data access is detected.

- MWC
  The value of the Multi Write back Count is displayed.

- PSDC
  The number of times that sequentiality of data access (Read I/O) is detected (value of the Prefetch Sequential Detect Count) is displayed. If any sequential data is accessed for the number of times specified for PSDC, such access is determined as sequential access and prefetch is performed.

- SDDC
  The number of times that sequentiality of data access (Write I/O) is detected (value of the Sequential Dirty Detect Count) is displayed. If any sequential data is accessed for the number of times specified for SDDC, such access is determined as sequential access and prefetch is performed.

- SS
  The value of the parameter (Sequential Slope) to determine the sequentiality of data access (Read I/O) is displayed. If the difference in addresses between the end LBA of the previous I/O and the start LBA of the current I/O is within (SS setting + 1), it is determined as sequential data.

- SDS
  The value of the parameter (Sequential Dirty Slope) to determine the sequentiality of data access (Write I/O) is displayed. If the difference in addresses between the end LBA of the previous I/O and the start LBA of the current I/O is within (SDS setting + 1), it is determined as sequential data.

- SPMC
  The value of the parameter (Sequential Parallel Multi I/O Count) to determine the sequentiality of data access (Read I/O and Write I/O) is displayed. If the difference in addresses between the start address of the previous I/O and the start address of the received I/O is within (I/O size x Specified value), it is determined as sequential data.

- ALUA
  The set state for ALUA is displayed. A "-" (hyphen) is displayed for volumes that cannot be mapped (*1).
  - Follow Host Response
    Use the same "Asymmetric / Symmetric Logical Unit Access" setting as the host response for the host group or the host.
  - ACTIVE / ACTIVE
    All of the paths to the volume are regarded as being recommended paths. The use of a multipath driver determines which paths are used.
  - ACTIVE-ACTIVE / PREFERRED_PATH
    There are recommended paths and non-recommended paths for each volume. By using a CA port in the Controlling CM of a RAID group in which the volume belongs for the recommended paths (other ports are regarded as non-recommended paths), data migration between CMs (cross access) can be reduced.

*1: The following volumes cannot be mapped.
- "SDPV" or "Temporary" type volumes
- ODX Buffer volumes
- "Usage" is "File" or "System"

Filter setting

Filter	Description
Name	Input the volume name that is to be displayed. When not using the volume name for filtering, leave this item blank.
Type	Select the volume type that is to be displayed.
Usage	Select the usage of the volume that is to be displayed.

Performance (QoS)

This function displays the performance information of the volume QoS for Host I/O.
IOPS, throughput, and the bandwidth limit for each volume can be checked.
Refer to "Note" in "Performance (CM)" (page 683) for the acquisition requirements and specifications of the performance information.

> **N o t e**
>
> - The target volume types for this function are Standard, SDV, WSV, TPV (including NAS user volumes and Deduplication/Compression Volumes), and FTV. Note that the performance information is not displayed for ODX Buffer volumes, NAS backup volumes, NAS system volumes, and Deduplication/Compression System Volumes.
> - This function displays the performance information of volume QoS regardless of whether the QoS mode is enabled or disabled. If the QoS mode is disabled, the default bandwidth limit ("Unlimited") is displayed for all items.
> - In this section, "volumes" include "External Volumes" if differentiation is not specifically required. Refer to "External Volume specification" (page 781) for details.

The following items are displayed in the Main area:

- No.
  The volume number is displayed.
  Click this item to display the [Volume Detail] screen.

- Name
  The volume name is displayed.
  Click this item to display the [Volume Detail] screen.

- Type
  The volume type is displayed.
  - Standard
  - TPV
  - FTV
  - WSV
  - SDV

- Usage
  The usage of the volume is displayed.
    - Block
      The volumes that are used for the SAN.
    - Block/Dedup
      The Deduplication/Compression Volumes.
    - File
      The volumes that are used for the NAS.
    - System
      System volumes for the Virtual Volume function.
    - Migration
      An External Volume that is used for data migrations.

- IOPS
  IOPS, the total number of reads and writes per second, is displayed.

- Throughput
  Throughput, the total amount of read data and write data transferred per second, is displayed.

- Bandwidth Limit
  The bandwidth limit for the volume is displayed.
  If the bandwidth limit has not been configured for the volume, the default value ("Unlimited") is displayed.

Filter setting

Filter	Description
Name	Input the volume name that is to be displayed. When not using the volume name for filtering, leave this item blank.
Type	Select the volume type that is to be displayed. "TPV" and "FTV" are displayed as options only when the Thin Provisioning function is enabled.
Usage	Select the usage of the volume that is to be displayed.

Performance (Advanced Copy)

This function displays the performance information of the volumes for Advanced Copy.
Refer to "Note" in "Performance (CM)" (page 683) for the acquisition requirements and specifications of the perfor-
mance information.

> ### ● N o t e
>
> - The performance information is not displayed for Deduplication/Compression System Volumes.
> - When the performance monitoring function is stopped, "0" is displayed as the performance information.
> - In this section, "volumes" include "External Volumes" if differentiation is not specifically required. Refer to
>   "External Volume specification" (page 781) for details.

The following items are displayed in the Main area:

- No.
  The volume number is displayed. Click this item to display the [Volume Detail] screen.

- Name
  The volume name is displayed. Click this item to display the [Volume Detail] screen.

- Type
  The volume type is displayed.
  - Standard
  - WSV
  - TPV
  - FTV
  - SDV
  - SDPV
  - Temporary

- Usage
  The usage of the volume is displayed.
  - Block
    The volumes that are used for the SAN.
  - Block/Dedup
    The Deduplication/Compression Volumes.
  - File
    The volumes that are used for the NAS.

- System
  The volumes that are used for management information.
  Refer to "Usage Details" (page 807) in "Volume Detail (Basic)" for details.
- Migration
  An External Volume that is used for data migrations.

- **Read IOPS**
  The read count per second is displayed.

- **Write IOPS**
  The write count per second is displayed.

- **Read Throughput**
  The amount of transferred data that is read per second is displayed.

- **Write Throughput**
  The amount of transferred data that is written per second is displayed.

- **Read Cache Hit Rate**
  The cache hit rate (for read) is displayed.

- **Write Cache Hit Rate**
  The cache hit rate (for write) is displayed.

- **Prefetch Cache Hit Rate**
  The cache hit rate (for prefetch) is displayed.

- **Extreme Cache Cache Hit Rate**
  The cache hit rate of EXC for read I/O is displayed.
  Refer to "Extreme Cache Cache Hit Rate" (page 783) in "Performance (Host I/O)" for details.

> **● N o t e**
>
> A "-" (hyphen) is usually displayed for the following volumes:
> - Volume type is "SDV" or "SDPV"
> - Volumes that are created in a RAID group or a TPP configured with SSDs or SSD SEDs
> - ODX Buffer volumes

Filter setting

Filter	Description
Name	Input the volume name that is to be displayed. When not using the volume name for filtering, leave this item blank.
Type	Select the volume type that is to be displayed.
Usage	Select the usage of the volume that is to be displayed.

LUN Group

This function displays the LUN groups of each volume.
A LUN group is a group of Logical Unit Numbers (LUNs), which can be recognized by the host. The allocation information of LUNs and volumes in the ETERNUS DX/AF are configured to the LUN group.

The following items are displayed in the Main area:

- No.
  The volume number is displayed.
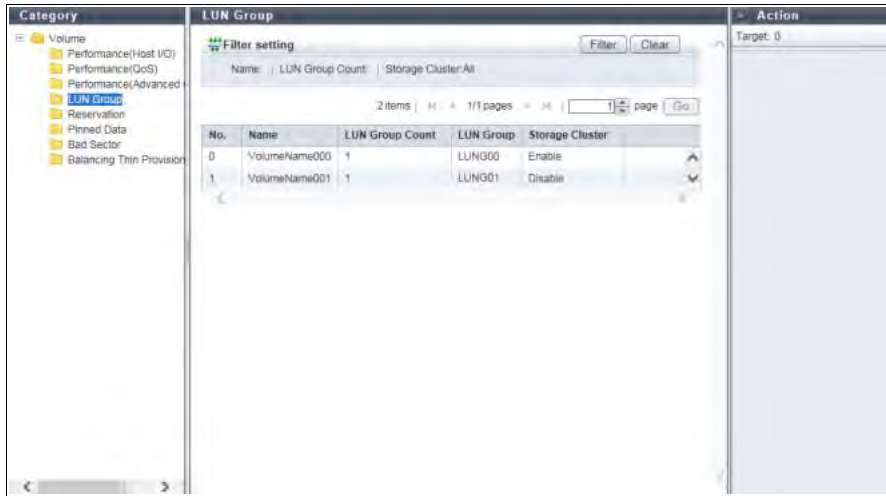
- Name
  The volume name is displayed.

- LUN Group Count
  The total number of LUN groups for the volume and the number of ports to which the volume is allocated is displayed.

- LUN Group
  The LUN group names of the volume are displayed. If the host, ports, and LUNs are allocated without specifying a host group or port group, the location information (x: CE number, y: CM number, z: CA number, w: Port number) of the ports is displayed.
  If the volume is registered in multiple LUN groups or the volume is allocated to multiple ports, the multiple LUN group names and port locations are displayed.
  When the volume does not belong to any LUN groups, or the volume is not allocated to any ports, a "-" (hyphen) is displayed.
  - LUN group name
  - For the ETERNUS DX8700 S3/DX8900 S3
    CE#x CM#y CA#z Port#w
  - For the other models
    CM#y CA#z Port#w

- Storage Cluster
  When the volume is being used by the Storage Cluster function, "Enable" is displayed. When no volumes are used for the Storage Cluster function, "Disable" is displayed.
  This item is displayed only when "Enable" is selected for the Storage Cluster function.

Filter setting

Filter	Description
Name	Input the volume name that is to be displayed. When not using the volume name for filtering, leave this item blank.
LUN Group	Input the LUN group name that is to be displayed. When not using the LUN group name for filtering, leave this item blank.
Storage Cluster	Select the Storage Cluster function usage status for the volume that is to be displayed. This item is displayed only when "Enable" is selected for the Storage Cluster function.

Reservation

This function displays the reservation status of the volumes that are specified by a host.

> **N o t e**
>
> - The reservation status for volumes where the usage is "Block", "Block/Dedup", and "Migration" is displayed. Refer to "Volume (Basic Information)" (page 775) for details.
> - In this section, "volumes" include "External Volumes" if differentiation is not specifically required. Refer to "External Volume specification" (page 781) for details.

The following items are displayed in the Main area:

- No.
  The volume number is displayed. Click this item to display the [Volume Detail] screen.
  Refer to "Volume Detail (Reservation)" (page 811) for display items.
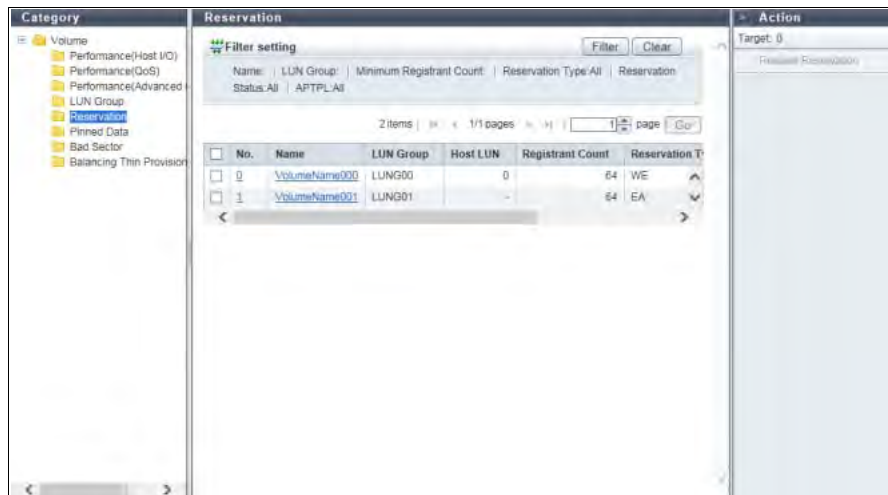
- Name
  The volume name is displayed. Click this item to display the [Volume Detail] screen.
  Refer to "Volume Detail (Reservation)" (page 811) for display items.

- LUN Group
  When the host affinity setting is specified for a host that reserves the volume, the LUN group name is displayed. If the host, ports, and LUNs are directly allocated (mapped), the location information (x: CE number, y: CM number, z: CA number, w: Port number) of the ports is displayed.
  When the volume is not reserved, a "-" (hyphen) is displayed.
  - LUN group name
  - For the ETERNUS DX8700 S3/DX8900 S3
    CE#x CM#y CA#z Port#w
  - For the other models
    CM#y CA#z Port#w

- Host LUN
  The host LUN, which is allocated to the volume, is displayed.
  When the volume is not reserved, a "-" (hyphen) is displayed.

- Registrant Count
  The number of reservation keys registered in the volume is displayed.

- **Reservation Type**
  When the volume is in persistent reservation status, one of the following persistent reservation types is displayed. When the volume is in reservation status other than persistent reservation status, or when the volume is not reserved, a "-" (hyphen) is displayed.
  - WE (Write Exclusive)
  - EA (Exclusive Access)
  - WE_RO (Write Exclusive-Registrants Only)
  - EA_RO (Exclusive Access-Registrants Only)
  - WE_AR (Write Exclusive-All Registrants)
  - EA_AR (Exclusive Access-All Registrants)

- **Reservation Status**
  The volume reservation status is displayed.
  - Yes
    In persistent reservation status
  - No
    In reservation status, but not in persistent reservation status
  - "-" (hyphen)
    Not in reservation status

- **APTPL (*1)**
  Whether or not persistent reservation information is kept after the ETERNUS DX/AF has been shutdown/rebooted is displayed. When the volume is in reservation status other than persistent reservation status, "No" is displayed. When the volume is not reserved, a "-" (hyphen) is displayed.
  *1:   Activate Persist Through Power Loss
  - Yes
    The persistent reservation information is kept.
  - No
    The persistent reservation information is not kept.

Filter setting

Filter	Description
Name	Input the volume name that is to be displayed. When not using the volume name for filtering, leave this item blank.
LUN Group	Input the LUN group name or the port location information for the volume that is to be displayed. When not using the LUN group name or port location information for filtering, leave this item blank.
Bottom of Registrant Count	Input the minimum number of registrants for the volume that is to be displayed. When not using the bottom of the registrant count, leave this item blank.
Reservation Type	Select the reservation type of the volume that is to be displayed.
Reservation Status	Select the reservation status of the volume that is to be displayed.
APTPL	Select the APTPL of the volume that is to be displayed.

Pinned Data

Volumes including pinned data are displayed.
"Pinned data" is the data left in the cache memory due to unsuccessful write-back to the volume from the cache memory.

> **N o t e**
>
> - When a system message that indicates the detection of pinned data is displayed in the [Overview] screen, or when a "Pinned data" event is notified by Host Sense Key Code Qualifier or SNMP Trap, use this function to check the detected pinned data.
>   Use the [Setup Event Notification] function to specify whether to perform event notification when pinned data is detected. Refer to "Setup Event Notification" (page 155) for details. Note that writing back, deleting, and saving pinned data can be performed by a maintenance engineer who has the "Maintenance Operation" policy.
> - Deduplication/Compression Volumes are not displayed in the pinned data list.
> - Pinned data is not created for External Volumes.

The following items are displayed in the Main area:

- No.
  The volume number is displayed. Click this item to display the [Volume Detail] screen.
  Refer to "Volume Detail (Pinned Data)" (page 812) for display items.

- Name
  The volume name is displayed. Click this item to display the [Volume Detail] screen.
  Refer to "Volume Detail (Pinned Data)" (page 812) for display items.

- Pinned Data Count
  The number of pinned data is displayed.

- Type
  The volume type is displayed.
  - Standard
  - WSV
  - TPV
  - FTV
  - SDV
  - SDPV
  - Temporary

- Usage
  The usage of the volume is displayed.
  - Block
    The volumes that are used for the SAN.
  - File
    The volumes that are used for the NAS.
  - System
    The volumes that are used for management information.
    Refer to "Usage Details" (page 807) in "Volume Detail (Basic)" for details.

- RAID Group/TPP/FRTP No.
  The following number is displayed:
  - If the type is "WSV"
    The RAID group number to which the representative volume (*1) belongs is displayed.
    *1: A volume for WSV, which is created by concatenating multiple RAID groups with striping, that belongs to the RAID group that is first in the concatenation order.
  - If the type is "TPV"
    The TPP number to which the volume belongs is displayed.
  - If the type is "FTV"
    The FTRP number to which the volume belongs is displayed.
  - If the type is not one of the types listed above
    The RAID group number to which the volume belongs is displayed.

- RAID Group/TPP/FTRP Name
  The following name is displayed:
  - If the type is "WSV"
    The RAID group name to which the representative volume belongs is displayed.
  - If the type is "TPV"
    The TPP name to which the volume belongs is displayed.
  - If the type is "FTV"
    The FTRP name to which the volume belongs is displayed.
  - If the type is not one of the types listed above
    The RAID group name to which the volume belongs is displayed.

- Controlling CM
  The Controlling CM of the RAID group to which the volume belongs is displayed.

Bad Sector

The bad sector information is displayed.

> **N o t e**
> - When data for rebuild, copyback, or redundant copy is not read normally, bad sector information is recorded.
> - When a system message that indicates the detection of bad sector is displayed in the [Overview] screen or when a "Bad data" event is notified by Host Sense Key Code Qualifier or an SNMP Trap, use this screen to check the detected bad sector.
>   Use the [Setup Event Notification] function to specify whether to perform event notification when a bad sector is detected. Refer to "Setup Event Notification" (page 155) for details. Note that the deletion of bad sector can be performed by a maintenance engineer who has the "Maintenance Operation" policy.
> - Deduplication/Compression Volumes are not displayed in the bad sector list.
> - A bad sector is not created for External Volumes.

The following items are displayed in the Main area:

- No.
  The volume number is displayed.

- Name
  The volume name is displayed.
  When the volume type is WSV or when the volume is concatenated by LUN concatenation, "Volume name (n/m)" (n: nth volume in the concatenation order, m: number of concatenated volumes) is displayed.

- Type
  The volume type is displayed.
    - Standard
    - WSV
    - TPV
    - FTV
    - SDV
    - SDPV
    - Temporary

- Usage
  The usage of the volume is displayed.
    - Block
      The volumes that are used for the SAN.

- File
  The volumes that are used for the NAS.
- System
  The volumes that are used for management information.
  Refer to "Usage Details" (page 807) in "Volume Detail (Basic)" for details.

- Error LBA
  The start position of the bad sector information in the volume is displayed using the LBA.
  When the volume type is WSV or when the volume is concatenated by LUN concatenation, the LBA for each volume that is concatenated (*1) is displayed.
  A "-" (hyphen) is displayed when the "Error Type" is "Dispersion".

- Error LBA Count
  The number of LBAs from Error LBA of the bad sector information in the volume is displayed.
  When the volume type is WSV or when the volume is concatenated by LUN concatenation, the LBA Count for each volume that is concatenated (*1) is displayed.
  A "-" (hyphen) is displayed when the "Error Type" is "Dispersion".

- Error Type
  The number of bad sector information in the volume is displayed.
  - When one bad sector information exists in the volume: "Contiguity"
  - When multiple number of bad sector information exist in the volume: "Dispersion"

*1:   Each volume is displayed in "volume name (n/m)" format (n: nth volume in the concatenation order, m: number of concatenated volumes). Refer to "Volume (Basic Information)" (page 775) for details.

Balancing Thin Provisioning Volume

This function displays the information of balancing TPVs.

> ▶ **Caution**
>
> When using the Thin Provisioning function, "Enable" the Thin Provisioning. Refer to "Set Thin Provisioning" (page 536) for details.

> ● **N o t e**
>
> • Deduplication/Compression Volumes and Deduplication/Compression System Volumes are not displayed in the TPV list because they are not targets for balancing.
> • To check whether the Thin Provisioning function is enabled or disabled, refer to the "Settings (Thin Provisioning)" (page 922).
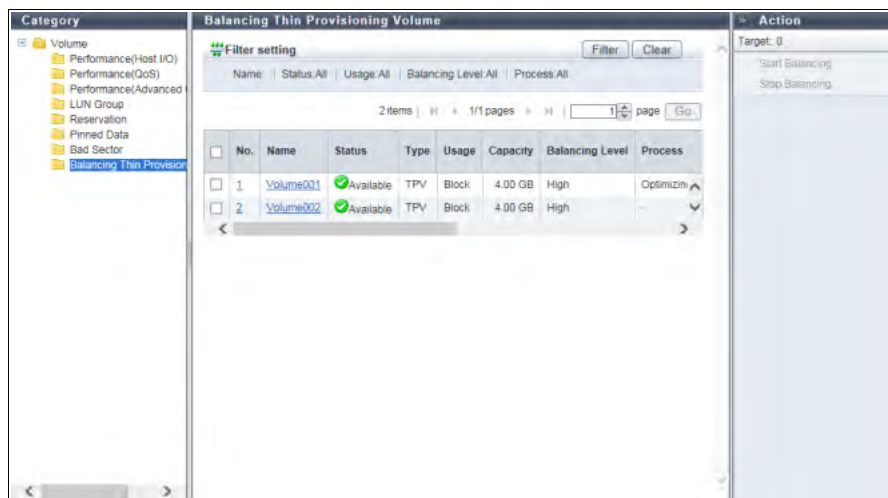
The following items are displayed in the Main area:

- No.
  The volume number is displayed. Click this item to display the [Volume Detail] screen.
  Refer to "Volume Detail (Balancing TPV)" (page 813) for display items.

- Name
  The volume name is displayed. Click this item to display the [Volume Detail] screen.
  Refer to "Volume Detail (Balancing TPV)" (page 813) for display items.

- Status
  The volume status is displayed. Refer to "Volume Status" (page 1373) for detailed information of volume status.

- Type
  The volume type (fixed to "TPV") is displayed.

- Usage
  The usage of the volume is displayed.
  - Block
    The volumes that are used for the SAN.
  - File
    The volumes that are used for the NAS.
  - System
    The volumes that are used for management information.
    Refer to "Usage Details" (page 807) in "Volume Detail (Basic)" for details.

- Capacity
  The total volume capacity is displayed.

- Balancing Level
  The balancing level of the volume is displayed.
    - When the volume is balanced
      High
    - When the volume is almost balanced
      Middle
    - When the volume is not balancing well
      Low
    - When the ETERNUS DX/AF is abnormal
      "-" (hyphen)

- Process
  A process that is being performed for the volume is displayed.
  Refer to "Process" (page 778) in "Volume (Basic Information)" for details.
    - Balancing
    - Formatting
    - Migrating
    - Optimizing Capacity
    - Reserved Optimizing Capacity

- Balancing Process
  When "Process" is not "Balancing", a "-" (hyphen) is displayed.
    - Status
      The status of TPV balancing is displayed.

        - Active
          Running normally

        - Error
          Stopped due to an error
    - Progress
      The progress of TPV balancing is displayed.
    - Work Vol. No.
      The volume number undergoing TPV balancing is displayed.
    - Work Vol. Name
      The volume name undergoing TPV balancing is displayed.
    - Error Code
      The error code of TPV balancing is displayed when an error occurs.
    - Elapsed Time
      The elapsed time of TPV balancing is displayed.
      The displayed time is the elapsed time at the point when this screen is displayed.

Filter setting

Filter	Description
Name	Input the volume name that is to be displayed. When not using the volume name for filtering, leave this item blank.
Status	Select the status of the volume that is to be displayed.
Usage	Select the usage of the volume that is to be displayed.
Balancing Level	Select the balancing level of the volume that is to be displayed.
Process	Select the process of the volume that is to be displayed.

Snapshot

This function displays the snapshot configuration information of the NAS user volume.
This function is displayed in a Unified Storage environment.
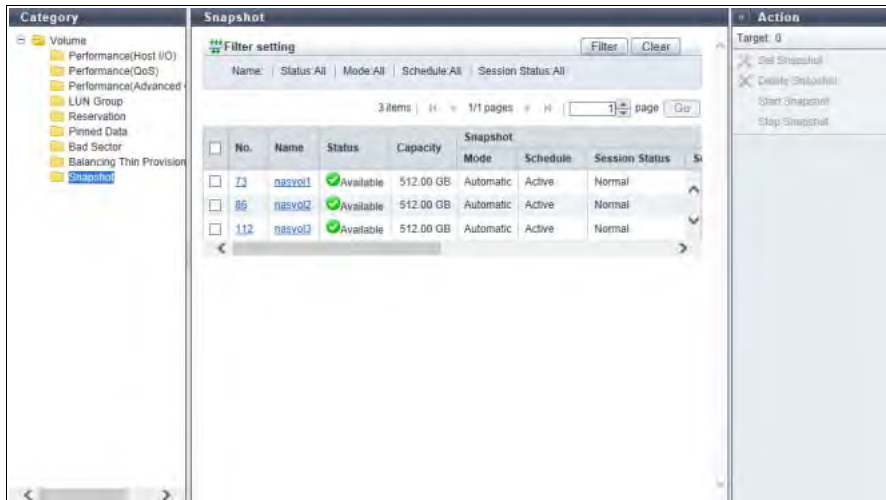
The following items are displayed in the Main area:

- No.
  The NAS user volume number is displayed. Click this item to display the [Volume Detail] screen.
  Refer to "Volume Detail (Snapshot)" (page 815) for display items.

- Name
  The NAS user volume name is displayed. Click this item to display the [Volume Detail] screen.
  Refer to "Volume Detail (Snapshot)" (page 815) for display items.

- Status
  The NAS user volume status is displayed.
  When the volume status is normal, "✅ Available" is displayed.
  Refer to "Volume Status" (page 1373) for detailed information of volume status.

- Capacity
  The NAS user volume capacity is displayed.

- Snapshot
  The snapshot information is displayed.
  - Mode
    The collection mode for the snapshot is displayed.
    If the snapshot is not set, a "-" (hyphen) is displayed.
    - Automatic
      The snapshot is set from ETERNUS Web GUI, ETERNUS CLI, or ETERNUS SF Storage Cruiser.
    - Manual
      The snapshot is set from VMware vSphere Web Client. Refer to "ETERNUS vCenter Plug-in User's Guide" for details.
  - Schedule
    Status of the scheduled operation for snapshot is displayed.
    If the snapshot is not set or if the collection mode (or the "Mode" setting) for snapshot is set to "Manual", a "-" (hyphen) is displayed.
    - Active
    - Inactive
  - Session Status
    The session status for the snapshot is displayed.
    If the snapshot is not set, a "-" (hyphen) is displayed.

- • Normal
  Snapshot performs normally.
- • Error
  Some snapshots cannot be referenced due to an error.
  If the session status of even one generation is error in the [Volume Detail] screen, "Error" is displayed for this item. Refer to "Volume Detail (Snapshot)" (page 815) for details.
- Schedule Day
  The snapshot acquisition schedule (set day) is displayed.
  If the snapshot schedule is specified for all the days of the week, "Every Day" is displayed.
  If the snapshot is not set or if the collection mode (or the "Mode" setting) for snapshot is set to "Manual", a "-" (hyphen) is displayed.
- Schedule Time
  The snapshot acquisition schedule (set time) is displayed.
  If the snapshot schedule is specified for all hours, "Every Hour" is displayed.
  If the snapshot is not set or if the collection mode (or the "Mode" setting) for snapshot is set to "Manual", a "-" (hyphen) is displayed.
- Number of Generations
  The number of generations for the snapshot is displayed. If the snapshot is not set, a "-" (hyphen) is displayed.
  - • ETERNUS DX100 S4
    1 - 64 (*1)
  - • ETERNUS DX200 S4
    1 - 128 (*1)
  - • ETERNUS DX500 S4
    1 - 128
  - • ETERNUS DX600 S4
    1 - 128
  - • ETERNUS DX100 S3
    1 - 16 (*2) or 1 - 64 (*1)
  - • ETERNUS DX200 S3
    1 - 64 (*2) or 1 - 128 (*1)
  - • ETERNUS DX500 S3
    1 - 128
  - • ETERNUS DX600 S3
    1 - 128
  - *1: The maximum number of generations when "Memory Extension" described below is installed. For the ETERNUS DX100 S4/DX100 S3, "Memory Extension" is used in the Unified Storage environment. For the ETERNUS DX200 S4/DX200 S3, "Memory Extension" is used in the Unified Storage environment or for the Deduplication/Compression function.
    - • ETERNUS DX100 S4/DX100 S3
      16GB/CM (the controller firmware version is V10L53 or later)
    - • ETERNUS DX200 S4/DX200 S3
      32GB/CM (the controller firmware version is V10L33 or later
  - *2: The maximum number of generations when "Memory Extension" described below is installed.
    - • ETERNUS DX100 S3
      8GB/CM
    - • ETERNUS DX200 S3
      16GB/CM
- RAID Group No.
  The RAID group number that the snapshot destination SDV belongs to is displayed. If the snapshot is not set, a "-" (hyphen) is displayed.
- RAID Group Name
  The RAID group name that the snapshot destination SDV belongs to is displayed. If the snapshot is not set, a "-" (hyphen) is displayed.

Filter setting

Filter	Description
Name	Input the volume name that is to be displayed. When not using the volume name for filtering, leave this item blank.
Status	Select the volume status that is to be displayed.
Mode	Select the snapshot collection mode of the volume that is to be displayed. To display volumes without the snapshot setting, select "-" (hyphen).
Schedule	Select the scheduled snapshot operation status of the volume that is to be displayed. To display volumes without the snapshot setting, select "-" (hyphen).
Session Status	Select the snapshot session status of the volume that is to be displayed. To display volumes without the snapshot setting, select "-" (hyphen).

Filter setting

Volume Detail (Basic)

Click the [No.] link or the [Name] link in the "Volume (Basic Information)" (page 775) to display the detailed infor-
mation of the target volume.

● Standard volume

● Standard volume (External Volume)

● **TPV**

● **NAS user volume**

● **Deduplication/Compression Volume**

The following items are displayed in the Main area:

- Status
  The volume status is displayed.
  When the volume status is normal, "✅ Available" is displayed.
   Refer to "Volume Status" (page 1373) for detailed information of RAID group status.
- Capacity
  The volume capacity is displayed with a unit that is determined according to the actual volume size ("MB", "GB", or "TB").
- Capacity on RAID Group
  The volume capacity is displayed with a unit that is determined according to the volume size secured in the RAID group or External RAID Group ("MB", "GB", or "TB"). The capacity is also displayed with "KB".
  While the capacity that is specified by the user when creating the volume is displayed in the "Capacity" field described above, the volume capacity that is actually secured in units of the basic volume size in the RAID group is displayed in this field. This item is displayed when the volume type is "Standard", "WSV", "SDV", "SDPV", or "Temporary".
- Used Capacity
  The used capacity (physically allocated capacity) of volume is displayed.
  A "-" (hyphen) is displayed for the Deduplication/Compression Volume (*1).
  This item is displayed when the volume type is "TPV" or "FTV".
  - *1:   The used capacity of the Deduplication/Compression Volumes in the TPP can be determined by checking the used capacity of the DEDUP_SYS Volume that is created in the TPP. The used capacity of the DEDUP_SYS Volume approximately corresponds to the total used capacity of the Deduplication/Compression Volumes in the relevant TPP.
- Used Rate
  The volume utilization is displayed between 0% - 100%.

  Used Rate = Used Capacity / Capacity

  A "-" (hyphen) is displayed for the Deduplication/Compression Volume (*1).
  This item is displayed when the volume type is "TPV" or "FTV".
  - *1:   The used rate of the Deduplication/Compression Volumes in the TPP can be determined by checking the used rate of the DEDUP_SYS Volume that is created in the TPP. The used rate of the DEDUP_SYS Volume approximately corresponds to the total used rate of the Deduplication/Compression Volumes in the relevant TPP. Note that the data reduction rate for the TPP due to the Deduplication/Compression function can be checked in the [Thin Provisioning Pool] screen. Refer to "Thin Provisioning Pool (Basic Information)" (page 896) for details.
- Threshold
  The threshold for monitoring the volume utilization is displayed between 1% - 100%.
  If the "Used Rate" value exceeds the "Threshold", a Host Sense Key Code Qualifier is notified.
  A "-" (hyphen) is displayed for the Deduplication/Compression Volume or the Deduplication/Compression System Volume.
  This item is displayed when the volume type is "TPV" or "FTV".

  🔵 **N o t e**

  - The threshold for TPPs can be checked in the [Threshold] screen. Refer to "Threshold (Thin Provisioning Pool)" (page 904) for details.
  - The threshold for FTRPs can be checked in the [Flexible Tier Pool] screen. Refer to "Flexible Tier Pool (Basic Information)" (page 909) for details.

- NAS FS Block Size
  The block size of the NAS file system (NAS user volume) is displayed.
  This item is displayed only when the usage details of the volume is "NAS Data".
  The maximum NAS user volume capacity and the maximum file size vary depending on the block size of the NAS file system. Refer to "The maximum NAS user volume capacity and the maximum file size of each "NAS FS Block Size"" (page 282) for details.

- NAS FS Version
The NAS file system (NAS user volume) version is displayed.
This item is displayed only when the usage details of the volume is "NAS Data". For the maximum NAS user volume capacity for each "NAS FS Version", refer to "The maximum NAS user volume capacity and the maximum file size of each "NAS FS Block Size"" (page 282).

NAS FS Version	Volume capacity expansion	Description
1	N/A	The NAS user volumes that are created with the controller firmware version earlier than V10L21. "NAS FS Block Size" is fixed to "256KB".
2	Available (*1)	The NAS user volumes that are created with the controller firmware version V10L21. "NAS FS Block Size" is fixed to "256KB".
3	Available (*1)	The NAS user volumes that are created with the controller firmware version V10L31. "NAS FS Block Size" is "8KB" or "32KB". When creating a NAS user volume where the block size is "256KB", "2" is displayed for this item.
4	Available (*1)	The NAS user volumes that are created with the controller firmware version V10L33. "NAS FS Block Size" is "8KB", "32KB", or "256KB". The maximum NAS user volume capacity varies depending on whether the version is "3" or "4" or later.
5	Available (*1)	The NAS user volumes that are created with the controller firmware versions V10L51 and later. "NAS FS Block Size" is "8KB", "32KB", or "256KB". When the version is "5" or later, the quota information can be configured for each shared folder.

*1: Refer to "Reconfigure NAS Volume" (page 289) and "Expand Thin Provisioning Volume" (page 281) for details.

▷ **Caution**

- If the file system format for the NAS user volume where the "NAS FS Version" is "1", "2", "3", or "4" is converted, the "NAS FS Version" is changed to "5". Refer to "Reconfigure NAS Volume" (page 289) for details. Note that the "NAS FS Block Size" for the relevant NAS user volume is not changed.
- To configure the quota information for each shared folder to which the NAS user volume belongs when the "NAS FS Version" is "2", "3", or "4", the file system must be changed. Use the [Reconfigure NAS Volume] function for Web GUI and execute the "start nas-fsck" ETERNUS CLI command to change the file system for the relevant NAS user volume. Refer to "Add Quota Setting" (page 496) for details.

● **N o t e**

If the "NAS FS Block Size" is "8KB" or "32KB" and the file system format for the NAS user volume where the "NAS FS Version" is "3" is converted, the maximum capacity of the NAS user volume that can be created is expanded.

- RAID Group No.
The RAID group number or External RAID Group number to which the volume belongs is displayed.
If the type is "WSV", the RAID group number to which the representative volume belongs is displayed.
This item is not displayed when the volume type is "TPV" or "FTV".

- RAID Group Name
The RAID group name or External RAID Group name to which the volume belongs is displayed.
If the type is "WSV", the RAID group name to which the representative volume belongs is displayed.
This item is not displayed when the volume type is "TPV" or "FTV".

- Thin Provisioning Pool No.
The TPP number to which the volume belongs is displayed.
This item is displayed only when the volume type is "TPV".

- Thin Provisioning Pool Name
  The TPP name to which the volume belongs is displayed.
  This item is displayed only when the volume type is "TPV".
- FTRP No.
  The FTRP name to which the volume belongs is displayed.
  This item is displayed only when the volume type is "FTV".
- FTRP Name
  The FTRP name to which the volume belongs is displayed.
  This item is displayed only when the volume type is "FTV".
- Encryption
  The encryption status of the volume is displayed.
  For the ETERNUS DX60 S4/DX60 S3, this item is not displayed.
  - CM
  - "-" (hyphen)
  - SED
- Data Integrity
  The volume protection method is displayed.
  - Default
    Data is protected within the ETERNUS DX/AF.
  - T10-DIF
    Data is protected with a T10-DIF compatible method in the ETERNUS DX/AF and the host paths. This method
    is available only when the host interface is FC.
- Wide Stripe Size
  The Wide Stripe Size is displayed.
  "Wide Stripe Size" is the size of the WSV Unit that is allocated to each RAID group in series. A "-" (hyphen) is dis-
  played when the volume type is other than "WSV".
  - Normal
    An integral multiple of the basic size for each RAID level (*1). The maximum size is 16MB or smaller.
  - Small
    An integral multiple of the basic size for each RAID level (*1). The maximum size is 2MB or smaller. Note
    that when the basic size for a RAID group is larger than 2MB, the basic size is specified.
  - *1:   The basic size (stripe size) when creating a volume. Refer to <u>"Basic Size for each RAID Group" (page 1340)</u> for
    details.
- Reserved Deletion
  The "Reserved Deletion" state of the SDPV is displayed.
  If the SDPV is currently being used, the target SDPV status is changed to "Reserved Deletion". Refer to <u>"Delete
  Snap Data Pool Volume" (page 293)</u> for details.
  A "-" (hyphen) is displayed when the volume type is other than "SDPV".
  - Yes
    SDPVs are in the "Reserved Deletion" state.
  - No
    SDPVs are not in the "Reserved Deletion" state.
- UID
  The UID is displayed.
  A "-" (hyphen) is displayed for the Deduplication/Compression System Volume.

> **🔵 N o t e**
>
> - For External Volumes that inherit the External LU Information, the UID of the External Volumes is dis-
>   played. For External Volumes that do not inherit the External LU Information, the UID that is assigned by
>   the ETERNUS DX/AF (local storage system) is displayed.
> - If the External LU Information is deleted, the UID that is assigned by the ETERNUS DX/AF is displayed. Refer
>   to <u>"Delete External LU Information" (page 333)</u> for details.

- UID Mode
  The UID status is displayed.
  A "-" (hyphen) is displayed for the Deduplication/Compression System Volume.
  - Default
  - Custom
  - External

  > 🔵 **N o t e**
  >
  > If the External LU Information is deleted, this item is changed from "External" to "Default". Refer to "Delete External LU Information" (page 333) for details.

- Storage Cluster
  When the volume is being used by the Storage Cluster function, "Enable" is displayed. When no volumes are used for the Storage Cluster function, "Disable" is displayed.
  This item is displayed only when "Enable" is selected for the Storage Cluster function.

- Virtual Volume
  When the volume is being used by the Virtual Volume function, "Enable" is displayed. When no volumes are used by the Virtual Volume function, "Disable" is displayed.
  For $VVOL_META, "Disable" is displayed even if the relevant volume is being used by the Virtual Volume function.
  This item is displayed only when "Enable" is selected for the Virtual Volume function.

- Allocation
  The allocation method for the volume is displayed.
  A "-" (hyphen) is displayed when the volume type is other than "TPV" or "FTV".
  - Thin
  - Thick

- Usage Details
  The detailed usage of the volume is displayed.
  - When the usage is "Block"
    "Block" is displayed. The volumes that are used for the SAN.
  - When the usage is "Block/Dedup"
    "Block Dedup" is displayed. The Deduplication/Compression Volumes.
    The volumes that have Deduplication, Compression, or both enabled when the volumes are created.

    > 🔵 **N o t e**
    >
    > For this item, the Deduplication or Compression status is not displayed. The relevant volume is in one of the following conditions.
    > - Only Deduplication is enabled
    > - Only Compression is enabled
    > - Deduplication and Compression are enabled
    >
    > To check the Deduplication or Compression status of the volume, refer to the Deduplication/ Compression status of the TPP to which the relevant volume belongs. Refer to "Thin Provisioning Pool (Basic Information)" (page 896) for details.

  - When the usage is "File"
    - NAS Data
      The user volumes that are used for the NAS.
      The NAS Data type volumes can be created by ETERNUS Web GUI.
    - NAS Backup
      The backup volumes that are used for the NAS.
      The NAS Backup type volumes are created by ETERNUS CLI or ETERNUS SF Storage Cruiser.

- NAS Snapshot
  The snapshot destination SDVs that are used for NAS.
  NAS Snapshots are automatically created when performing the [Set Snapshot] function.
- When the usage is "System"
  - NAS CM#0 System (*1)
    The system volumes that are used for CM#0 in the NAS system.
  - NAS CM#1 System (*1)
    The system volumes that are used for CM#1 in the NAS system.
  - NAS FS Management (*1)
    The system volumes that are used for NAS system file management.
  - NAS CM#0 EX System (*2)
    The NAS expanded system volume that is used to store NAS monitoring logs for CM#0 in the NAS system.
  - NAS CM#1 EX System (*2)
    The NAS expanded system volume that is used to store NAS monitoring logs for CM#1 in the NAS system.
  - VVOL Metadata
    The system volumes that are used for storing the management information (metadata) of the Virtual Volume function.
    This volume is automatically created when the Virtual Volume function is set to "Enable" and when VVOL is created from ETERNUS SF Storage Cruiser for the first time.
  - Dedup System (*3)
    The Deduplication/Compression System Volumes (or DEDUP_SYS Volumes).
    This volume is used to store data and meta data after the Deduplication/Compression process is complete.
  - Dedup Map (*3)
    The Deduplication/Compression System Volumes (or DEDUP_MAP Volumes).
    This volume is used to store the mapping tables for obtaining the physical location information of DEDUP_SYS Volumes from Deduplication/Compression Volumes.

  *1: The volume is created automatically when NAS Data volumes are created.
  *2: The volume is created by executing the "create volume" ETERNUS CLI command. Web GUI cannot be used to create these volumes. NAS volumes of which the usage is "System" is collectively referred to as "NAS system volumes" in this manual.
  *3: The volume is created automatically when Deduplication/Compression (or the Deduplication/Compression function) for TPP is enabled.

- When the usage is "Migration"
  An External Volume that is used for data migrations.

- Process
  A process that is being performed for the volume is displayed. If multiple processes are currently being performed, the processes are separated with a ":" (colon) and displayed in the "xx:yy:zz" format. "Encrypting", "Formatting", "Migrating", or "Balancing" is displayed as "xx". "Optimizing Capacity", "Reserved Optimizing Capacity", "Automatic Stop", or "Manual Stop" is displayed as "yy". "Optimizing Capacity" or "Reserved Optimizing Capacity" is displayed as "zz".
  Note that "Automatic Stop" and "Manual Stop" are displayed only if the Non-disruptive Storage Migration License has been registered.
  If no process is being performed, a "-" (hyphen) is displayed.
  - Encrypting
  - Formatting
  - Migrating
  - Balancing
  - Optimizing Capacity
  - Reserved Optimizing Capacity
  - Automatic Stop
  - Manual Stop

> **◉ N o t e**
>
> If "Automatic Stop" or "Manual Stop" is selected for "Data Sync after Migration" when starting a data migration for Non-disruptive Storage Migration using the [Start RAID Migration] function, "Migrating : Automatic Stop" or "Migrating : Manual Stop" is displayed for "Process" of the migration source volume. The following items are displayed if "Manual Stop" is selected and a data synchronization is being performed between the migration source volumes and migration destination volumes even if the migration has been completed.
>
> | Item | Migration source volume | Migration destination volume |
> |------|------------------------|------------------------------|
> | Usage Details | Migration | Block |
> | Process | Migrating : Manual Stop | Migrating |
> | Migration Status | Active | Active |
> | Progress | 100 % | 100 % |

- Migration Status
  The RAID migration status is displayed.
  This item is only displayed when using controller firmware version V10L4x or later, and when the process is "Migrating".
  - Reserved
    The RAID migration is in a reserved state.
  - Active
    The RAID migration is operating normally.
  - Error
    The RAID migration has been suspended due to an error.
  - "-" (hyphen)
    A status other than the ones listed above.
- Progress
  The progress of a process that is being performed is displayed with a bar and a rate (%). To display the latest progress, refresh the screen. If no process is being performed, or if the migration status is "Reserved", a "-" (hyphen) is displayed.
- Estimated Time Left
  The estimated remaining time before formatting is complete is displayed. To display the latest estimated remaining time, refresh the screen. This item is not displayed when the process is other than "Formatting".
  - Calculating
    The ETERNUS DX/AF is calculating the estimated remaining time.
  - 30 days or more
    The estimated remaining time is 30 days or more.
  - x days y h z min. (x: 1 - 29, y: 0 - 23, z: 0 - 59)
    The estimated remaining time is more than one minute and less than 30 days. When the estimated remaining time is less than one day, the "days" value is omitted. When the estimated remaining time is less than one hour, the "days" and "hours" values are omitted.
  - Less than 1 min.
    The estimated remaining time is less than one minute.

> **▷ Caution**
>
> The "Estimated Time Left" value may increase or decrease due to the I/O load when displaying this item.

- Remaining Size
  The remaining size of the unformatted volume is displayed. To display the latest size, refresh the screen. This item is not displayed when the process is other than "Formatting".

- Optimizing Capacity Progress
  The progress of capacity optimization processes that are being performed is displayed with a bar and a ratio value. To display the latest progress for the capacity optimization, refresh the screen. When capacity optimization is not being performed, a "-" (hyphen) is displayed.
  When the storage system status is "Not Ready", the field is blank.

- Total Device Space
  The total space of the file system is displayed.
  The "Total Device Space" indicates the NAS user volume capacity that is available for the user.
  This item is displayed only when the usage details of the volume is "NAS Data".

- Used Device Space
  The used space in the file system is displayed.
  The "Used Device Space" indicates the NAS user volume capacity that has already been used by the user.
  This item is displayed only when the usage details of the volume is "NAS Data".

- Free Device Space
  The free space in the file system is displayed.
  The "Free Device Space" indicates the NAS user volume capacity that will be available for the user.
  This item is displayed only when the usage details of the volume is "NAS Data".

- File System Information
  The mount state of the file system is displayed.
  This item is displayed only when the usage details of the volume is "NAS Data".

- External LU Information
  Whether the volume inherits the External LU Information is displayed.
  This item displays "Inherited" for External Volumes that inherit the External LU information while the usage is "Migration" (if a data migration has not been performed or if a data migration is being performed).
  A "-" (hyphen) is displayed for the following volumes.
    - Volumes that have inherited the External LU Information if a data migration has already been performed
    - External Volumes that do not inherit the External LU Information
    - Volumes of which the External LU Information is deleted
    - Volumes (or volumes created in RAID groups)
  This item is displayed only if the Non-disruptive Storage Migration License has been registered.

Volume Detail (Reservation)

The detailed information of reservation volume is displayed.
When reservation keys are registered in volumes, up to 64 host information is displayed.

The following items are displayed in the Main area:

- Host WWN/iSCSI Name
  The WWN or the iSCSI name of the host that can access the volume is displayed.

- CA Port
  The location information (x: CE number, y: CM number, z: CA number, w: Port number) of the CA port that con-
  nects to the host is displayed.

  - For the ETERNUS DX8700 S3/DX8900 S3
    CE#x CM#y CA#z Port#w

  - For the other models
    CM#y CA#z Port#w

- Reservation Key
  The reservation key that is used for persistent reservation of the volume is displayed.
  When no reservation keys exist, a "-" (hyphen) is displayed.

- Hold Reservation
  Whether the target reservation key is used for persistent reservation is displayed.
  When the volume is in reservation status other than persistent reservation status, "No" is displayed.

  - Yes
    In persistent reservation status

  - No
    Not in persistent reservation status

Volume Detail (Pinned Data)

The detailed information of pinned data is displayed.
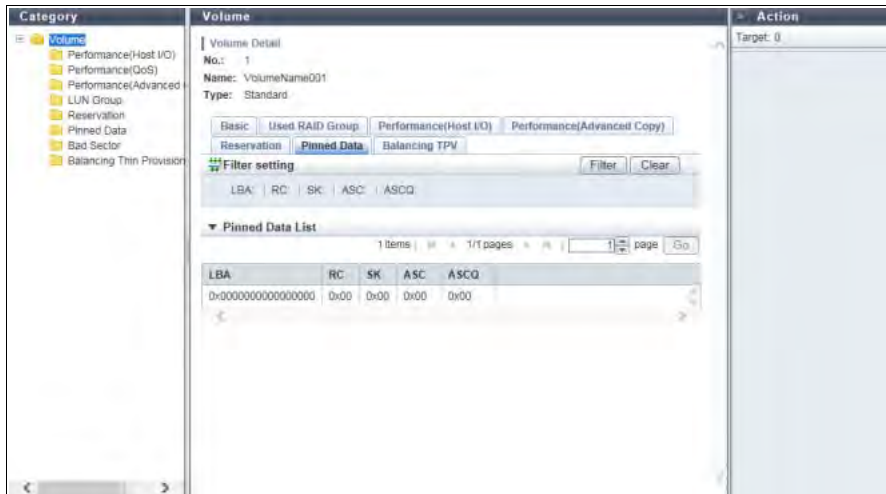
The following items are displayed in the Main area:
- LBA
  The location of the pinned data in the volume is displayed using the Logical Block Address (LBA).
- RC
  The reason (Reason Code) that created the pinned data is displayed.
- SK
  The Sense Key (SK) part is displayed from the sense information that is output when the pinned data is created.
- ASC
  Additional Sense Code (ASC) part is displayed from the sense information that is output when the pinned data is created.
- ASCQ
  Additional Sense Code Qualifier (ASCQ) part is displayed from the sense information that is output when the pinned data is created.

Filter setting

Filter	Description
LBA	Input the LBA that is to be displayed. When not using the LBA for filtering, leave this item blank.
RC	Input the RC that is to be displayed. When not using the RC for filtering, leave this item blank.
SK	Input the SK that is to be displayed. When not using the SK for filtering, leave this item blank.
ASC	Input the ASC that is to be displayed. When not using the ASC for filtering, leave this item blank.
ASCQ	Input the ASCQ that is to be displayed. When not using the ASCQ for filtering, leave this item blank.

Volume Detail (Balancing TPV)

The detailed information of TPV balancing is displayed.
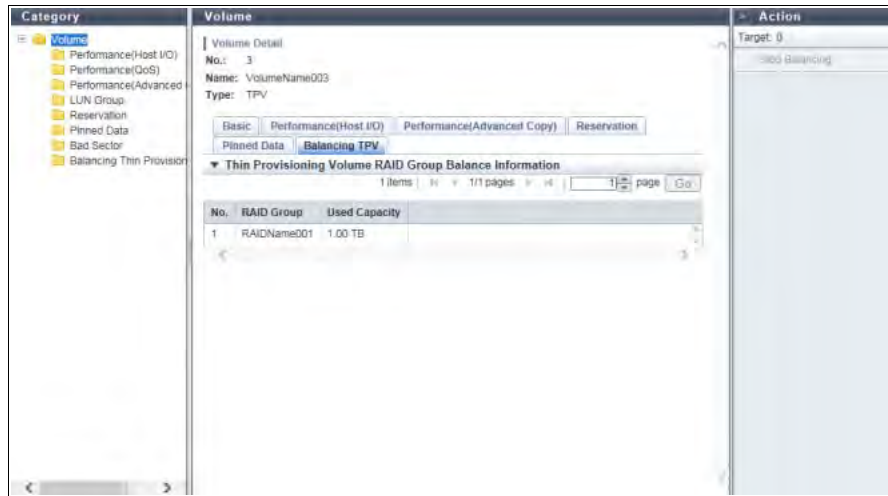
The following items are displayed in the Main area:
- No.
  The RAID group number that configures the TPP to which the target TPV belongs is displayed.
- RAID Group
  The name of the RAID group that configures the TPP to which the target TPV belongs is displayed.
- Used Capacity
  The capacity of each RAID group that is currently allocated to the target TPV is displayed.
  Note that it is not the capacity after re-allocating the physical capacity in the relevant TPV to the RAID groups in the TPP.

Volume Detail (Used RAID Group)

The detailed information of LUN concatenation or WSV is displayed. This screen is not displayed when the volume type is "TPV" and "FTV".
The information for a RAID group that is being used is displayed in the following order. Note that sorting of the display contents is not available.

- When the volume type is "Standard", volumes are displayed in concatenation order with LUN Concatenation
- When the volume type is "WSV", volumes are displayed according to the concatenation number of the WSV Unit (the order of allocating the WSV unit to the RAID group)
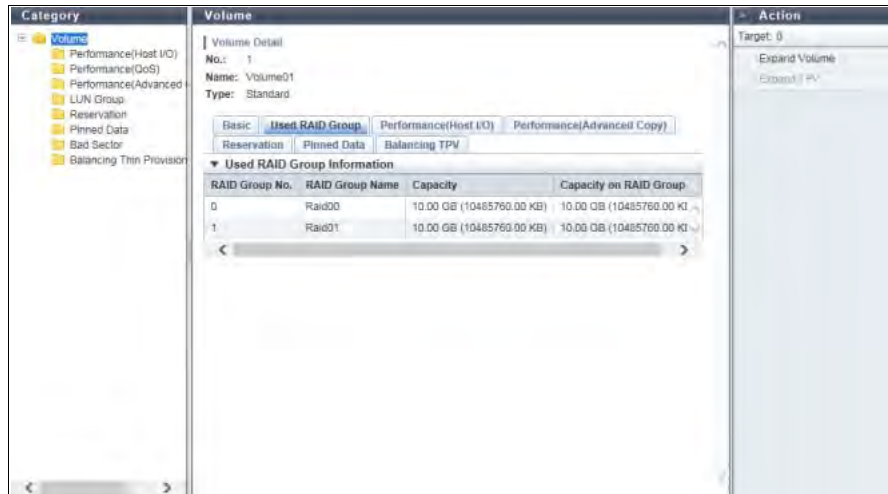
The following items are displayed in the Main area:

- RAID Group No.
  The RAID group number to which the concatenated volume or WSV Unit belongs is displayed.
- RAID Group Name
  The RAID group name to which the concatenated volume or WSV Unit belongs is displayed.
- Capacity
  The capacity of the concatenated volume or the WSV Unit is displayed. The volume capacity is displayed with "MB", "GB", or "TB". The unit of measurement for the capacity is determined according to the actual volume size. The capacity is also displayed with "KB".
- Capacity on RAID Group
  The capacity that is secured in the RAID group by the concatenated volume or the WSV Unit is displayed. The volume capacity is displayed with "MB", "GB", or "TB". The unit of measurement for the capacity is determined according to the actual volume size. The capacity is also displayed with "KB".

Volume Detail (Snapshot)

The detailed information of the snapshot is displayed.
This screen is displayed only for NAS user volumes (volumes of which the "Usage Details" are "NAS Data").
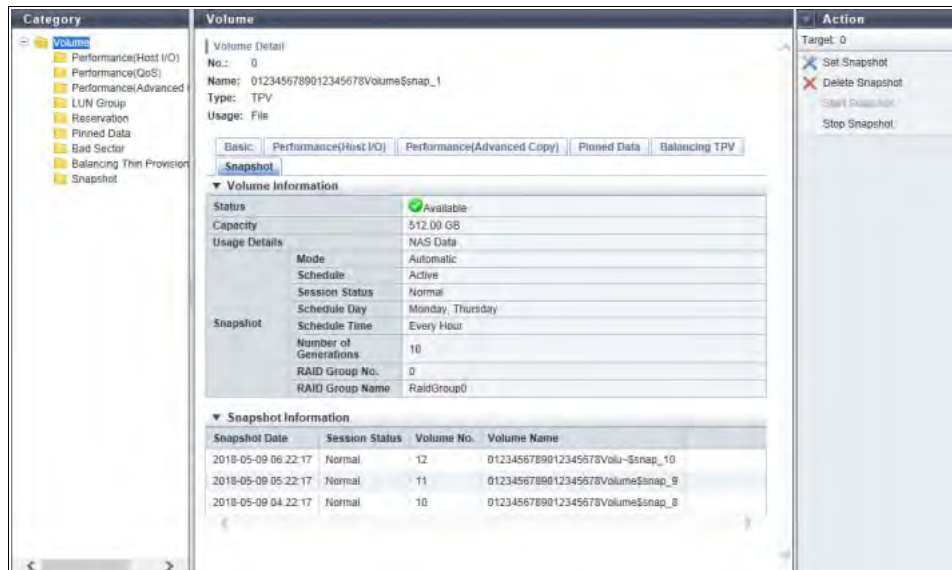
The following items are displayed in the Main area:

● **Volume Information**

- Status
  The NAS user volume status is displayed.
  Refer to "Volume Status" (page 1373) for detailed information of volume status.

- Capacity
  The NAS user volume capacity is displayed.

- Usage Details
  The usage details of the NAS user volume are displayed.

- Snapshot
  The snapshot information is displayed.
  - Mode
    The collection mode for the snapshot is displayed.
    If the snapshot is not set, a "-" (hyphen) is displayed.
    • Automatic
    • Manual
  - Schedule
    Status of the scheduled operation for snapshot is displayed.
    If the snapshot is not set or if the collection mode (or the "Mode" setting) for snapshot is set to "Manual", a "-" (hyphen) is displayed.
    • Active
    • Inactive
  - Session Status
    The session status for the snapshot is displayed.
    If the snapshot is not set, a "-" (hyphen) is displayed.
    • Normal
    • Error

- Schedule Day
  The snapshot acquisition schedule (set day) is displayed.
  If the snapshot schedule is specified for all the days of the week, "Every Day" is displayed.
  If the snapshot is not set or if the collection mode (or the "Mode" setting) for snapshot is set to "Manual", a "-" (hyphen) is displayed.
- Schedule Time
  The snapshot acquisition schedule (set time) is displayed.
  If the snapshot schedule is specified for all hours, "Every Hour" is displayed.
  If the snapshot is not set or if the collection mode (or the "Mode" setting) for snapshot is set to "Manual", a "-" (hyphen) is displayed.
- Number of Generations
  The number of generations for the snapshot is displayed.
  If the snapshot is not set, a "-" (hyphen) is displayed.
- RAID Group No.
  The RAID group number that the snapshot destination SDV belongs to is displayed.
  If the snapshot is not set, a "-" (hyphen) is displayed.
- RAID Group Name
  The RAID group name that the snapshot destination SDV belongs to is displayed.
  If the snapshot is not set, a "-" (hyphen) is displayed.

● **Snapshot Information**

- Snapshot Date
  The date and time of when the snapshot was acquired is displayed in descending order.
  If the snapshot is not set, a "-" (hyphen) is displayed.
  - YYYY-MM-DD hh:mm:ss (YYYY: Year (2001-2037), MM: Month (01 - 12), DD: Date (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))
- Session Status
  The session status for the snapshot is displayed.
  If the snapshot is not set, a "-" (hyphen) is displayed.
  - Normal
    Snapshot performs normally.
  - Error
    The snapshot is stopped due to an error.

- Volume No.
  The volume number for the snapshot destination SDV is displayed.

- Volume Name
  The volume name for the snapshot destination SDV is displayed.

11. Connectivity Status

Connectivity status displays the status information of volumes.
Connectivity status screens can be displayed by clicking the following categories:

Category	Connectivity status screen
Connectivity	Connectivity (Basic Information)
Host Group	Host Group
FC	FC/FCoE Host
iSCSI	iSCSI Host
SAS	SAS Host
Port Group	CA Port Group
FC	FC Port
iSCSI	iSCSI Port
SAS	SAS Port
FCoE	FCoE Port
LUN Group	LUN Group
Host Response	Host Response
CA Reset Group	CA Reset Group
Host-LU QoS	Host-LU QoS
Host QoS	Host QoS (Basic)
FC/FCoE	FC/FCoE Host QoS
iSCSI	iSCSI Host QoS
SAS	SAS Host QoS
Port QoS	Port QoS (Basic)
FC	FC Port QoS
iSCSI	iSCSI Port QoS
SAS	SAS Port QoS
FCoE	FCoE Port QoS
LU QoS Group	LU QoS Group
NAS	NAS
NAS Interface	NAS Interface
Environment Settings	Environment Settings
Quota Management	Quota Management
Meta Cache Distribution	Meta Cache Distribution

Detailed information of the current settings can be displayed from the following screens:
- Host Affinity Detail (Host Group - CA Port Group - LUN Group Setting)
- Host Affinity Detail (Host - CA Port - LUN Group Setting)
- Host Group Detail
- LUN Group Detail
- Host-LU QoS Performance Information
- LUN Group : LU QoS Group Detail

Connectivity (Basic Information)

A list of the host affinity groups is displayed.

When the target connection is "Host Group - CA Port Group", a host affinity is a group that defines an association between a "Host Group", a "CA Port Group", and a "LUN Group". When the target connection is "Host - CA Port", a host affinity is a group that defines an association between a "Host", a "CA Port", and a "LUN Group".
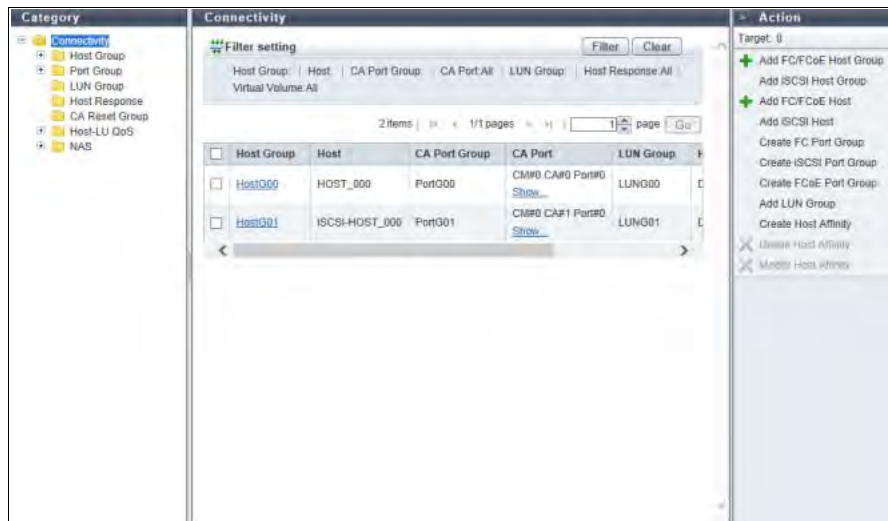
The following items are displayed in the Main area:

- Host Group
  The "Host Group Name" with the host affinity setting is displayed.
  If all of the hosts are to be connected, instead of specific host groups, "All" is displayed.
  By clicking "Host Group Name" or "All", "Host Affinity Detail (Host Group - CA Port Group - LUN Group Setting)" (page 821) is displayed. Regardless of whether the host belongs to a host group, a "-" (hyphen) is displayed if the host affinity setting is specified when selecting a host.
  By clicking "-" (hyphen), "Host Affinity Detail (Host - CA Port - LUN Group Setting)" (page 822) is displayed.

- Host
  The "Host Name" with the host affinity setting is displayed.
  If all of the hosts are to be connected, instead of specific hosts, "All" is displayed.
  When setting the host affinity with the host group specification, the host name that configures the host group is displayed. If "All" has been selected for the host group, "All" is displayed for the host.

- CA Port Group
  The CA port group names for which the host affinity setting is configured are displayed.
  Regardless of whether the CA port belongs to a CA port group, a "-" (hyphen) is displayed if the host affinity setting is specified for a CA port.

- CA Port
  The location information (x: CE number, y: CM number, z: CA number, w: Port number) of the CA port with the host affinity setting is displayed.
  When setting the host affinity with the CA port group specifications, the location information of the CA port that configures the CA port group is displayed.
  - For the ETERNUS DX8700 S3/DX8900 S3
    CE#x CM#y CA#z Port#w
  - For the other models
    CM#y CA#z Port#w

- LUN Group
  The names of the LUN groups with host affinity settings are displayed.
  When LUNs are directly allocated to the CA port (when LUN mapping is created) by an application other than ETERNUS Web GUI, a "-" (hyphen) is displayed.

- Host Response
One of the following host responses is displayed.
  - Host response that is allocated to the host group
  - Host response that is allocated to the host
  - If all of the hosts are to be connected ("All" is displayed in the "Host" field), the host response that was selected when setting the host affinity
    - Solaris MPxIO
    - HP-UX
    - AIX
    - AIX VxVM
    - VS850/SVC
    - BS2000
    - Host responses registered in the ETERNUS DX/AF
    - Default

- Virtual Volume
When the host affinity is being used by the Virtual Volume function, "Enable" is displayed. When the host affinity is not used for the Virtual Volume function, "Disable" is displayed.
This item is displayed only when "Enable" is selected for the Virtual Volume function.

▷ **Caution**

Host affinities of which the Virtual Volume function is enabled cannot be modified by using ETERNUS Web GUI. To change host affinities, use the ETERNUS SF Storage Cruiser.

Display Examples of Host Affinities

Display examples of host affinities are shown in the following table.

Example No.	Display contents						Description
	Host Group	Host	CA Port Group	CA Port	LUN Group	Host Response	
Example 1	Host_ Group_ xxx	Host_1 Show...	Port_ Group_ xxx	CM#0 CA#0 Port#0 Show...	LUN_ Group_ xxx	Host_ Response1	The host affinity setting has been configured in "Host_Group_xxx", "Port_Group_xxx" and "LUN_Group_xxx". The server recognizes the LUN group, "LUN_Group_xxx", which has been specified for each member host (HBA) in "Host_Group_xxx". In the host field, the name of the host that configures "Host_Group_xxx" is displayed. In the CA port field, the location information of the CA port that configures "Port_Group_xxx" is displayed. Refer to "Example 6" for display example when clicking the [Show...] link in the "Host" field or the "CA Port" field.
Example 2	All	All	Port_ Group_ yyy	CM#0 CA#1 Port#1	LUN_ Group_ yyy	Host_ Response2	All servers will be covered. The server recognizes the specified LUN group, "LUN_Group_yyy", from every member port in "Port_Group_yyy". In the CA port field, the location information of the CA port that configures "Port_Group_yyy" is displayed.

Example No.	Display contents						Description
	Host Group	Host	CA Port Group	CA Port	LUN Group	Host Response	
Example 3	–	Host_z	–	CM#0 CA#0 Port#0	LUN_ Group_ zzz	Host_ Response3	The host affinity setting of "Host_z (HBA)" and "LUN Group_zzz" has been configured to the device side CA port, "CM#0 CA#0 Port#0". Hosts, CA ports, and LUN groups are allocated without specifying a host group or CA port group.
Example 4	–	All	–	CM#1 CA#1 Port#1	LUN_ Group_ www	Host_ Response4	The LUN mapping of "LUN_Group_www" has been config-ured to the device side CA port, "CM#1 CA#1 Port#1". Hosts, CA ports, and LUN groups are allocated without specifying a host group or CA port group.
Example 5	–	All	–	CM#0 CA#1 Port#1	–	Host_ Response5	The LUN is directly allocated to CA port "CM#0 CA#1 Port#1" by an appli-cation other than ETERNUS Web GUI (LUN mapping is created).
Example 6	Host_ Group_ xxx	Host_1 Host_2 Host_3 Hide...	Port_ Group_ xxx	CM#0 CA#0 Port#0 CM#1 CA#0 Port#0 Hide...	LUN_ Group_ xxx	Host_ Response1	Display example when the [Show...] link for the "Host" field or the "CA Port" field is clicked in Example 1. In the host field, the names of all the hosts that configure "Host_Group_xxx" are displayed. In the CA port field, the location infor-mation of all the CA ports that config-ure "Port_Group_xxx" is displayed. Refer to "Example 1" for display example when clicking the [Hide...] link in the "Host" field or the "CA Port" field.

Filter setting

Filter	Description
Host Group	Input the host group name that is to be displayed. When not using the host group name for filtering, leave this item blank.
Host	Input the host name that is to be displayed. When not using the host name for filtering, leave this item blank.
CA Port Group	Input the CA port group name that is to be displayed. When not using the CA port group name for filtering, leave this item blank.
CA Port	Select the CA port name that is to be displayed.
LUN Group	Input the LUN group name that is to be displayed. When not using the LUN group name for filtering, leave this item blank.
Host Response	Select the host response name that is to be displayed.
Virtual Volume	Select the set state of the Virtual Volume function that is to be displayed. This item is only displayed when "Enable" is selected for the Virtual Volume function.

Host Affinity Detail (Host Group - CA Port Group - LUN Group Setting)

The details of the host affinity are displayed.

The following items are displayed in the Main area:

● **Host Group - CA Port Group - LUN Group Setting**

- Host Group
  The selected host group name or "All" is displayed.

- CA Port Group
  The CA port group that is allocated to the selected host group is displayed.

- LUN Group
  The LUN group that is allocated to the selected host group is displayed.

● **Host - CA Port Connection**

- Host
  Member hosts in the selected host group is displayed.
  If "All" has been selected for the host group, "All" is also displayed for the host.

- CA Port
  The location information of the CA port which has the host affinity setting with the relevant host is displayed.

Host Affinity Detail (Host - CA Port - LUN Group Setting)

The detailed information of host affinities is displayed.

The following items are displayed in the Main area:

● **Host - CA Port - LUN Group Setting**

- Host
  The selected host name or "All" is displayed.

- CA Port
  The location information of the CA port, which is allocated with the selected host, is displayed.

- LUN Group
  The LUN group that is allocated with the selected host, or a "-" (hyphen) is displayed.

Host Group

The list of the host groups is displayed.
A host group uses the same interface type, and groups the hosts (HBAs), which access the same LUN group.
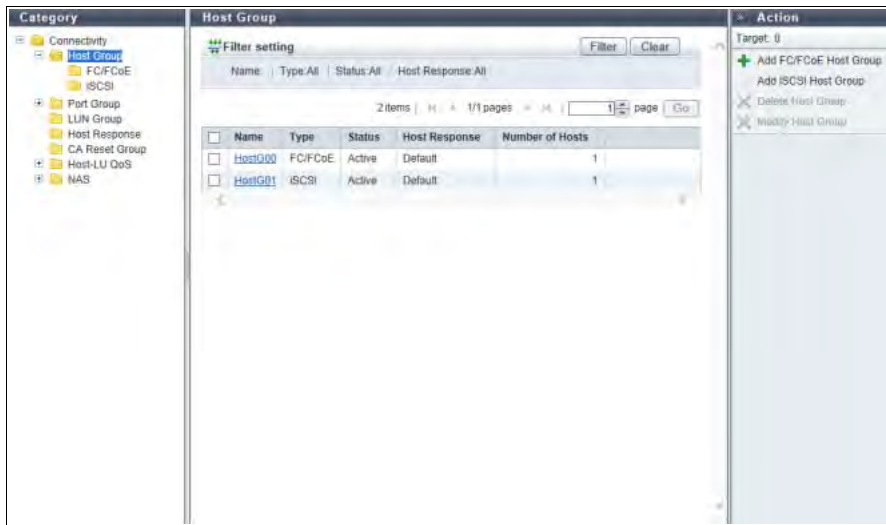
The following items are displayed in the Main area:

- Name
  The host group name is displayed. Click this item to display .

- Type
  The interface type of the host registered in the host group is displayed.

- Status
  Whether the host group is used ("Active") or not ("Inactive") for the host affinity settings is displayed.
  "Host affinity setting" is to specify association between "Host Group", "CA Port Group", and "LUN Group".
  - Active
    The host group is used for the host affinity settings. The LUN group can be accessed from the member host of the host group.
  - Inactive
    The host group is not used for the host affinity settings.

- Host Response
  The host response name that has been assigned to a host group is displayed.

- Number of Hosts
  The number of hosts that have been registered in the host group is displayed.

Filter setting

Filter	Description
Name	Input the host group name that is to be displayed. When not using the name for filtering, leave this item blank.
Type	Select the interface type of the host group that is to be displayed.
Status	Select the set state of the host affinity for the host group that is to be displayed.
Host Response	Select the name of the host response that is assigned to the host group that is to be displayed.

Host Group Detail

The details of the host group are displayed.

The following items are displayed in the Main area:

● **Host Group Information**

- Name
  The host group name is displayed.

- Host Response
  The host response, which has been assigned to a host group, is displayed.

- Status
  Whether the host group is "Active" or "Inactive" in the host affinity setting is displayed.

- Number of Hosts
  The number of hosts, which have been registered in the host group, is displayed.

● **Host List**

- Name
  The host name is displayed.

- WWN
  When the host interface type is "FC/FCoE", the WWN of the host is displayed.

- iSCSI Name
  When the host interface type is "iSCSI", the iSCSI name of the host is displayed.

- SAS Address
  When the host interface type is "SAS", the SAS address of the host is displayed.

- Other Host Group
  The other host group names to which the host belongs are displayed.
  If the host belongs to only one host group, the field is blank.

FC/FCoE Host

In this screen, registered FC hosts in the ETERNUS DX/AF are displayed.

> **N o t e**
>
> The interface types "FC" and "FCoE" are both regarded as "FC". Both "FC host" and "FCoE host" are abbreviated as "FC host" in this section.

The following items are displayed in the Main area:

- No.
  The FC host number is displayed.

- Name
  The FC host name is displayed.

- WWN
  The FC host WWN is displayed.

- Host Group
  The host group name, to which the FC host belongs, is displayed.
  If the FC host does not belong to a host group, a "-" (hyphen) is displayed.

- CA Port Group
  The name of the CA port group that has the host affinity setting with the FC host is displayed.
  If no CA port group with the host affinity setting exists, a "-" (hyphen) is displayed.

- CA Port
  The location information (x: CE number, y: CM number, z: CA number, w: Port number) of the CA port that has the host affinity setting with the FC host is displayed.
  If no CA port with the host affinity setting exists, a "-" (hyphen) is displayed.
    - For the ETERNUS DX8700 S3/DX8900 S3
      CE#x CM#y CA#z Port#w
    - For the other models
      CM#y CA#z Port#w

- Host Response
  The host response that is assigned to the FC host or to the host group of the FC host is displayed.

• Status
Whether the host affinity setting is applied to the FC host is displayed.
- Active
The host affinity setting is applied to the FC host. The LUN group can be accessed from the FC host.
- Inactive
The host affinity setting is not applied to the FC host.

Filter setting

Filter	Description
Name	Input the FC host name that is to be displayed. When not using the name for filtering, leave this item blank.
WWN	Input the WWN for the FC host that is to be displayed. When not using the WWN for filtering, leave this item blank.
Host Group	Input the name of the host group to which the FC host that is to be displayed belongs. When not using the host group for filtering, leave this item blank.
CA Port Group	Input the name of the CA port group that has the host affinity setting with the FC host that is to be displayed. When not using the CA port group for filtering, leave this item blank.
CA Port	Select the CA port that has the host affinity setting with the FC host that is to be displayed.
Host Response	Select the name of the host response that is assigned to the FC host that is to be displayed.
Status	Select the set state of the host affinity for the FC host that is to be displayed.

iSCSI Host

In this screen, registered iSCSI hosts in the ETERNUS DX/AF are displayed.
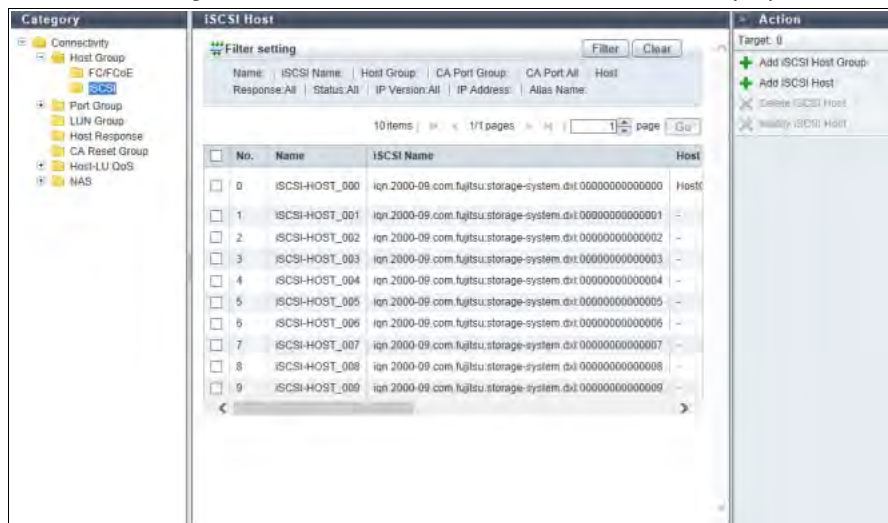
The following items are displayed in the Main area:
• No.
The iSCSI host number is displayed.

• Name
The iSCSI host name is displayed.

• iSCSI Name
The iSCSI name of the iSCSI host is displayed.

• Host Group
The host group name, to which the iSCSI host belongs, is displayed.
If the iSCSI host does not belong to a host group, a "-" (hyphen) is displayed.

- CA Port Group
The name of the CA port group that has the host affinity setting with the iSCSI host is displayed.
If no CA port group with the host affinity setting exists, a "-" (hyphen) is displayed.

- CA Port
The location information (x: CE number, y: CM number, z: CA number, w: Port number) of the CA port that has the host affinity setting with the iSCSI host is displayed.
If no CA port with the host affinity setting exists, a "-" (hyphen) is displayed.
  - For the ETERNUS DX8700 S3/DX8900 S3
  CE#x CM#y CA#z Port#w
  - For the other models
  CM#y CA#z Port#w

- Host Response
The host response that is assigned to the iSCSI host or to the host group of the iSCSI host is displayed.

- Status
Whether the host affinity setting is applied to the iSCSI host is displayed.
  - Active
  The host affinity setting is applied to the iSCSI host. The LUN group can be accessed from the iSCSI host.
  - Inactive
  The host affinity setting is not applied to the iSCSI host.

- IP Version
The IP version when the IP address was registered for the iSCSI host is displayed.

- IP Address
The IP address of the iSCSI host is displayed.
Note that the IPv6 address is displayed as an abbreviation. Refer to for details.
If the IP address is not specified, the field is blank.

- Alias Name
The iSCSI host Alias Name is displayed.
If the Alias Name is not set, the field is blank.

- CHAP User ID
The CHAP user name of the iSCSI host is displayed.
If the CHAP user ID is not specified, the field is blank.

Filter setting

Filter	Description
Name	Input the iSCSI host name that is to be displayed. When not using the name for filtering, leave this item blank.
iSCSI Name	Input the iSCSI name of the iSCSI host that is to be displayed. When not using the iSCSI name for filtering, leave this item blank.
Host Group	Input the name of the host group to which the iSCSI host that is to be displayed belongs. When not using the host group for filtering, leave this item blank.
CA Port Group	Input the name of the CA port group that has the host affinity setting with the iSCSI host that is to be displayed. When not using the CA port group for filtering, leave this item blank.
CA Port	Select the CA port that has the host affinity setting with the iSCSI host that is to be displayed.
Host Response	Select the name of the host response that is assigned to the iSCSI host that is to be displayed.
Status	Select the set state of the host affinity for the iSCSI host that is to be displayed.
IP Version	Select the IP version for the iSCSI host that is to be displayed.

Filter	Description
IP Address	Input the IP address for the iSCSI host that is to be displayed. The iSCSI hosts that match the beginning of the entered IP address are displayed. When not using the IP address for filtering, leave this item blank.
Alias Name	Input the Alias name of the iSCSI host that is to be displayed. When not using the Alias name for filtering, leave this item blank.

■ IPv6 Address Notation

Since the IPv6 address is 128-bit and extremely long, this address is displayed using "xxxx", which describes 16-bit in hexadecimals as being one block that is separated by colons (":").

xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
- Use 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) for inputting an IPv6 address.
- The current setting is displayed with 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
- Up to 128-bit
- The first 64-bit (prefix) of the link local address is fixed to "fe80::".

The following three abbreviation methods are available for IPv6 addresses:

(1) Omission of the first "0" of a block that follows consecutive zeros.
   [Example] 2001:1000:0120:0000:0000:0123:0000:0000

       2001:1000:120:0000:0000:123:0000:0000

(2) Replacement of "0000" blocks with "0".
   [Example] 2001:1000:120:0000:0000:123:0000:0000

       2001:1000:120:0:0:123:0:0

(3) Replacement of a block with consecutive zeros by "::" is performed only once.
   [Example] 2001:1000:120:0:0:123:0:0

       2001:1000:120::123:0:0 is OK
       2001:1000:120::123:: is not allowed
      (Replacement of a block with consecutive zeros by "::" is allowed only once.)

SAS Host

In this screen, registered SAS hosts in the ETERNUS DX are displayed.

The following items are displayed in the Main area:

- No.
  The SAS host number is displayed.

- Name
  The SAS host name is displayed.

- SAS Address
  The SAS address of the SAS host is displayed.

- Host Group
  The host group name, to which the SAS host belongs, is displayed.
  If the SAS host does not belong to a host group, a "-" (hyphen) is displayed.

- CA Port Group
  The name of the CA port group that has the host affinity setting with the SAS host is displayed.
  If no CA port group with the host affinity setting exists, a "-" (hyphen) is displayed.

- CA Port
  The location information of the CA port that has the host affinity setting with the SAS host is displayed.
  If no CA port with the host affinity setting exists, a "-" (hyphen) is displayed.

- Host Response
  The host response that is assigned to the SAS host or to the host group of the SAS host is displayed.

- Status
  Whether the host affinity setting is applied to the SAS host is displayed.
  - Active
    The host affinity setting is applied to the SAS host. The LUN group can be accessed from the SAS host.
  - Inactive
    The host affinity setting is not applied to the SAS host.

Filter setting

Filter	Description
Name	Input the SAS host name that is to be displayed. When not using the name for filtering, leave this item blank.
SAS Address	Input the SAS address for the SAS host that is to be displayed. When not using the SAS address for filtering, leave this item blank.
Host Group	Input the name of the host group to which the SAS host that is to be displayed belongs. When not using the host group for filtering, leave this item blank.
CA Port Group	Input the name of the CA port group that has the host affinity setting with the SAS host that is to be displayed. When not using the CA port group for filtering, leave this item blank.
CA Port	Select the CA port that has the host affinity setting with the SAS host that is to be displayed.
Host Response	Select the name of the host response that is assigned to the SAS host that is to be displayed.
Status	Select the set state of the host affinity for the SAS host that is to be displayed.

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CA Port Group

A list of the CA port groups is displayed.
A CA port group is a group of the same CA type ports that are connected to the specified host group.
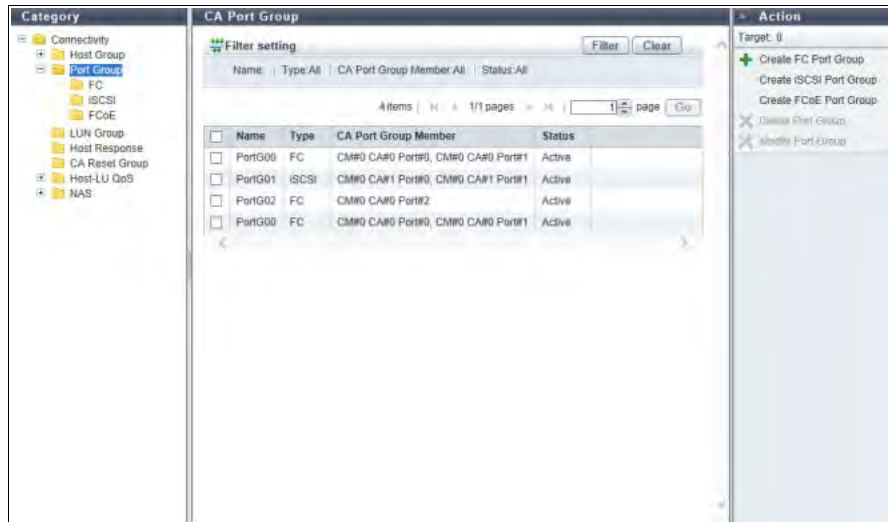
The following items are displayed in the Main area:

- Name
  The port group name is displayed.

- Type
  The type of the CA port group is displayed.
  - FC
  - iSCSI
  - SAS
  - FCoE

- CA Port Group Member
  The location information (x: CE number, y: CM number, z: CA number, w: Port number) of the port, which is a CA port group member, is displayed.
  - For the ETERNUS DX8700 S3/DX8900 S3
    CE#x CM#y CA#z Port#w
  - For the other models
    CM#y CA#z Port#w

- Status
  Whether the CA port group is used ("Active") or not ("Inactive") for the host affinity settings is displayed.
  "Host affinity setting" is to specify association between "Host Group", "CA Port Group" and "LUN Group".
  - Active
    The CA port group is used for the host affinity settings. The LUN group can be accessed from the host group via the CA port group.
  - Inactive
    The CA port group is not used for the host affinity settings.

Filter setting

Filter	Description
Name	Input the CA port group name that is to be displayed. When not using the name for filtering, leave this item blank.
Type	Select the type of the CA port group that is to be displayed.
CA Port Group Member	Select the location information of the member port for the CA port group that is to be displayed.
Status	Select the set state of the host affinity for the CA port group that is to be displayed.

FC Port

Parameters of the FC ports that are registered in the ETERNUS DX/AF are displayed.
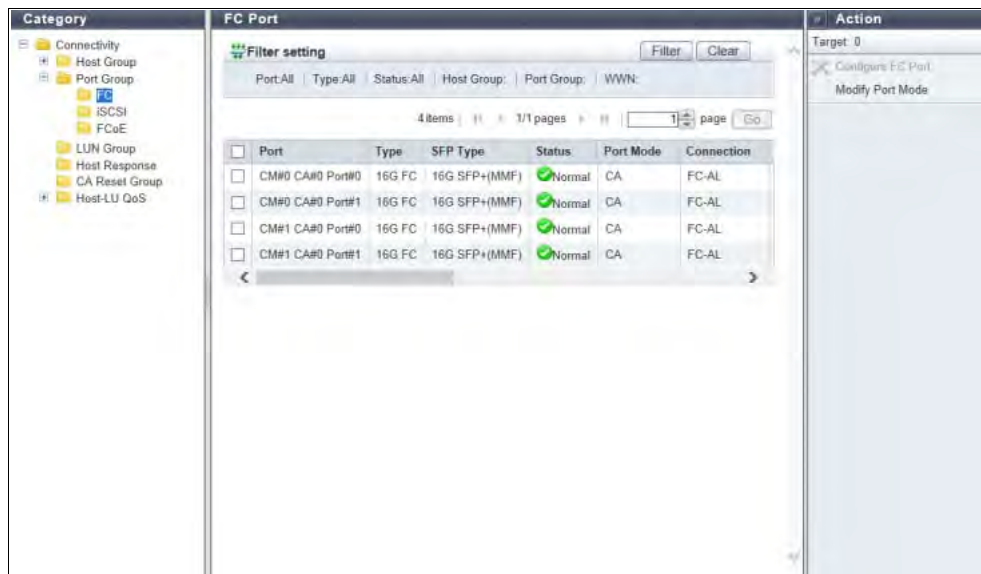
The following items are displayed in the Main area:

- Port
  The location information (x: CE number, y: CM number, z: CA number, w: Port number) of the target port is displayed.
  - For the ETERNUS DX8700 S3/DX8900 S3
    CE#x CM#y CA#z Port#w
  - For the other models
    CM#y CA#z Port#w

- Type
  The CA type of the target port is displayed.
  - 8G FC
  - 16G FC
  - 32G FC

> ▶ **Caution**

"32G FC" is supported in the ETERNUS DX100 S4/DX200 S4, the ETERNUS DX500 S4/DX600 S4, and the ETERNUS AF250 S2/AF650 S2.

- SFP Type
  The SFP type of the target port is displayed.
   If an SFP is not installed, "Unmount" is displayed.
  - SFP+(SMF)
    An SFP (8G LongWave) that is installed in an 8Gbit/s (maximum) FC port.
  - SFP+(MMF)
    An SFP (8G SFP+) that is installed in an 8Gbit/s (maximum) FC port.
  - 16G SFP+(SMF)
    An SFP (16G LongWave) that is installed in a 16Gbit/s (maximum) FC port.
  - 16G SFP+(MMF)
    An SFP (16G SFP+) that is installed in a 16Gbit/s (maximum) FC port.
  - 32G SFP+(MMF)
    An SFP (32G SFP+) that is installed in a 32Gbit/s (maximum) FC port.
  - Unknown
    Other than the above SFPs.

- Status
  The status of the target port is displayed. Refer to "Component Status" (page 1376) for details.

- Port Mode
  The mode of the target port is displayed.
  - CA
  - RA
  - CA/RA
  - Initiator

- Connection
  The connection type of the target port is displayed.
  - Fabric
    A connection type that enables simultaneous communication among multiple nodes through a Fibre Channel switch. This connection type can also be used for a direct connection when "Transfer Rate" is "16 Gbit/s" or more.
  - FC-AL
    A connection type that connects multiple nodes in a loop.

- Loop ID
  If the connection type of the target port is "FC-AL", the Loop ID is displayed.
  "Loop ID" is an identification number of a node in a loop.
  When the Loop ID is manually specified, the ID that is to be set for the port is displayed between 0x00 to 0x7D.
  When the Loop ID is automatically specified, "Ascending" or "Descending" is displayed.
  When the connection type of the target port is "Fabric", a "-" (hyphen) is displayed.

- Transfer Rate
  The transfer speed of the target port is displayed.
  - Auto-negotiation
  - 4 Gbit/s
  - 8 Gbit/s
  - 16 Gbit/s
  - 32 Gbit/s

- FC Frame Size
  The frame size of the target port is displayed.
  "FC Frame Size" specifies the length of the communication information.
  - 512 bytes
  - 1024 bytes
  - 2048 bytes

- Reset Scope
  The reset scope of the target port is displayed.
  Reset scope is the range where the command reset from the server is performed, when the target port is connected to multiple servers.
  A "-" (hyphen) is displayed when the port mode is "RA" or "Initiator".
  - I_T_L (I: Initiator, T: Target, L: LUN)
    Reset (cancel) the command request from the server that sent the command reset request.
  - T_L (T: Target, L: LUN)
    Reset (cancels) the command request from all of the servers that are connected to the port.

- Release Reservation if Chip is Reset
  Whether the function to release the reservation status of the volume when the target port (chip) is reset is enabled or disabled is displayed.
  A "-" (hyphen) is displayed when the port mode is "RA" or "Initiator".

- REC Line No.
  The REC line number of the target port is displayed.
  The REC line number is used to switch the communication path when a line fails.
  A "-" (hyphen) is displayed when the port mode is "CA" or "Initiator".
  This item is displayed only when the Advanced Copy license has been registered.

- REC Transfer Mode
  Whether the REC synchronous transfer mode, the REC asynchronous stack mode, the REC asynchronous consistency mode, or the REC asynchronous through mode is enabled or disabled for the target port is displayed.
  A "-" (hyphen) is displayed when the port mode is "CA" or "Initiator".
  This item is displayed only when the Advanced Copy license has been registered.
  - Sync
    When the REC synchronous transfer mode is enabled, the target port can be used as an REC synchronous transfer mode path.
  - Async Stack
    When the REC asynchronous stack mode is enabled, the target port can be used as an REC asynchronous stack mode path.
  - Async Consistency
    When the REC asynchronous consistency mode is enabled, the target port can be used as an REC asynchronous consistency mode path.
  - Async Through
    When the REC asynchronous through mode is enabled, the target port can be used as an REC asynchronous through mode path.

- TFO Transfer Mode
  Whether the TFO transfer mode is enabled or disabled for the target port is displayed.
  A "-" (hyphen) is displayed when the port mode is "CA" or "Initiator".
  This item is displayed only when "Enable" is selected for the Storage Cluster function.

- TFO WWN Mode
  When the target port is being used by the Storage Cluster function, "Custom" is displayed if WWN has been changed, and "Default" is displayed if no changes have been made.
  A "-" (hyphen) is displayed when the port mode is "RA", "CA/RA", or "Initiator".
  This item is displayed only when "Enable" is selected for the Storage Cluster function.

- TFO Port
  When the target port is being used by the Storage Cluster function, "Used" is displayed, and "Unused" is displayed when the target port is not used.
  This item is displayed only when "Enable" is selected for the Storage Cluster function.

- Host Group
  The name of the host group that has the host affinity setting with the target port is displayed.
  If no host group with the host affinity setting exists, a "-" (hyphen) is displayed.

- Port Group
The name of the port group to which the target port belongs is displayed.
If the target port does not belong to a port group, a "-" (hyphen) is displayed.

- WWN
WWNs of all FC/FCoE hosts that have the host affinity setting with the target port are displayed.
If the host affinity setting is not configured, the field is blank.

Filter setting

Filter	Description
Port	Select the location information of the port that is to be displayed.
Type	Select the CA type of the port that is to be displayed.
Status	Select the status of the port that is to be displayed.
Host Group	Input the name of the host group that has the host affinity setting with the port that is to be displayed. When not using the host group name for filtering, leave this item blank.
Port Group	Input the name of the port group to which the port that is to be displayed belongs. When not using the port group name for filtering, leave this item blank.
WWN	Input the WWN of the FC/FCoE host that has the host affinity setting with the port that is to be displayed. When not using the WWN for filtering, leave this item blank.

iSCSI Port

Parameters of the iSCSI ports that are registered in the ETERNUS DX/AF are displayed.
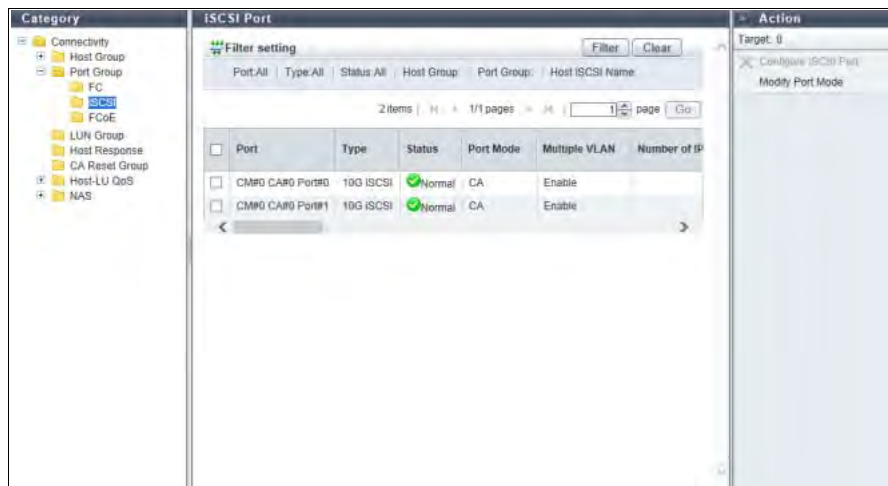
The following items are displayed in the Main area:
- Port
The location information (x: CE number, y: CM number, z: CA number, w: Port number) of the target port is displayed.
  - For the ETERNUS DX8700 S3/DX8900 S3
  CE#x CM#y CA#z Port#w
  - For the other models
  CM#y CA#z Port#w

- Type
  The type of the target port is displayed.
  - 1G iSCSI
    1Gbit/s iSCSI. The port mode can be changed (CA, RA, or CA/RA).
  - 10G iSCSI
    10Gbit/s iSCSI. The port mode can be changed (CA, RA, or CA/RA).
  - 10G Base-T iSCSI
    10Gbit/s iSCSI. The port mode can be changed (CA, RA, or CA/RA). This port can be installed in the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, and the ETERNUS AF250.

- Status
  The status of the target port is displayed. Refer to "Component Status" (page 1376) for details.

- Port Mode
  The mode of the target port is displayed.
  - CA
  - RA
  - CA/RA

- Multiple VLAN
  Whether the Multiple VLAN is enabled or disabled for the target port is displayed. "Multiple VLAN" is a function that enables up to 16 pieces of VLAN information (IP address information) to be registered for each port.
  A "-" (hyphen) is displayed when the port mode is "RA".

- Number of IP Addresses
  The number of IP addresses that are used for the relevant port is displayed. When "Multiple VLAN" is enabled, the number of IP addresses that are registered in the port is displayed. When "Multiple VLAN" is disabled or "-" is displayed in the "Multiple VLAN" field, "1" is displayed.

- Transfer Rate
  The transfer speed of the target port is displayed. All transfers are full-duplex.
  - Auto-negotiation
  - 1Gbit/s
  - 10Gbit/s
  - 100Mbit/s

- Reset Scope
  The reset scope of the target port is displayed.
  Reset scope is the range where the command reset from the server is performed, when the target port is connected to multiple servers. A "-" (hyphen) is displayed when the port mode is "RA".
  - I_T_L (I: Initiator, T: Target, L: LUN)
    Reset (cancel) the command request from the server that sent the command reset request.
  - T_L (T: Target, L: LUN)
    Reset (cancels) the command request from all of the servers that are connected to the port.

- Release Reservation if Chip is Reset
  Whether the function to release the reservation status of the volume when the target port (chip) is reset is enabled or disabled is displayed.
  A "-" (hyphen) is displayed when the port mode is "RA".

- iSCSI Name
  The iSCSI name of the target port is displayed.

- Alias Name
  The Alias Name of the target port is displayed.
  If the Alias Name is not specified, the field is blank.

- Bandwidth Limit
  A "-" (hyphen) is displayed for this item.

- MTU
  The MTU size of the target port is displayed.
  "Maximum Transmission Unit (MTU)" is the maximum amount of data that can be transmitted at the one time over the communication network.
  A "-" (hyphen) is displayed when the port mode is "CA".

- CHAP
  When CHAP authentication for the target port is enabled, "ON" is displayed. If the authentication is disabled, "OFF" is displayed.
  When the "Port Mode" is "CA/RA", this item is displayed in "x / y" format.
  x: The CHAP authentication status of the CA port ("ON" or "OFF")
  y: The CHAP authentication status of the RA port ("ON" or "OFF")

- REC Line No.
  The REC line number of the target port is displayed.
  The REC line number is used to switch the communication path when a line fails.
  A "-" (hyphen) is displayed when the port mode is "CA".
  This item is displayed only when the Advanced Copy license has been registered.

- REC Transfer Mode
  Whether the REC synchronous transfer mode, the REC asynchronous stack mode, the REC asynchronous consistency mode, or the REC asynchronous through mode is enabled or disabled for the target port is displayed.
  A "-" (hyphen) is displayed when the port mode is "CA".
  This item is displayed only when the Advanced Copy license has been registered.

  - Sync
    When the REC synchronous transfer mode is enabled, the target port can be used as an REC synchronous transfer mode path.
  - Async Stack
    When the REC asynchronous stack mode is enabled, the target port can be used as an REC asynchronous stack mode path.
  - Async Consistency
    When the REC asynchronous consistency mode is enabled, the target port can be used as an REC asynchronous consistency mode path.
  - Async Through
    When the REC asynchronous through mode is enabled, the target port can be used as an REC asynchronous through mode path.

- TFO Transfer Mode
  Whether the TFO transfer mode is enabled or disabled for the target port is displayed.
  A "-" (hyphen) is displayed when the port mode is "CA".
  This item is displayed only when "Enable" is selected for the Storage Cluster function.

- TFO Port
  When the target port is being used by the Storage Cluster function, "Used" is displayed, and "Unused" is displayed when the target port is not used.
  This item is only displayed when "Enable" is selected for the Storage Cluster function.

- Host Group
  The name of the host group that has the host affinity setting with the target port is displayed.
  If no host group with the host affinity setting exists, a "-" (hyphen) is displayed.

- Port Group
  The name of the port group to which the target port belongs is displayed.
  If the target port does not belong to a port group, a "-" (hyphen) is displayed.

- Host iSCSI Name
  iSCSI names of all iSCSI hosts that have the host affinity setting with the target port are displayed.
  If the host affinity setting is not configured, a "-" (hyphen) is displayed.

Filter setting

Filter	Description
Port	Select the location information of the port that is to be displayed.
Type	Select the type of the port that is to be displayed.
Status	Select the status of the port that is to be displayed.
Host Group	Input the name of the host group that has the host affinity setting with the port that is to be displayed. When not using the host group name for filtering, leave this item blank.
Port Group	Input the name of the port group to which the port that is to be displayed belongs. When not using the port group name for filtering, leave this item blank.
Host iSCSI Name	Input the host iSCSI name of the iSCSI host that has the host affinity setting with the port that is to be displayed. When not using the host iSCSI name for filtering, leave this item blank.

SAS Port

Parameters of the SAS ports that are registered in the ETERNUS DX are displayed.
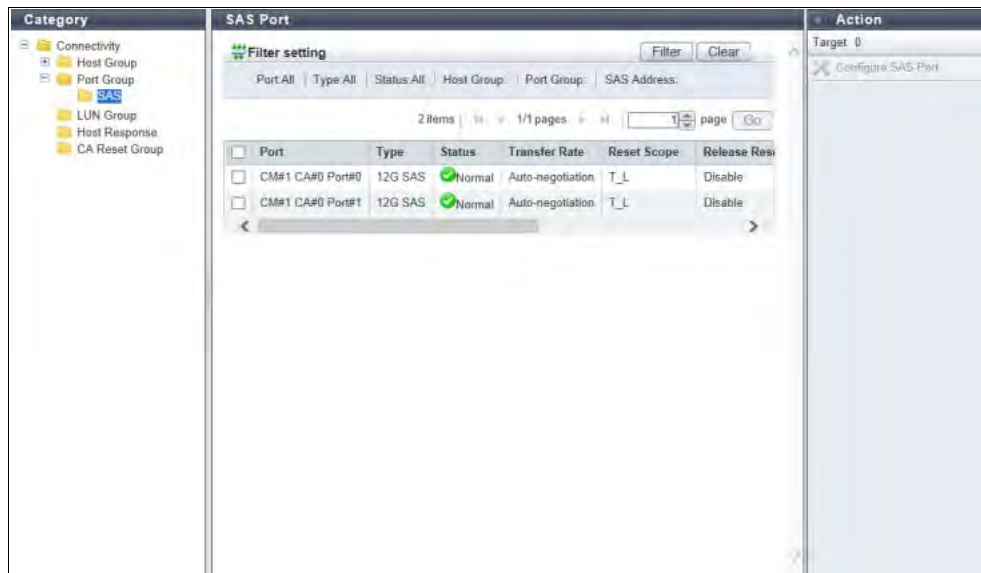
The following items are displayed in the Main area:
- Port
  The location information of the target port is displayed.
  - CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)

- Type
  The CA type of the target port is displayed.
  - 6G SAS
  - 12G SAS

> ▶ **Caution**

- "6G SAS" is supported in the ETERNUS DX60 S4 and the ETERNUS DX60 S3/DX100 S3/DX200 S3.
- "12G SAS" is supported in the ETERNUS DX60 S4/DX100 S4/DX200 S4.

- Status
  The status of the target port is displayed. Refer to "Component Status" (page 1376) for details.

- **Transfer Rate**
  The transfer speed of the target port is displayed.
  - Auto-negotiation
  - 1.5 Gbit/s
  - 3 Gbit/s
  - 6 Gbit/s
  - 12 Gbit/s

- **Reset Scope**
  The reset scope of the target port is displayed.
  Reset scope is the range where the command reset request from the server is performed, when the target port is connected to multiple servers.
  - I_T_L (I: Initiator, T: Target, L: LUN)
    Reset (cancel) the command request from the server that sent the command reset request.
  - T_L (T: Target, L: LUN)
    Reset (cancel) the command request from all of the servers that are connected to the port.

- **Release Reservation if Chip is Reset**
  Whether the function to release the reservation status of the volume when the target port (chip) is reset is enabled or disabled is displayed.

- **Host Group**
  The name of the host group that has the host affinity setting with the target port is displayed.
  If no host group with the host affinity setting exists, a "-" (hyphen) is displayed.

- **Port Group**
  The name of the port group to which the target port belongs is displayed.
  If the target port does not belong to a port group, a "-" (hyphen) is displayed.

- **SAS Address**
  SAS addresses of all SAS hosts that have the host affinity setting with the target port are displayed.
  If the host affinity setting is not configured, a "-" (hyphen) is displayed.

Filter setting

Filter	Description
Port	Select the location information of the port that is to be displayed.
Type	Select the type of the port that is to be displayed.
Status	Select the status of the port that is to be displayed.
Host Group	Input the name of the host group that has the host affinity setting with the port that is to be displayed. When not using the host group name for filtering, leave this item blank.
Port Group	Input the name of the port group to which the port that is to be displayed belongs. When not using the port group name for filtering, leave this item blank.
SAS Address	Input the SAS Address of the SAS host that has the host affinity setting with the port that is to be displayed. When not using the SAS address for filtering, leave this item blank.

FCoE Port

Parameters of the FCoE ports that are registered in the ETERNUS DX are displayed.
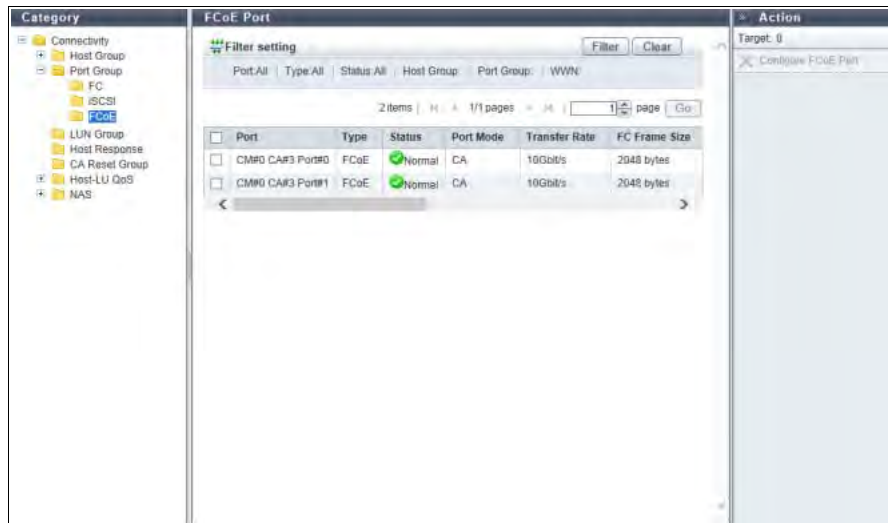
The following items are displayed in the Main area:

- Port
  The location information (x: CE number, y: CM number, z: CA number, w: Port number) of the target port is displayed.
  - For the ETERNUS DX8700 S3/DX8900 S3
    CE#x CM#y CA#z Port#w
  - For the other models
    CM#y CA#z Port#w

- Type
  The CA type (fixed at "FCoE") of the target port is displayed.

- Status
  The status of the target port is displayed. Refer to "Component Status" (page 1376) for details.

- Port Mode
  The mode (fixed at "CA") of the target port is displayed.

- Transfer Rate
  The transfer speed (fixed at "10 Gbit/s") of the target port is displayed.

- FC Frame Size
  The frame size of the target port is displayed.
  "FC Frame Size" specifies the length of the communication information.
  - 512 bytes
  - 1024 bytes
  - 2048 bytes

- VLAN ID
  The VLAN ID of the target port is displayed.
  When the VLAN ID is manually specified, the VLAN ID is displayed between 0 - 4095.
  When the VLAN ID is automatically specified, "Automatic" is displayed.

- Fabric Name
  The fabric name of the target port is displayed.
  When the fabric name is manually specified, the specified fabric name is displayed.
  When the fabric name is automatically specified, "Automatic" is displayed.

- Reset Scope
  The reset scope of the target port is displayed.
  Reset scope is the range where the command reset from the server is performed, when the target port is connected to multiple servers.
    - I_T_L (I: Initiator, T: Target, L: LUN)
      Reset (cancel) the command request from the server that sent the command reset request.
    - T_L (T: Target, L: LUN)
      Reset (cancels) the command request from all of the servers that are connected to the port.

- Release Reservation if Chip is Reset
  Whether the function to release the reservation status of the volume when the target port (chip) is reset is enabled or disabled is displayed.

- Host Group
  The name of the host group that has the host affinity setting with the target port is displayed.
  If no host group with the host affinity setting exists, a "-" (hyphen) is displayed.

- Port Group
  The name of the port group to which the target port belongs is displayed.
  If the target port does not belong to a port group, a "-" (hyphen) is displayed.

- WWN
  WWNs of all FC/FCoE hosts that have the host affinity setting with the target port are displayed.
  If the host affinity setting is not configured, the field is blank.

Filter setting

Filter	Description
Port	Select the location information of the port that is to be displayed.
Type	Select the CA type of the port that is to be displayed.
Status	Select the status of the port that is to be displayed.
Host Group	Input the name of the host group that has the host affinity setting with the port that is to be displayed. When not using the host group name for filtering, leave this item blank.
Port Group	Input the name of the port group to which the port that is to be displayed belongs. When not using the port group name for filtering, leave this item blank.
WWN	Input the WWN of the FC/FCoE host that has the host affinity setting with the port that is to be displayed. When not using the WWN for filtering, leave this item blank.

LUN Group

A list of the LUN groups is displayed.
A LUN group is a group of LUNs, which can be recognized by the host. The allocation information of LUNs and volumes in the ETERNUS DX/AF are configured to the LUN group.

The following items are displayed in the Main area:

- No.
  The LUN group number is displayed. By clicking this item, "LUN Group Detail" (page 843) is displayed.

- Name
  The LUN group name is displayed. By clicking this item, "LUN Group Detail" (page 843) is displayed.

- Status
  Whether the LUN group is used ("Active") or not ("Inactive") for the host affinity settings is displayed.
  "Host Affinity Setting" is to specify association between "Host Group", "CA Port Group", and "LUN Group" or association between "Host", "CA Port", "and "LUN Group".
  - Active
    The LUN group is used for the host affinity settings. The LUN group can be accessed from the host.
  - Inactive
    The LUN group is not used for the host affinity settings.

- Number of LUNs
  The number of LUNs, which have been allocated to volumes in the LUN group, is displayed.

- LUN Overlap
  If volumes in the LUN group satisfy one or both of the following conditions, "Yes" is displayed. For any other conditions, the field is blank.
  - The volumes are allocated to different LUN groups.
  - The volumes are included in the mapping information, which is directly allocated to the CA port without specifying the host group or the CA port group.

- Storage Cluster
  If volumes in the LUN group are used for the Storage Cluster function, "Enable" is displayed. When no volumes are used for the Storage Cluster function, "Disable" is displayed.
  This item is displayed only when "Enable" is selected for the Storage Cluster function.

Filter setting

Filter	Description
Name	Input the LUN group name that is to be displayed. When not using the LUN group name for filtering, leave this item blank.
Status	Select the LUN group status that is to be displayed.
Number of LUNs	Select the number of LUNs that is to be displayed. Using "512LUN" as the standard, ">512" or "<=512" can be selected.
Storage Cluster	Select "Enable" when displaying LUN groups with volumes that are used by the Storage Cluster function exists. Select "Disable" when displaying LUN groups without volumes used by the Storage Cluster function. This item is displayed only when "Enable" is selected for the Storage Cluster function.

LUN Group Detail

The detailed information of a LUN group is displayed.
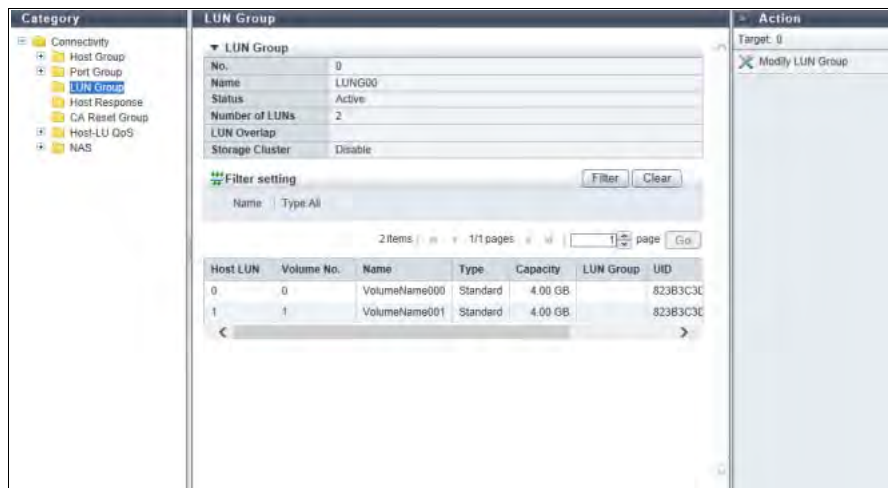
The following items are displayed in the Main area:

- Host LUN
  The host LUN is displayed.

- Volume No.
  The volume number, which is allocated to the LUN, is displayed.

- Name
  The volume name is displayed.

- Type
  The volume type is displayed.
  - Standard
  - WSV
  - TPV
  - FTV
  - SDV

- Capacity
  The volume capacity is displayed.
  When the "Type" is "SDV", the logical capacity, which can be accessed from the host, is displayed.

- LUN Group
  If the volume is allocated to different LUN groups, the LUN group name is displayed. If the host, ports, and LUNs are allocated without specifying a host group or CA port group, the location information of the ports is displayed.
  When a volume is not allocated to different LUN groups, the field is blank.

- UID
  The volume UID is displayed.
  The UID is an identifier (storage system name) to specify a volume from the open system server.
  A "-" (hyphen) is displayed for the Deduplication/Compression System Volume.
  This item is displayed only when the controller firmware version V10L4x or later is used.

Host Response

The registered host responses are displayed.
The host response configures the appropriate operation mode on which the host makes connection. The usual host connection uses a recommended pattern or the default setting which have been arranged in advance in accordance with each OS type.
When customizing the host response in accordance with the OS type or the operating environment, refer to "Add Host Response" (page 444).

The following items are displayed in the Main area:
- Name
  All of the host responses, which have been registered in the ETERNUS DX/AF, are displayed.
  - Solaris MPxIO
  - HP-UX
  - AIX
  - AIX VxVM
  - VS850/SVC
  - BS2000
  - Host responses registered in the ETERNUS DX/AF
  - Default

- Status
  The usage of the host response ("Active" or "Inactive") is displayed.
  - Active
    A host response which is being used on host, host group, or host affinity.
  - Inactive
    A host response which is not being used on host, host group, or host affinity.

CA Reset Group

A list of the registered CA reset groups is displayed.
A "CA reset group" is a group of ports which are released simultaneously under the instruction of a server.
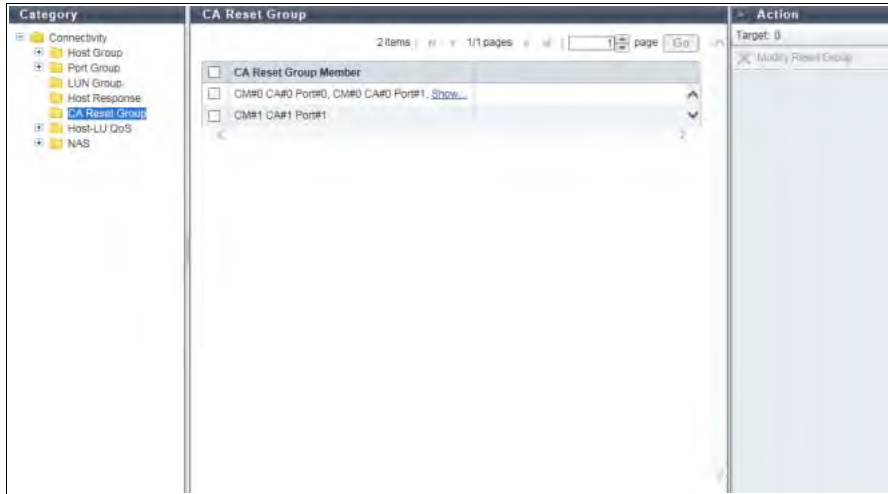
The following items are displayed in the Main area:

- CA Reset Group Member
  The location information (x: CE number, y: CM number, z: CA number, w: Port number) of member ports of each CA reset group is displayed.
  - For the ETERNUS DX8700 S3/DX8900 S3
    CE#x CM#y CA#z Port#w
  - For the other models
    CM#y CA#z Port#w

Host-LU QoS

A list of the registered Host-LU QoS groups is displayed.
The Host-LU QoS list shows the association between "Host", "CA Port", and "LUN Group", bandwidth limit (performance limits), and performance information.

> ▷ **Caution**
>
> - When using ETERNUS Web GUI, schedule settings for QoS parameters and displaying scheduled QoS parameters are not available. Use ETERNUS CLI to check the scheduled QoS parameters that are specified using ETERNUS CLI. ETERNUS Web GUI displays the bandwidth limit and the performance information that are specified by using ETERNUS Web GUI.
> - Host-LU QoS does not support from LUN#1024 onward. If volumes are mapped from LUN#1024 onward, only the first 1024 LUNs (LUN#0 - LUN#1023) are displayed.

> ● **N o t e**
>
> - Whether the QoS mode is enabled or disabled can be checked in the action field. Refer to "Enable/Disable QoS" (page 452) for details.
> - Host-LU QoS starts its operation by configuring the bandwidth limit on a "hosts", "CA ports", or "LUNs", and enabling the QoS mode.
> - This function displays the performance information that is obtained during performance monitoring regardless of whether the QoS mode is enabled or disabled. When the performance information is displayed before stopping performance monitoring, the performance information that is obtained from the start time until the time when displaying the performance information is requested is displayed. This function displays the total performance information for the host and the performance information for each host LUN.
> - The performance information of each CA port can also be displayed. Refer to "Port QoS (Basic)" (page 856) for details.

The following items are displayed in the Main area:
- Host : Bandwidth Limit
  - Host
    The host name for which the host affinity setting is configured is displayed.
    If "All" is displayed, all of the hosts can access the ETERNUS DX/AF.
  - Bandwidth Limit
    The maximum performance is displayed in IOPS (throughput value). If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed.
    If "All" has been selected for hosts, a "-" (hyphen) is displayed.
  Click the [Host : Bandwidth Limit] link to display the total performance information for the host and the performance information of each LUN. Refer to "Host-LU QoS Performance Information" (page 848) for details.

- Host Group
  If a host belongs to a host group, the host group name is displayed. If a host does not belongs to the host group, a "-" (hyphen) is displayed.
  If "All" is displayed, all of the hosts can access the ETERNUS DX/AF.

- CA Port : Bandwidth Limit
  - CA Port
    The location information of the CA port with the host affinity setting is displayed.
  - Bandwidth Limit
    The maximum performance is displayed in IOPS (throughput value). If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed.

- CA Port Group
  If a CA port belongs to a CA port group, the CA port group name is displayed. If a host does not belong to a CA port group, a "-" (hyphen) is displayed.

- LUN Group : LU QoS Group
  - LUN Group
    The LUN group name is displayed. If the ETERNUS CLI command ("set mapping") is used for LUN mapping, a "- " (hyphen) is displayed.
  - LU QoS Group
    The LU QoS group number is displayed between 0 and 1055. If a LU QoS group number is not configured, a "-" (hyphen) is displayed.

  Click the [LUN Group : LU QoS Group] link to display a bandwidth limit on each LUN. Refer to "LUN Group : LU QoS Group Detail" (page 853) for details.

Host-LU QoS Performance Information

When a host affinity setting with a specific host group is already configured, the total performance information for the host and the performance information of each LUN are displayed.
If a host affinity setting with all of the host groups is configured ("All" is specified as the target host group), the performance information of each host LUN is displayed.

> ▷ **Caution**

The monitoring status of the performance information and obtained performance information are cleared in the following conditions:
- The port mode is changed (from CA or CA/RA to other port modes)
- The ETERNUS DX/AF is rebooted
- An error is detected in the ETERNUS DX/AF
- Hot maintenance of the CM is performed
- Hot controller firmware upgrade is performed
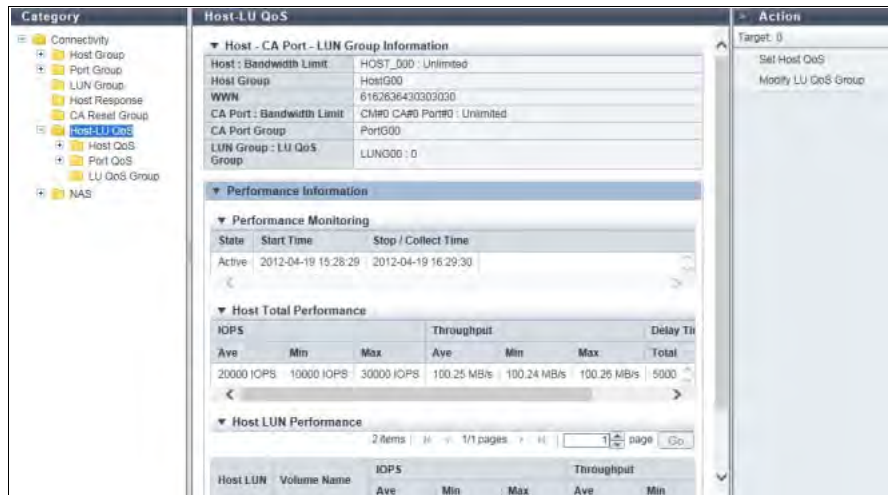
The following items are displayed in the Main area:

● **Host - CA Port - LUN Group Information**

- Host : Bandwidth Limit
  The host name and the bandwidth limit of the selected host is displayed in "Host : Bandwidth Limit" format.
  If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed
  as the "Bandwidth Limit". If "All" has been selected for the host, a "-" (hyphen) is displayed as the "Bandwidth
  Limit".

- Host Group
  The host group name, to which the selected host belongs, is displayed.
  If all of the hosts are to be connected, "All" is displayed.
  If the host does not belong to a host group, a "-" (hyphen) is displayed.

- WWN
  The WWN for the selected host is displayed.
  This item is displayed when the host affinity setting is configured and the selected host is "FC" or "FCoE".

- iSCSI Name
  The iSCSI name for the selected host is displayed.
  This item is displayed when the host affinity setting is configured and the selected host is "iSCSI".

- IP Version
  The IP version of the iSCSI host is displayed. This item is displayed when the host affinity setting is configured
  and the selected host is "iSCSI".
  - IPv4
  - IPv6

- IP Address
  The IP address of the selected iSCSI host is displayed.
  Note that the IPv6 address is displayed as an abbreviation. If the IP address is not specified, the field is blank.
  This item is displayed when the host affinity setting is configured and the selected host is "iSCSI".
  - For IPv4 address
    - xxx.xxx.xxx.xxx
      xxx: 0 - 255 for other fields (decimal)
  - For IPv6 address
    - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
      xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
      Refer to "IPv6 Address Notation" (page 828) for details.

- **SAS Address**
  The SAS address of the selected host is displayed.
  This item is displayed when the host affinity setting is configured and the selected host is "SAS".

- **CA Port : Bandwidth Limit**
  The location information and the bandwidth limit of the selected CA port is displayed in "CA Port : Bandwidth Limit" format.
  If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed as the "Bandwidth Limit".

- **CA Port Group**
  If a CA port that is connected to the selected host belongs to a CA port group as a member, the CA port group name is displayed. If a host does not belong as a member, a "-" (hyphen) is displayed.

- **LUN Group : LU QoS Group**
  The LUN group name and LU QoS group number (between 0 and 1055) are displayed in "LUN Group : LU QoS Group" format.
  If the ETERNUS CLI command ("set mapping") is used for LUN mapping, a "-" (hyphen) is displayed as "LUN Group".
  If a LUN QoS group number has not been configured, a "- " (hyphen) is displayed as "LU QoS Group".

● **Performance information**

- **Login IP Address**
  IP address that is logged in is displayed.
  The performance information is displayed for each specified IP address. Note that the IPv6 address is displayed as an abbreviation. If there is no IP address, a "-" (hyphen) is displayed.
  This item is displayed for the iSCSI host when the host affinity setting is configured, the iSCSI name is specified, and the IP address is not specified.
  - For IPv4 address
    - xxx.xxx.xxx.xxx
      xxx: 0 - 255 for other fields (decimal)
  - For IPv6 address
    - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
      xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
      Refer to for details.

● **Performance Monitoring**

- **State**
  The status of performance monitoring for the host is displayed.
  - Active
  - Stopped

- **Start Time**
- **Stop / Collect Time**
  The start time and the end time for performance monitoring are displayed.
  - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Date (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))
  The displayed time varies depending on how the performance monitoring is started or ended.
  - Before monitoring is started (*1)
    "State" for performance monitoring is "Stopped". "-" (hyphens) are displayed for "Start Time" and "Stop Collect Time".
  - Monitoring is started
    "State" for performance monitoring is changed from "Stopped" to "Active". The time when performance monitoring was started is displayed for "Start Time". The time when the performance information is obtained is displayed for "Stop / Collect Time".

- Monitoring is started while the monitoring session has already been started
"State" for performance monitoring is "Active". The last time when performance monitoring was started is displayed for "Start Time". The time when the performance information is obtained is displayed for "Stop / Collect Time".
- Monitoring is stopped
"State" for performance monitoring is changed from "Active" to "Stopped". The last time when performance monitoring was started is displayed for "Start Time". The time when performance monitoring is stopped is displayed for "Stop / Collect Time".
- Monitoring is stopped while the monitoring session has already been stopped
"State" for performance monitoring is "Stopped". The last time when performance monitoring was started is displayed for "Start Time". The first time when performance monitoring was stopped is displayed for "Stop / Collect Time".
    *1:   When performance monitoring is not being performed after the ETERNUS DX/AF is started.
In the following conditions, "-" (hyphens) are displayed for "Start Time" and "Stop / Collect Time".
- When no iSCSI host with the host affinity setting is connected
- When no IP address for an iSCSI host with the host affinity setting is logged in
- When the start time is "0"

> **Caution**

If performance monitoring is restarted during an active performance monitoring session, the performance information that is already obtained is deleted and the collection of performance information starts again.

● **Host Total Performance**

When the host affinity setting is configured by a port and a specific host group, the total performance information for the specific host that is connected to the port is displayed.
If an IP address is not specified and multiple IP addresses are logged in with the iSCSI host that is connected to the target port, the performance information of each IP address is displayed.

• IOPS
The performance information from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed.
- Ave
The average I/O count per second is displayed.
- Min
The minimum I/O count per second is displayed.
- Max
The maximum I/O count per second is displayed.

• Throughput
The transfer data size from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed.
- Ave
The average data transfer size per second is displayed.
- Min
The minimum data transfer size per second is displayed.
- Max
The maximum data transfer size per second is displayed.

• Delay Time
- Total
The total delay time for executing a command from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed. If the total delay time exceeds the maximum value, "Overflow" is displayed.

- Ave
  The average delay time per command from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed.

● **Host LUN Performance**

The performance information of each LUN is displayed for the specific host (when "All" is specified for the host, all of the hosts) that is connected to the port.

- Host LUN
  The host LUN is displayed.
  - 0 - 1023

- Volume Name
  The volume name is displayed.

- IOPS
  The performance information from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed.
  - Ave
    The average I/O count per second is displayed.
  - Min
    The minimum I/O count per second is displayed.
  - Max
    The maximum I/O count per second is displayed.

- Throughput
  The transfer data size from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed.
  - Ave
    The average data transfer size per second is displayed.
  - Min
    The minimum data transfer size per second is displayed.
  - Max
    The maximum data transfer size per second is displayed.

- Delay Time
  - Total
    The total delay time for executing a command from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed. If the total delay time exceeds the maximum value, "Overflow" is displayed.
  - Ave
    The average delay time per command from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed.

LUN Group : LU QoS Group Detail

The bandwidth limit for each LUN is displayed.

The following items are displayed in the Main area:

- LUN Group
  The LUN group name is displayed. If the ETERNUS CLI command ("set mapping") is used for LUN mapping, a "-" (hyphen) is displayed.

- LU QoS Group No.
  The LU QoS group number is displayed between 0 and 1055. If a LU QoS group number is not configured, a "-" (hyphen) is displayed.

- Host LUN
  The host LUN number is displayed.

- Name
  The volume name is displayed.

- Bandwidth Limit
  The maximum performance is displayed in IOPS (throughput value). If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed.

Host QoS (Basic)

Follow the message in the Information area to configure a bandwidth limit on each host.

FC/FCoE Host QoS

The bandwidth limit of the FC/FCoE hosts that are registered in the ETERNUS DX/AF is displayed.

> **N o t e**
>
> This function displays all the hosts that are registered in the ETERNUS DX/AF regardless of whether the hosts belong to host groups or not.

The following items are displayed in the Main area:

- Name
  The FC/FCoE host name is displayed.

- WWN
  The FC/FCoE host WWN is displayed.

- Bandwidth Limit
  The maximum performance of the FC/FCoE host is displayed in IOPS (throughput value). If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed.

iSCSI Host QoS

The bandwidth limit of the iSCSI hosts that are registered in the ETERNUS DX/AF is displayed.

> **N o t e**
>
> This function displays all the hosts that are registered in the ETERNUS DX/AF regardless of whether the hosts belong to host groups or not.

The following items are displayed in the Main area:

- Name
  The iSCSI host name is displayed.

- IP Version
  The IP version of the iSCSI host is displayed.

- IP Address
  The IP address of the iSCSI host is displayed.
  Note that the IPv6 address is displayed as an abbreviation. Refer to for details.
  If the IP address is not set, the field is blank.

- Bandwidth Limit
  The maximum performance of the iSCSI host is displayed in IOPS (throughput value). If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed.

SAS Host QoS

The bandwidth limit of the SAS hosts that are registered in the ETERNUS DX is displayed.

> ◯ **N o t e**
>
> This function displays all the hosts that are registered in the ETERNUS DX regardless of whether the hosts belong to host groups or not.

The following items are displayed in the Main area:
- Name
  The SAS host name is displayed.

- SAS Address
  The SAS address of the SAS host is displayed.

- Bandwidth Limit
  The maximum performance of the SAS host is displayed in IOPS (throughput value). If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed.

Port QoS (Basic)

Follow the message in the Information area to configure a bandwidth limit on each port.

FC Port QoS

This function displays the bandwidth limit and the performance information of the FC ports that are registered in the ETERNUS DX/AF.

> **N o t e**
>
> - The ports with "CA" or "CA/RA" as the port mode that are registered by the ETERNUS DX/AF are displayed regardless of whether the ports belong to CA port groups or not.
> - This function displays the performance information that is obtained during performance monitoring regardless of whether the QoS mode is enabled or disabled. When the performance information is displayed before stopping performance monitoring, the performance information that is obtained from the start time until the time when displaying the performance information is requested is displayed. This function displays the performance information of each port.

The following items are displayed in the Main area:

- Port
  The location information of the target port is displayed.

- Type
  The type of the target port is displayed.
  - 8G FC
  - 16G FC
  - 32G FC

- Bandwidth Limit
  The maximum performance of the target port is displayed in IOPS (throughput value). If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed.

- Performance Monitoring
  - State
    The status of performance monitoring for the host is displayed.
    - Active
    - Stopped

  - Start Time
  - Stop / Collect Time
    The start time and the end time for performance monitoring are displayed.
    - YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Date (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))

    The displayed time varies depending on how the performance monitoring is started or ended.
    - Before monitoring is started (*1)
      "State" for performance monitoring is "Stopped". "-" (hyphens) are displayed for "Start Time" and "Stop Collect Time".
    - Monitoring is started
      "State" for performance monitoring is changed from "Stopped" to "Active". The time when performance monitoring was started is displayed for "Start Time". The time when the performance information is obtained is displayed for "Stop / Collect Time".
    - Monitoring is started while the monitoring session has already been started
      "State" for performance monitoring is "Active". The last time when performance monitoring was started is displayed for "Start Time". The time when the performance information is obtained is displayed for "Stop / Collect Time".

- Monitoring is stopped
"State" for performance monitoring is changed from "Active" to "Stopped". The last time when performance monitoring was started is displayed for "Start Time". The time when performance monitoring is stopped is displayed for "Stop / Collect Time".
- Monitoring is stopped while the monitoring session has already been stopped
"State" for performance monitoring is "Stopped". The last time when performance monitoring was started is displayed for "Start Time". The first time when performance monitoring was stopped is displayed for "Stop / Collect Time".
- *1: When performance monitoring is not being performed after the ETERNUS DX/AF is started.
When the start time is "0", "-" is displayed for "Start Time" and "Stop / Collect Time".

> **Caution**

If performance monitoring is restarted during an active performance monitoring session, the performance information that is already obtained is deleted and the collection of performance information starts again.

- IOPS
The performance information from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed.
  - Ave
  The average I/O count per second is displayed.
  - Min
  The minimum I/O count per second is displayed.
  - Max
  The maximum I/O count per second is displayed.
- Throughput
The transfer data size from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed.
  - Ave
  The average data transfer size per second is displayed.
  - Min
  The minimum data transfer size per second is displayed.
  - Max
  The maximum data transfer size per second is displayed.
- Delay Time
  - Total
  The total delay time for executing a command from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed. If the total delay time exceeds the maximum value, "Overflow" is displayed.
  - Ave
  The average delay time per command from when performance monitoring is started until performance monitoring is ended (or performance information is displayed) is displayed.

iSCSI Port QoS

This function displays the bandwidth limit and the performance information of the iSCSI ports that are registered in the ETERNUS DX/AF.

> 🔵 **N o t e**
>
> - The ports with "CA" or "CA/RA" as the port mode that are registered by the ETERNUS DX/AF are displayed regardless of whether the ports belong to CA port groups or not.
> - This function displays the performance information that is obtained during performance monitoring regardless of whether the QoS mode is enabled or disabled. When the performance information is displayed before stopping performance monitoring, the performance information that is obtained from the start time until the time when displaying the performance information is requested is displayed. This function displays the performance information of each port.

The following items are displayed in the Main area:

- Port
The location information of the target port is displayed.

- Type
The type of the target port is displayed.
    - 1G iSCSI
1Gbit/s iSCSI.
    - 10G iSCSI
10Gbit/s iSCSI.

- Bandwidth Limit
The maximum performance of the target port is displayed in IOPS (throughput value). If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed.

- Performance Monitoring
Refer to "Performance Monitoring" (page 857) for details.

- IOPS
Refer to "Performance Monitoring" (page 857) for details.

- Throughput
Refer to "Performance Monitoring" (page 857) for details.

- Delay Time
Refer to "Performance Monitoring" (page 857) for details.

SAS Port QoS

This function displays the bandwidth limit and the performance information of the SAS ports that are registered in the ETERNUS DX.

> 🔵 **N o t e**
>
> - The ports that are registered by the ETERNUS DX are displayed regardless of whether the ports belong to CA port groups or not.
> - This function displays the performance information that is obtained during performance monitoring regardless of whether the QoS mode is enabled or disabled. When the performance information is displayed before stopping performance monitoring, the performance information that is obtained from the start time until the time when displaying the performance information is requested is displayed. This function displays the performance information of each port.

The following items are displayed in the Main area:

- Port
  The location information of the target port is displayed.

- Type
  The type of the target port is displayed.
  - 6G SAS
  - 12G SAS

- Bandwidth Limit
  The maximum performance of the target port is displayed in IOPS (throughput value). If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed.

- Performance Monitoring
  Refer to "Performance Monitoring" (page 857) for details.

- IOPS
  Refer to "Performance Monitoring" (page 857) for details.

- Throughput
  Refer to "Performance Monitoring" (page 857) for details.

- Delay Time
  Refer to "Performance Monitoring" (page 857) for details.

FCoE Port QoS

This function displays the bandwidth limit and the performance information of the FCoE ports that are registered in the ETERNUS DX.

> ⬤ **N o t e**
>
> • The ports that are registered by the ETERNUS DX are displayed regardless of whether the ports belong to CA port groups or not.
> • This function displays the performance information that is obtained during performance monitoring regardless of whether the QoS mode is enabled or disabled. When the performance information is displayed before stopping performance monitoring, the performance information that is obtained from the start time until the time when displaying the performance information is requested is displayed. This function displays the performance information of each port.

The following items are displayed in the Main area:
- Port
  The location information of the target port is displayed.

- Type
  The type of the target port is displayed.

- Bandwidth Limit
  The maximum performance of the target port is displayed in IOPS (throughput value). If the bandwidth limit has not been configured (the bandwidth has not been limited), "Unlimited" is displayed.

- Performance Monitoring
  Refer to "Performance Monitoring" (page 857) for details.

- IOPS
  Refer to "Performance Monitoring" (page 857) for details.

- Throughput
  Refer to "Performance Monitoring" (page 857) for details.

- Delay Time
  Refer to "Performance Monitoring" (page 857) for details.

LU QoS Group

A list of the registered LU QoS groups is displayed.
An LU QoS group is a group of the bandwidth limit (the maximum performance) configured for each Host LUN.

> 🔵 **N o t e**
>
> By assigning a LU QoS group to a LUN group with the host affinity setting, the bandwidth limit can be configured for each LUN. Refer to "Set Host-LU QoS" (page 454) for details.
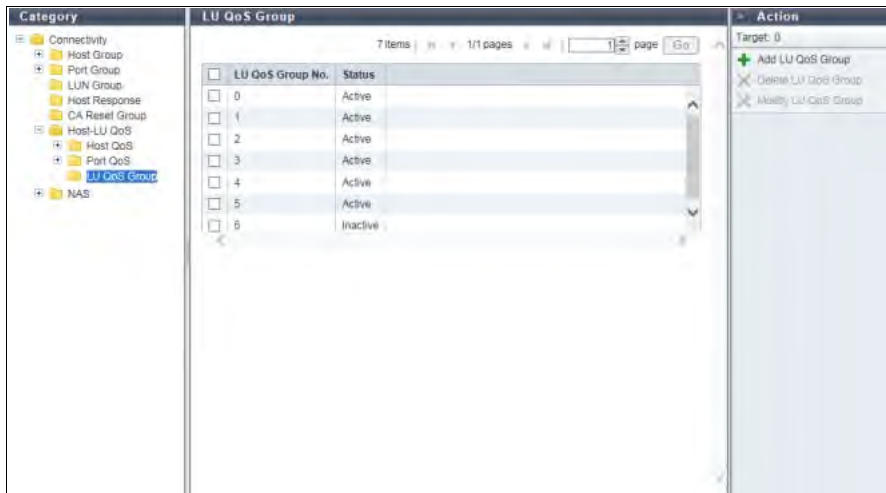
The following items are displayed in the Main area:

- LU QoS Group No.
  The LU QoS group number is displayed between 0 and 1055.
- Status
  Whether a LU QoS group is assigned to a LUN group with the host affinity setting is displayed.
  "Host affinity setting" is to specify association between "Host", "CA Port" and "LUN Group".
  - Active
    The LU QoS group is assigned to a LUN group.
  - Inactive
    The LU QoS group is not assigned to a LUN group.

NAS

This function displays a list of shared folders that are used in a NAS environment.
This function is displayed in a Unified Storage environment.

> ► **Caution**
>
> The display process for the shared folder list may be delayed for a maximum of two minutes while a meta cache redistribution is being performed for NAS volumes (NAS user volumes or NAS backup volumes).

> ⬤ **N o t e**
>
> • A unified upgrade is necessary for an ETERNUS DX S4/S3 series that will be used in a Unified Storage environment if it was previously used in a SAN environment. Note that "Maintenance Operation" policy is required to perform the unified upgrade. This function is added in the category after the unified upgrade is complete.
> • Shared folders include home directories.
> "Home directory" is created for each user and is used as a dedicated folder that can be used freely by the user. Users that are authenticated by the Active Directory authentication server or the local user authentication use home directories with a CIFS connection.

The following items are displayed in the Main area:

• No.
The shared folder number is displayed between 0 - 255.

> ► **Caution**
>
> When a NAS backup volume is restored, shared folder numbers that belong to the NAS backup volume targeted for restoration, may be changed. Use this function to check the shared folder number after restoration. Note that a shared folder number is not changed when the folder has not been restored.

• Shared Folder Name
The shared folder name is displayed.
For the home directory, "homes" is displayed in this item. User dedicated folders are created under the "homes" folder. For home directories, the following display items are fixed.
  - Shared Folder Name
    homes
  - Protocol
    CIFS

- Writable
  Yes
- Access Based Enumeration
  Disable
- NFS Allowed Hosts
  Blank
- CIFS Permissions
  Blank

- Protocol
  The protocol for the shared folder is displayed.
    - When the Windows CIFS protocol is used, "CIFS" is displayed
    - When the UNIX NFS protocol is used, "NFS" is displayed
    - When the Windows CIFS or the UNIX NFS protocol is used, "CIFS/NFS" is displayed

- Shared Status
  The shared status is displayed.

    - 🟢 Online
      The folder is shared.

    - 🟦 Offline
      The folder is not shared.

    - ❓ Unknown
      Other than above status.

- Process
  A process that is being performed for the shared folder is displayed.
  If the NAS data is being deleted, "Clearing Data" is displayed.
  If no process is being performed, a "-" (hyphen) is displayed.

- Oplocks
  When using the Opportunistic locking (Oplocks) function to avoid conflicts between files by locking the files in the shared folder, "Enable" is displayed. When this function is not used, "Disable" is displayed.
  A "-" (hyphen) is displayed when the protocol is "NFS".

- Writable
  When the write permission is specified for the shared folder, "Yes" is displayed. When the write permission is not specified, "No" is displayed.

- Volume No.
  The NAS user volume number (decimal) to which the shared folder belongs is displayed.

- Volume Name
  The NAS user volume name to which the shared folder belongs is displayed.

- Volume Total Capacity
  The total capacity of the NAS user volume to which the shared folder belongs is displayed between 400.00 GB - 128.00 TB.

- Volume Total Free Space
  The total free space in the NAS user volume to which the shared folder belongs is displayed between 0.00 MB - 128.00 TB.

- Owner
  The owner of the shared folder is displayed.

- Group
  The group of the shared folder is displayed.

- **SMB Encryption of Data Access**
  The current SMB encryption setting (enabled or disabled) for the data access is displayed.
  When SMB encryption is performed for data while accessing the shared folder, "Enable" is displayed. When data is not encrypted, "Disable" is displayed.
  A "-" (hyphen) is displayed when the protocol is "NFS".

- **Access Based Enumeration**
  The current setting (enabled or disabled) for the enumeration based on the access permission is displayed.
  When shared folders and directories that cannot be accessed are hidden according to the access control list (ACL function), "Enable" is displayed. When inaccessible shared folders and directories are not hidden, "Disable" is displayed.
  A "-" (hyphen) is displayed when the protocol is "NFS".

- **CIFS Allowed Hosts**
  A list of CIFS Allowed Hosts is displayed.

- **CIFS Denied Hosts**
  A list of CIFS Denied Hosts is displayed.

- **NFS Allowed Hosts**
  A list of NFS Allowed Hosts is displayed.

- **CIFS Permissions**
  The CIFS access permissions that are set for the shared folder is displayed.
  A "-" (hyphen) is displayed when the protocol is "NFS".

  The CIFS access permissions are displayed in the following format.
  - User name or group name [Type, Authority]
    - **Type**
      This item shows whether the displayed name is for user or group (u: User, g: Group).
    - **Authority**
      This item shows the access permission (r: Read Only, rw: Read/Write) for the displayed name.
      "Read/Write" indicates that reading from and writing to the shared folder is allowed.
      "Read Only" indicates that the shared folder is read only.
    - If "Everyone" is displayed as the group name, the specified authority is applied to all authorized users and groups in the ETERNUS DX S4/S3 series. In this case, "Type" is omitted.

  [Example]
  - aaa000 [u, rw]
    Type is "User", name is "aaa000", and authority is "Read/Write".
  - group0 [g, r]
    Type is "Group", name is "group0", and authority is "Read Only".
  - Everyone [rw]
    Type is "Everyone" and authority is "Read/Write".

  🔵 **N o t e**

  - User and group are user information that is managed in the Active Directory authentication server.
  - "Read/Write" is given priority over "Read Only".
    - If "Read Only" is specified for UserA and "Read/Write" is specified for GroupA in which UserA is a part of, "Read/Write" is set for all users in GroupA including UserA.
    - If "Read/Write" is specified for UserA and "Read Only" is specified for GroupA in which UserA is a part of, "Read/Write" is set for UserA and "Read Only" is set for other users in GroupA excluding UserA.
  - If "Everyone" is selected for the CIFS access permission type, the authority is set with the same conditions as when "Read/Write" or "Read Only" is set to all authorized groups in the ETERNUS DX S4/S3 series.

NAS Interface

This function displays a list of the NAS interfaces.
This function is displayed in a Unified Storage environment.

The following items are displayed in the Main area:

- No.
  The NAS interface number is displayed 0 - 159.

- IP Address
  The IPv4 address of the target port is displayed.

- Subnet Mask
  The subnet mask of the target port is displayed.

- Gateway
  The IPv4 gateway address of the target port is displayed.

- IPv6 Link Local Address
  The IPv6 link local address of the target port is displayed.

- IPv6 Connect IP Address
  The IPv6 connect IP address of the target port is displayed.

- IPv6 Prefix length
  The IPv6 prefix length of the target port is displayed.

- IPv6 Gateway
  The IPv6 gateway address of the target port is displayed.

- RIP Setting
  Whether the Routing Information Protocol (RIP) setting is enabled or disabled is displayed.
  When this setting is enabled, the network settings are simplified.

- VLAN ID
  The VLAN ID of the target port is displayed.
  If the VLAN ID is not specified, a "-" (hyphen) is displayed.

- Port
  The location information of the port with the NAS interface setting is displayed.

- Redundant Port
  The location information of the pair port, which configure multipath setting with the target port, is displayed.
  If the redundant port is not specified, a "-" (hyphen) is displayed.

- Failover Status
The failover status of the multipath is displayed.
A "-" (hyphen) is displayed when the multipath is not set (or when "Redundancy" is "Single").
  - Normal
  The multipath setting between the "Port" and "Redundant Port" is in a normal state.
  - CM#x CA#y Port#z is currently inactive
  The multipath between the "Port" and "Redundant Port" is set, but the "CM#x CA#y Port#z" port is not used.

- Redundancy
The connection type of the target port is displayed.
When the connection type is "Active-Active" or "Active-Standby", the "Redundant Port" information is displayed.
  - Active-Active
  Combine the ports in both of the CMs and configure the redundant ports. For this configuration, the ports of both CMs can be used at any time.
  - Active - Standby
  Combine the ports in both of the CMs and configure the redundant ports. For this configuration, one port remains in standby status.
  - Single
  Use only for the ports in the CM that are not redundant.

Environment Settings

This function displays the setup information of the servers (NAS servers, DNS servers, and authentication servers) and the local user authentication that is used for the NAS system.
This function is displayed in a Unified Storage environment.

> **Note**
>
> - The local user authentication cannot be used when an Active Directory authentication server or an LDAP authentication server is used. In this case, the setting item names are displayed in the [Local User] tab and the [Local Group] tab, but all contents are blank.
> - If the local user authentication is used, an Active Directory authentication server and an LDAP authentication server cannot be used. In this case, the setting item names are displayed for the Active Directory authentication server and the LDAP authentication server, but all contents are blank.

■ **When an Active Directory authentication server or an LDAP authentication server is used**
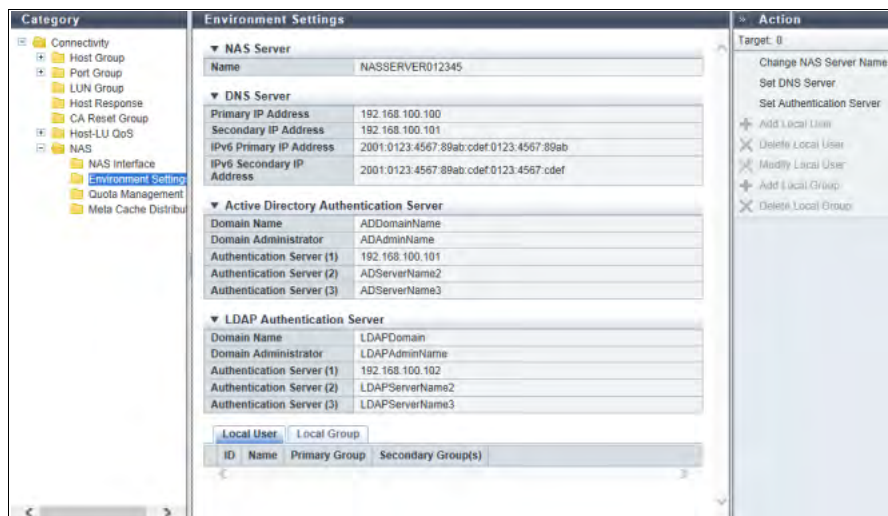
■ **When a local user authentication is used (Add Local User)**
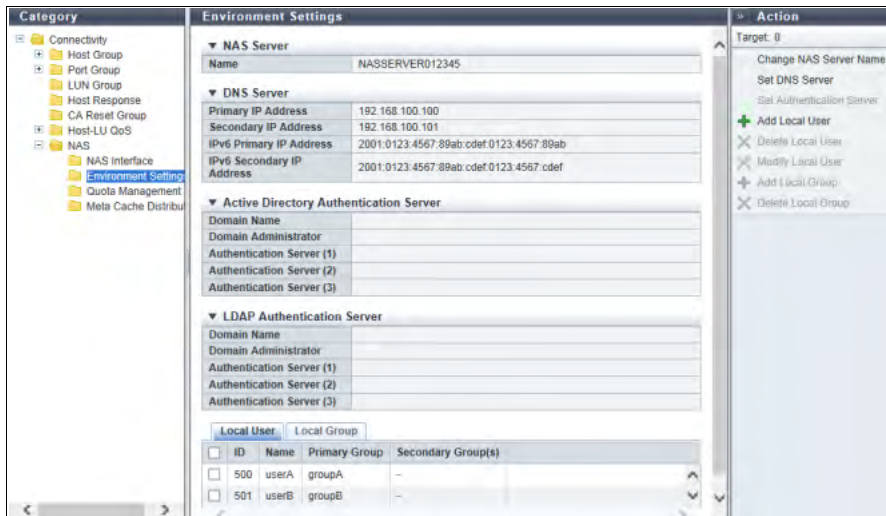
■ **When a local group authentication is used (Add Local Group)**

The following items are displayed in the Main area:

● **NAS Server**

• Name
The NAS server name is displayed.

● **DNS Server**

• Primary IP Address
The IPv4 primary IP address of the DNS server is displayed.
If the relevant IP address is not specified, the field is blank.

• Secondary IP Address
The IPv4 secondary IP address of the DNS server is displayed.
If the relevant IP address is not specified, the field is blank.

• IPv6 Primary IP Address
The IPv6 primary IP address of the DNS server is displayed.
If the relevant IP address is not specified, the field is blank.

- IPv6 Secondary IP Address
  The IPv6 secondary IP address of the DNS server is displayed.
  If the relevant IP address is not specified, the field is blank.

● **Active Directory Authentication Server**

- Domain Name
  The domain name of the Active Directory authentication server is displayed.
  If the authentication server is not specified, the field is blank.

- Domain Administrator
  The administrator name of the Active Directory authentication server is displayed.
   If the authentication server is not specified, the field is blank.

- Authentication Server (1)
  The IPv4 address, IPv6 address, or the FQDN of the Active Directory authentication server is displayed.
  If the Authentication Server (1) is not specified, the field is blank.

- Authentication Server (2)
  The IPv4 address, IPv6 address, or the FQDN of the Active Directory authentication server is displayed.
  If the Authentication Server (2) is not specified, the field is blank.

- Authentication Server (3)
  The IPv4 address, IPv6 address, or the FQDN of the Active Directory authentication server is displayed.
  If the Authentication Server (3) is not specified, the field is blank.

● **LDAP Authentication Server**

- Domain Name
  The domain name of the LDAP authentication server is displayed.
  If the authentication server is not specified, the field is blank.

- Domain Administrator
  The administrator name of the LDAP authentication server is displayed.
  If the authentication server is not specified, the field is blank.

- Authentication Server (1)
  The IPv4 address, IPv6 address, or the FQDN of the LDAP authentication server is displayed.
  If the Authentication Server (1) is not specified, the field is blank.

- Authentication Server (2)
  The IPv4 address, IPv6 address, or the FQDN of the LDAP authentication server is displayed.
  If the Authentication Server (2) is not specified, the field is blank.

- Authentication Server (3)
  The IPv4 address, IPv6 address, or the FQDN of the LDAP authentication server is displayed.
  If the Authentication Server (3) is not specified, the field is blank.

● **Local User**

- ID
  The user ID of the local user is displayed.
  If the local user authentication that has been supported by controller firmware versions V10L51 and earlier is used, "450" is displayed.
  If the local user is not registered in the ETERNUS DX, the field is blank.

- Name
  The local user name is displayed.
  If the local user authentication that has been supported by controller firmware versions V10L51 and earlier is used, "shareuser$" is displayed.
  If the local user is not registered in the ETERNUS DX, the field is blank.

- Primary Group
The primary group name to which the local user belongs is displayed.
If the local user is not registered in the ETERNUS DX, the field is blank.

- Secondary Group(s)
The secondary group names to which the local user belongs are displayed.
If multiple secondary groups exist, all factors are separated with a "," (comma) and displayed. If no secondary group name exists, a "-" (hyphen) is displayed.
If the local user is not registered in the ETERNUS DX, the field is blank.

● Local Group

- ID
The group ID for the local group is displayed.
For details about group IDs for local groups that are automatically created in the ETERNUS DX, refer to .

- Name
The local group name is displayed.
For details about group names for local groups that are automatically created in the ETERNUS DX, refer to .

- User(s) who belongs to a Primary Group
The local user names that belong to the primary group are displayed.
If multiple local user names exist, all factors are separated with a "," (comma) and displayed. If no local user name exists, a "-" (hyphen) is displayed.
If the local user is not registered in the ETERNUS DX, the field is blank.

- User(s) who belongs to a Secondary Group
The local user names that belong to the secondary group are displayed.
If multiple local user names exist, all factors are separated with a "," (comma) and displayed. If no local user name exists, a "-" (hyphen) is displayed.
If the local user is not registered in the ETERNUS DX, the field is blank.

Special group

Local group ID	Local group name	Description
450	shareuser$	The local user "shareuser$" belongs to this group. This group is automatically created when the controller firmware is updated from controller firmware version V10L51 or earlier while the authentication server is not being used (or all users share the same fixed user account) to V10L53 or later. Regular local users can also belong to this group.
451	sharegroup$	The initial primary group to which the created local users belong. This group is automatically created when local users are created. If all local users that belong to this group are deleted, this group is automatically deleted. If the local user "shareuser$" is deleted and then added again, the recreated "shareuser$" belongs to this group.
1002	BUILTIN_Administrators	One of the BUILTIN groups (*1). Users who belong to this group can execute all operations for all domain controllers within the domain.
1003	BUILTIN_Users	One of the BUILTIN groups (*1). Users who belong to this group can execute most of the general operations.
1004	BUILTIN_BackupOperators	One of the BUILTIN groups (*1). Users who belong to this group can perform file backups and file recoveries regardless of the access permissions for all the files of domain controllers within the domain.

*1: "BUILTIN groups" are groups that are included in the ETERNUS DX as standard. If local users belong to these groups, the backup software "Arcserve Backup" can be used to back up or restore files by using the ETERNUS DX as a backup device.

Quota Management

The list of quota setting information is displayed.
Quota is a function that limits drive space or the number of files used on a NAS user volume or a shared folder to prevent the depletion of resources in the ETERNUS DX. There are two types of thresholds ("Warning" and "Limit"). This function is displayed in a Unified Storage environment.

▷ **Caution**

- Quotas for NAS user volumes are set for users or groups that are registered in the authentication server. When using this function, registering the users or groups in the authentication server in advance is necessary.
- Quotas for shared folders are set for shared folders that are registered in the ETERNUS DX. Create the shared folders in advance. Refer to "Create Shared Folder" (page 471) for details.

● **N o t e**

Shared folders include home directories.

The following items are displayed in the Main area:

- Volume No.
  The volume number of the quota setting target volume is displayed.

- Volume Name
  The name of the quota setting target volume is displayed.

- Type
  The quota target type is displayed.
  - User
  - Group
  - Share

- Name
  The quota target user name, group name, or shared folder name is displayed.
  For the home directory, "homes" is displayed for this item.

- Used Status
  The use state for the quota target drive space or file count is displayed.
  If the drive space use state and the file count use state do not match, the use state is displayed according to the priority.

- ✅ Normal
  Normal status (The usage is below the warning value. If the warning value is not specified, the usage is below the limit value.)

- ⚠️ Warning
  The usage has exceeded the warning value but is below the limit value.

- ❌ Exceeded
  The usage has exceeded the limit value.

- ❓ Unknown
  Other than above.

The priority for the use state is "❓ Unknown" > "❌ Exceeded" > "⚠️ Warning" > "✅ Normal".

- Drive Space
  The usage amount of the drive is displayed.

  - Used Size
    The current drive usage amount is displayed.
    If no quota target user or group is registered in the authentication server, or if the usage amount cannot be obtained, a "-" (hyphen") is displayed.

    🔵 **N o t e**

    The usage amount is displayed with the largest unit (TB/GB/MB) after rounding off to two decimal places.
    For example, if the usage amount in the ETERNUS DX is "1572864000 KB", "1.46 TB" is displayed.

  - Used Rate
    The usage rate of the drive usage limit value is displayed between 0 - 100%.
    Used Rate = Used Size / Limit
    A "-" (hyphen) is displayed in the following conditions:
    - The limit value is not specified
    - No quota target user or group is registered in the authentication server
    - The used size cannot be obtained

    🔵 **N o t e**

    For the used rate, the result of the division is rounded up to two decimal places. If the used rate is larger than "0" but smaller than or equal to "1", "1 %" is displayed.

  - Warning
    The drive usage warning value is displayed.
    If not specified, "Not Specified" is displayed. If the warning value cannot be obtained, a "-" (hyphen) is displayed.

    🔵 **N o t e**

    The warning value is displayed with the largest unit (TB/GB/MB) after rounding off to two decimal places.
    Refer to the Note of "Used Size" (page 872) for details.

  - Limit
    The drive usage limit value is displayed.
    If not specified, "Not Specified" is displayed. If the limit value cannot be obtained, a "-" (hyphen) is displayed.

    🔵 **N o t e**

    The limit value is displayed with the largest unit (TB/GB/MB) after rounding off to two decimal places. Refer to the Note of "Used Size" (page 872) for details.

- File Count
  The number of used files is displayed.
    - Used Count
      The current file count is displayed.
      If no quota target user or group is registered in the authentication server, or if the used count cannot be obtained, a "-" (hyphen") is displayed.
    - Used Rate
      The usage rate of the file count limit value is displayed between 0 - 100%.
      Used Rate = Used Count / Limit
      A "-" (hyphen) is displayed in the following conditions:
        - The limit value is not specified
        - No quota target user or group is registered in the authentication server
        - The used count cannot be obtained

> 🔵 **N o t e**
>
> For the used rate, the result of the division is rounded up to two decimal places. If the used rate is larger than "0" but smaller than or equal to "1", "1 %" is displayed.

    - Warning
      The file count warning value is displayed.
      If not specified, "Not Specified" is displayed. If the warning value cannot be obtained, a "-" (hyphen) is displayed.
    - Limit
      The file count limit value is displayed.
      If not specified, "Not Specified" is displayed. If the limit value cannot be obtained, a "-" (hyphen) is displayed.

Filter setting

Filter	Description
Volume Name	Input the volume name that is to be displayed. When not using the volume name for filtering, leave this item blank.
Name	Input the user name, group name, shared folder name of the quota target that is to be displayed, or "homes". When not using the name for filtering, leave this item blank.
Used Status	Select the used state that is to be displayed.
Drive Used Size	Input the used size of the drive that is to be displayed. The quota setting information is displayed if the drive used size is larger than or equal to the specified value. When not using the drive used size for filtering, leave this item blank.
Drive Used Rate	Input the used rate of the drive that is to be displayed. The quota setting information is displayed if the drive used rate is larger than or equal to the specified value. When not using the drive used rate for filtering, leave this item blank.
File Used Count	Input the number of used files that is to be displayed. The quota setting information is displayed if the number of used files is greater than or equal to the specified value. When not using the file used count for filtering, leave this item blank.
File Used Rate	Input the used rate for the file that is to be displayed. The quota setting information is displayed if the file used rate is larger than or equal to the specified value. When not using the file used rate for filtering, leave this item blank.

Meta Cache Distribution

This function displays the setting state of the automatic meta cache distribution and the location of the meta cache.

"Meta cache" is a cache area in NAS for storing the management information of the file system. If the meta cache distribution is different from the initial location when the NAS volumes (NAS user volumes and the NAS backup volumes) are created, the meta cache is concentrated in one controller. In this case, the CM memory where the meta cache exists may become insufficient or the access performance to the NAS volumes from the CM without meta cache may be reduced.

This function is displayed in a Unified Storage environment.

> **◯ N o t e**
>
> - To distribute the meta cache, using the [Initialize Meta Cache Distribution] function is recommended.
> - The meta cache distribution can be initialized manually. Refer to "Initialize Meta Cache Distribution" (page 502) for details.
> - The meta cache distribution can be initialized automatically. Refer to "Enable Automatic Meta Cache Distribution" (page 504) for details.
> - Automatic meta cache distribution can be disabled. Refer to "Disable Automatic Meta Cache Distribution" (page 505) for details.

The following items are displayed in the Main area:

● **Automatic Meta Cache Distribution**

- Automatic Meta Cache Distribution
  Whether the automatic meta cache distribution is enabled or not is displayed.

● **Meta Cache Distribution Information**

- Volume No.
  The NAS volume number is displayed.

- Volume Name
  The NAS volume name is displayed.

- Current Location
  The current meta cache distribution is displayed.
  When the distribution information cannot be obtained, a "-" (hyphen) is displayed.

- Initial Location
  The location of the meta cache when the NAS volume was created is displayed.
  When the distribution information cannot be obtained, a "-" (hyphen) is displayed.

12. RAID Group Status

RAID group status displays the status information of volumes.
RAID group status screens can be displayed by clicking the following categories:

Category	RAID group status screen
RAID Group	RAID Group (Basic Information)
Tuning	Tuning
Eco-mode Schedule	Eco-mode Schedule (RAID Group)
SED Key Group	SED Key Group
External RAID Group	External RAID Group

Detailed information of the RAID groups can be displayed from the following screens:

- RAID Group Detail (Basic)
- RAID Group Detail (Volume Layout)
- RAID Group Detail (Drives)
- External RAID Group Detail (Basic)
- External RAID Group Detail (External Drives)

RAID Group (Basic Information)

This function displays the basic information of RAID groups.
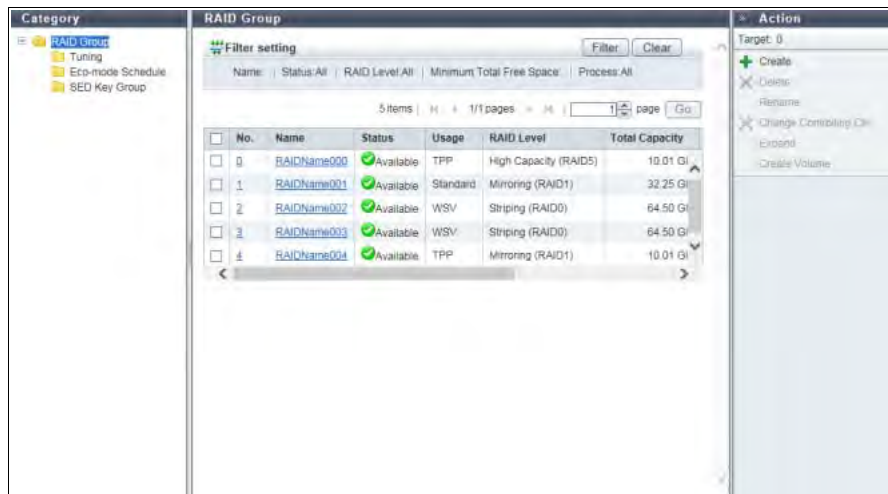
The following items are displayed in the Main area:

- No.
  The RAID group number is displayed. Click this item to display "RAID Group Detail (Basic)" (page 884).
  The RAID group number is allocated when a volume is created from the smallest unused decimal number in ascending order.

- Name
  The RAID group name is displayed. Click this item to display "RAID Group Detail (Basic)" (page 884).

- Status
  The RAID group status is displayed. Refer to "RAID Group Status" (page 1374) for detailed information of RAID group status.

- Usage
  The usage of the RAID group is displayed.
  - Standard
    A RAID group that is used for creating "Standard", "SDV", or "SDPV" type volumes
  - Standard / WSV
    A RAID group that is used for creating the following volumes:
    - "WSV" and "Standard"
    - "WSV" and "SDV"
    - "WSV" and "SDPV"
  - WSV
    A RAID group that is used for creating "WSV" type volumes
  - TPP
    A RAID group that belongs to a TPP
  - FTRP
    A RAID group that belongs to an FTRP
  - RDB
    A RAID group that is registered as an REC Disk Buffer
  - Extreme Cache Pool
    A RAID group that is registered as an Extreme Cache Pool
  - Temporary
    A RAID group that is temporarily created while LDE is being performed
  - "-" (hyphen)
    A RAID group that is not used

- RAID Level
  The RAID level is displayed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - High Reliability (RAID6-FR)
  - Reliability (RAID5+0)
  - Mirroring (RAID1)
  - Striping (RAID0)

- Total Capacity
  The total capacity of the RAID groups is displayed.
  The capacity is displayed in units of "GB" or "TB". Even when volumes are created in units of "GB", if the volume capacity exceeds 1023.99GB, the capacity is displayed in units of "TB". The capacity is rounded off to two decimal places.

- Total Free Space
  The total free space in the RAID group is displayed.
  If the total free capacity exceeds 1023.99MB, the capacity is displayed in units of "GB". If the total free capacity exceeds 1023.99GB, the capacity is displayed in units of "TB". The capacity is rounded off to two decimal places.
  "Free space" means an area in the RAID group where no volume is created, and dispersed areas which became free by creating and deleting a volume.

- Controlling CM
  The Controlling CM of the RAID group is displayed (x: CE number, y: CM number).
  - For the ETERNUS DX8700 S3/DX8900 S3
    CE#x CM#y
  - For the other models
    CM#y

- Process
  A process that is being performed for the RAID group is displayed. If no process is being performed, a "-" (hyphen) is displayed.
  - Recovering
    Rebuild, copyback, redundant copy, or RAID group recovery is being performed.
  - Expanding
    Expansion of the RAID group by LDE is being performed.
  - Formatting
    Formatting of the RAID group is being performed.

Filter setting

Filter	Description
Name	Input the RAID group name that is to be displayed. When not using the RAID group name for filtering, leave this item blank.
Status	Select the RAID group status that is to be displayed.
RAID Level	Select the RAID level that is to be displayed.
Minimum Total Free Space	Input the minimum capacity of total free space for the RAID groups that are to be displayed and select the units of capacity. When the total free space of the RAID group is not used for filtering, leave this item blank or specify "0".
Process	Select the process that is being performed for the RAID group to be displayed.

Tuning

The RAID group tuning information is displayed.

The following items are displayed in the Main area:

- No.
  The RAID group number is displayed. Click this item to display "RAID Group Detail (Basic)" (page 884).

- Name
  The RAID group name is displayed. Click this item to display "RAID Group Detail (Basic)" (page 884).

- Status
  The RAID group status is displayed. Refer to "RAID Group Status" (page 1374) for detailed information of RAID group status.

- Usage
  The usage of the RAID group is displayed. A "-" (hyphen) is displayed for the RAID group that is not used. Refer to "Usage" (page 876) in "RAID Group (Basic Information)" for details.
  - Standard
  - Standard / WSV
  - WSV
  - TPP
  - FTRP
  - RDB
  - Extreme Cache Pool

- RAID Level
  The RAID level is displayed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - High Reliability (RAID6-FR)
  - Reliability (RAID5+0)
  - Mirroring (RAID1)
  - Striping (RAID0)

- Total Capacity
  The total capacity of the RAID groups is displayed.

- Rebuild Priority
The rebuild priority of the RAID group is displayed.
When the Rebuild Priority is "Low", give priority to host access.
When the Rebuild Priority is "Middle", give the same priority as the host access to rebuild, copyback, and redundant copy.
When the Rebuild Priority is "High", give priority to rebuild, copyback, and redundant copy.
A "-" (hyphen) is displayed for the RAID group that is registered as an EXCP.

- DCMF
The Drive Command Multiplying Factor (DCMF) is displayed.
If the DCMF is changed, the number of commands issued to the drive is increased in multiples of the DCMF set value (if DCMF is "2", it is double).

- Drive Access Priority
The drive access priority is displayed.
When "Response" is specified, responses to host I/O are given priority over throughput.
When "Throughput" is specified, throughput is given priority over responses to host I/O.
When the drives that configure the target RAID group are SSDs or SSD SEDs, a "-" (hyphen) is displayed.

- Throttle
The throttle value is displayed.
Throttle is the proportion of the number of commands that are issued to a drive at the same time to the maximum number of commands that can be issued. When the throttle value is "100%", the maximum number of commands specified for each drive (the default number of commands) are issued.
When "Drive Tuning Parameter Setting" of the [Modify RAID Group Parameters] function is disabled, a "-" (hyphen) is displayed.
When logged in with a user account that has a default "Monitor" role, this item is not displayed.

- Ordered Cut
Ordered Cut is displayed between 0 and 65535.
Ordered Cut is the number of commands for optimizing drive access processing (priority control). When Ordered Cut is "x", the command to perform the priority control is issued for every x commands issued, and priority control is performed for the command issued before this command.
When Ordered Cut is "0", the interval for priority control (priority control at every "x" commands) cannot be specified. All of the commands issued to the drive are processed according to their priority settings.
When "Drive Tuning Parameter Setting" of the [Modify RAID Group Parameters] function is disabled, or the configuration drive of the RAID group is SSD or SSD SED, a "-" (hyphen) is displayed.
When logged in with a user account that has a default "Monitor" role, this item is not displayed.

▷ **Caution**

RAID groups in which LDE is being performed are not displayed in the list.

Filter setting

Filter	Description
Name	Input the RAID group name that is to be displayed. When not using the RAID group name for filtering, leave this item blank.
Status	Select the RAID group status that is to be displayed.
RAID Level	Select the RAID level that is to be displayed.

Eco-mode Schedule (RAID Group)

This function displays the set state of the Eco-mode that is applied for the RAID group.

> **◯ N o t e**
>
> - To use the Eco-mode, follow the procedure in "Modify Eco-mode General Setting" (page 94) and "Create Eco-mode Schedule" (page 95) to perform the general Eco-mode setup and create an Eco-mode schedule.
> - To assign the Eco-mode to a RAID group, refer to "Assign Eco-mode Schedule (RAID Group)" (page 525).

The following items are displayed in the Main area:

- No.
  The RAID group number is displayed. Click this item to display "RAID Group Detail (Basic)" (page 884).

- Name
  The RAID group name is displayed. Click this item to display "RAID Group Detail (Basic)" (page 884).

- Status
  The RAID group status is displayed. Refer to "RAID Group Status" (page 1374) for detailed information of RAID group status.

- Usage
  The usage of the RAID group is displayed. Refer to "Usage" (page 876) in "RAID Group (Basic Information)" for details.
  - Standard
  - Standard / WSV
  - WSV

- RAID Level
  The RAID level is displayed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - High Reliability (RAID6-FR)
  - Reliability (RAID5+0)
  - Mirroring (RAID1)
  - Striping (RAID0)

- Total Capacity
  The total capacity of the RAID groups is displayed.

- Eco-mode Schedule
The Eco-mode schedule name that is assigned to the RAID group is displayed. If the Eco-mode is controlled with Storage Foundation Software ETERNUS SF, "External" is displayed. When no Eco-mode schedule has been assigned, the field is blank.

- Eco-mode Action
The Eco-mode schedule action status is displayed.
When no Eco-mode schedule has been assigned, a "-" (hyphen) is displayed.
  - Drive power off
  The power for the drive is turned off during Eco-mode operation.
  - Drive motor off
  The drive motor is stopped during Eco-mode operation.
  - Drive always on
  Disable Eco-mode and the drive is always active.

- Motor Status
The drive motor status is displayed.
  - Active
  The drive motors are activated.
  - In the Boot Process
  The drive motors are starting up.
  - Idle
  The drive motors are stopped.
  - In the Stop Process
  The drive motors are being stopped.
  - Power off
  The drive power is being turned off.

Filter setting

Filter	Description
Name	Input the RAID group name that is to be displayed. When not using the RAID group name for filtering, leave this item blank.
Status	Select the RAID group status that is to be displayed.
RAID Level	Select the RAID level that is to be displayed.
Eco-mode Schedule	Input the Eco-mode schedule that is to be displayed. When not using the Eco-mode schedule name for filtering, leave this item blank.
Eco-mode Action	Select the Eco-mode action that is to be displayed.

SED Key Group

This function displays the key group settings for the RAID groups that are configured with SEDs.
The key group combines all of the RAID groups that use the same SED authentication key.

> **N o t e**
>
> - One key group can be created in the ETERNUS DX/AF.
> - Use the [Key Group] screen to check the SED authentication key information and the SSL/KMIP certificate information that is used for the key group. Refer to "Key Group" (page 653) for details.
> - There are two types of SED keys: an SED authentication key that is managed by the key server and a common key that is stored in the ETERNUS DX/AF. If a RAID group that is configured with SEDs is registered in the key group, the relevant RAID group is managed by the SED authentication key. If the RAID group is not registered in the key group, the relevant RAID group is managed by the common key.
> - RAID groups that are configured with SEDs can be added in the key group or deleted from the key group. Refer to "Set Key Group (RAID Group)" (page 528) for details.

The following items are displayed in the Main area:

- No.
  The RAID group number is displayed. Click this item to display "RAID Group Detail (Basic)" (page 884).

- Name
  The RAID group name is displayed. Click this item to display "RAID Group Detail (Basic)" (page 884).

- Status
  The RAID group status is displayed. Refer to "RAID Group Status" (page 1374) for detailed information of RAID group status.

- Usage
  The usage of the RAID group is displayed. A "-" (hyphen) is displayed for the RAID group that is not used.
  Refer to "Usage" (page 876) in "RAID Group (Basic Information)" for details.
  - Standard
  - Standard / WSV
  - WSV
  - TPP
  - FTRP
  - RDB
  - Temporary

- **RAID Level**
  The RAID level is displayed.
    - High Performance (RAID1+0)
    - High Capacity (RAID5)
    - High Reliability (RAID6)
    - High Reliability (RAID6-FR)
    - Reliability (RAID5+0)
    - Mirroring (RAID1)
    - Striping (RAID0)

- **Total Capacity**
  The total capacity of the RAID groups is displayed.

- **Key Group**
  The set state of the key group for the RAID groups is displayed.
    - If the relevant RAID group is registered in the key group: "Enable"
    - If one of the following conditions applies to the relevant RAID group: "Disable"
      - No common key for SEDs is registered
      - The relevant RAID group is not registered in the key group

Filter setting

Filter	Description
Name	Input the RAID group name that is to be displayed. When not using the RAID group name for filtering, leave this item blank.
Status	Select the RAID group status that is to be displayed.
RAID Level	Select the RAID level that is to be displayed.

RAID Group Detail (Basic)

Click the [No.] link or the [Name] link in the "RAID Group (Basic Information)" (page 876) to display the detailed information of the target RAID group.

The following items are displayed in the Main area:

- Status
  The RAID group status is displayed. Refer to "RAID Group Status" (page 1374) for detailed information of RAID group status.

- RAID Level
  The RAID level is displayed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - High Reliability (RAID6-FR)
  - Reliability (RAID5+0)
  - Mirroring (RAID1)
  - Striping (RAID0)

- Fast Recovery Configuration
  The drive configuration in the Fast Recovery RAID group is displayed.
  This item is displayed only when the RAID level is "High Reliability (RAID6-FR)".
  - (3D+2P)x2+1HS
  - (4D+2P)x2+1HS
  - (6D+2P)x2+1HS
  - (9D+2P)x2+1HS
  - (12D+2P)x2+1HS
  - (5D+2P)x4+1HS
  - (13D+2P)x2+1HS
  - (8D+2P)x3+1HS
  - (4D+2P)x5+1HS
  - (3D+2P)x6+1HS
  D: Data drives, P: Parity drives, HS: Hot Spares

- Total Capacity
  The total capacity of the RAID groups is displayed.

- Total Free Space
  The total free space in the RAID group is displayed.

- **Controlling CM**
  The Controlling CM of the RAID group is displayed (x: CE number, y: CM number).
  - For the ETERNUS DX8700 S3/DX8900 S3
    CE#x CM#y
  - For the other models
    CM#y

- **Eco-mode Schedule**
  The Eco-mode schedule name that is assigned to the RAID group is displayed.
  If the Eco-mode is controlled with Storage Foundation Software ETERNUS SF, "External" is displayed.
  When no Eco-mode schedule has been assigned, the field is blank.

- **Eco-mode Action**
  The Eco-mode schedule action status is displayed.
  When no Eco-mode schedule has been assigned, a "-" (hyphen) is displayed.
  Refer to "Eco-mode Action" (page 881) in "Eco-mode Schedule (RAID Group)" for details.
  - Drive power off
  - Drive motor off
  - Drive always on

- **Motor Status**
  The drive motor status is displayed.
  Refer to "Motor Status" (page 881) in "Eco-mode Schedule (RAID Group)" for details.
  - Active
  - In the Boot Process
  - Idle
  - In the Stop Process
  - Power Off

- **Fast Recovery Drive**
  When the hot spare area in the Fast Recovery RAID group is used (*1), the drive number for the data recovery source drive is displayed. If Fast Recovery (*2) is not used, the field is blank.
  This item is displayed only when the RAID level is "High Reliability (RAID6-FR)".
  - *1: The hot spare area is used from the beginning of high-speed rebuilding up until the copyback process (from the hot spare area to the replaced normal drive) completes successfully.
  - *2: High-speed rebuilding when one drive fails in the Fast Recovery RAID group.
    - CE Drive#yy (for the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F)
    - DE#xx Drive#yy (xx: DE number, yy: Drive number)

- **Process**
  A process that is being performed for the RAID group is displayed. If no process is being performed, a "-" (hyphen) is displayed.

- **Progress**
  The progress of a process that is being performed is displayed with a bar and a rate (%). To display the latest progress, refresh the screen. If no process is being performed, a "-" (hyphen) is displayed.

- **Estimated Time Left**
  The estimated remaining time before recovering is complete is displayed. To display the latest estimated remaining time, refresh the screen. This item is not displayed when the process is other than "Recovering".
  - Calculating
    The ETERNUS DX/AF is calculating the estimated remaining time.
  - 30 days or more
    The estimated remaining time is 30 days or more.

- x days y h z min. (x: 1 - 29, y: 0 - 23, z: 0 - 59)
  The estimated remaining time is more than one minute and less than 30 days. When the estimated remaining time is less than one day, the "days" value is omitted. When the estimated remaining time is less than one hour, the "days" and "hours" values are omitted.
- Less than 1 min.
  The estimated remaining time is less than one minute.

> ▶ **Caution**

The "Estimated Time Left" value may increase or decrease due to the I/O load when displaying this item.

• Remaining Size
The remaining size of the unrecovered RAID group is displayed. To display the latest size, refresh the screen. This item is not displayed when the process is other than "Recovering".

> ▶ **Caution**

The remaining physical capacity in the drive that is being recovered is displayed. Note that the remaining capacity may be larger than the capacity that is currently being used by users.

• Stripe Depth
The Stripe Depth (*1) of the RAID group is displayed.
If the RAID level is "Mirroring (RAID1)", a "-" (hyphen) is displayed.
  - 64 KB
  - 128 KB
  - 256 KB
  - 512 KB
  - 1024 KB

*1: The number of logical blocks that are assigned to a drive for each stripe when configuring a stripe volume in a RAID group. Normally, it is 64KB.

RAID Group Detail (Volume Layout)

Detailed information of the volume layout is displayed. Note that the [Volume Layout] tab is not displayed for RAID groups that are registered as EXCPs.
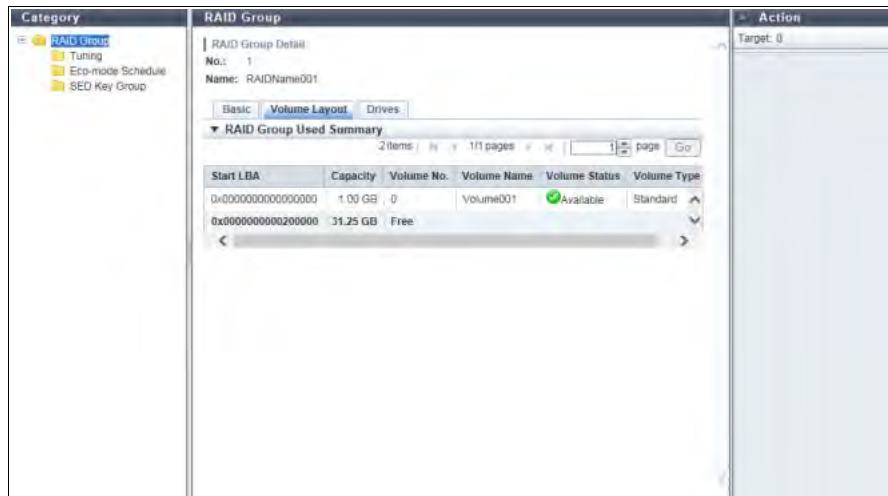
The following items are displayed in the Main area:

- Start LBA
  The first LBA of the volume is displayed.

- Capacity
  The volume capacity is displayed.
  If the volume capacity exceeds 1023.99MB, the capacity is displayed in units of "GB". If the volume capacity exceeds 1023.99GB, the capacity is displayed in units of "TB". The capacity is rounded off to two decimal places. To check the volume capacity in units of "MB", use ETERNUS CLI.

- Volume No.
  The volume number is displayed. Unused space is displayed as "Free".

- Volume Name
  The volume name is displayed.

- Volume Status
  The volume status is displayed. Refer to "Volume Status" (page 1373) for detailed information of volume status.

- Volume Type
  The volume type is displayed.
    - Standard
    - WSV
    - SDV
    - SDPV

RAID Group Detail (Drives)

Detailed information of drives that configure the RAID group is displayed.
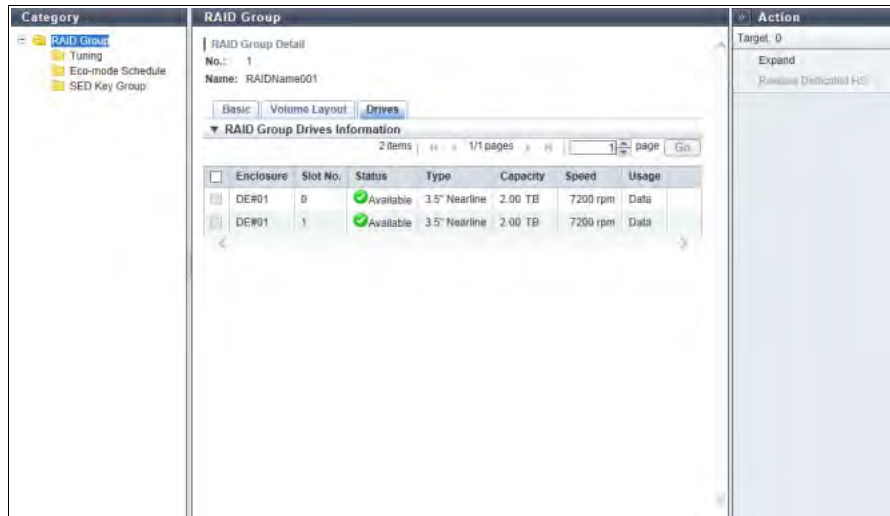
The following items are displayed in the Main area:

- Enclosure
  The number of the enclosure where the drive is installed is displayed.

- Slot No.
  The number of the slot where the drive is installed is displayed.

- Status
  The drive status is displayed. Refer to for details.

- Type
  The drive type is displayed in combination with the following.
  - Drive size
    - For 2.5-inch drives
      2.5"
    - For 3.5-inch drives
      3.5"
  - Drive type
    - For SAS disks
      Online
    - For Nearline SAS disks
      Nearline
    - For SSDs, the following items are displayed depending on the SSD type
      - For SSD-Ms (12 Gbit/s) (*1)
        SSD-M
      - For SSD-Ls (12 Gbit/s) (*1)
        SSD-L
      - For SSDs (6 Gbit/s) (*1)
        SSD

  Note that "SED" is also displayed for self encrypting drives and "AF" is also displayed for Advanced Format com-
  pliant drives.

  *1: The displayed item varies depending on the interface speed (bandwidth) or the capacity of the reserved space.
  Unless otherwise specified, this manual refers to "SSD-M", "SSD-L", and "SSD" collectively as "SSD". In addition, there
  may be cases when "SSD SED" is used as a collective term for self encrypting drives (SSD-M, SSD-L, SSD).

- Capacity
  The capacity of the drive is displayed.

  > **Caution**

  The drive capacity that is displayed for the SSD-L differs from the product's actual capacity. For example, the drive capacity of a "1.92TB SSD-L" is displayed as "2.00 TB".

- Speed
  The drive speed is displayed. For SSD or SSD SED, a "-" (hyphen) is displayed.

- Usage
  The usage of the drive is displayed. Refer to "Usage" (page 707) in "Drives" for details.
  - Data
  - Global Hot Spare
  - Dedicated Hot Spare

External RAID Group

This function displays the External RAID Group list.
This function is displayed only if the Non-disruptive Storage Migration License has been registered.

> ▷ **Caution**
>
> Creating an External RAID Group is required in advance. Refer to "Create External RAID Group" (page 531) for details.

The following items are displayed in the Main area:

- No.
  The External RAID Group number is displayed. Click this item to display "External RAID Group Detail (Basic)" (page 892).

- Name
  The External RAID Group name is displayed. Click this item to display "External RAID Group Detail (Basic)" (page 892).

- Status
  The External RAID Group status is displayed. Refer to "External RAID Group Status" (page 1375) for details.

- Usage
  The usage of the External RAID Group is displayed.
  - Migration
    An External RAID Group that is used for data migrations.

- External LU Information
  Whether the External RAID Group inherits the "External LU Information" is displayed.
  If "External LU Information" is inherited, "Inherited" is displayed.
  If "External LU Information" is not inherited, a "-" (hyphen) is displayed.

- Controlling CM
  The Controlling CM of the External RAID Group is displayed (x: CE number, y: CM number).
  - For the ETERNUS DX8700 S3/DX8900 S3
    CE#x CM#y
  - For the other models
    CM#y

- Total Capacity
  The total capacity of the External RAID Group is displayed.

- Total Free Space
  The total free space in the External RAID Group is displayed.
  If an External Volume is created in the External RAID Group, "0.00 MB" is displayed for this item.
  If no External Volume is created in the External RAID Group, the total capacity of the External RAID Group is displayed for this item.
  For example, if the total capacity of the External RAID Group is "2.00 GB", either of the following values is displayed for this item.
  - If an External Volume is created
    "0.00 MB"
  - If no External Volume is created
    "2.00 GB"

Filter setting

Filter	Description
Name	Input the External RAID Group name that is to be displayed. When not using the External RAID Group name for filtering, leave this item blank.
Status	Select the External RAID Group status that is to be displayed.
Minimum Total Free Space	Input the minimum capacity of total free space for the External RAID Groups that are to be displayed and select the units of capacity. When the total free space of the External RAID Group is not used for filtering, leave this item blank or specify "0".

External RAID Group Detail (Basic)

Click the [No.] link or the [Name] link in the "External RAID Group" (page 890) to display the detailed information of the target External RAID Group.

The following items are displayed in the Main area:

- Status
  The External RAID Group status is displayed. Refer to "External RAID Group Status" (page 1375) for details.

- Usage
  The usage of the External RAID Group is displayed.

- External LU Information
  Whether the External RAID Group inherits the "External LU Information" is displayed.
  If "External LU Information" is inherited, "Inherited" is displayed.
  If "External LU Information" is not inherited, a "-" (hyphen) is displayed.

- Controlling CM
  The Controlling CM of the External RAID Group is displayed (x: CE number, y: CM number).
  - For the ETERNUS DX8700 S3/DX8900 S3
    CE#x CM#y
  - For the other models
    CM#y

- Total Capacity
  The total capacity of the External RAID Group is displayed.
  In addition, the capacity is displayed in "bytes" within parentheses.

- Total Free Space
  The total free space in the External RAID Group is displayed.
  In addition, the capacity is displayed in "bytes" within parentheses.
  If an External Volume is created in the External RAID Group, "0.00 MB" is displayed for this item.
  If no External Volume is created in the External RAID Group, the total capacity of the External RAID Group is displayed for this item.
  For example, if the total free space in the External RAID Group is "2.00 GB", either of the following values is displayed for this item.
  - If an External Volume is created
    "0.00 MB"
  - If no External Volume is created
    "2.00 GB"

External RAID Group Detail (External Drives)

In this screen, the detailed information of the External Drives that are used in the External RAID Group is displayed.
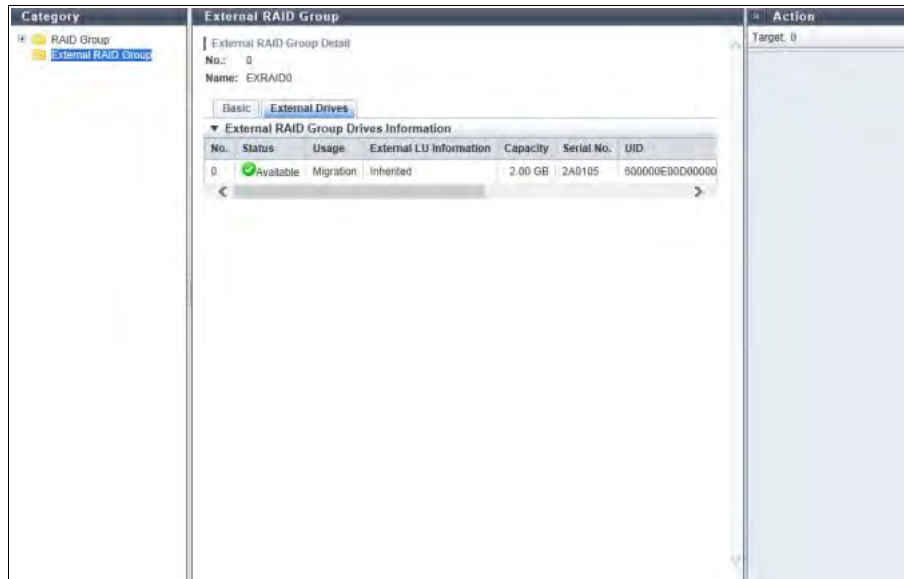
The following items are displayed in the Main area:

- No.
  The External Drive number is displayed.

- Status
  The External Drive status is displayed. Refer to "External Drive Status" (page 1377) for details.

- Usage
  The usage of the External Drive is displayed.

- External LU Information
  Whether the External Drive inherits the "External LU Information" is displayed.
  If "External LU Information" is inherited, "Inherited" is displayed.
  If "External LU Information" is not inherited, a "-" (hyphen) is displayed.

- Capacity
  The capacity of the External Drive is displayed.

- Serial No.
  The serial number of the external storage system is displayed.

- UID
  The identifier (storage system name) that identifies the External Drive from the host is displayed.

- Vendor ID
  The manufacturer name of the external storage system is displayed.

- Product ID
  The product name of the external storage system is displayed.

- LUN Addressing
  The format type of the LUN Addressing that is set for the External Drive is displayed.
  If LUN Addressing is not "PRHL" or "FLAT", a "-" (hyphen) is displayed.
  - PRHL
  - FLAT

- LUN
  The volume number (host LUN) of the External Drive is displayed.
  - If the LUN Addressing is "PRHL" or "FLAT"
    0 - 4095 (decimal)
  - For the other conditions
    Volume number (16-digit hexadecimal)

13. Thin Provisioning Pool Status

This chapter describes Thin Provisioning Pool status.

Thin Provisioning Pool status displays the status information of Thin Provisioning Pools.
Thin Provisioning Pool status screens can be displayed by clicking the following categories:

Category	Thin Provisioning Pool status screen
Thin Provisioning Pools	Thin Provisioning Pools
Threshold	Threshold (Thin Provisioning Pool)
Eco-mode Schedule	Eco-mode Schedule (Thin Provisioning Pool)
Flexible Tier Pools	Flexible Tier Pools
Settings	Settings (Thin Provisioning)

Detailed information of the Thin Provisioning Pools can be displayed from the following screen:
- Thin Provisioning Pool Detail (Basic)
- Thin Provisioning Pool Detail (RAID Group)
- Thin Provisioning Pool Detail (Volume)
- Flexible Tier Pool Detail (Basic)
- Flexible Tier Pool Detail (Flexible Tier Sub Pool)
- Flexible Tier Pool Detail (Volume)
- Flexible Tier Sub Pool Detail (Basic)
- Flexible Tier Sub Pool Detail (RAID Group)
- Flexible Tier Sub Pool Detail (RAID Group Detail)

Thin Provisioning Pools

The Thin Provisioning Pools category provides the setting information for Thin Provisioning Pools.

Thin Provisioning Pool (Basic Information)

This function shows the list of TPPs.

> ▷ **Caution**
>
> - When creating TPP type volumes, "Enable" the Thin Provisioning function. Refer to "Set Thin Provisioning" (page 536) for details.
> - When the used status of the Thin Provisioning Pool is " ⚠ Attention" or " ❌ Warning" in the TPP list, the TPP used capacity exceeds the threshold. Add drives immediately to expand the TPP capacity.

> 🔵 **N o t e**
>
> - This function displays the TPP basic information, a list of the RAID groups that configure the TPP, and a list of the TPVs that are registered in the TPP.
> - To check whether the Thin Provisioning function is enabled or disabled, refer to "Settings (Thin Provisioning)" (page 922).
> - To check the threshold for monitoring the used capacity of a TPP, refer to "Threshold (Thin Provisioning Pool)" (page 904).
> - To check the Eco-mode settings of a TPP, refer to "Eco-mode Schedule (Thin Provisioning Pool)" (page 906).

The following items are displayed in the Main area:

- No.
  The TPP number is displayed. Click this item to display "Thin Provisioning Pool Detail (Basic)" (page 899).

- Name
  The TPP name is displayed. Click this item to display "Thin Provisioning Pool Detail (Basic)" (page 899).

- Drive Type
  The type of drive that is used to configure the TPP is displayed.
  - For SAS disks
    Online
  - For Nearline SAS disks
    Nearline
  - For SSDs
    SSDs (*1)
  - For Online SEDs
    Online SED

- For Nearline SEDs
  Nearline SED
- For SSD SEDs
  SSD SED

*1: "SSD" is displayed regardless of the actual SSD type (SSD-M/SSD-L/SSD).

- RAID Level
  The level of RAID group that configures the TPP is displayed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - High Reliability (RAID6-FR)
  - Mirroring (RAID1)
  - Striping (RAID0)

- Status
  The TPP status is displayed. Refer to "Thin Provisioning Pool Status" (page 1375) for detailed information of TPP status.

- Used Status
  The usage of TPP is displayed.

  - ✅ Normal
    TPP usage does not exceed the "Attention" threshold.

  - ⚠️ Attention
    TPP usage exceeds the "Attention" threshold but does not exceed the "Warning" threshold.

  - ❌ Warning
    TPP usage exceeds the "Warning" threshold.

- Encryption
  The TPP encryption status is displayed.
  For the ETERNUS DX60 S4/DX60 S3, this item is not displayed.
  - CM
    The TPP that is encrypted by CM.
  - "-" (hyphen)
    The TPP that is not encrypted.
  - SED
    The TPP that is encrypted by SED.

- Chunk Size
  The chunk size (*1) of the TPP is displayed.
  For TPPs that are created with a controller firmware version earlier than V10L70, "21 MB" is displayed for this item.
  If the chunk size information cannot be obtained, a "-" (hyphen) is displayed.
  - 21 MB
  - 42 MB
  - 84 MB
  - 168 MB

*1: Chunk size is a physical capacity that is assigned to virtual logical volumes created in TPPs when a write occurs from the host. The chunk size is determined according to the "Maximum Pool Capacity" of the ETERNUS DX/AF when a new TPP is created. The chunk size for the created TPP cannot be changed.

- Deduplication
  The Deduplication status (whether the setting is enabled and the state of the Deduplication) for the TPP is dis-
  played.
  This item is displayed only when Deduplication/Compression for the ETERNUS DX/AF is enabled.
    - Enable
      Deduplication for the TPP is enabled and Deduplication is in the normal state.
    - Disable
      Deduplication for the TPP is disabled.
    - Error
      Deduplication for the TPP is enabled and the information cannot be obtained.
    - "-" (hyphen)
      Deduplication for the TPP is enabled and the information cannot be obtained.

- Compression
  The Compression status (whether the setting is enabled and the state of the Compression) for the TPP is dis-
  played.
  This item is displayed only when Deduplication/Compression for the ETERNUS DX/AF is enabled.
    - Enable
      Compression for the TPP is enabled and Compression is in the normal state.
    - Disable
      Compression for the TPP is disabled.
    - Error
      Compression for the TPP is enabled and Compression is in the error state.
    - "-" (hyphen)
      Compression for the TPP is enabled and the information cannot be obtained.

- Data Reduction Rate
  The data reduction rate for Deduplication, Compression, or both for the TPP is displayed.
  If 10 TB of data is written to 3 TB after deduplicated and compressed, "70%" is displayed.
  This item is displayed only when Deduplication/Compression for the ETERNUS DX/AF is enabled.
  A "-" (hyphen) is displayed in the following conditions:
    - Statuses of Deduplication and Compression for the TPP are both "Disable"
    - Status of Deduplication or Compression for a TPP is "Error" or "-" (hyphen)
    - The DEDUP_SYS Volumes cannot be accessed

Filter setting

Filter	Description
Name	Input the name of the TPP that is to be displayed. When not using the TPP name for filtering, leave this item blank.
Drive Type	Select the drive type of the TPP that is to be displayed.
RAID Level	Select the RAID level of the TPP that is to be displayed.
Chunk Size	Select the chunk size of the TPP that is to be displayed.
Deduplication	Select the Deduplication set state of the TPP that is to be displayed. This item is displayed only when Deduplication/Compression for the ETERNUS DX/AF is enabled.
Compression	Select the Compression set state of the TPP that is to be displayed. This item is displayed only when Deduplication/Compression for the ETERNUS DX/AF is enabled.

Thin Provisioning Pool Detail (Basic)

Click the [No.] link or the [Name] link on the "Thin Provisioning Pools" (page 896) to display the corresponding Thin Provisioning Pool Details screen.

The following items are displayed in the Main area:

- **Drive Type**
  The type of drive that configures the TPP is displayed.
    - Online
    - Nearline
    - SSD
    - Online SED
    - Nearline SED
    - SSD SED

- **RAID Level**
  The level of RAID group that configures the TPP is displayed.
    - High Performance (RAID1+0)
    - High Capacity (RAID5)
    - High Reliability (RAID6)
    - High Reliability (RAID6-FR)
    - Mirroring (RAID1)
    - Striping (RAID0)

- **Fast Recovery Configuration**
  The Fast Recovery configuration of the RAID group that configures TPPs is displayed.
  This item is displayed only when the RAID level is "RAID6-FR".
    - (4D+2P)x2+1HS
    - (6D+2P)x2+1HS
    - (8D+2P)x3+1HS
    - (4D+2P)x5+1HS
  D: Data drives, P: Parity drives, HS: Hot Spares

- **Status**
  The TPP status is displayed. Refer to "Thin Provisioning Pool Status" (page 1375) for detailed information of TPP status.

- **Provisioned Capacity**
  The total logical capacity of the TPVs in the TPP is displayed.

- Provisioned Rate
  The ratio (%) of the total logical capacity (*1) of TPVs in the TPP and the total capacity of the TPP is displayed.
  A "-" (hyphen) is displayed if Deduplication or Compression for a TPP is enabled.
  *1:   The provisioned rate is calculated with the total logical capacity where the chunk size is taken into consideration.

- Total Capacity
  The total capacity of TPP is displayed.
  "Total Capacity" indicates the total capacity of the RAID groups in the TPP.

- Used Capacity
  The used capacity of TPP is displayed.
  "Used Capacity" indicates the total for the physically allocated capacities of the TPVs in the TPP.

- Used Status
  The usage of TPP is displayed.

  - ✅ Normal

  - ⚠️ Attention

  - ❌ Warning

- Warning
  The TPP physical capacity "xxx", which is converted based on the TPP warning threshold, and the threshold (yy%) are displayed.

- Attention
  The TPP physical capacity "xxx", which is converted based on the TPP attention threshold, and the threshold (yy%) are displayed.
  When the attention threshold is omitted, a "-" (hyphen) is displayed.

- Encryption
  The TPP encryption status is displayed. A "-" (hyphen) is displayed for the TPP that is not encrypted.
  For the ETERNUS DX60 S4/DX60 S3, this item is not displayed.

  - CM
  - SED

- Chunk Size
  The chunk size of the TPP is displayed.
  For TPPs that are created with a controller firmware version earlier than V10L70, "21 MB" is displayed for this item.
  If the chunk size information cannot be obtained, a "-" (hyphen) is displayed.

  - 21 MB
  - 42 MB
  - 84 MB
  - 168 MB

- MWC
  The Multi Writeback Count (MWC) of the TPP is displayed.
  This item is displayed only when a user account with the "RAID Group Management" policy is used to log in.

- Usage
  "TPV" is displayed when a TPV is registered in the TPP.
  If there are no TPVs in the Thin Provisioning Pool, a "-" (hyphen) is displayed.

- Eco-mode Schedule
  The Eco-mode schedule name that is assigned to the TPP is displayed. If the Eco-mode is controlled with Storage Foundation Software ETERNUS SF, "External" is displayed.
  When no Eco-mode schedule has been assigned, the field is blank.

- Eco-mode Action
  The Eco-mode schedule action status is displayed. When no Eco-mode schedule has been assigned, a "-" (hyphen) is displayed.
  Refer to "Eco-mode Action" in "Eco-mode Schedule (RAID Group)" for details.
  - Drive power off
  - Drive motor off
  - Drive always on

- Motor Status
  The drive motor status is displayed.
  Refer to "Motor Status" in "Eco-mode Schedule (RAID Group)" for details.
  - Active
  - In the Boot Process
  - Idle
  - In the Stop Process
  - Power Off

- Process
  A process that is being performed for the TPP is displayed. If no process is being performed, a "-" (hyphen) is displayed.

- Progress
  The progress of a process that is being performed is displayed with a bar and a rate (%). To display the latest progress, refresh the screen. If no process is being performed, a "-" (hyphen) is displayed.

- Estimated Time Left
  The estimated remaining time before formatting is complete is displayed. To display the latest estimated remaining time, refresh the screen. This item is not displayed when the process is other than "Formatting".
  - Calculating
    The ETERNUS DX/AF is calculating the estimated remaining time.
  - 30 days or more
    The estimated remaining time is 30 days or more.
  - x days y h z min. (x: 1 - 29, y: 0 - 23, z: 0 - 59)
    The estimated remaining time is more than one minute and less than 30 days. When the estimated remaining time is less than one day, the "days" value is omitted. When the estimated remaining time is less than one hour, the "days" and "hours" values are omitted.
  - Less than 1 min.
    The estimated remaining time is less than one minute.

  ▷ **Caution**

  The "Estimated Time Left" value may increase or decrease due to the I/O load when displaying this item.

- Remaining Size
  The remaining size of the unformatted volume is displayed. To display the latest size, refresh the screen. This item is not displayed when the process is other than "Formatting".

- Stripe Depth
  The Stripe Depth value (*1) for the RAID groups that configure the TPP is displayed.
  If the RAID level is "Mirroring (RAID1)", a "-" (hyphen) is displayed.
  *1:   The number of logical blocks that are assigned to a drive for each stripe when configuring a stripe volume in a RAID group. Normally, it is 64KB.

- **Deduplication**
The Deduplication status (whether the setting is enabled and the state of the Deduplication) for the TPP is displayed. If Deduplication is enabled and the information cannot be obtained, a "-" (hyphen) is displayed.
This item is displayed only when Deduplication/Compression for the ETERNUS DX/AF is enabled.
  - Enable
  - Disable
  - Error

- **Compression**
The Compression status (whether the setting is enabled and the state of the Compression) for the TPP is displayed. If Compression is enabled and the information cannot be obtained, a "-" (hyphen) is displayed.
This item is displayed only when Deduplication/Compression for the ETERNUS DX/AF is enabled.
  - Enable
  - Disable
  - Error

- **Data Reduction Rate**
The data reduction rate for Deduplication, Compression, or both for the TPP is displayed.
A "-" (hyphen) is displayed in the following conditions:
  - Statuses of Deduplication and Compression for the TPP are both "Disable"
  - Status of Deduplication or Compression for a TPP is "Error" or "-" (hyphen)
  - The DEDUP_SYS Volumes cannot be accessed

Thin Provisioning Pool Detail (RAID Group)

In this screen, a list of the RAID groups that configure the relevant TPP is displayed. When no RAID groups are registered in the TPP, only the item name is displayed.

The following items are displayed in the Main area:

- **No.**
The RAID group number is displayed. Click this item to display "RAID Group Detail (Basic)" (page 884).

- **Name**
The RAID group name is displayed. Click this item to display "RAID Group Detail (Basic)" (page 884).

- **Status**
The RAID group status is displayed. Refer to "RAID Group Status" (page 1374) for detailed information of RAID group status.

- RAID Level
  The RAID level is displayed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - High Reliability (RAID6-FR)
  - Mirroring (RAID1)
  - Striping (RAID0)

- Total Capacity
  The total capacity of the RAID groups is displayed.

- Used Capacity
  The used capacity of the RAID groups is displayed.
  "Used Capacity" indicates the total for the physically allocated capacities of the TPVs in the RAID group.

Thin Provisioning Pool Detail (Volume)

In this screen, the volumes that are registered in the TPP can be checked. When no volumes are registered in the TPP, only the item name is displayed.

The following items are displayed in the Main area:

- No.
  The volume number is displayed. Click this item to display "Volume Detail (Basic)" (page 802).

- Name
  The volume name is displayed. Click this item to display "Volume Detail (Basic)" (page 802).

- Status
  The volume status is displayed. Refer to "Volume Status" (page 1373) for detailed information of volume status.

- Type
  The volume type is displayed. This volume list displays only the volumes whose type is "TPV".

- Usage
  The usage of the volume is displayed.
  - Block
    The volumes that are used for the SAN.
  - Block/Dedup
    The Deduplication/Compression Volumes.

- File
The volumes that are used for the NAS.
- System
The volumes that are used for management information.
Refer to "Usage Details" (page 807) in "Volume Detail (Basic)" for details.

- Allocation
The allocation method for the volume is displayed.
  - Thin
  Physical area is allocated to the target area of the volume when a write I/O is received.
  - Thick
  Physical area is allocated to the whole area of the volume when volumes are created.

- Capacity
The volume capacity is displayed.

- Used Capacity
The used capacity (physically allocated capacity) of volume is displayed.

- Used Rate
The volume utilization is displayed between 0% - 100%.
Used Rate = Used Capacity / Capacity

- Threshold
The threshold for monitoring the volume utilization is displayed between 1% - 100%.
If the "Used Rate" value exceeds the "Threshold", a Host Sense Key Code Qualifier is reported.

- Process
A process that is being performed for the TPP is displayed. If no process is being performed, a "-" (hyphen) is displayed.
  - Balancing
  TPV balancing is being performed.
  - Formatting
  Formatting is being performed.
  - Migrating
  RAID migration is being performed.

Threshold (Thin Provisioning Pool)

This function shows the threshold for monitoring the used capacity of a Thin Provisioning Pool.

▷ **Caution**

When changing threshold for TPP monitoring, "Enable" the Thin Provisioning function. Refer to "Set Thin Provisioning" (page 536) for details.

● **N o t e**

- To check whether the Thin Provisioning function is enabled or disabled, refer to "Settings (Thin Provisioning)" (page 922).
- If the TPP used capacity exceeds the threshold, notification is sent to the destination that was specified using the [Setup Event Notification] function. Refer to "Setup Event Notification" (page 155) for details.
- To change the threshold of a TPP, follow the procedure that is provided in "Modify Threshold Thin Provisioning Pool" (page 561).

The following items are displayed in the Main area:

- No.
  The TPP number is displayed. Click this item to display the screen shown in "Thin Provisioning Pool Detail (Basic)" (page 899).

- Name
  The TPP name is displayed. Click this item to display the screen shown in "Thin Provisioning Pool Detail (Basic)" (page 899).

- Drive Type
  The type of drive that is used to configure the TPP is displayed.
  - Online
    SAS disks
  - Nearline
    Nearline SAS disks
  - SSD
    SSDs (*1)
  - Online SED
    Online SEDs
  - Nearline SED
    Nearline SEDs
  - SSD SED
    SSD SEDs

  *1:   "SSD" is displayed regardless of the actual SSD type (SSD-M/SSD-L/SSD).

- RAID Level
  The level of RAID group that configures the TPP is displayed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - High Reliability (RAID6-FR)
  - Mirroring (RAID1)
  - Striping (RAID0)

- Status
  The TPP status is displayed. Refer to "Thin Provisioning Pool Status" (page 1375) for detailed information of TPP status.

- Used Status
  The usage of TPP is displayed.

  - ✅ Normal

  - ⚠️ Attention

  - ❌ Warning

- Total Capacity
  The total capacity of TPP is displayed.

- Used Capacity
  The used capacity of TPP is displayed.
   "Used Capacity" indicates the total for the physically allocated capacities of the TPVs in the TPP.

- Warning
  The warning threshold (%) for monitoring the TPP used capacity is displayed.

- Attention
  The attention threshold (%) for monitoring the TPP used capacity is displayed. When the "Attention" threshold is omitted, "0%" is displayed.

- MWC
  The Multi Writeback Count (MWC) of the TPP is displayed.
  This item is displayed only when a user account with the "RAID Group Management" policy is used to log in.

Filter setting

Filter	Description
Name	Input the TPP name that is to be displayed. When not using the TPP name for filtering, leave this item blank.
Drive Type	Select the drive type that is to be displayed.
RAID Level	Select the RAID level that is to be displayed.

Eco-mode Schedule (Thin Provisioning Pool)

This function displays the Eco-mode setting state of the Thin Provisioning Pool.

▷ **Caution**

When assigning Eco-mode schedule to the Thin Provisioning Pool, "Enable" the Thin Provisioning function. Refer to "Set Thin Provisioning" (page 536) for details.

🔵 **N o t e**

- To check whether the Thin Provisioning function is enabled or disabled, refer to "Settings (Thin Provisioning)" (page 922).
- To use the Eco-mode, follow the procedure in "Modify Eco-mode General Setting" (page 94) and "Create Eco-mode Schedule" (page 95) to perform the general Eco-mode setup and create an Eco-mode schedule.
- To assign the Eco-mode schedule to a TPP, refer to "Assign Eco-mode Schedule (Thin Provisioning Pool)" (page 565).

The following items are displayed in the Main area:

- No.
  The TPP number is displayed. Click this item to display the screen shown in "Thin Provisioning Pool Detail (Basic)" (page 899).

- Name
  The TPP name is displayed. Click this item to display the screen shown in "Thin Provisioning Pool Detail (Basic)" (page 899).

- Drive Type
  The type of drive that configures the TPP is displayed.
  - Online
    SAS disks
  - Nearline
    Nearline SAS disks
  - SSD
    SSDs (*1)
  - Online SED
    Online SEDs
  - Nearline SED
    Nearline SEDs
  - SSD SED
    SSD SEDs
  *1:   "SSD" is displayed regardless of the actual SSD type (SSD-M/SSD-L/SSD).

- RAID Level
  The level of RAID group that configures the TPP is displayed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - High Reliability (RAID6-FR)
  - Mirroring (RAID1)
  - Striping (RAID0)

- Status
  The TPP status is displayed. Refer to "Thin Provisioning Pool Status" (page 1375) for detailed information of TPP status.

- Used Status
  The usage of TPP is displayed.
  - ✅ Normal
  - ⚠️ Attention
  - ❌ Warning

- Total Capacity
  The total capacity of TPP is displayed.

- Eco-mode Schedule
  The Eco-mode schedule name that is assigned to the TPP is displayed. If the Eco-mode is controlled with Storage Foundation Software ETERNUS SF, "External" is displayed.
  When no Eco-mode schedule has been assigned, the field is blank.

- Eco-mode Action
  The Eco-mode schedule action status is displayed.
  A "-" (hyphen) is displayed if no Eco-mode schedule has been assigned. Refer to "Eco-mode Action" (page 881) in "Eco-mode Schedule (RAID Group)" for details.
  - Drive power off
  - Drive motor off
  - Drive always on

- Motor Status
  The drive motor status is displayed.
  Refer to "Motor Status" (page 881) in "Eco-mode Schedule (RAID Group)" for details.
  - Active
  - In the Boot Process
  - Idle
  - In the Stop Process
  - Power Off

Filter setting

Filter	Description
Name	Input the TPP name that is to be displayed. When not using the TPP name for filtering, leave this item blank.
Drive Type	Select the drive type that is to be displayed.
RAID Level	Select the RAID level that is to be displayed.
Eco-mode Schedule	Select the Eco-mode schedule that is to be displayed.
Eco-mode Action	Select the Eco-mode action that is to be displayed.

Flexible Tier Pools

The Flexible Tier Pools category provides the setting information for Flexible Tier Pools.

Flexible Tier Pool (Basic Information)

This function shows the list of FTRPs.

> ▷ **Caution**
>
> - To use the Flexible Tier function (Automated Storage Tiering), the following operations are required:
>   - Select "Enable" for the Thin Provisioning function. Refer to <u>"Set Thin Provisioning" (page 536)</u> for details.
>   - To use Automated Storage Tiering with multiple layers, register the Optimization option license for ETER-NUS SF Storage Cruiser.
>   - Use ETERNUS SF Storage Cruiser to perform the following procedure.
>   - Enable "Automated Storage Tiering"
>   - Create FTRPs, FTSPs, and FTVs
> - When " ⚠ Attention" or " ❌ Warning" is displayed in the "Used Status" field for the FTRP list, the used capacity of the relevant FTRP has exceeded the threshold. Immediately add drives and use ETERNUS SF Storage Cruiser to expand the capacity of the appropriate FTSP (for which expansion is determined to be necessary based upon the performance and used capacity).
> - If the target FTRP does not exist when displaying the details screen, a message, " ⚠ Target is Not Found." is displayed.

> ● **N o t e**
>
> - This function displays a basic FTRP information, a list of FTSPs which belong to the FTRP, a list of RAID groups which configure the FTSP, and a list of FTVs which have been registered to the FTRP.
> - To check whether the Thin Provisioning function is enabled or disabled, refer to <u>"Settings (Thin Provisioning)" (page 922)</u>.

The following items are displayed in the Main area:

- No.
The FTRP number is displayed. Click this item to display the screen shown in "Flexible Tier Pool Detail (Basic)" (page 912).

- Name
The FTRP name is displayed. Click this item to display the screen shown in "Flexible Tier Pool Detail (Basic)" (page 912).

- Status
The FTRP status is displayed. Refer to "Thin Provisioning Pool Status" (page 1375) for detailed information of FTRP status.

- Used Status
The usage of FTRP is displayed.

    - ✅ Normal
    FTRP usage does not exceed the "Attention" threshold.

    - ⚠️ Attention
    FTRP usage exceeds the "Attention" threshold but does not exceed the "Warning" threshold.

    - ❌ Warning
    FTRP usage exceeds the "Warning" threshold.

- Provisioned Capacity
The ratio (%) of the total logical capacity (*1) of FTVs in the FTRP and the total capacity of the FTRP is displayed.
    *1:   The provisioned rate is calculated with the total logical capacity where the chunk size is taken into consideration.

- Provisioned Rate
The ratio (%) of the total logical capacity of FTVs in the FTRP and the total capacity of the FTRP is displayed.
Capacity ratio (Provisioned Rate) = Total logical capacity of FTVs in the relevant FTRP (Provisioned Capacity) / Total capacity of the relevant FTRP (Total Capacity)

- Total Capacity
The total capacity of FTRP is displayed.

- Used Capacity
The used capacity of the FTRP is displayed.
"Used Capacity" indicates the total for the physically allocated capacities of the FTVs in the FTRP.

- Warning
The warning threshold (%) for monitoring the FTRP used capacity is displayed.

- Attention
The attention threshold (%) for monitoring the FTRP used capacity is displayed. When the "Attention" threshold is omitted, "0%" is displayed.

- Encryption
The FTRP encryption status is displayed.
    - CM
    The FTRP that is encrypted by CM.
    - "-" (hyphen)
    The FTRP that is not encrypted.

- **Chunk Size**
  The chunk size (*1) of the FTRP is displayed.
  For FTRPs that are created with a controller firmware version earlier than V10L70, "21 MB" is displayed for this item.
  If the chunk size information cannot be obtained, a "-" (hyphen) is displayed.
    - 21 MB
    - 42 MB
    - 84 MB
    - 168 MB
  *1: Chunk size is a physical capacity that is assigned to virtual logical volumes created in FTRPs when a write occurs from the host. The chunk size is determined according to the "Maximum Pool Capacity" of the ETERNUS DX/AF when a new FTRP is created. The chunk size for the created FTRP cannot be changed.

- **Balancing Level**
  The balancing level of the FTRP is displayed.
  If multiple FTSPs exist in the FTRP, the lowest balancing level among the FTSPs is displayed. A "-" (hyphen) is displayed when the physically allocated capacity cannot be checked due to the storage system status or when the balancing level cannot be obtained due to the FTRP status (*1).
    - High
      The physically allocated capacity among the RAID groups in the FTSP is equalized.
    - Middle
      The physically allocated capacity among the RAID groups in the FTSP is slightly unequal.
    - Low
      The physically allocated capacity among the RAID groups in the FTSP is significantly unequal.

- **Balancing Process**
  A "-" (hyphen) is displayed when FTRP balancing is not being performed, when the physically allocated capacity cannot be checked due to the storage system status, or when the balancing level cannot be obtained due to the FTRP status (*1).
    - Status
      The balancing status of the FTRP is displayed.
        - Active
          All of the FTVs in the FTRP are either reserved or operating normally.
        - Error
          An FTV in error status exists in the FTRP.
    - Error Code
      The error code of FTRP balancing is displayed when an error occurs.
      A "-" (hyphen) is displayed if no errors occur.
  *1: The status of the FTRP is not " ✅ Available", " 🚫 Partially Readying", or " ⚠ Exposed"

- **Shrinking**
  The shrinking status is displayed.
  Shrinking is a function that deletes specific RAID groups in the FTRP to reduce the physical capacity of the FTRP.
  A "-" (hyphen) is displayed if the shrinking is not being performed.
    - Executing
      The FTRP capacity is being reduced.
    - Error
      Reducing the FTRP capacity failed.

Flexible Tier Pool Detail (Basic)

Click the [No.] link or the [Name] link on the "Flexible Tier Pool (Basic Information)" (page 909) to display the detailed information of the corresponding FTRP.
Click the [Basic] tab on the [Flexible Tier Pool Detail] screen to display the basic information of the corresponding FTRP.
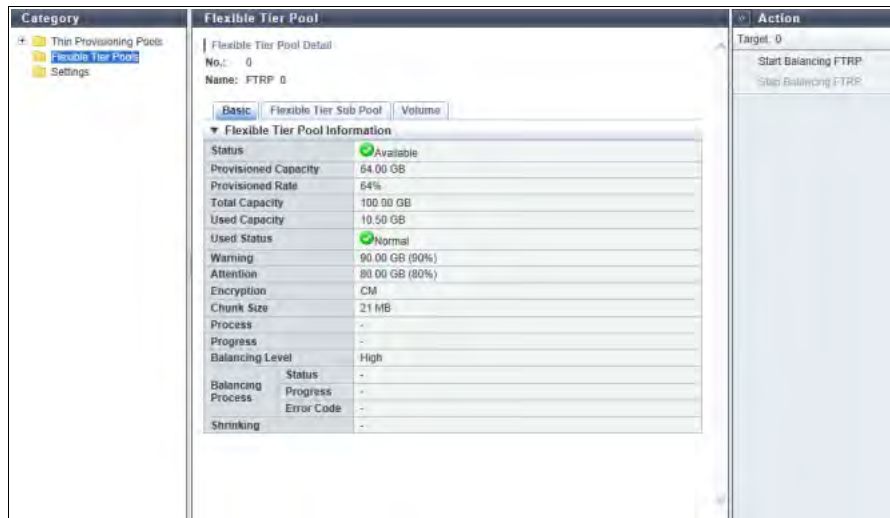
The following items are displayed in the Main area:

- Status
  The FTRP status is displayed. Refer to "Thin Provisioning Pool Status" (page 1375) for detailed information of FTRP status.

- Provisioned Capacity
  The total logical capacity of FTVs in the FTRP is displayed.

- Provisioned Rate
  The ratio (%) of the total logical capacity (*1) of FTVs in the FTRP and the total capacity of the FTRP is displayed.
  *1:   The provisioned rate is calculated with the total logical capacity where the chunk size is taken into consideration.

- Total Capacity
  The total capacity of FTRP is displayed.

- Used Capacity
  The used capacity of the FTRP is displayed.
  "Used Capacity" indicates the total for the physically allocated capacities of the FTVs in the FTRP.

- Used Status
  The usage of FTRP is displayed.
  - ✅ Normal
  - ⚠️ Attention
  - ❌ Warning

- Warning
  The FTRP physical capacity "xxx", which is converted based on the FTRP warning threshold, and the threshold (yy%) are displayed.

- Attention
  The FTRP physical capacity "xxx", which is converted based on the FTRP attention threshold, and the threshold (yy%) are displayed.
  When the attention threshold is omitted, a "-" (hyphen) is displayed.

- **Encryption**
  The FTRP encryption status is displayed. If the FTRP is not encrypted, a "-" (hyphen) is displayed.
    - CM

- **Chunk Size**
  The chunk size of the FTRP is displayed.
  For FTRPs that are created with a controller firmware version earlier than V10L70, "21 MB" is displayed for this item.
  If the chunk size information cannot be obtained, a "-" (hyphen) is displayed.
    - 21 MB
    - 42 MB
    - 84 MB
    - 168 MB

- **Process**
  A process that is being performed for the FTRP is displayed.
  If no process is being performed, a "-" (hyphen) is displayed.

- **Progress**
  The progress of a process that is being performed is displayed with a bar and a rate (%). To display the latest progress, refresh the screen.
  If no process is being performed, a "-" (hyphen) is displayed.

- **Estimated Time Left**
  The estimated remaining time before formatting is complete is displayed. To display the latest estimated remaining time, refresh the screen.
  This item is not displayed when the process is other than "Formatting". Refer to <u>"Estimated Time Left" (page 901)</u> in <u>"Thin Provisioning Pool Detail (Basic)"</u> for details.
    - Calculating
    - 30 days or more
    - x days y h z min. (x: 1 - 29, y: 0 - 23, z: 0 - 59)
    - Less than 1 min.

> ▷ **Caution**

  The "Estimated Time Left" value may increase or decrease due to the I/O load when displaying this item.

- **Remaining Size**
  The remaining size of the unformatted volume is displayed. To display the latest size, refresh the screen. This item is not displayed when the process is other than "Formatting".

- **Balancing Level**
  The balancing level of the FTRP is displayed.
  If multiple FTSPs exist in the FTRP, the lowest balancing level among the FTSPs is displayed. A "-" (hyphen) is displayed when the physically allocated capacity cannot be checked due to the storage system status or when the balancing level cannot be obtained due to the FTRP status (*1).
    - High
    - Middle
    - Low

- Balancing Process
A "-" (hyphen) is displayed when FTRP balancing is not being performed, when the physically allocated capacity cannot be checked due to the storage system status, or when the balancing level cannot be obtained due to the FTRP status (*1).
    - Status
    The balancing status of the FTRP is displayed.
        - Active
        - Error
    - Progress
    The lowest progress rate among the FTV balancing sessions that are being performed in the FTRP is displayed.
    - Error Code
    The error code of FTRP balancing is displayed when an error occurs.
    A "-" (hyphen) is displayed if no errors occur.
    *1: The status of the FTRP is not " ✅ Available", " 🟠 Partially Readying", or " ⚠ Exposed".

- Shrinking
The shrinking status is displayed.
A "-" (hyphen) is displayed if the shrinking is not being performed.
    - Executing
    - Error

Flexible Tier Pool Detail (Flexible Tier Sub Pool)

Click the [No.] link or the [Name] link on the "Flexible Tier Pools" (page 909) to display the corresponding Flexible Tier Pool Details screen.
Click the [Flexible Tier Sub Pool] tab on the [Flexible Tier Pool Detail] screen to display a list of FTSPs that are registered in the corresponding FTRP.
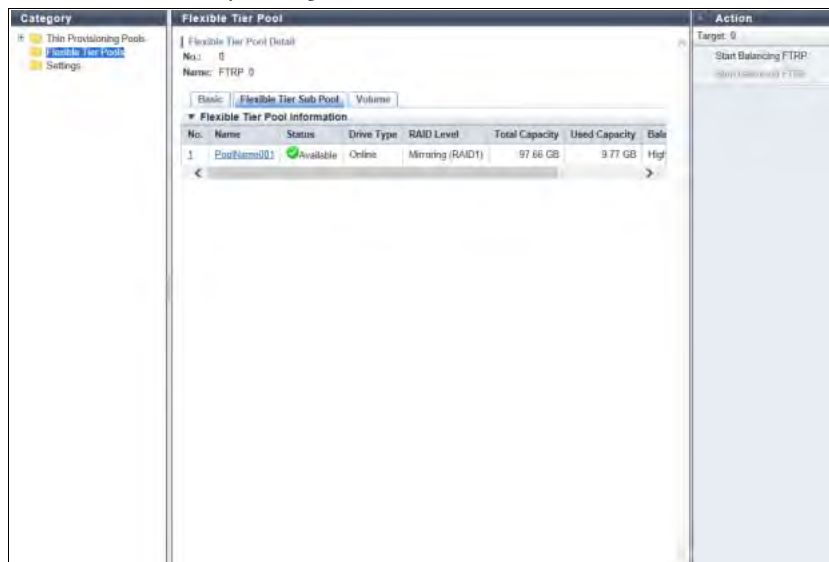
The following items are displayed in the Main area:

- No.
The FTSP number is displayed. Click this item to display the screen shown in "Flexible Tier Sub Pool Detail (Basic)" (page 917).

- Name
The FTSP name is displayed. Click this item to display the screen shown in "Flexible Tier Sub Pool Detail (Basic)" (page 917).

- Status
  The FTSP status is displayed. Refer to "Thin Provisioning Pool Status" (page 1375) for detailed information of FTSP status.

- Drive Type
  The type of drive that is used to configure the FTSP is displayed.
    - Online
      SAS disks
    - Nearline
      Nearline SAS disks
    - SSD
      SSDs (*1)
    - Online SED
      Online SEDs
    - Nearline SED
      Nearline SEDs
    - SSD SED
      SSD SEDs
  *1:   "SSD" is displayed regardless of the actual SSD type (SSD-M/SSD-L/SSD).

- RAID Level
  The level of RAID group that configures the FTSP is displayed.
    - High Performance (RAID1+0)
    - High Capacity (RAID5)
    - High Reliability (RAID6)
    - High Reliability (RAID6-FR)
    - Mirroring (RAID1)
    - Striping (RAID0)

- Total Capacity
  The total capacity of FTSP is displayed.

- Used Capacity
  The used capacity of the FTSP is displayed.
  "Used Capacity" indicates the total for the physically allocated capacities of the FTVs in the FTSP.

- Balancing Level
  The balancing level of the FTSP is displayed.
  A "-" (hyphen) is displayed when the physically allocated capacity cannot be checked due to the storage system status or when the balancing level cannot be obtained due to the FTRP status (*1).
    - High
      The physically allocated capacity among the RAID groups is equalized.
    - Middle
      The physically allocated capacity among the RAID groups is slightly unequal.
    - Low
      The physically allocated capacity among the RAID groups is significantly unequal.
  *1:   The status of the FTRP is not " ✅ Available", " 🚫 Partially Readying", or " ⚠ Exposed"

- Shrinking
  The shrinking status of the RAID groups in the FTSP is displayed.
  A "-" (hyphen) is displayed if the shrinking is not being performed.
    - Executing
    - Error

Flexible Tier Pool Detail (Volume)

Click the [No.] link or the [Name] link on the "Flexible Tier Pools" (page 909) to display the corresponding Flexible Tier Pool Details screen.
Click the [Volume] tab on the [Flexible Tier Pool Detail] screen to display a list of volumes that are registered in the corresponding FTRP. When no volumes are registered in the FTRP, only the item name is displayed.
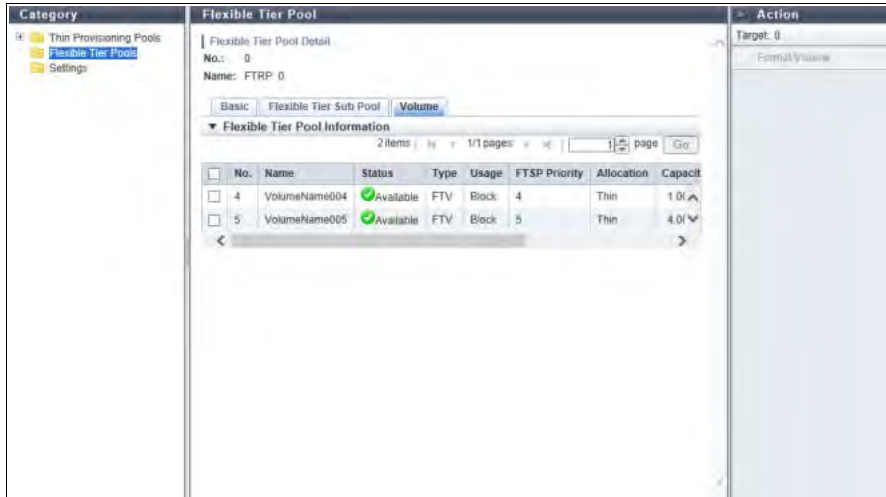
The following items are displayed in the Main area:

- No.
  The volume number is displayed.

- Name
  The volume name is displayed.

- Status
  The volume status is displayed. Refer to "Volume Status" (page 1373) for detailed information of volume status.

- Type
  The volume type is displayed.
  This volume list displays only the volumes whose type is "FTV".

- Usage
  The usage of the volume is displayed.
    - Block
      The volumes that are used for the SAN.
    - File
      The volumes that are used for the NAS.
    - System
      The volumes that are used for management information.
      Refer to "Usage Details" (page 807) in "Volume Detail (Basic)" for details.

- FTSP Priority
  The FTSP number, to which a volume is assigned on a priority basis in the FTRP, is displayed. When the setting is omitted, "-" (hyphen) is displayed.

- Allocation
  The allocation method for the volume is displayed.
    - Thin
      Physical area is allocated to the target area of the volume when a write I/O is received.
    - Thick
      Physical area is allocated to the whole area of the volume when volumes are created.

- Capacity
  The total volume capacity is displayed.

- Used Capacity
  The used capacity (physically allocated capacity) of volume is displayed.

- Used Rate
  The volume utilization is displayed.
  Used Rate = Used Capacity / Capacity

- Threshold
  The threshold for monitoring the volume utilization is displayed.
  If the "Used Rate" value exceeds the "Threshold", a Host Sense Key Code Qualifier is reported.

Flexible Tier Sub Pool Detail (Basic)

Click the [No.] link or the [Name] link on the "Flexible Tier Pool Detail (Flexible Tier Sub Pool)" (page 914) to display the corresponding Flexible Tier Sub Pool Detail screen.
Click the [Basic] tab on the [Flexible Tier Sub Pool Detail] screen to display the basic information of the corresponding FTSP.

The following items are displayed in the Main area:

- Status
  The FTSP status is displayed. Refer to "Thin Provisioning Pool Status" (page 1375) for detailed information of FTSP status.

- Drive Type
  The type of drive that configures the FTSP is displayed.
  - Online
  - Nearline
  - SSD
  - Online SED
  - Nearline SED
  - SSD SED

- RAID Level
  The level of RAID group that configures the FTSP is displayed.
  - High Performance (RAID1+0)
  - High Capacity (RAID5)
  - High Reliability (RAID6)
  - High Reliability (RAID6-FR)

- - Mirroring (RAID1)
  - - Striping (RAID0)

- • Total Capacity
  The total capacity of FTSP is displayed.

- • Used Capacity
  The used capacity of the FTSP is displayed.
  "Used Capacity" indicates the total for the physically allocated capacities of the FTVs in the FTSP.

- • Shrinking
  The shrinking status of the RAID groups in the FTSP is displayed.
  A "-" (hyphen) is displayed if the shrinking is not being performed.
  - - Executing
  - - Error

Flexible Tier Sub Pool Detail (RAID Group)

Click the [No.] link or the [Name] link on the "Flexible Tier Pool Detail (Flexible Tier Sub Pool)" (page 914) to display the detailed information of the corresponding FTSP.
Click the [RAID Group] tab on the [Flexible Tier Sub Pool Detail] screen to display the drive list that configures the relevant RAID group.

The following items are displayed in the Main area:

- • No.
  The number of the RAID group that belongs to the FTSP is displayed. Click this item to display the [RAID Group Detail] screen.

- • Name
  The RAID group name is displayed. Click this item to display the [RAID Group Detail] screen.

- • Status
  The RAID group status is displayed. Refer to "RAID Group Status" (page 1374) for details.

- • RAID Level
  The RAID level is displayed.
  - - High Performance (RAID1+0)
  - - High Capacity (RAID5)
  - - High Reliability (RAID6)
  - - High Reliability (RAID6-FR)

- Mirroring (RAID1)
- Striping (RAID0)

● Total Capacity
The total capacity of the RAID groups is displayed.

● Used Capacity
The used capacity of the RAID groups is displayed.
"Used Capacity" indicates the total for the physically allocated capacities of the FTVs in the RAID group.

● Deleting
The RAID group deletion status is displayed.
A "-" (hyphen) is displayed if a RAID group deletion process is not being performed.
- Executing
A RAID group deletion process is being performed or a data migration related to the deletion process is being performed.
- Error
Deletion of the RAID group failed.

Flexible Tier Sub Pool Detail (RAID Group Detail)

Click the [No.] link or the [Name] link on the "Flexible Tier Sub Pool Detail (RAID Group)" (page 918) to display the detailed information of the corresponding RAID group.

The following items are displayed in the Main area:

● Status
The RAID group status is displayed. Refer to "RAID Group Status" (page 1374) for details.

● RAID Level
The RAID level is displayed.
- High Performance (RAID1+0)
- High Capacity (RAID5)
- High Reliability (RAID6)
- High Reliability (RAID6-FR)
- Mirroring (RAID1)
- Striping (RAID0)

- Fast Recovery Configuration
  The drive configuration in the Fast Recovery RAID group is displayed.
  This item is displayed only when the RAID level is "High Reliability (RAID6-FR)".
  - (4D+2P)x2+1HS
  - (6D+2P)x2+1HS
  - (8D+2P)x3+1HS
  - (4D+2P)x5+1HS

  D: Data drives, P: Parity drives, HS: Hot Spares

- Total Capacity
  The total capacity of the RAID groups is displayed.

- Used Capacity
  The used capacity of the RAID groups is displayed.
  "Used Capacity" indicates the total for the physically allocated capacities of the FTVs in the RAID group.

- Controlling CM
  The Controlling CM of the RAID group is displayed (x: CE number, y: CM number).
  - For the ETERNUS DX8700 S3/DX8900 S3
    CE#x CM#y
  - For the other models
    CM#y

- Eco-mode Schedule
  The Eco-mode schedule name that is assigned to the RAID group is displayed.
  If the Eco-mode is controlled with Storage Foundation Software ETERNUS SF, "External" is displayed.
  When no Eco-mode schedule has been assigned, the field is blank.

- Eco-mode Action
  The Eco-mode schedule action status is displayed.
  When no Eco-mode schedule has been assigned, a "-" (hyphen) is displayed.
  Refer to "Eco-mode Action" (page 881) in "Eco-mode Schedule (RAID Group)" for details.
  - Drive power off
  - Drive motor off
  - Drive always on

- Motor Status
  The drive motor status is displayed.
  Refer to "Motor Status" (page 881) in "Eco-mode Schedule (RAID Group)" for details.
  - Active
  - In the Boot Process
  - Idle
  - In the Stop Process
  - Power Off

- Fast Recovery Drive
  When the hot spare area in the Fast Recovery RAID group is used, the drive number for the data recovery source drive is displayed. If Fast Recovery (*1) is not used, the field is blank.
  This item is displayed only when the RAID level is "High Reliability (RAID6-FR)".
  *1:   High-speed rebuilding when one drive fails in the Fast Recovery RAID group.
    - CE Drive#yy (for the ETERNUS DX100 S4/DX200 S4, the ETERNUS DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F)
    - DE#xx Drive#yy (xx: DE number, yy: Drive number)

- Process
  A process that is being performed is displayed. If no process is being performed, a "-" (hyphen) is displayed.

- Progress
  The progress of a process that is being performed is displayed with a bar and a rate (%). To display the latest progress, refresh the screen. If no process is being performed, a "-" (hyphen) is displayed.

- Stripe Depth
  The Stripe Depth (*1) of the RAID group is displayed.
  If the RAID level is "Mirroring (RAID1)", a "-" (hyphen) is displayed.
    - 64 KB
    - 128 KB
    - 256 KB
    - 512 KB
    - 1024 KB
  *1:   The number of logical blocks that are assigned to a drive for each stripe when configuring a stripe volume in a RAID group. Normally, it is 64KB.

- Deleting
  The RAID group deletion status is displayed.
  If a RAID group deletion process is not being performed, a "-" (hyphen) is displayed.
    - Executing
    - Error

Settings (Thin Provisioning)

This function displays information on the Thin Provisioning function settings.

> ◯ **N o t e**
>
> The parameters that are described below can be changed. Refer to "Set Thin Provisioning" (page 536) for details.
> - Whether to enable or disable the Thin Provisioning function
> - Maximum Pool Capacity

The following items are displayed in the Main area:

- **Thin Provisioning**
  Whether the Thin Provisioning function is enabled or disabled is displayed.

- **Maximum Pool Capacity**
  The maximum pool capacity that is specified for the ETERNUS DX/AF is displayed.
  The maximum pool capacity is the maximum total capacity for TPPs and FTRPs that can be created in the ETERNUS DX/AF. The chunk size for creating TPPs or FTRPs varies depending on the maximum pool capacity. Refer to "The maximum number of pools, maximum pool capacity, and determined chunk size for each model" (page 539) for details.
  This item is displayed only when the Thin Provisioning function for the ETERNUS DX/AF is enabled.

> ▷ **Caution**
>
> The maximum pool capacity is used as a virtual logical capacity in the ETERNUS DX/AF. When the Thin Provisioning function is enabled, the ETERNUS DX/AF allocates capacity to the physical drives proportionate to the amount of data that is written to the virtual volume. Therefore, the actual available capacity is limited depending on the maximum physical capacity of the drives that can be installed in the storage system or the maximum pool capacity, whichever is smaller. For example, when using an ETERNUS AF250 S2 that is configured only with 400GB SSDs, the actual capacity that can be used is approximately 18TB even if the maximum pool capacity is "32.00TB".

- **Total Physical Capacity**
  The total physical capacity [PB/TB/GB/MB] of the TPPs in the ETERNUS DX/AF is displayed.
  This item is displayed only when the Thin Provisioning function for the ETERNUS DX/AF is enabled.

14. Advanced Copy Status

Advanced Copy status displays the status information of volumes.
Advanced Copy status screens can be displayed by clicking the following categories:

Category	Advanced Copy status screen
Advanced Copy	Advanced Copy (Basic Information)
Local Copy	Advanced Copy (All Local Sessions)
EC	EC
OPC	OPC
QuickOPC	QuickOPC
SnapOPC	SnapOPC
SnapOPC+	SnapOPC+
Monitor	Monitor
Remote Copy	Advanced Copy (All Remote Sessions)
REC	REC
ODX	ODX Sessions
XCopy	XCOPY Sessions
Virtual Volume	Virtual Volume Sessions
Settings	Settings (Advanced Copy)
Snap Data Pool	Snap Data Pool
Copy Path	Copy Path
REC Buffer	REC Buffer
REC Disk Buffer	REC Disk Buffer

Detailed information of the Advanced Copy functions can be displayed from the following screens:

- Advanced Copy (Property)
- Advanced Copy (Extent information)
- Copy Path Detail

Advanced Copy (Basic Information)

This function displays the status of all the Advanced Copy sessions.

> **◯ N o t e**
>
> - To display the local/remote copy session information and the Advanced Copy information, register the Advanced Copy license. Note that the Remote Copy Sessions Information and Remote Copy related categories (copy path, REC Buffer, and REC Disk Buffer) are displayed only when using an ETERNUS DX/AF model that supports REC.
> - In the Unified Storage environment, the following items are displayed even if the Advanced Copy function license is not registered.
>   - Local Copy Sessions Information (SnapOPC+ Session)
>   - Advanced Copy Information (Usable Advanced Copy Size for SnapOPC+)
> - Registering an Advanced Copy license is not required to display the Advanced Copy session information for ODX sessions, XCOPY sessions, or Virtual Volume sessions.

The following items are displayed in the Main area:

● **Local / Remote Copy Sessions Information**

- Session Count
  The number of Advanced Copy sessions that are currently being performed for each type (EC, OPC, QuickOPC, SnapOPC, SnapOPC+, Monitor, and REC) is displayed.
  The "Session Count" is a total of copy sessions in all the statuses including "◉ Reserved". Click the [Session Count] link to display the list of sessions for each type.
  - ETERNUS DX60 S4/DX60 S3
    0 - 1024
  - ETERNUS DX100 S4/DX100 S3
    0 - 1024 (2048) (*1)
  - ETERNUS DX200 S4/DX200 S3
    0 - 2048 (4096) (*1)
  - ETERNUS DX500 S4/DX500 S3 and ETERNUS DX600 S4/DX600 S3
    0 - 8192
  - ETERNUS DX8100 S3
    0 - 8192
  - ETERNUS DX8700 S3 and ETERNUS DX8900 S3
    0 - 32768

-    ETERNUS AF250 S2/AF250
     0 - 2048
-    ETERNUS AF650 S2/AF650
     0 - 8192
-    ETERNUS DX200F
     0 - 2048

*1:   Values in parentheses indicate the number of sessions when "Expand Volume Mode" is "Enable". Refer to "Setup Sub-system Parameters" (page 65) for details.

- Status
  The status for each Advanced Copy session is displayed.

    - ✅ Normal
      All the copy sessions are in the normal state.

    - ❌ Error
      At least one copy session is not in the normal state.

● **ODX Copy Sessions Information**

    An ODX session is created when the ODX function of Windows server 2012 is used.

- Session Count
  The number of ODX sessions (0 - 4096) that are currently being performed is displayed.
  The "Session Count" is a total of copy sessions in all the statuses including "✅ Reserved". Click the [Session Count] link to display the list of sessions.

- Status
  The status for ODX sessions are displayed.

    - ✅ Normal
      All the copy sessions are in the normal state.

    - ❌ Error
      At least one copy session is not in the normal state.

● **XCOPY Sessions Information**

    An XCOPY session is created when the Full Copy function of vStorage APIs for Array Integration (VMware VAAI) is used.

- Session Count
  The number of XCOPY (Extended Copy) sessions (0 - 4096) (*1) that are currently being performed is displayed.
  The "Session Count" is a total of copy sessions in all the statuses including "✅ Reserved". Click the [Session Count] link to display the list of sessions.
  *1:   An XCOPY session is created when the Full Copy function of VMware VAAI is used.

- Status
  The status for XCOPY sessions are displayed.

    - ✅ Normal
      All the copy sessions are in the normal state.

    - ❌ Error
      At least one copy session is not in the normal state.

● **Virtual Volume Sessions Information**

> ▷ **Caution**
>
> For the ETERNUS DX60 S4/DX60 S3, this session information is not displayed.

- Session Count
  The number of Virtual Volume sessions that are currently running is displayed.
  The "Session Count" is a total of copy sessions in all the statuses including "🟢 Reserved". Click the [Session Count] link to display the list of sessions.
  - ETERNUS DX100 S4/DX100 S3
    0 - 4096
  - ETERNUS DX200 S4/DX200 S3
    0 - 4096 (8192) (*1)
  - ETERNUS DX500 S4/DX500 S3 and ETERNUS DX600 S4/DX600 S3
    0 - 16384
  - ETERNUS DX8100 S3
    0 - 16384
  - ETERNUS DX8700 S3 and ETERNUS DX8900 S3
    0 - 65535
  - ETERNUS AF250 S2/AF250
    0 - 1536
  - ETERNUS AF650 S2/AF650
    0 - 6144
  - ETERNUS DX200F
    0 - 1536
  *1:   Values in parentheses indicate the number of sessions when "Expand Volume Mode" is "Enable". Refer to "Setup Subsystem Parameters" (page 65) for details.

- Status
  The Virtual Volume session status is displayed.

  - 🟢 Normal
    All the copy sessions are in the normal state.

  - ❌ Error
    At least one copy session is not in the normal state.

● **Advanced Copy Information**

- Usable Advanced Copy Size
  The Advanced Copy capacity that can be added to the session is displayed.

Advanced Copy (All Local Sessions)

This function displays status for local copy sessions.
The following session types are available: EC, OPC, QuickOPC, SnapOPC, SnapOPC+, and Monitor.

> **N o t e**
>
> - Local Copy Sessions Information is displayed only when the Advanced Copy function license has been registered.
> - When an ETERNUS DX is used in a Unified Storage environment, the SnapOPC+ session list and SnapOPC+ session details are displayed even if the Advanced Copy function license has not been registered.

The following items are displayed in the Main area:

- Session ID
  The session ID is displayed.
  Click this item to display the screen shown in "Advanced Copy (Property)" (page 954) or "Advanced Copy (Extent information)" (page 960).

- Source Volume No.
  The copy source volume number is displayed.
  If the status is " Reserved", a "-" (hyphen) is displayed.

- Destination Volume No.
  The copy destination volume number is displayed.
  If the "Status" is " Reserved" or when the copy session type is "MON", a "-" (hyphen) is displayed.

- Type
  The copy session type is displayed using an abbreviation.
  - For Equivalent Copy: EC
  - For One Point Copy: OPC
  - For QuickOPC: QOPC
  - For SnapOPC: SOPC
  - For SnapOPC+: SOPC+
  - For Monitor: MON

- Status
  The copy session status is displayed.
  - Active
    Operating normally

- ✅ Reserve
Session ID reserved

- ✅ Suspend
Suspended by an instruction from the host

- ❌ Error Suspend
Copy canceled due to an error

- ❓ Unknown
A status other than the ones listed above

- **Phase**

The copy session phase is displayed. If the status is "✅ Reserved", a "-" (hyphen) is displayed.

- Copying
For OPC, EC, SnapOPC, and SnapOPC+: Copying
For QuickOPC: Copying the updated areas after recording of updated areas is stopped
For Monitor: Recording the updated areas
- Equivalent
Maintaining equivalent status of the copy source and copy destination that are duplicated after copy is complete
- Tracking
Recording only the updated area after copy is complete
- Tracking & Copy
Recording the area updated during copy processing and after copy starts
- Readying
Readying to start multiple copy using the Concurrent OPC.

- **Error Code**

The error code is displayed when an error occurs. If the status is "✅ Reserved", a "-" (hyphen) is displayed.
Refer to "K. Error Code" (page 1371) for details.

- **Time Stamp**

The time when backup is complete and the time when an error occurred are displayed. If the status is "✅ Reserved", a "-" (hyphen) is displayed.
The time stamp is updated in the following conditions:

- OPC, QuickOPC, SnapOPC, and SnapOPC+
The time stamp is updated when copy starts and when an error occurs.
The following information is displayed:

- When "Status" is "✅ Active", the backup time when the copy started is displayed.
- When "Status" is "❌ Error Suspend", the time when the error occurred is displayed.

- QuickOPC
The time stamp is updated when copy starts, restarts, and when an error occurs.
The following information is displayed:

- When "Status" is "✅ Active", the backup time when the copy started is displayed.
- When "Status" is "❌ Error Suspend", the time when the error occurred is displayed.

- EC
The time stamp is updated at Suspend and when an error occurs.
The following information is displayed:

- When "Status" is "✅ Active" and the copy session is not suspended yet, "0" is displayed for all of the display items. When suspend is requested and "Status" is "✅ Active", the backup time of the previous suspend that was requested is displayed.
- When "Status" is "✅ Suspend", the backup time when the copy was suspended is displayed.
- When "Status" is "❌ Error Suspend", the time when an error occurred is displayed.

- Monitor

  When "Status" is "✅ Active", "0" is displayed for all of the display items.

● Elapsed Time

The elapsed time after a copy session has started is displayed. If the status is "✅ Reserved", a "-" (hyphen) is displayed.

● Copied Data Size

The size of a copy that has been completed is displayed. If the status is "✅ Reserved", a "-" (hyphen) is displayed.
When the copy type is "SOPC" or "SOPC+", only the original data (or previous data) before update in the copy target area is copied.
When the copy type is "MON", the updated data in the area for monitoring updates is copied. This copy type performs a pseudo copy to measure the updated amount of data.

● Total Data Size

The data size of the copy target area is displayed. If the status is "✅ Reserved", a "-" (hyphen) is displayed.
When the copy type is "MON", the data size of the area for monitoring updates is displayed.

● Resolution

The copy session resolution is displayed. If the status is "✅ Reserved", a "-" (hyphen) is displayed.

● Requestor

The information of the client that started the copy session is displayed. If the status is "✅ Reserved", a "-" (hyphen) is displayed.
  - SCSI
    Copy session requested by the copy management software (via SCSI).
  - LAN
    Copy session requested by the copy management software (via LAN).
  - GUI
    Copy session requested by ETERNUS Web GUI.
  - CLI
    Copy session requested by ETERNUS CLI.
  - SMI-S
    Copy session requested by SMI-S.
  - Unknown
    Other than the above clients.

● License
The registration status of the Advanced Copy license when the copy session is started is displayed.
  - Regular
    The copy session is started with a paid license or a free license (for the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F).
  - Trial
    The copy session is started with a trial license. Copy sessions that use a trial license are deleted automatically after the expiration of the trial license.

Filter setting

Filter	Description
Status	Select the copy session status that is to be displayed.
Phase	Select the copy session phase to be displayed.
Session ID	Input the session ID of the copy session that is to be displayed. When not using the session ID for filtering, leave this item blank.

EC

This function displays detailed information for EC sessions.


```
Note
```

Refer to "Advanced Copy (All Local Sessions)" (page 927) for display items.

OPC

This function displays detailed information for OPC sessions.


```
Note
```

Refer to "Advanced Copy (All Local Sessions)" (page 927) for display items.

QuickOPC

This function displays detailed information for QuickOPC sessions.
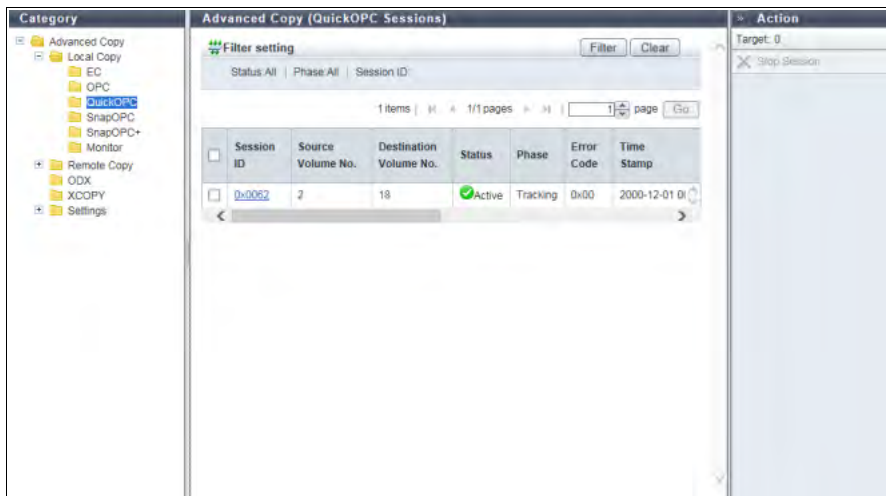
The following items are displayed in the Main area:

- Modified Data Size
  The differential data size when QuickOPC is executed is displayed.
  The modified data size is updated in the "Tracking & Copy" and "Tracking" phases. When recopy starts, the modified data size is once changed to "0" and then the differential data size from the time when recopy started is displayed. When tracking stops, the modified data size is changed to "0". If the status is " Reserved", a "-" (hyphen) is displayed.

> **Note**
>
> Refer to "Advanced Copy (All Local Sessions)" (page 927) for the display items that are not described in this section.

SnapOPC

This function displays detailed information for SnapOPC sessions.
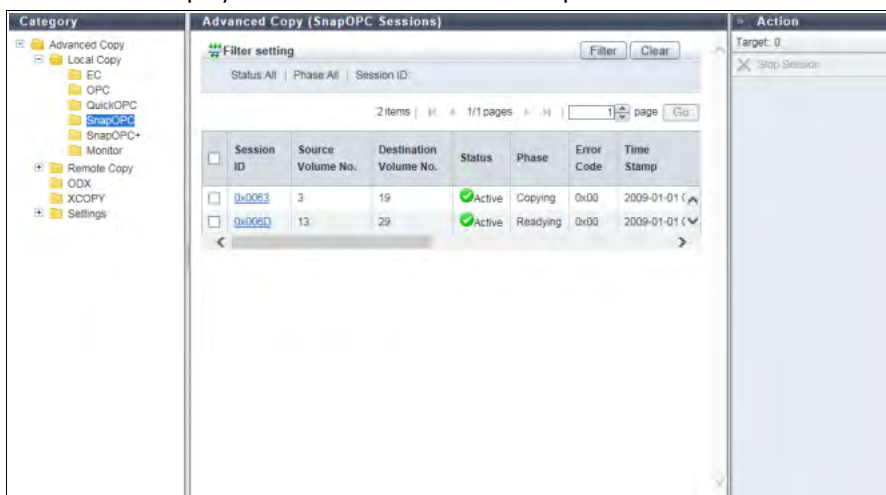
The following items are displayed in the Main area:

- SDP No.
  The Snap Data Pool number, which is used when the copy destination SDV capacity is insufficient, is displayed.
  If the status is " Reserved" or when the copy destination is not an SDP, a "-" (hyphen) is displayed.

- SDP Used Capacity

  The used capacity of Snap Data Pool is displayed. If the status is "   Reserved" or when the copy destination is not an SDP, a "-" (hyphen) is displayed.

> **Note**
>
> Refer to "Advanced Copy (All Local Sessions)" (page 927) for the display items that are not described in this section.

SnapOPC+

This function displays detailed information for SnapOPC+ sessions.

■ When the copy destinations are SDPs
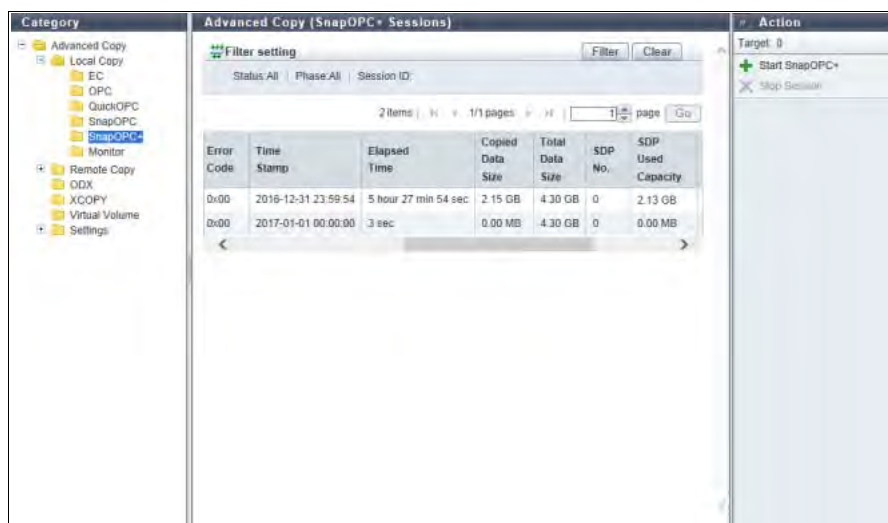
■ When the copy destinations are TPPs
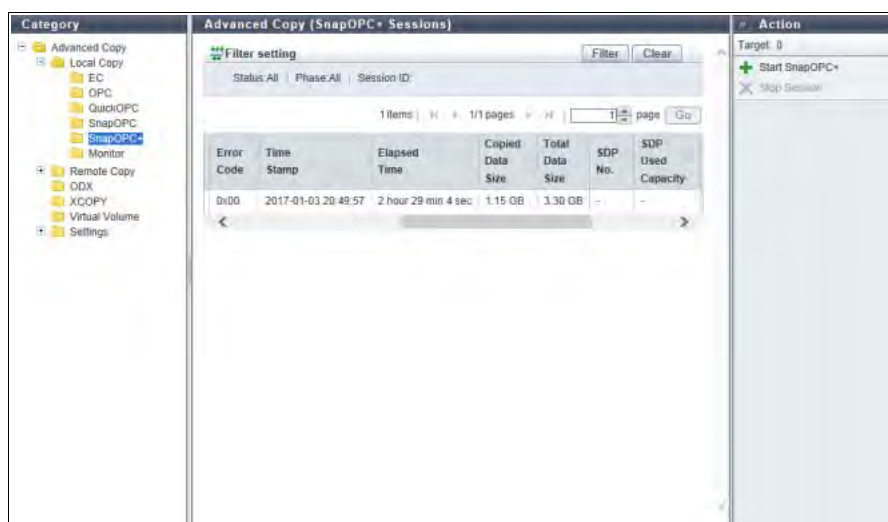
The following items are displayed in the Main area:
- Generation
  The generation and total number of generations of the copy session are displayed.

- SDP No.
  The Snap Data Pool number, which is used when the copy destination SDV capacity is insufficient, is displayed.
  If the status is "✅ Reserved" or when the copy destination is not an SDP, a "-" (hyphen) is displayed.

- SDP Used Capacity
  The used capacity of Snap Data Pool is displayed. If the status is "✅ Reserved" or when the copy destination is not an SDP, a "-" (hyphen) is displayed.

> **🔵 N o t e**
>
> Refer to "Advanced Copy (All Local Sessions)" (page 927) for the display items that are not described in this section.

Monitor

This function displays detailed information for Monitor sessions.

> **🔵 N o t e**
>
> Refer to "Advanced Copy (All Local Sessions)" (page 927) for display items.

Advanced Copy (All Remote Sessions)

This function displays the status for remote copy sessions.

> 🔵 **N o t e**
>
> Remote Copy Sessions Information is displayed only when the Advanced Copy function license has been registered, and when using an ETERNUS DX/AF model that supports REC.

The following items are displayed in the Main area:
- Session ID
The session ID is displayed.
Click this item to display the screen shown in "Advanced Copy (Property)" (page 954) or "Advanced Copy (Extent information)" (page 960).

- Source Volume No.

The copy source volume number is displayed. If the status is "🟢 Reserved", a "-" (hyphen) is displayed.

- Destination Volume No.

The copy destination volume number is displayed. If the status is "🟢 Reserved", a "-" (hyphen) is displayed.

- Remote Session ID
The session ID for the remote storage system is displayed.

- Type
The copy session type is displayed using an abbreviation (REC).

- Status
The copy session status is displayed.

  - 🟢 Active
Operating normally

  - 🟢 Reserve
Session ID reserved

  - 🟢 Suspend
Suspended by an instruction from the host

  - ❌ Halt
Remote copy disabled due to an error

- ❌ Error Suspend
  Copy canceled due to an error

- ❓ Unknown
  A status other than the ones listed above

- **Phase**

  The copy session phase is displayed. If the status is "✅ Reserved", a "-" (hyphen) is displayed.

  - Copying
    Copying
  - Equivalent
    Maintaining equivalent status of the copy source and copy destination that are duplicated after copy is complete

- **Error Code**

  The error code is displayed when an error occurs. If the status is "✅ Reserved", a "-" (hyphen) is displayed.
  Refer to <u>"K. Error Code" (page 1371)</u> for details.

- **Direction**

  The copy direction of the applicable session is displayed. If the status is "✅ Reserved", a "-" (hyphen) is displayed.

  - From Local/To Remote
    Session from the local storage system (copy source) to the remote storage system (copy destination)
  - From Remote/To Local
    Session from the remote storage system (copy source) to the local storage system (copy destination)

- **Time Stamp**
  The time when backup has been completed, and the time when an error occurred, are displayed.
  The time stamp is updated when the process is suspended, when an error occurs, and when the status is changed.
  The following information is displayed for "Time Stamp".

  - When "Status" is "✅ Reserved", a "-" (hyphen) is displayed.
  - When "Status" is "✅ Active" and the copy session is not suspended yet, "0" is displayed for all of the display items. When suspend is requested and "Status" is "✅ Active", the backup time of the previous suspend that was requested is displayed.
  - When "Status" is "✅ Suspend", the backup time when the copy was suspended is displayed.
  - When "Status" is "❌ Error Suspend", the time when an error occurred is displayed.
  - When "Status" is "❌ Halt", the time when an error occurred is displayed.

    When the status is changed from "❌ Halt" to "✅ Active" or when the copy session is forcibly suspended, the time stamp information is cleared and "0" is displayed for all of the display items.

- **Elapsed Time**

  The elapsed time after a copy session starts is displayed. If the status is "✅ Reserved", a "-" (hyphen) is displayed.

- **Copied Data Size**

  The size of copy that has been completed is displayed. If the status is "✅ Reserved", a "-" (hyphen) is displayed.

- **Total Data Size**

  The total copy size is displayed. If the status is "✅ Reserved", a "-" (hyphen) is displayed.

- **Resolution**

  The copy session resolution is displayed. If the status is "✅ Reserved", a "-" (hyphen) is displayed.

- Requestor
The information of the client that started the copy session is displayed. If the status is "🟢 Reserved", a "-" (hyphen) is displayed.
  - SCSI
  Copy session requested by the copy management software (via SCSI).
  - LAN
  Copy session requested by the copy management software (via LAN).
  - SMI-S
  Copy session requested by SMI-S.
  - Unknown
  Other than the above clients.

- License
The registration status of the Advanced Copy license when the copy session is started is displayed.
If the license information for the connection target storage system cannot be obtained due to a copy path error, "Unknown" is displayed.
  - Regular
  The copy session is started with a paid license.
  - Trial
  The copy session is started with a trial license. Copy sessions that use a trial license are deleted automatically after the expiration of the trial license.

- Remote Box ID
The remote Box ID is displayed.

Filter setting

Filter	Description
Status	Select the copy session status that is to be displayed.
Phase	Select the copy session phase that is to be displayed.
Session ID	Input the session ID of the copy session that is to be displayed. When not using the session ID for filtering, leave this item blank.
Remote Box ID	Input the remote Box ID of the copy session that is to be displayed. When not using the remote BOX ID for filtering, leave this item blank.

REC

This function displays detailed information for REC sessions.

> **N o t e**
>
> Refer to "Advanced Copy (All Remote Sessions)" (page 934) for display items.

ODX Sessions

This function displays the status for ODX sessions.
ODX sessions are created when the ODX function is used for a server with "Windows Server 2012" or later. The ODX function offloads the workload for copying or migrating data from the server to the ETERNUS DX/AF.

The following items are displayed in the Main area:

- Session ID
  The session ID is displayed.
  Click this item to display the screen shown in "Advanced Copy (Property)" (page 954) or "Advanced Copy (Extent information)" (page 960).

- Source Volume No.

  The copy source volume number is displayed. If the status is " ✔ Reserved", a "-" (hyphen) is displayed.

- Destination Volume No.

  The copy destination volume number is displayed. If the status is " ✔ Reserved", a "-" (hyphen) is displayed.

- Status
  The copy session status is displayed.

  - ✔ Active
    Operating normally

  - ✔ Reserve
    Session ID reserved

  - ✖ Error Suspend
    Copy canceled due to an error

  - ❓ Unknown
    A status other than the ones listed above

- Error Code

  The error code is displayed when an error occurs. If the status is " ✔ Reserved", a "-" (hyphen) is displayed.
  Refer to "K. Error Code" (page 1371) for details.

- Time Stamp
  The time when backup is complete and the time when an error occurred are displayed.
  The time stamp is updated when starting a copy session or an error occurs.
  The following information are displayed for this item:
  - If the status is " ✅ Reserved", a "-" (hyphen) is displayed.
  - If the status is " ✅ Active", the backup time when the copy started is displayed.
  - If the status is " ❌ Error Suspend", the time when an error occurred is displayed.

- Elapsed Time
  The elapsed time after a session starts is displayed. If the status is " ✅ Reserved", a "-" (hyphen) is displayed.

- Copied Data Size
  The size of copy that has been completed is displayed. If the status is " ✅ Reserved", a "-" (hyphen) is displayed.

- Total Data Size
  The total copy size is displayed. If the status is " ✅ Reserved", a "-" (hyphen) is displayed.

Filter setting

Filter	Description
Status	Select the copy session status that is to be displayed.
Session ID	Input the session ID of the copy session that is to be displayed. When not using the session ID for filtering, leave this item blank.

XCOPY Sessions

This function displays the status for XCOPY sessions.
An XCOPY (Extended Copy) session is created when the Full Copy function of VMware vStorage APIs for Array Integration (VAAI) is used.

The following items are displayed in the Main area:

- Session ID
  The session ID is displayed.
  Click this item to display the screen shown in "Advanced Copy (Property)" (page 954) or "Advanced Copy (Extent information)" (page 960).

- Source Volume No.

  The copy source volume number is displayed. If the status is " ✅ Reserved", a "-" (hyphen) is displayed.

- Destination Volume No.

  The copy destination volume number is displayed. If the status is " ✅ Reserved", a "-" (hyphen) is displayed.

- Status
  The copy session status is displayed.

  - ✅ Active
    Operating normally

  - ✅ Reserve
    Session ID reserved

  - ❌ Error Suspend
    Copy canceled due to an error

  - ❓ Unknown
    A status other than the ones listed above

- Error Code

  The error code is displayed when an error occurs. If the status is " ✅ Reserved", a "-" (hyphen) is displayed.
  Refer to "K. Error Code" (page 1371) for details.

- Time Stamp
  The time when backup has been completed, and the time when an error occurred, are displayed.
  The time stamp is updated when starting a copy session or an error occurs.
  The following information is displayed:
  - If the status is " Reserved", a "-" (hyphen) is displayed.
  - If the status is " Active", the backup time when the copy started is displayed.
  - If the status is " Error Suspend", the time when the error occurred is displayed.

- Elapsed Time
  The elapsed time after a session starts is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.

- Copied Data Size
  The size of copy that has been completed is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.

- Total Data Size
  The total copy size is displayed. If the status is " Reserved", a "-" (hyphen) is displayed.

Filter setting

Filter	Description
Status	Select the copy session status that is to be displayed.
Session ID	Input the session ID of the copy session that is to be displayed. When not using the session ID for filtering, leave this item blank.

Virtual Volume Sessions

This function displays the status for the Virtual Volume session.
Virtual Volume sessions are created by VMware vSphere 6.
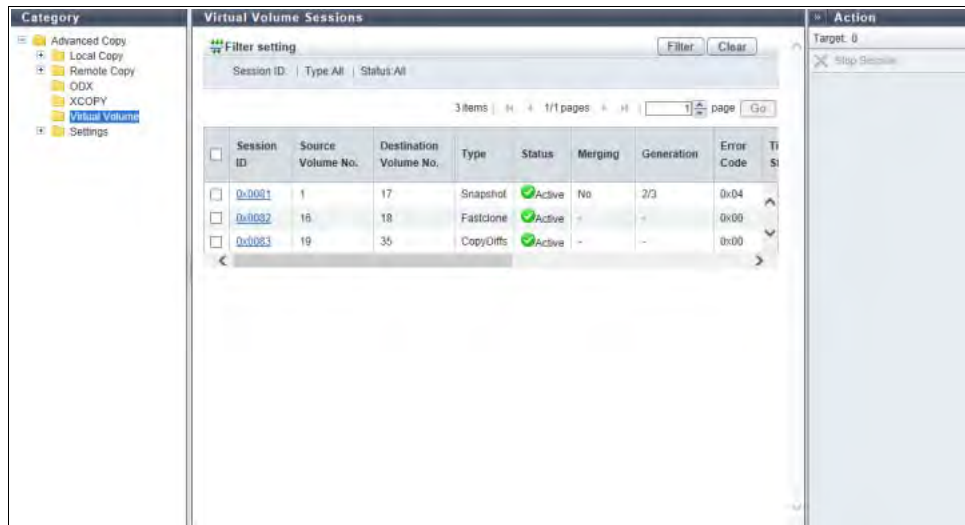
The following items are displayed in the Main area:
- Session ID
  The session ID is displayed.
  Click this item to display the screen shown in "Advanced Copy (Property)" (page 954).

- Source Volume No.

  The copy source volume number is displayed. If the status is " 🟢 Reserved", a "-" (hyphen) is displayed.

- Destination Volume No.

  The copy destination volume number is displayed. If the status is " 🟢 Reserved", a "-" (hyphen) is displayed.

- Type
  The session type is displayed.
  - Snapshot
    VVOLs are being copied with the Copy-on-Write method (equivalent to SnapOPC+).
    Write I/O for the copy destination VVOL is not allowed.
  - Fastclone
    VVOLs are being copied with the Copy-on-Write method (equivalent to SnapOPC).
    Write I/O for the copy destination VVOL is allowed, but restoring data is not allowed.
  - Clone
    VVOLs are being copied with the Background copy method (equivalent to OPC).
  - Revert
    Data is being restored from the snapshot destination VVOL to the snapshot source VVOL.
  - CopyDiffs
    Comparison result (the difference of a data) between two VVOLs during a snapshot session is being copied
    to the third VVOL.

- Status
  The copy session status is displayed.

  - 🟢 Active
    Operating normally

  - 🟢 Reserved
    Session ID reserved

- ⊗ Error Suspend
  Copy canceled due to an error

- ❓ Unknown
  A status other than the ones listed above

- • Merging
  When the data merge process for a snapshot is being performed, "Yes" is displayed.
  If not, "No" is displayed. The "merge process" targets deleted data of a specific generation (except the oldest generation) and copies the difference in data to the previous generation.
  When the session type is not "Snapshot" or when the copy status is "✅ Reserved", a "-" (hyphen) is displayed.

- • Generation
  The generation and total number of generations of the snapshot session are displayed.
  When the session type is not "Snapshot" or when the copy status is "✅ Reserved", a "-" (hyphen) is displayed.

- • Error Code
  The error code is displayed when an error occurs. If the status is "✅ Reserved", a "-" (hyphen) is displayed.
  Refer to "K. Error Code" (page 1371) for details.

- • Time Stamp
  The time when backup has been completed, and the time when an error occurred, are displayed.
  The time stamp is updated when starting a copy session or an error occurs.
  The following information is displayed:

  - If the status is "✅ Reserved", a "-" (hyphen) is displayed.

  - If the status is "✅ Active", the backup time when the copy started is displayed.

  - If the status is "⊗ Error Suspend", the time when the error occurred is displayed.

- • Elapsed Time
  The elapsed time after a session starts is displayed. If the status is "✅ Reserved", a "-" (hyphen) is displayed.

- • Copied Data Size
  The size of copy that has been completed is displayed. If the status is "✅ Reserved", a "-" (hyphen) is displayed.

- • Total Data Size
  The total copy size is displayed. If the status is "✅ Reserved", a "-" (hyphen) is displayed.

- • Destination FTRP No.
  The FTRP No. to which the copy destination FTV belongs is displayed.
  When the copy session type is not "Snapshot" or "Fastclone", or when the copy status is "✅ Reserved", a "-" (hyphen) is displayed.

- • Used Session Capacity
  The used capacity of FTRP area is displayed.
  When the copy session type is not "Snapshot" or "Fastclone", or when the copy status is "✅ Reserved", a "-" (hyphen) is displayed.

Filter setting

Filter	Description
Session ID	Input the session ID of the copy session that is to be displayed. When not using the session ID for filtering, leave this item blank.
Type	Select the type of the copy session that is to be displayed.
Status	Select the copy session status that is to be displayed.

Settings (Advanced Copy)

This function displays the current Advanced Copy license registration status and the Advanced Copy setting state.

> **Ｎ o t e**
>
> - When the trial license is registered, the registration date and the expiration date is displayed.
> - Registering an Advanced Copy license and registering the copy table size are not required when using the ODX or XCOPY function, or when using copy functions with VVOLs.

The following items are displayed in the Main area:

● License Information

- State
  Registration status of the Advanced Copy license is displayed.
  "Remote Copy" is displayed only for models that support REC.

  - Not Registered
    No license is registered.

  - Free
    The free license is registered. Up to eight local copy sessions can be created as an Advanced Copy. This item is only displayed for the local copy functions of an ETERNUS DX60 S4/DX100 S4/DX200 S4, an ETERNUS DX60 S3/DX100 S3/DX200 S3, an ETERNUS AF250 S2, an ETERNUS AF250, and an ETERNUS DX200F.

  - Trial
    A trial license is registered. All of the Advanced Copy functions can be used for a limited time.

  - Trial Expiration
    The trial license is expired. The Advanced Copy function is not available. This item is displayed for the local copy functions of an ETERNUS DX500 S4/DX600 S4, an ETERNUS DX500 S3/DX600 S3, an ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, an ETERNUS AF650 S2, and an ETERNUS AF650.

  - Full
    A paid license is registered. All of the Advanced Copy functions can be used.

- Registration Date
  The date when the trial license was registered is displayed. A "-" (hyphen) is displayed in the following conditions:

  - Trial license has never been registered.
  - A paid license or a free license is registered.

- Expiration Date
  The expiration date for the trial license is displayed. A "-" (hyphen) is displayed in the following conditions:
    - Trial license has never been registered.
    - A paid license or a free license is registered.

● **Advanced Copy Settings**

- Copy Table Size
  A copy table size is displayed.
  This item is displayed only when the Advanced Copy function license has been registered or when the Unified Storage function is enabled.

- EC/OPC Priority
  The EC/OPC priority is displayed.
  This item is displayed only when the Advanced Copy function license or the Storage Cluster function license has been registered.
    - Automatic Priority
      This mode changes the EC/OPC priority automatically in response to the operating load status.
    - High Priority
      This mode operates by making maximum use of internal resources.
    - Middle Priority
      This mode operates slightly slower than the High Priority mode.
    - Low Priority
      This mode reduces the effect on host access.
    - Very Low Priority
      This mode operates slower than the Low Priority mode.

- Current EC/OPC Priority
  The current EC/OPC priority is displayed.
  This item is displayed only when the Advanced Copy function license or the Storage Cluster function license has been registered.
    - High Priority
    - Middle Priority
    - Low Priority
    - Very Low Priority

- ODX Buffer Volume
  The registration status of the ODX Buffer volume is displayed.
    - Registered
    - Not Registered

Snap Data Pool

This function displays the usage of SDP.
SDP is the area used when in case executing SnapOPC and SnapOPC+ increases the amount of copy data and exceeds the SDV capacity.
SDP becomes available when creating an SDPV. Created SDPV is automatically added to the SDP.

🔵 **N o t e**

- This function is displayed only when the Advanced Copy function license has been registered or when the Unified Storage function is enabled.
- Because the ETERNUS DX60 S4/DX60 S3 do not support the encryption function, display items that follow "Total Capacity" are displayed without the "Encrypted/Unencrypted" table heading.

■ **For the ETERNUS DX60 S4 and the ETERNUS DX60 S3**

■ **For the other models**

The following items are displayed in the Main area:
- SDP No.
  The SDP number (fixed as "0") is displayed.

- Total Capacity
  The total capacity of the SDP is displayed.

- Total Free Space
  The total free space of the SDP is displayed.

- SDPE
  SDPE, the allocation unit for SDV, is displayed with 1GB, 2GB, or 4GB.

- Unencrypted
  - Total Capacity
    The total capacity of unencrypted SDP is displayed.
  - Total Used Capacity
    The total used capacity of unencrypted SDP is displayed.
  - Total Used Capacity (%)
    The usage rate of unencrypted SDP is displayed.

- Used Host Capacity
  The total capacity of the SDPE that is allocated for an unencrypted SDV where a capacity shortage caused by data writing from the host has occurred is displayed.
- Used Copy Capacity
  The total capacity of the SDPE that is allocated for an unencrypted SDV where a capacity shortage caused by SnapOPC or SnapOPC+ has occurred is displayed.

- Encrypted
  - Total Capacity
    The total capacity of encrypted SDP is displayed.
  - Total Used Capacity
    The total used capacity of encrypted SDP is displayed.
  - Total Used Capacity (%)
    The usage rate of encrypted SDP is displayed.
  - Used Host Capacity
    The total capacity of the SDPE that is allocated for an encrypted SDV where a capacity shortage caused by data writing from the host has occurred is displayed.
  - Used Copy Capacity
    The total capacity of the SDPE that is allocated for an encrypted SDV where a capacity shortage caused by SnapOPC or SnapOPC+ has occurred is displayed.

Copy Path

This function displays the REC path status between the local and remote storage systems. It shows whether the copy path created with the function in "Set Copy Path" is operating properly. Refer to "Set Copy Path" (page 589). Select the target remote storage system. (Up to 16 storage systems can be registered.) The following items are displayed.

- Storage System
- Advanced Copy Path Status

▷ **Caution**

After creating the copy paths, make sure to check the copy path status with this function.

⬤ **N o t e**

- This function is displayed only when the Advanced Copy function license or the Storage Cluster function license has been registered, and when using an ETERNUS DX/AF model that supports REC.
- The "Priority Level" and the "Multiplicity" settings can be specified for each remote Box ID. Refer to "Modify REC Multiplicity" (page 625) for details.
- To change the "Link Speed" setting, create a copy path with a new link speed by using the [Set Copy Path] function, and apply the created copy path to the related storage systems. Refer to "Set Copy Path" (page 589) for details.

The following items are displayed in the Main area:

● **Local Storage System Information**

- Box ID
  The Box ID for the local storage system is displayed.
  "Box ID" is an identifier used to identify individual storage systems. This ID is a unique name in the user system and consists of 40-digit code.
  The initial Box ID is a device ID consisting of device information (such as series name, model name, and serial number).

● **Remote Storage System Information**

- Box ID
  This is the Box ID of the remote storage system that has a path to the local storage system. Click this item to display "Copy Path Detail" (page 961).

- Connection Type
  The type of connection to the remote storage system that has a path to the local storage system is displayed.
  - Direct
  - Remote

- Priority Level
  REC is performed using the priority level (Automatic Priority/High Priority/Middle Priority/Low Priority/Very Low Priority) that is specified with the [Modify EC/OPC Priority] function (*1).
  - Automatic
    REC is performed using the priority level (Automatic Priority/High Priority/Middle Priority/Low Priority/Very Low Priority) that is specified using the "Modify REC Multiplicity" function (*1).
  - 1 - 8
    REC is performed with the displayed priority level. "1" corresponds to "Very Low Priority", and "8" corresponds to "High Priority" for the [Modify EC/OPC Priority] function (*1).

- Multiplicity
  When the local storage system and the remote storage system are connected by remote connection, the multiplicity is displayed. If the "Connection Type" is "Direct", a "-" (hyphen) is displayed.
  - Automatic
    REC is performed with the recommended multiplicity that is calculated by the [Measure Round Trip Time] result (*2).
  - 1 - 1024
    REC is performed with the multiplicity that is manually specified with the [Modify REC Multiplicity] function (*3).

- Recommended Multiplicity
  When the local storage system and the remote storage system are connected by remote connection, the recommended multiplicity is displayed. If the "Connection Type" is "Direct", a "-" (hyphen) is displayed.
  - 1 - 1024
    The recommended multiplicity that is calculated by the [Measure Round Trip Time] result (*2).
  - ***
    The round trip time is not measured by the [Measure Round Trip Time] function (*2).

- Link Speed
  When the local storage system and the remote storage system are connected by remote connection, the link speed is displayed between 1 Mbit/s - 65535 Mbit/s. If the "Connection Type" is "Direct", a "-" (hyphen) is displayed.

*1:   Refer to "Modify EC/OPC Priority" (page 579) for details.
*2:   Refer to "Measure Round Trip Time" (page 612) for details.
*3:   Refer to "Modify REC Multiplicity" (page 625) for details.

REC Buffer

This function displays the REC Buffer status when performing REC in "REC asynchronous consistency mode".
The "Consistency mode" secures the order of data transfer to the remote storage system for all of the specified REC sessions. This mode requires constant securement of the dedicated REC Buffer in the cache memory. Copying via REC Buffer stores multiple REC session I/Os in the REC Buffer for a certain period of time, and copies in blocks.

> ◯ N o t e
>
> This function is displayed only when the Advanced Copy function license has been registered, and when using an ETERNUS DX/AF model that supports REC.

The following items are displayed in the Main area:
- Group
  The management group number of the REC Buffer is displayed.
  - ETERNUS DX100 S4/DX100 S3
    0
  - ETERNUS DX200 S4/DX200 S3
    0 - 3
  - ETERNUS DX500 S4/DX500 S3 and ETERNUS DX600 S4/DX600 S3
    0 - 7
  - ETERNUS DX8100 S3, ETERNUS DX8700 S3, and ETERNUS DX8900 S3
    0 - 7

- ETERNUS AF250 S2/AF250
  0 - 3
- ETERNUS AF650 S2/AF650
  0 - 7
- ETERNUS DX200F
  0 - 3

- **Usage**
  The REC Buffer usage is displayed.
  - Unused
  - Send
  - Receive

- **Remote Box ID**
  The Box ID for the remote storage system is displayed.
  If the copy path information is deleted after the REC Buffer creation, "???" is displayed. Note that REC Buffers with "???" cannot be used. Delete any REC Buffers with this status. Refer to <u>"Modify REC Buffer" (page 613)</u> for details.
  A "-" (hyphen) is displayed when the usage is "Unused".

- **Status**
  The REC Buffer status is displayed.
  - ACTIVE
    REC Buffer can transfer data.
  - INACTIVE
    REC Buffer cannot transfer data.

- **Mirror Status**
  The mirroring status (redundancy status) of the REC Buffer is displayed. When the REC Buffer usage is "Unused", a "-" (hyphen) is displayed. The REC Buffer is duplicated by two CMs to prevent data loss when the ETERNUS DX/AF fails or when maintenance is performed.
  - Normal
    Duplication of the REC Buffer was successful.
  - Recovering
    Duplication of the REC Buffer failed.

- **Size**
  The REC Buffer size is displayed. When the REC Buffer usage is "Unused", a "-" (hyphen) is displayed.
  - ETERNUS DX100 S4/DX100 S3
    128MB
  - ETERNUS DX200 S4/DX200 S3
    128MB, 256MB, 512MB
  - ETERNUS DX500 S4/DX500 S3 and ETERNUS DX600 S4/DX600 S3
    128MB, 256MB, 512MB, 1024MB, 2048MB
  - ETERNUS DX8100 S3, ETERNUS DX8700 S3, and ETERNUS DX8900 S3
    128MB, 256MB, 512MB, 1024MB, 2048MB
  - ETERNUS AF250 S2/AF250
    128MB, 256MB, 512MB
  - ETERNUS AF650 S2/AF650
    128MB, 256MB, 512MB, 1024MB, 2048MB
  - ETERNUS DX200F
    128MB, 256MB, 512MB

- **Forwarding Interval**
  The data transfer interval is displayed. When the REC Buffer usage is "Unused", a "-" (hyphen) is displayed.

- Monitoring Time
  The monitoring time, before transition to the "Halt" state for a copy session when an REC Buffer shortage occurs, is displayed. When the monitoring time" is "0 min.", the ETERNUS DX/AF is not being monitored. When the REC Buffer usage is "Unused", a "-" (hyphen) is displayed.

- HALT Wait Timer
  The maximum non-responding time is displayed. During the non-response time, the host I/O response is stopped to give priority to performing REC Buffer transfers in a high-load state. When the REC Buffer usage is "Unused", a "-" (hyphen) is displayed.

- I/O Priority Mode
  Whether the "I/O Priority Mode" is enabled or disabled is displayed. A "-" (hyphen) is displayed when the usage is "Unused".
  "I/O Priority Mode" reduces the effect on host I/O when an initial copy for starting, restarting, or recovering the copy function is performed.
  This item is available when logged in using a user account with the "Advanced Copy Management" policy.

- Immediate HALT Mode
  Whether the "Immediate HALT Mode" is enabled or disabled is displayed. A "-" (hyphen) is displayed when the usage is "Unused".
  "Immediate HALT Mode" reduces the effect on host I/O because the REC Buffer is insufficient when "HALT Wait Timer" is set to "0 sec.".
  This item is available when logged in using a user account with the "Advanced Copy Management" policy.

- High Bandwidth Mode
  Whether the "High Bandwidth Mode" is enabled or disabled is displayed. A "-" (hyphen) is displayed when the usage is "Unused".
  "High Bandwidth Mode" reduces the number of communications by transferring control data required for buffer transfers with as little time as possible to improve the transfer speed for long distance communication.
  This item is available when a user with the "Advanced Copy Management" policy is logged on an ETERNUS DX/AF with a controller firmware version V10L4x or later.

- REC Disk Buffer Status
  When the REC Buffer usage is "Send", the status of the REC Disk Buffers that are assigned to the REC Buffer is displayed. A "-" (hyphen) is displayed when the REC Disk Buffer is not allocated or the usage is "Receive" or "Unused".
  - Active
    All of the REC Disk Buffers in the REC Buffer are available.
  - Rebuilding
    Rebuild/copyback is being performed in some of the REC Disk Buffers.
  - Formatting
    Formatting is being performed in some of the REC Disk Buffers.
  - Not Supported
    The copy destination storage system for REC does not support the REC Disk Buffers.
  - Not Mirrored
    Some of the REC Disk Buffers have lost redundancy due to disk failure.
  - Error
    Some of the REC Disk Buffers cannot be used (due to RAID group failure or RAID group blockage).

  If the "REC Disk Buffer Status" is "Formatting", "Not Supported", or "Error", all of the other REC Disk Buffers that belong to the same REC Buffer cannot be used.

- REC Disk Buffer Total Capacity
  When the usage is "Send", the total capacity of the REC Disk Buffer, which is assigned to the REC Buffer, is displayed. A "-" (hyphen) is displayed when the REC Disk Buffer is not assigned or when the usage is "Receive" or "Unused".

- Total Storage Data Size
When the REC Buffer usage is "Send", the size of the data in the REC Disk Buffer that is assigned to the REC Buffer is displayed. A "-" (hyphen) is displayed when the REC Disk Buffer is not assigned or when the usage is "Receive" or "Unused".

- Free Disk Buffer Size
When the usage is "Send", the unused capacity of the REC Disk Buffer, which is assigned to the REC Buffer, is displayed. A "-" (hyphen) is displayed when the REC Disk Buffer is not assigned or when the usage is "Receive" or "Unused".

REC Disk Buffer

This function displays the existing REC Disk Buffers in the ETERNUS DX/AF.

▷ **Caution**

Drives are not monitored for bad sectors when the drives configure the REC Disk Buffer.

⬤ **N o t e**

This function is displayed only when the Advanced Copy function license has been registered, and when using an ETERNUS DX/AF model that supports REC.

The following items are displayed in the Main area:

● REC Disk Buffer List

- No.
The RAID group number of the REC Disk Buffer is displayed. Click this item to display the [REC Disk Buffer Detail] screen.

- Name
The REC Disk Buffer name is displayed. Click this item to display the [REC Disk Buffer Detail] screen.

- Status
The REC Disk Buffer status is displayed. Refer to "RAID Group Status" (page 1374) for details.

- Total Capacity
The total capacity of the REC Disk Buffer is displayed.

- **Controlling CM**
  The Controlling CM of the REC Disk Buffer is displayed (x: CE number, y: CM number).
  - For the ETERNUS DX8700 S3/DX8900 S3
    CE#x CM#y
  - For the other models
    CM#y

- **REC Buffer**
  The management group number of the REC Buffer, to which the REC Disk Buffer is assigned, is displayed. A "-" (hyphen) is displayed for an REC Disk Buffer that is not assigned to any REC Buffers.
  - ETERNUS DX100 S4/DX100 S3
    0
  - ETERNUS DX200 S4/DX200 S3
    0 - 3
  - ETERNUS DX500 S4/DX500 S3 and ETERNUS DX600 S4/DX600 S3
    0 - 7
  - ETERNUS DX8100 S3, ETERNUS DX8700 S3, and ETERNUS DX8900 S3
    0 - 7
  - ETERNUS AF250 S2/AF250
    0 - 3
  - ETERNUS AF650 S2/AF650
    0 - 7
  - ETERNUS DX200F
    0 - 3

- **Encryption**
  The encryption status of the REC Disk Buffer is displayed.
  - CM
    An REC Disk Buffer that is encrypted by CM
  - "-" (hyphen)
    An REC Disk Buffer that is not encrypted (unencrypted volume)
  - SED
    An REC Disk Buffer that is encrypted by SED

- **Process**
  A process that is being performed for the REC Disk Buffer is displayed. If no process is being performed, a "-" (hyphen) is displayed.
  - Recovering
    Rebuild, copyback, redundant copy, or recovery of the RAID group is being performed.
  - Formatting
    Formatting is being performed.

Filter setting

Filter	Description
Name	Input the REC Disk Buffer name that is to be displayed. REC Disk Buffers matching or partially matching the input name are displayed. When not using the REC Disk Buffer name for filtering, leave this item blank.
Status	Select the REC Disk Buffer status that is to be displayed. When not using the REC Disk Buffer status for filtering, select "All" (all REC Disk Buffers).

Advanced Copy (Property)

Detailed information (Property) about the Advanced Copy is displayed.

■ For Local Copy

The following items are displayed in the Main area:

- Session ID
  The session ID selected in the [Local Copy] screen is displayed.

- Source Volume Name

  The copy source volume name is displayed. If the status is "✅ Reserved", a "-" (hyphen) is displayed.

- Destination Volume Name

  The copy destination volume name is displayed. When the "Status" is "✅ Reserved" or when the copy session type is "MON", a "-" (hyphen) is displayed.

- Copy Range

  The copy range of the copy session is displayed. If the status is "✅ Reserved", a "-" (hyphen) is displayed.
    - Totally
      Whole volume
    - Extent
      Part of volume

- Secondary Access Permission

  If the status is "✅ Active", accessibility from the host to the copy destination volume is displayed. This item is displayed in EC. If the status is "✅ Reserved", a "-" (hyphen) is displayed.
    - Read Only at Equivalency
      When the "Phase" is "Equivalent", only read access to the copy destination volume is allowed
    - No Read/Write
      No read/write access to the copy destination volume is allowed

- Concurrent Suspend Status
  When an instruction to collectively and tentatively separate multiple pairs of a copy source volume and a copy destination volume (Concurrent Suspend request) is received in EC session, transition status to "Suspend" is displayed. This item is displayed in EC. If the status is "✅ Reserved", a "-" (hyphen) is displayed. If the Concurrent Suspend Status cannot be obtained, "Unknown" is displayed.
    - Normal
      Transition to the "Suspend" state is complete or Concurrent Suspend cannot be performed

- Exec
  Transition to the "Suspend" state in progress
- Error
  Transition to the "Suspend" state failed
- Unknown
  A status other than the ones listed above

> **◯ N o t e**
>
> Refer to "Advanced Copy (All Local Sessions)" (page 927) for the display items that are not described in this section.

■ For Remote Copy
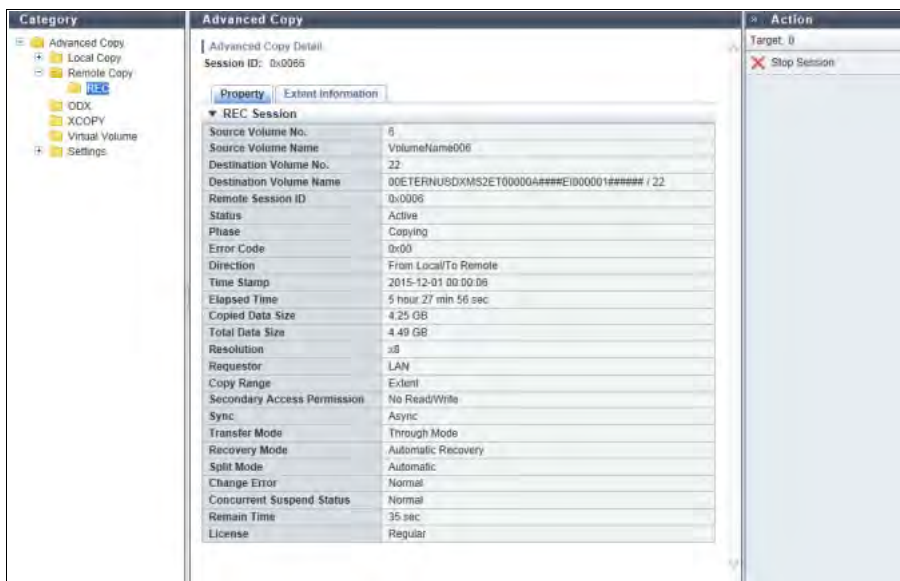
The following items are displayed in the Main area:

- Session ID
  The session ID selected in the [Remote Copy] screen is displayed.

- Source Volume Name
  The following is displayed depending on the "Direction". If the status is "✅ Reserved", a "-" (hyphen) is displayed.
    - When the "Direction" is "From Local/To Remote"
      The copy source volume name is displayed.
    - When the "Direction" is "From Remote/To Local"
      The "Remote Box ID / Copy source volume number" is displayed.

- Destination Volume Name
  The following is displayed depending on the "Direction". If the status is "✅ Reserved", a "-" (hyphen) is displayed.
    - When the "Direction" is "From Local/To Remote"
      The "Remote Box ID / Copy destination volume number" is displayed.
    - When the "Direction" is "From Remote/To Local"
      The copy destination volume name is displayed.

- Copy Range
  The copy range of the copy session is displayed. If the status is "✅ Reserved", a "-" (hyphen) is displayed.
    - Totally
      Whole volume

- Extent
Part of volume

- Secondary Access Permission

If the status is " ✅ Active", accessibility from the host to the copy destination volume is displayed. If the status is " ✅ Reserved", a "-" (hyphen) is displayed.

- Read Only at Equivalency
When the "Phase" is "Equivalent", only read access to the copy destination volume is allowed
- No Read/Write
No read/write access to the copy destination volume is allowed

- Sync

The operation mode of the copy session is displayed. If the status is " ✅ Reserved", a "-" (hyphen) is displayed.
- Sync (synchronous)
- Async (asynchronous)

- Transfer Mode

The transfer mode of the copy session is displayed. If the "Status" is " ✅ Reserved", a "-" (hyphen) is displayed. If the "Sync" is "Sync", a "-" (hyphen) is displayed.
- Stack Mode (Asynchronous Stack mode)
- Consistency Mode (Asynchronous Consistency mode)
- Through Mode (Asynchronous Through mode)

- Recovery Mode

The recovery mode of the copy session is displayed. If the status is " ✅ Reserved", a "-" (hyphen) is displayed.
- Automatic Recovery
In this mode, copy automatically resumes when the copy path is recovered from error status.
- Manual Recovery
In this mode, copy does not automatically resume when the copy path is recovered from error status.

- Split Mode
The split mode of the copy session is displayed. This item is available only for sessions in REC synchronous mode. If the status is " ✅ Reserved", a "-" (hyphen) is displayed. If the "Transfer Mode" is "Stack Mode" or "Consistency Mode", the field is blank.
- Automatic
In this mode, Write I/O access to the copy source volume is accepted when the copy path is in error status.
- Manual
In this mode, Write I/O access to the copy source volume is not accepted when the copy path is in error status. Specific sense data is sent to the host.

- Change Error
The result of changing REC mode ("Transfer Mode", "Recovery Mode", or "Split Mode") and the result of REC reverse operation is displayed.
When anything other than "Normal" is displayed, the operation mode may be different between the copy source and the copy destination storage systems, or REC reverse operation may disabled due to restriction in other functions.

If the status is " ✅ Reserved", a "-" (hyphen) is displayed.

- Normal
REC mode change and REC reverse operation are working normally
- Mode Change Error
An error was detected while changing the REC mode change
- Reverse Error
An error was detected while the REC reverse operation was being performed

- Concurrent Suspend Status
  When an instruction to collectively and tentatively separate multiple pairs of a copy source volume and a copy destination volume (Concurrent Suspend request) is received in REC session, transition status to "Suspend" is displayed. If the status is " ✅ Reserved", a "-" (hyphen) is displayed. If the Concurrent Suspend Status cannot be obtained, "Unknown" is displayed.
  - Normal
    Transition to the " Suspend" state is complete or Concurrent Suspend cannot be performed
  - Exec
    Transition to the " Suspend" state is in progress
  - Error
    Transition to the " Suspend" state failed
  - Unknown
    A status other than the ones listed above

- Remain Time
  The expected time to complete transition to the "Suspend" when a Concurrent Suspend request is received.
  If the "Status" is " ✅ Reserved", or if the "Remain Time" cannot be obtained, a "-" (hyphen) is displayed.

🔵 **N o t e**

Refer to "Advanced Copy (All Remote Sessions)" (page 934) for the display items that are not described in this section.

■ **For ODX**

The following items are displayed in the Main area:

- Session ID
  The session ID selected in the [ODX] screen is displayed.

- Source Volume Name

  The copy source volume name is displayed. If the "Status" is " ✅ Reserved", a "-" (hyphen) is displayed.

- Destination Volume Name

  The copy destination volume name is displayed. If the "Status" is " ✅ Reserved", a "-" (hyphen) is displayed.

🔵 **N o t e**

Refer to "ODX Sessions" (page 938) for the display items that are not described in this section.

■ **For XCOPY**

The following items are displayed in the Main area:

- Session ID
  The session ID selected in the [XCOPY] screen is displayed.

- Source Volume Name

  The copy source volume name is displayed. If the "Status" is "✅ Reserved", a "-" (hyphen) is displayed.

- Destination Volume Name

  The copy destination volume name is displayed. If the "Status" is "✅ Reserved", a "-" (hyphen) is displayed.

> ◯ **N o t e**
>
> Refer to "XCOPY Sessions" (page 940) for the display items that are not described in this section.

■ **For Virtual Volume**
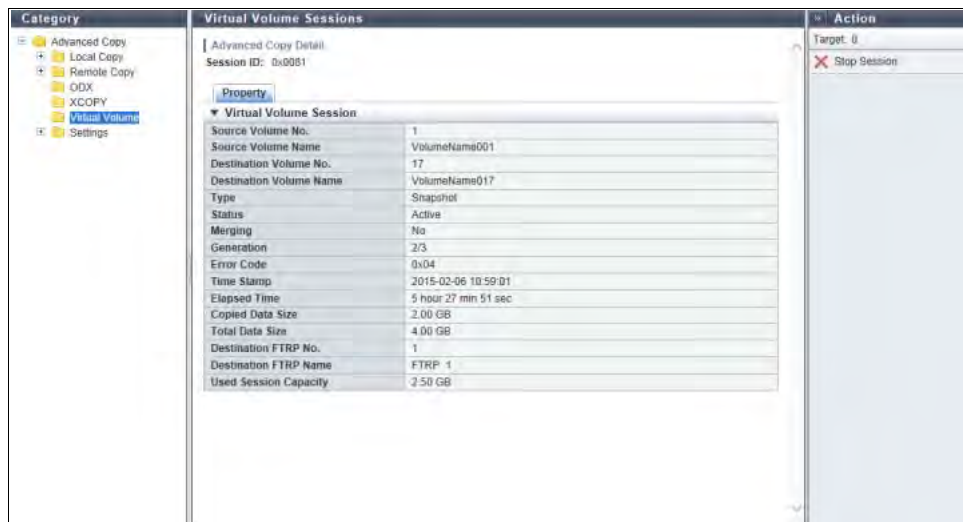
The following items are displayed in the Main area:

- Session ID
  The session ID selected in the [Virtual Volume] screen is displayed.

- Source Volume Name

  The copy source volume name is displayed. If the "Status" is "✅ Reserved", a "-" (hyphen) is displayed.

- **Destination Volume Name**

  The copy destination volume name is displayed. If the "Status" is "✅ Reserved", a "-" (hyphen) is displayed.

- **Destination FTRP Name**

  The FTRP name to which the copy destination FTV belongs is displayed. If the "Status" is "✅ Reserved",
  a "-" (hyphen) is displayed. If the copy session type is not "Snapshot" or "Fastclone", this item is not displayed.

  ⬤ **N o t e**

  Refer to for the display items that are not described in this section.

Advanced Copy (Extent information)

Detailed information (Extent information) about the Advanced Copy is displayed.
This screen is available only when the "Copy Range" is "Extent".
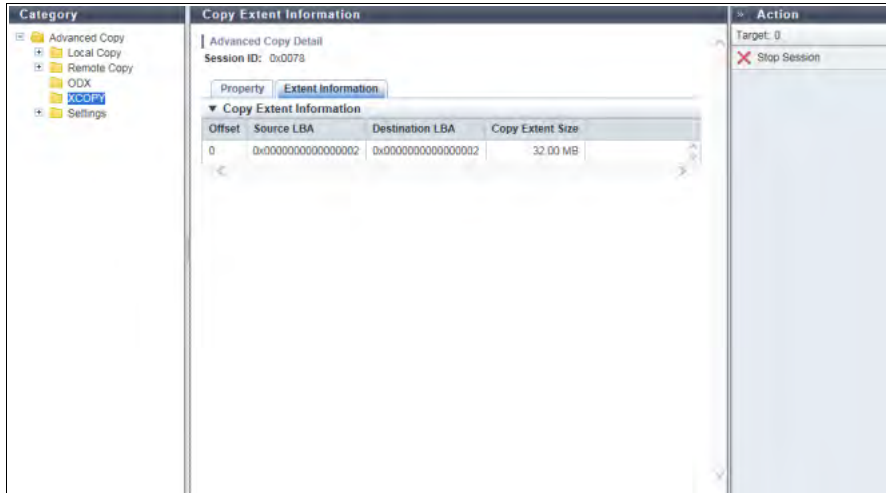
The following items are displayed in the Main area:

- Offset
  The array number of extent information is displayed.

- Source LBA
  The copy source start LBA of copy with range specification is displayed.

- Destination LBA
  The copy destination start LBA of copy with range specification is displayed.

- Copy Extent Size
  The data amount for copy with range specification is displayed.

Copy Path Detail

Detailed information of copy path is displayed.

The following items are displayed in the Main area:

● Storage System Information

- Local Storage System Box ID
  The Box ID of the local storage system is displayed.

- Remote Storage System Box ID
  The Box ID of the selected remote storage system is displayed.

- Connection Type
  The connection type between the local storage system and the selected remote storage system is displayed.
    - Direct
    - Remote

- Priority Level
  When the local storage system and the selected remote storage system are connected by direct connection, the priority level is displayed. If the "Connection Type" is "Remote", a "-" (hyphen) is displayed.

- Multiplicity
  When the local storage system and the selected remote storage system are connected by remote connection, the multiplicity is displayed. If the "Connection Type" is "Direct", a "-" (hyphen) is displayed.

- Recommended Multiplicity
  When the local storage system and the selected remote storage system are connected by remote connection, the recommended multiplicity is displayed. If the "Connection Type" is "Direct", a "-" (hyphen) is displayed.

- Link Speed
  When the local storage system and the selected remote storage system are connected by remote connection, the link speed is displayed. If the "Connection Type" is "Direct", a "-" (hyphen) is displayed.

● Advanced Copy Path Status

- Local Port
  The port information of the local storage system is displayed.

- Status
The port path status between the local and remote storage systems is displayed with an icon and a character string.
  - 🟢 Normal
  The copy path is in the normal state.
  - ❌ Error
  The copy path is in the error state.

- Remote Port WWN/iSCSI Name
The port WWN or iSCSI name of the remote storage system is displayed.

- IP Version
When the port type is iSCSI, the IP version for the destination iSCSI port of the copy path is displayed.
A "-" (hyphen) is displayed when the port type is FC.
  - IPv4
  - IPv6 (Link Local)
  - IPv6 (Connect IP)
  - "-" (hyphen)

- IP Address
When the port type is iSCSI, the IP address for the destination iSCSI port of the copy path is displayed.
The display format varies according to the IP version.
A "-" (hyphen) is displayed when the port type is FC.
  - For IPv4 address
    - xxx.xxx.xxx.xxx
    xxx: 0 - 255 (decimal)
  - For IPv6 address
    - xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
    xxxx: 0 - ffff (hexadecimal, "a" - "f" are lowercase letters)
    Refer to "IPv6 Address Notation" (page 828) for details.

- Bandwidth Limit
The bandwidth limit for sending data from the local storage system to the path is displayed.
  - Unlimited
  - 1 - 65535 Mbit/s

- Detail Information
Detailed information about the copy path is displayed.
If an error occurs in the copy path, the error details or location is displayed using the following abbreviations. If there are multiple error locations, multiple abbreviations are displayed.
  - Connectable
  The copy path is in the normal state.
  - Path Unstable
  The copy path between the local storage system and remote storage system is in unstable status. For example, link-down repeatedly occurs in a certain period of time or communication fails.
  - Bitmap Resolution Mismatched
  The resolution settings are different between the local and remote storage systems.
  - Suspected Spot (D)
  The copy path settings may be invalid.
  - Suspected Spot (N)
  The error is suspected to have occurred in the remote storage system.
  - Suspected Spot (T)
  The error is suspected to have occurred in the FC-RA port or iSCSI-RA port in the remote storage system.
  - Suspected Spot (C)
  The error is suspected to have occurred in the cable.

- Suspected Spot (O)
  The error is suspected to have occurred in the adapter other than the local storage system and the remote storage system.
- Suspected Spot (S)
  The error is suspected to have occurred in the switch or the switch settings.
- Suspected Spot (I)
  The error is suspected to have occurred in the FC-RA port or iSCSI-RA port on the local storage system.
- Suspected Spot (M)
  The error is suspected to have occurred in the memory.

A.   Parameter List

This appendix provides information on the parameters of each function.

- System Management
- Component Management
- Volume Management
- Connectivity Management
- RAID Group Management
- Thin Provisioning Management
- Advanced Copy Management

System Management

This section provides information on the parameters of the following actions for system management.

- Change User Password
- Set SSH Public Key
- Register Non-disruptive Storage Migration License
- System Settings
- Utility Management
- Eco-mode Management
- User Management
- Network Management
- Event / Dump Management
- Audit Log Management
- Key Management
- Storage Migration Management
- External Drive Management
- Remote Support Management
- Firmware Management

Change User Password

For details about this function, refer to "Change User Password" (page 48).

● Password Setting

- Old Password

Description	Input the current password.
Input condition/ Display contents	4 - 64 alphanumeric characters and symbols ('!', '"', '#', '$', '%', '&', ''', '(', ')', '*', '+', ',', '-', '.', '/', '@', '[', '\', ']', '^', '_', '`', '{', '|', '}', '~', ':', ';', '<', '=', '>', '?')

• New Password

Description	Input a new password. Entered letters are case-sensitive. If "Password Policy" for the target user account is enabled, the following input conditions are added according to the configuration with the [Modify User Policy] function. • Minimum Password Length • Password Complexity • Password History

Input condition/
Display contents
	• For user accounts in which "Password Policy" is disabled
	4 - 64 alphanumeric characters and symbols ('!', '"', '#', '$', '%', '&', ''', '(', ')', '*', '+', ',', '-', '.', '/', '@', '[', '\', ']', '^', '_', '`', '{', '|', '}', '~', ':', ';', '<', '=', '>', '?')
	• For user accounts in which "Password Policy" is enabled
	  - When "Password Complexity" is enabled
	    "Minimum password length" to 64 (minimum password length: 4 - 64)
	    At least three of the following character types must be used
	      • Uppercase letters (A - Z)
	      • Lowercase letters (a - z)
	      • Numeric characters (0 - 9)
	      • Symbols ('!', '"', '#', '$', '%', '&', ''', '(', ')', '*', '+', ',', '-', '.', '/', '@', '[', '\', ']', '^', '_', '`', '{', '|', '}', '~', ':', ';', '<', '=', '>', '?')
	  - When "Password Complexity" is disabled
	    "Minimum password length" to 64 (minimum password length: 4 - 64)
	    Alphanumeric characters and symbols ('!', '"', '#', '$', '%', '&', ''', '(', ')', '*', '+', ',', '-', '.', '/', '@', '[', '\', ']', '^', '_', '`', '{', '|', '}', '~', ':', ';', '<', '=', '>', '?')

▷ **Caution**

• Passwords must be changed if "Expired" is displayed for the "Days To Expiration" field in "User Information".

• Passwords can be changed if "Changeable" is displayed for the "Days To Password Change" field in "User Information".

• An error screen appears if the password does not satisfy the input conditions described below. The following shows procedures corresponding to each error.
  - If "Minimum Password Length" is not satisfied
    The entered password is less than the required number of characters. Check the minimum length ("x") displayed in the "x - 64" format to the right of the password input field.
  - If "Password Complexity" is not satisfied
    The required character types have not been used in the entered password. At least three of the following character types must be used; "uppercase letters", "lowercase letters", "numeric characters", and "symbols".
  - If "Password History" is not satisfied
    The entered password does not meet the reuse condition. The same password that was previously set (between the latest and the specified number of generations) cannot be used. Set a different password.

◯ **N o t e**

Refer to the "Password Policy" settings in advance for details about "Password Complexity" and "Password History". Refer to "Modify User Policy" (page 107) for details.

• Confirm New Password

Description	Input the same character string as the value entered in the "New Password" field for confirmation.
Input condition/ Display contents	Refer to "New Password" (page 965) in "Password Setting" for details.

Set SSH Public Key

For details about this function, refer to "Set SSH Public Key" (page 50).

● SSH Public Key Setting

• SSH Public Key

Description	Register or change the SSH client public key used for login authentication from ETERNUS CLI in the ETERNUS DX/AF. Click the [Browse...] button and specify the public key to be registered or to be changed. When using the SSH client key authentication, register the SSH public key in the ETERNUS DX/AF and prepare the SSH secret key, corresponding to the public key in the client PC in advance. To delete the current user's (your) SSH client public key, select the checkbox. The checkbox is displayed only when the SSH client public key has been registered.

Input condition/
Display contents
	• Delete checkbox
	  - Selected
	  - Cleared
	
	• Click the [Browse...] button and specify the public key that is to be registered or to be changed.

Register Non-disruptive Storage Migration License

For details about this function, refer to "Register Non-disruptive Storage Migration License" (page 55).

● License Settings

• License Key

Description	Input the Non-disruptive Storage Migration License key.
Input condition/ Display contents	16 capital letters and numeric characters

System Settings

Modify Storage System Name

For details about this function, refer to "Modify Storage System Name" (page 60).

● Set the Name of the Storage System

• Name

Description	Specify the storage system name (required).
Input condition/ Display contents	• Up to 16 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

• Installation Location

Description	Specify the installation location of the ETERNUS DX/AF.
Input condition/ Display contents	• 0 to 50 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

• Administrator

Description	Specify the administrator information (the administrator name, contact information, etc) of the ETERNUS DX/AF.
Input condition/ Display contents	• 0 to 50 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

• Description

Description	Specify the description of the ETERNUS DX/AF.
Input condition/ Display contents	• 0 to 50 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

Modify Date and Time

For details about this function, refer to .
For the factory default settings for this function, refer to .

● Date/Time Settings

• Date

Description	Change the current date and time settings.
Input condition/ Display contents	YYYY-MM-DD hh:mm:ss (YYYY: Year (2001 - 2037), MM: Month (01 - 12), DD: Date (01 - 31), hh: Hour (00 - 23) , mm: Minute (00 - 59), ss: Second (00 - 59))

● Time Zone Settings

• Time Zone

Description	Select the Time Zone from the list box. If the appropriate Time Zone does not exist, select "Manually".
Input condition/ Display contents	• (GMT-12:00) Eniwetok, Kwajalein • (GMT-11:00) Samoa • (GMT-10:00) Honolulu • (GMT-09:00) Alaska • (GMT-08:00) Los Angeles, San Francisco, San Diego • (GMT-07:00) Phoenix, Calgary, Denver • (GMT-06:00) Chicago, Mexico City • (GMT-05:00) New York, Bogota • (GMT-04:00) Caracas • (GMT-03:30) Newfoundland • (GMT-03:00) Sao Paulo, Brasilia • (GMT-02:00) Mid-Atlantic • (GMT-01:00) Azores Island, Cape Verde • (GMT+00:00) Dublin, London, Manchester, Lisbon

Input condition/ Display contents (Cont'd)	• (GMT+01:00) Paris, Madrid, Stockholm • (GMT+01:00) Rome, Vienna, Berlin • (GMT+01:00) Milan, Amsterdam • (GMT+02:00) Athens, Helsinki, Cairo • (GMT+02:00) Beirut, Cape Town • (GMT+03:00) Nairobi, Moscow • (GMT+04:00) Abu Dhabi • (GMT+05:00) Islamabad, Karachi • (GMT+05:30) New Delhi • (GMT+06:00) Dhaka • (GMT+07:00) Bangkok, Jakarta • (GMT+08:00) Hong Kong, Manila, Singapore • (GMT+08:00) Beijing, Taipei, Kuala Lumpur, Perth • (GMT+09:00) Tokyo, Osaka, Kyoto, Fukuoka, Sapporo • (GMT+09:00) Seoul • (GMT+09:30) Adelaide • (GMT+10:00) Guam, Sydney, Melbourne • (GMT+11:00) Solomon Islands, New Caledonia • (GMT+12:00) Wellington, Auckland, Fiji • Manually

• Time Zone (time difference setting)

Description	When selecting "Manually" in the time zone field, specify the time difference from GMT.

Input condition/
Display contents
	• Time difference
	  Select "+" or "-".
	• Hour
	  00 - 12
	• Minute
	  00, 15, 30, 45

● **Daylight Saving Time Settings**

• Daylight Saving Time

Description	Select whether to enable or disable the Daylight Saving Time.
Input condition/ Display contents	• Enable • Disable

• Range (By day of the week)

Description	If Daylight Saving Time is enabled, and "by day of the week" is selected for the range, specify the start day, end day, and start time and end time.
Input condition/ Display contents	• Start day and end day (Month: 01 - 12 Week: 1st - 4th week and the last week of month Day: Monday - Sunday) • Start time and end time Hour (00 - 23)

• Range(by Date)

Description	If Daylight Saving Time is enabled, and "by Date" is selected for the range, specify the start date, end date, and start time and end time.
Input condition/ Display contents	• Start date and end date (Month: 01 - 12 Day: 01 - 31 and the Last Date) • Start time and end time Hour (00 - 23)

● NTP Settings

• Synchronize with NTP Server

Description	When performing the time synchronization with the NTP server, select "Enable". If the time synchronization is not used, select "Disable".
Input condition/ Display contents	• Enable • Disable

• Domain Name / IP Address (Primary NTP Server, Secondary NTP Server)

Description	Input the domain name or the IP address of the primary or secondary NTP server. There are two methods to specify an IP address; "IPv4" and "IPv6". The following IPv6 addresses can be used; "link local address", "global address", "unique local address", or "6to4 address". Refer to "Available IPv6 Address" (page 122) for details. This item is only available when "Yes" is selected for "Synchronize with NTP Server".
Input condition/ Display contents	• For domain name Up to 63 alphanumeric characters and symbols • For IPv4 address xxx.xxx.xxx.xxx xxx: 1 - 255 for the top field (decimal) xxx: 0 - 255 for other fields (decimal) • For IPv6 address xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation" (page 371) for details.

• LAN Port used for NTP (Primary NTP Server, Secondary NTP Server)

Description	Select which port is used to connect to the primary or secondary NTP server. This item is only available when "Yes" is selected for "Synchronize with NTP Server".
Input condition/ Display contents	• MNT • RMT

Change Box ID

For details about this function, refer to "Change Box ID" (page 64).
For the factory default settings for this function, refer to "B. Change Box ID" (page 1252).

● Set Box ID

• Box ID

Description	The Box ID setting of the ETERNUS DX/AF is displayed.
	If the ETERNUS DX/AF is changed, correct the Box ID. The initial Box ID displayed is a 40-digit code (device ID) that is created by combining device information (series name, model, serial number, etc.). If the Box ID entered is less than 40 characters, a "#" (hash key) is appended to the Box ID for each character short.
Input condition/ Display contents	• Capital letters • Numeric characters • Spaces • "#" (hash keys) • Up to 40 characters

▷ Caution

When spaces are input for the Box ID, the spaces are changed to "#" (hash keys).

Setup Subsystem Parameters

For details about this function, refer to "Setup Subsystem Parameters" (page 65).
For the factory default settings for this function, refer to "B. Setup Subsystem Parameters" (page 1253).

● **Setup Subsystem Parameters**

- Thin Provisioning Allocation Mode

Description	Select allocation mode of Thin Provisioning.
	
	This mode is applied only for Thin Provisioning pools. Note that this setting is not applied for pools that are created by the Flexible Tier (Automated Storage Tiering) function.
	[Example]
	Three TPVs (TPV#0, TPV#1, and TPV#2) are registered in a single TPP.
	A single TPP is configured with four RAID groups (RAID group #0, RAID group #1, RAID group #2, and RAID group #3).
	
	• TPP balancing
	Physical area is allocated in the following order regardless of the TPV in which the data is written.
	   RAID group#0 → RAID group#1 → RAID group#2 → RAID group#3 →
	   RAID group#0 → ...
	
	• TPV balancing
	When data is written in TPVs that are registered in the TPP, the physical area is allocated in the following order.
	   TPV#0: RAID group#0 → RAID group#1 → RAID group#2 → RAID group#3 → RAID group#0 → ...
	   TPV#1: RAID group#1 → RAID group#2 → RAID group#3 → RAID group#0 → RAID group#1 → ...
	   TPV#2: RAID group#2 → RAID group#3 → RAID group#0 → RAID group#1 → RAID group#2 → ...

Input condition/ Display contents	• TPP balancing Physical area is allocated almost evenly from the RAID groups that configure a TPP. Allocation is performed in order of writing to the TPV. This is a conventional method. • TPV balancing Physical area is allocated almost evenly from the RAID groups that configure a TPP. Allocation is performed by distributing RAID groups evenly for each TPV.

▷ **Caution**

The "Thin Provisioning Allocation Mode" is available only when the Thin Provisioning function is enabled.

- Flexible Write Through

Description	Select whether to enable or disable the Flexible Write Through. If "Enable" is selected, the cache action is changed only for specific conditions.
Input condition/ Display contents	• Enable For the Flexible Write Through target I/O, by performing a special Write Through action, data is written to the drive in high speed. Therefore, duplication of the cache memory and parity is not performed. By enabling this function in the ETERNUS AF250 S2/AF650 S2, the ETERNUS AF250/AF650, and the ETERNUS DX200F, CPU load reduction can be expected. For storage systems other than the above, sequential write performance may improve if I/O size tuning is available from the host (such as with High Performance Computing). • Disable Changes the cache action according to the cache mode of the ETERNUS DX/AF.

> ▶ **Caution**

- Do not change the default setting for normal use.
- If "Enable" is selected for storage systems other than the ETERNUS AF250 S2/AF650 S2, the ETERNUS AF250/AF650, and the ETERNUS DX200F, performance for the host I/O may improve only if all of the following conditions are satisfied. The target is the Write I/O for "Standard (including concatenation volumes by means of LUN Concatenation)" and "WSV".
    - Sequential write
    - The I/O size from the host is an integral multiple of the basic size (stripe size) for each RAID level.
      Refer to "G. Basic Size and MWC Input Condition for RAID Groups" (page 1340) for details.
    - If any of the following RAID levels is used:
        - RAID5 (2D+1P) - RAID5 (8D+1P)
        - RAID6 (3D+2P) - RAID6 (8D+2P)
        - RAID6-FR
            - (3D+2P)x2+1HS
            - (4D+2P)x2+1HS
            - (6D+2P)x2+1HS
            - (5D+2P)x4+1HS
            - (8D+2P)x3+1HS
            - (4D+2P)x5+1HS
            - (3D+2P)x6+1HS
- If "Enable" is selected for the ETERNUS AF250 S2/AF650 S2, the ETERNUS AF250/AF650, and the ETERNUS DX200F, performance for the host I/O may improve if any of the following conditions are satisfied.
    - When the RAID level is "Striping (RAID0)", "High Performance (RAID1+0)", or "Mirroring (RAID1)"
      The Write I/O for "Standard (including concatenation volumes by means of LUN Concatenation)" and "WSV"
    - When the RAID level is "High Capacity (RAID5)", "Reliability (RAID5+0)", "High Reliability (RAID6)", or "High Reliability (RAID6-FR)"
      The Write I/O for "Standard (including concatenation volumes by means of LUN Concatenation)" and "WSV" where the I/O size from the host is an integral multiple of the basic size (stripe size) for each RAID group
- If the cache mode of the ETERNUS DX/AF is in "Write Through Mode", regardless of whether "Flexible Write Through" is set, all I/Os will be operated with the Write Through mode.

> ● **Ｎ ｏ ｔ ｅ**

The cache modes for the ETERNUS DX/AF are "Write Back Mode" and "Write Through Mode". Refer to "System (Basic Information)" (page 635) for details.

- Turbo Mode

Description	Select whether to enable or disable the Turbo Mode. The Turbo Mode is a function to improve performance by using processors in the CMs with an operating frequency that is higher than the specified rated value. This function is also referred to as "Intel® Turbo Boost Technology". This item is displayed for the ETERNUS DX200 S4, the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, the ETERNUS AF250 S2/AF650 S2, and the ETERNUS AF250/AF650.

Input condition/
Display contents
	• Enable
	  Enable the Turbo Mode.
	• Disable
	  Disable the Turbo Mode.

> ▶ **Caution**

Do not change the default setting for normal use.

• Writeback Limit Count

Description	Specify the maximum limit for the Writeback Limit Count (WLC). The WLC is the number of commands that are issued when writing data back to the drive. When specifying a larger WLC, data writeback speed is increased. However, resources are used for data writeback so I/O performance may be affected.

Input condition/
Display contents
	• For the ETERNUS DX60 S4 and the ETERNUS DX60 S3
	  - 128
	  - 256
	  - 512
	  - 1024
	
	• For the ETERNUS DX100 S4/DX200 S4, the ETERNUS DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F
	  - 128
	  - 256
	  - 512
	  - 1024
	  - 2048
	
	• For the ETERNUS DX500 S4, the ETERNUS DX500 S3, and the ETERNUS DX8100 S3
	  - 128
	  - 256
	  - 512
	  - 1024
	  - 2048
	  - 3072
	
	• For the ETERNUS DX600 S4, the ETERNUS DX600 S3, the ETERNUS DX8700 S3/DX8900 S3, the ETERNUS AF650 S2, and the ETERNUS AF650
	  - 128
	  - 256
	  - 512
	  - 1024
	  - 2048
	  - 3072
	  - 6144

> ▷ **Caution**

Do not change the default setting ("512") for normal use.

• Expand Volume Mode

Description	Select whether to enable or disable "Expand Volume Mode". If "Expand Volume Mode" is enabled, the following parameters are expanded to the maximum value. • Number of volumes • Number of Advanced Copy sessions • Number of Virtual Volume sessions The following table shows the number of volumes and sessions according to the "Expand Volume Mode" setting.

	ETERNUS DX100 S4/DX100 S3		ETERNUS DX200 S4/DX200 S3	
	Disable	Enable	Disable	Enable
Number of volumes	2048	4096	4096	8192
Number of Advanced Copy sessions	1024	2048	2048	4096
Number of Virtual Volume sessions	4096	4096	4096	8192

	This item is displayed for the ETERNUS DX100 S4/DX200 S4 and the ETERNUS DX100 S3/DX200 S3.
Input condition/ Display contents	• Enable • Disable

▷ **Caution**

• To change the "Expand Volume Mode" setting from "Enable" to "Disable", perform the following operations in advance.
  - Stop the local/remote copy sessions and the Virtual Volume sessions.
  - Delete all the local/remote copy sessions and the Virtual Volume sessions.
• If the existing volume number is not within the following range, the "Expand Volume Mode" setting cannot be changed from "Enable" to "Disable".
  - For the ETERNUS DX100 S4/DX100 S3
    0 - 2047
  - For the ETERNUS DX200 S4/DX200 S3
    0 - 4095

● **Setup Host**

- Load Balance

Description	Select whether to enable or disable the load balance for the ETERNUS DX/AF. The Load Balance function delays execution for newly received commands when the command execution time in the ETERNUS DX/AF exceeds the specific value. Select "Enable" to respond with the sense that is specified in the "Load Balance Response" field of the host response setting.
Input condition/ Display contents	• Enable • Disable

> ⚠ **Caution**

- When connecting the ETERNUS DX/AF and HP-UX hosts, disable the Load Balance setting. If the "Load Balance" checkbox is selected (enabled), incorrect logs may be recorded in the host.
- Load balancing by Multipath Driver is operated regardless of whether the "Load Balance" of this function is enabled/disabled.

- Reject INQUIRY from Unauthorized Host

Description	Select whether to reject the "Inquiry" command from an unauthorized host. Select the "Enable" checkbox to reject. When the "Inquiry" command is rejected, ETERNUS DX/AF returns an Affinity Error (5/25/81) for the "Inquiry" command from the unauthorized host. When the command is not rejected, the ETERNUS DX/AF responds normally.
Input condition/ Display contents	• Enable • Disable

> ⚠ **Caution**

When using the Veritas Volume Manager Dynamic Multipathing (VxVM DMP), select "Enable". When VxVM DMP is not used, the setting of this parameter does not affect the state of the ETERNUS DX/AF.

- Optimize for Advanced Format SSD

Description	Select whether to perform a 4K byte alignment access from the host (host access that is aligned to 4K byte) to the volumes in RAID groups or TPPs configured with SSDs or SSD SEDs. Select "Enable" to perform a 4K byte alignment access.
Input condition/ Display contents	• Enable • Disable

> ⚠ **Caution**

Even when the ETERNUS DX/AF firmware is upgraded to V10L30 or later, changing the default setting ("Disable") is not required as long as there is no problem for SSD and SSD SED read/write performance.

• Expand Host Mode

Description	Specify whether to enable or disable "Expand Host Mode". If "Expand Host Mode" is enabled, the following parameters for each storage system are expanded to the maximum value. • Number of hosts • Number of LUN groups The following table shows the number of hosts and LUN groups according to the "Expand Host Mode" setting.

	Disable	Enable
Number of hosts	1024	4096
Number of LUN groups	1024	2048

Description (cont.)	This item is displayed for the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS AF650 S2, and the ETERNUS AF650.
Input condition/ Display contents	• Enable • Disable

▶ Caution

For the following conditions, the "Expand Host Mode" setting cannot be changed from "Enable" to "Disable".

• There are 1025 or more hosts in the ETERNUS DX/AF.

• There is a host with a host number that is 1024 or larger.

• There is a LUN group with a LUN group number that is 1024 or larger.

● **Setup Disk Drive**

• Checkcode Enforcement

Description	Select whether to enable or disable the Checkcode Enforcement mode.
Input condition/ Display contents	• Enable Error detection function in the ETERNUS DX/AF is enhanced. When data is duplicated, the check codes of all the data blocks are checked. • Disable Error detection in the ETERNUS DX/AF is performed with the normal procedure.

▶ Caution

• Do not change the default setting ("Enable") for normal use.

• If "Disable" is selected, the detection performance when errors occur is reduced.

- Copybackless

Description	Select whether to enable or disable the Copybackless function. The Copybackless function registers the rebuilding destination hot spare in the RAID group after rebuilding is complete instead of performing a copyback operation. The failed drive in the RAID group is changed to a hot spare after the rebuilding is complete. If the failed drive is replaced with a normal drive, the replacement drive can be used as a hot spare. After the redundant copy is complete, this function is performed in the same way as the rebuilding function. Both types of hot spares (Global Hot Spares and Dedicated Hot Spares) can be the target hot spares for this function. The Copybackless function is performed when the following hot spares are selected. • Hot spares that are the same type as the target drive (Online/Nearline/SSD/Online SED/Nearline SED/SSD SED) • Hot spares that are the same type as the target SSD (SSD-M/SSD-L/SSD/SSD-M SED/SSD-L SED) • Hot spares with the same capacity as the target drive • Hot spares with the same speed as the target drive • Hot spares with the same sector format as the target drive (AF-compliant/non-AF-compliant)
Input condition/ Display contents	• Enable • Disable

> **Caution**

If the Copybackless function is enabled, a normal drive that replaces the failed drive cannot return to the original RAID group configuration. This should be taken into consideration when determining whether to enable or disable the Copybackless function.

⬤ **N o t e**

The Copybackless function is not performed when the first drive fails in a "RAID6-FR" type RAID group. A high-speed rebuild is performed in a hot spare area within the RAID group, and when the failed drive is exchanged for a normal drive, copyback is performed. The Copybackless setting is applied when the second drive fails.

● Web GUI Settings

- Function to Add Host

Description	Select which function for adding hosts is to be used. • "Use "Add Host Group"" checkbox Create a host group and register the hosts as members. When the "Use "Add Host Group"" checkbox is selected, the actions for creating host groups are displayed. • "Use "Add Host"" checkbox Register hosts without creating host groups. When the "Use "Add Host"" checkbox is selected, the actions for adding hosts are displayed.

Input condition/
Display contents
	• "Use "Add Host Group"" checkbox
	  - Selected
	  - Cleared
	• "Use "Add Host"" checkbox
	  - Selected
	  - Cleared

▷ **Caution**

Selecting either "Use "Add Host Group"" or "Use "Add Host"" is recommended. If both of these checkboxes are not selected, the [Set] button cannot be clicked.

◉ **N o t e**

Select "Use "Add Host"" only when using the previous procedure for registering hosts as the older storage systems (such as ETERNUS DX410/DX440 and ETERNUS DX8100/DX8400/DX8700). This checkbox is not selected by default. Both checkboxes can be selected at the same time.

● **Deduplication/Compression Settings**

• Data Compare when hash collision occurs

Description	Select whether to compare the entire data if the same hash value is detected when using the Deduplication/Compression function. "Hash collision" indicates that the same hash value is generated from different data. By selecting "Enable" for this setting, if the hash value matches, the entire data is compared with the existing data to determine whether it is duplicated. This item is only displayed when Deduplication/Compression is enabled in the ETERNUS DX/AF.
Input condition/ Display contents	• Enable • Disable

▷ **Caution**

• Do not change the default setting ("Disable") for normal use.

• Delete all the Deduplication/Compression Volumes in the ETERNUS DX/AF in advance. If Deduplication/Compression Volumes exist in the ETERNUS DX/AF, the current setting cannot be changed.

• If "Enable" is selected, the performance is reduced.

Setup Encryption Mode

For details about this function, refer to "Setup Encryption Mode" (page 68).

● **Encryption Mode Setting**

• Encryption Mode

Description	Select the encryption mode to encrypt volumes by using the CM. This item is displayed when no encrypted volume and no encrypted pool (or TPP and FTRP) exist in the ETERNUS DX/AF. To enable encryption by the CM, select "Fujitsu Original Encryption", "AES", "AES-128", or "AES-256".
Input condition/ Display contents	• Disable The encryption function by the CM is not used. When the encryption mode is changed to "Disable" from one of the following options, reboot the ETERNUS DX/AF. - Fujitsu Original Encryption - AES - AES-128 - AES-256 • Fujitsu Original Encryption "Fujitsu Original Encryption" is an encryption method which uses a Fujitsu proprietary algorithm. Compared to the AES-128bit method, its practical security level is almost equal while it allows faster processing than the AES-128bit method. • AES "AES" is an encryption method that uses the AES 128bit method. "Advanced Encryption Standard (AES)" (standard encryption used for information processing by the US federal government) is a standardized encryption method. • AES-128 "AES-128" is an encryption method that uses the AES 128bit method. • AES-256 "AES-256" is an encryption method that uses the AES 256bit method. Compared to the AES-128bit method, the encryption strength is higher (meaning that decrypting the encrypted data is difficult), but the Read/Write access performance for the volumes is reduced.

▷ **Caution**

The available options for this function vary depending on the controller firmware version.

• For controller firmware versions "V10L50-3000", "V10L52-3000", and V10L53 and later

 - Disable

 - Fujitsu Original Encryption

 - AES-128

 - AES-256

• For controller firmware versions other than the above

 - Disable

 - Fujitsu Original Encryption

 - AES (*1)

   *1:   "AES" is an encryption method that uses the AES 128bit method.

ETERNUS Web GUI User's Guide

Setup SMI-S Environment

For details about this function, refer to "Setup SMI-S Environment" (page 70).
For the factory default settings for this function, refer to "B. Setup SMI-S Environment" (page 1254).

● SMI-S Settings

- SMI-S

Description	Select whether to enable or disable the SMI-S settings.
Input condition/ Display contents	• Enable • Disable

- SSL Certificate

Description	Select the SSL certificate that is used for access from SMI-S via HTTPS. This item is only available if "Enable" is selected for "SMI-S". Note that "Web GUI SSL Certificate" cannot be selected if both SSL certificates ("self-signed SSL certificate" and "SSL server certificate") for ETERNUS Web GUI are not registered.
Input condition/ Display contents	• SMI-S Self-signed SSL Certificate An SSL certificate (self-signed SSL certificate) that is registered from SMI-S. • Web GUI SSL Certificate An SSL certificate ("self-signed SSL certificate" or "SSL server certificate") that is registered from ETERNUS Web GUI.

> ▶ **Caution**

To change the "SSL Certificate" setting, disable "SMI-S" and then enable it again.

- Performance Information

Description	Select whether to enable or disable the SMI-S performance information response. This item can be selected if "Enable" is specified for "SMI-S".
Input condition/ Display contents	• Enable • Disable

Setup Power Management

For details about this function, refer to "Setup Power Management" (page 72).
For the factory default settings for this function, refer to "B. Setup Power Management" (page 1254).

● Power Control by External Device

- RCIL

Description	Select whether to "Enable" or "Disable" the RCIL connection.
Input condition/ Display contents	• Enable • Disable

- Auto Power

Description	Select whether to "Enable" or "Disable" the power interlock mode (the function to automatically power on when the power is supplied). When PMAN is connected, enable the "Auto Power". When the power synchronized unit is connected, disable the "Auto Power".
Input condition/ Display contents	• Enable • Disable

- Power Resume

Description	Select whether to "Enable" or "Disable" the auto power recovery mode (the function to automatically power on at power recovery after a power failure).
Input condition/ Display contents	• Enable • Disable

● **Connection Module Settings**

- PWC

Description	Select the checkbox for each module to enable power management by an external input device. If any checkbox is selected, set "Delay until Shutdown", "Set management unit interface", "Power Failure Signal", "Low Battery Signal" and "UPS Shutdown Signal". This item is displayed for the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3.

Input condition/ Display contents	• For the ETERNUS DX8100 S3, checkboxes for "CM#0" and "CM#1"
	  - Selected
	  - Cleared
	• For the ETERNUS DX8700 S3/DX8900 S3, checkboxes for "SVC#0" and "SVC#1"
	  - Selected
	  - Cleared

● **PWC Connection Settings**

- Connection CM

Description	Select the checkbox for the controller module (CM) to enable power management by an external input device (multiple selections can be made). When this item is selected, set "Delay until Shutdown", "Set management unit interface", "Power Failure Signal", "Low Battery Signal" and "UPS Shutdown Signal". This item is displayed for the ETERNUS DX/AF other than the ETERNUS DX8100 S3/DX8700 S3/ DX8900 S3.
Input condition/ Display contents	Checkbox for CM • Selected • Cleared

• Delay until Shutdown

Description	Specify the delay time (minutes) before starting shutdown after receiving a shut down notification signal from the external input device. When PMAN is connected, specify the delay time before starting shutdown after receiving a low battery signal. Specify a delay time longer than the time required for the server shutdown process so that the ETERNUS DX/AF is turned off after the server shutdown is complete.
Input condition/ Display contents	0 - 15

• Set management unit interface

Description	Select the external input device connected via RS232C interface. For the ETERNUS DX/AF other than the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, the "Manual" setting is for particular use, thus should not be used during normal operation.

Input condition/
Display contents
	• For the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3
	  - Power Synchronized Unit
	  - Manual
	• For the other models
	  - Power Synchronized Unit
	  - PMAN
	  - Manual

• Power Failure Signal

Description	Select the signal logic for power failure signal when the power failure occurs. When "Power Synchronized Unit" or "PMAN" is selected for the "Set management unit interface" field, this item is automatically set.

Input condition/
Display contents
	• Positive
	  Positive logic
	• Negative
	  Negative logic

• Low Battery Signal

Description	Select the signal logic for a low battery signal when a low battery charge occurs. When "Power Synchronized Unit" or "PMAN" is selected for the "Set management unit interface" field, this item is automatically set.

Input condition/
Display contents
	• Positive
	  Positive logic
	• Negative
	  Negative logic

• UPS Shutdown Signal

Description	When enabling the UPS shutdown signal, select the "Enable" checkbox. Also, select the signal logic for UPS shutdown signal. To disable this item, clear the "Enable" checkbox.

Input condition/
Display contents
	"Enable" checkbox
	• Selected
	  Enables the UPS shutdown signal.
	  - Positive
	    Positive logic
	  - Negative
	    Negative logic
	• Cleared
	  Disables the UPS shutdown signal.

Setup Extreme Cache

For details about this function, refer to <u>"Setup Extreme Cache" (page 74)</u>.
For the factory default settings for this function, refer to <u>"B. Setup Extreme Cache" (page 1254)</u>.

● Extreme Cache Settings

• Cache Used

Description	Select the cache that is to be used. "Extreme Cache Pool (Expanded)" can be selected only for the ETERNUS DX100 S4/DX200 S4.
Input condition/ Display contents	• Extreme Cache • Extreme Cache Pool • Extreme Cache Pool (Expanded) • Not Used

Cache selection conditions

▷ **Caution**

EXC and EXCP cannot be used at the same time.

Cache	Description
Extreme Cache	PFMs that are installed in the CM are used as secondary cache memory. EXC can only be used for Read I/O. PFMs must be installed. Refer to <u>"Availability of the EXC setting according to the number of installed PFMs" (page 984)</u> for details. For the ETERNUS DX500 S4/DX600 S4 and the ETERNUS DX500 S3/DX600 S3, set the memory size of EXC for each storage system. For the ETERNUS DX8700 S3/DX8900 S3, click the [Set] button. The cache memory size of the target CM is automatically set according to the PFM capacity that is installed in each CM. Enabling or disabling EXC for each volume can be performed with ETERNUS CLI or ETERNUS SF Storage Cruiser. Available models are as follows: • ETERNUS DX500 S4/DX600 S4 • ETERNUS DX500 S3/DX600 S3 • ETERNUS DX8700 S3/DX8900 S3 The maximum available cache memory size (per storage system) is "2800GB x No. of CMs".

Cache	Description
Extreme Cache Pool	Use RAID groups that are configured with SSDs installed in the CE or DE as the secondary cache memory. EXCP must be set for each CM. A different memory size can be set for each CM. Each CM can be set with 800 GB only if an ETERNUS DX100 S4/DX200 S4 is being used and "Extreme Cache Pool (Expanded)" is selected for "Cache Used". Refer to "Available EXCP memory size (per CM)" (page 984) for details. EXCP can only be used for Read I/O to a volume that is controlled by the Controlling CM of the RAID group. Enabling or disabling EXCP for each volume can be performed with ETERNUS Web GUI. Refer to "Modify Cache Parameters" (page 315) for details. Available models are as follows: • ETERNUS DX100 S4/DX200 S4 • ETERNUS DX500 S4/DX600 S4 • ETERNUS DX100 S3/DX200 S3 • ETERNUS DX500 S3/DX600 S3 • ETERNUS DX8700 S3/DX8900 S3 ▶ **Caution** The cache memory size depends on the capacity of the SSD registered as EXCP. However, a capacity that exceeds the maximum available cache memory size cannot be set.

Availability of the EXC setting according to the number of installed PFMs

PFM installation		Enabling or disabling EXC		Changing the EXC memory size	
		ETERNUS DX500 S4/DX600 S4, ETERNUS DX500 S3/DX600 S3	ETERNUS DX8700 S3/DX8900 S3	ETERNUS DX500 S4/DX600 S4, ETERNUS DX500 S3/DX600 S3	ETERNUS DX8700 S3/DX8900 S3
PFMs are installed in all of the CMs	The same number of PFMs is installed	Available	Available	Available	Available
	The number of installed PFMs does not match among the CMs	Available	Available	N/A	Available
PFMs are not installed in some CMs		N/A	Available	N/A	Available
No PFMs are installed in any CMs		N/A	N/A	N/A	N/A

Available EXCP memory size (per CM)

Model	RAID group configuration	SSD capacity		
		400GB	800GB	1600GB
ETERNUS DX100 S4/DX200 S4	RAID0 (1D)	400GB	–	–
	RAID0 (2D)	800GB	–	–
ETERNUS DX500 S4/DX600 S4	RAID0 (1D)	400GB	–	–
	RAID0 (2D)	800GB	–	–
	RAID0 (3D)	1200GB	–	–
	RAID0 (4D)	1600GB	–	–
ETERNUS DX100 S3/DX200 S3	RAID0 (1D)	400GB	400GB	400GB

Model	RAID group configuration	SSD capacity		
		400GB	800GB	1600GB
ETERNUS DX500 S3/DX600 S3 ETERNUS DX8700 S3/DX8900 S3	RAID0 (1D)	400GB	800GB	1600GB
	RAID0 (2D)	800GB	1600GB	1600GB
	RAID0 (3D)	1200GB	1600GB	1600GB
	RAID0 (4D)	1600GB	1600GB	1600GB

● **Extreme Cache Memory Size Settings (when "Extreme Cache" is selected)**

🔵 **N o t e**

For the ETERNUS DX500 S4/DX600 S4 and the ETERNUS DX500 S3/DX600 S3, set the memory size of EXC.

• New Memory Size

Description	Input the EXC capacity that is to be set for the ETERNUS DX.
Input condition/ Display contents	• 0GB - Maximum available memory size (unit: 100GB) • Numeric characters

▶ **Caution**

Assume that "1TB = 1000GB" and input the EXC memory size. Do not assume that "1TB = 1024GB".

🔵 **N o t e**

To change the EXC memory size, enter the EXC memory size per ETERNUS DX in the "New memory Size" field.
For the "Current Memory Size" field, memory size that is currently set in the ETERNUS DX is displayed. For the "Maximum Available Memory Size" field, the maximum EXC memory size that can be set for the ETERNUS DX is displayed. If the PFM capacity in each CM does not match, the total capacity of the smallest capacity (the smallest PFM capacity x the number of CMs) is displayed as the maximum available memory size.

● **Extreme Cache Memory Size Settings (when "Extreme Cache Pool" or "Extreme Cache Pool (Expanded)" is selected)**

• Encryption by CM

Description	Select the encryption status of the EXCP area. "Off" is displayed when the memory size is "0GB". This item is available only when the encryption mode is enabled.
Input condition/ Display contents	• On Create an encrypted EXCP area. • Off Create an unencrypted EXCP area.

▶ **Caution**

• If encrypted volumes are included in the volumes that are controllable for the relevant CM, encrypt the EXCP area. If the EXCP area is not encrypted, this area cannot be used as the second cache memory for the I/O to the encrypted volume.
• If no volumes are encrypted in the volumes that are controllable for the relevant CM, encrypting the EXCP area is not required.

● **Select Drives ([Tabular] Tab)**

• Checkbox to select drives

Description	Select checkboxes for the SSDs in RAID groups that configure EXCPs.
Input condition/ Display contents	Checkbox • Selected • Cleared

● **Select Drives ([Graphic] Tab)**

• DE selection list box

Description	Select the DE group. The following DE groups are displayed as options in the list box. • For the ETERNUS DX8700 S3/DX8900 S3, the DE groups that are connected to the CE with the CM where the EXCP memory size to be set • For the other models, the DE group with a CE or a DE that is installed in the ETERNUS DX Refer to "Options and DE groups for each model" (page 1191) for details.
Input condition/ Display contents	DE#Xx (X: 0 - B)

• Checkbox to select drives

Description	Select the checkbox for the drive to be used. Checkboxes are displayed for unused drives. Refer to "Drive location" (page 1192) for details about drive location for each DE. Placing the mouse pointer on the ⓘ icon displays the detailed information of the drive.
Input condition/ Display contents	Checkbox • Selected • Cleared

● **Tuning Parameters Settings**

• Initial Caching Threshold

Description	This parameter specifies the threshold that affects how frequently data is stored in EXC or EXCP.
	
	The higher the value is, the less frequently data is stored in EXC or EXCP. The smaller the value is, the more frequently data is stored in EXC or EXCP.
	If the set value is exceeded, it is assumed that the relevant data is read frequently and the data is stored in EXC or EXCP.
	The threshold value that can be specified with this parameter varies depending on the controller firmware version.
	• V10L20 or later
	  This parameter specifies the threshold value that is used until the EXC or the EXCP memory is full after EXC or EXCP is enabled.
	• V10L1x or earlier
	  This parameter specifies the threshold value that is used until the EXC or the EXCP memory is full every time from when the ETERNUS DX is turned on.

Input condition/ Display contents	1 - 16

> ▶ **Caution**
>
> This parameter is used for performance tuning. It is not necessary to change the default setting (1) for normal use.

• Caching Threshold

Description	Similar to "Initial Caching Threshold", this parameter specifies the threshold that affects how frequently data is stored in EXC or EXCP. If the set value is exceeded, it is assumed that the relevant data is read frequently and the data is stored in EXC or EXCP. This threshold value is used after the EXC or the EXCP memory is full.
Input condition/ Display contents	1 - 16

> ▶ **Caution**
>
> • This parameter is used for performance tuning. It is not necessary to change the default setting (5) for normal use.
> • This item is available only when the "Not replace Cache Data" checkbox is cleared (cache data is relocated).

• "Not replace Cache Data" checkbox

Description	Select or clear the "Not replace Cache Data" checkbox. If the checkbox is selected, new data is not stored (relocated) after the EXC or the EXCP memory is full. If the checkbox is cleared, the ETERNUS DX chronologically deletes the stored data from EXC or EXCP beginning with the oldest and stores (relocates) new data.
Input condition/ Display contents	"Not replace Cache Data" checkbox • Selected • Cleared

• Caching Priority

Description	This parameter specifies the concurrency for storing data in EXC or EXCP. The greater the value is, the higher the concurrency is set for storing data in EXC or EXCP. The smaller the value is, the lower the concurrency is set for storing data in EXC or EXCP. This item is displayed only when using the controller firmware version V10L4x or later.
Input condition/ Display contents	10 (Fastest) - 1

> ▶ **Caution**
>
> This parameter is used for performance tuning. It is not necessary to change the default setting ("10 (Fastest)") for normal use.

• Monitoring I/O

Description	Select the target I/O type that is to be monitored for data storing to the cache. This parameter affects how frequently data is stored in the EXC or EXCP.
Input condition/ Display contents	• Read • Read / Write

Setup Exclusive Read Cache

For details about this function, refer to "Setup Exclusive Read Cache" (page 82).
For the factory default settings for this function, refer to "B. Setup Exclusive Read Cache" (page 1255).

● Cache Size Settings

- Exclusive Read Cache

Description	Select the exclusive read cache ratio for the CM cache memory. The actual capacity of the exclusive read cache varies depending on the memory size installed in the ETERNUS DX/AF. Exclusive read cache capacity = Cache area for user data (*1) x Exclusive read cache (%) *1: Cache area for user data = (Memory size per CM - Active table area (such as copy table size)) / 2 (*2) *2: To mirror the user data, divide the calculated value in half.
Input condition/ Display contents	• 0 % • 5 % • 10 % • 15 % • 20 % • 25 % • 30 %

Setup Disk Drive Patrol

For details about this function, refer to "Setup Disk Drive Patrol" (page 83).
For the factory default settings for this function, refer to "B. Setup Disk Drive Patrol" (page 1255).

● Disk Drive Patrol Settings

- Disk Drive Patrol

Description	Select whether to "Enable" or "Disable" the disk drive patrol function.
Input condition/ Display contents	• Enable • Disable

Setup Debug Mode

For details about this function, refer to "Setup Debug Mode" (page 84).
For the factory default settings for this function, refer to "B. Setup Debug Mode" (page 1255).

● Master Trace Level Settings

- Master Trace Level

Description	Set the master trace level.

Input condition/ Display contents	• Off
	  Does not save a trace. Equivalent to level "0xFF".
	• Standard
	  The firmware trace information is saved. Equivalent to level "0x06".
	• Detail
	  All the firmware trace are saved. Equivalent to level "0x00".
	• Specification
	  The firmware traces according to the user specified level are saved.

- Level

Description	When selecting "Specification" for the master trace level, input the trace level.
Input condition/ Display contents	• 2-digit hexadecimal (0x00 - 0xFF)

● Trace Level by Group

- Level

Description	Input the trace level for each group ID.
Input condition/ Display contents	• 2-digit hexadecimal (0x00 - 0xFF)

● Panic

- Collection Mode

Description	Select the collection mode for panic dump.

Input condition/ Display contents	• Nose and Tail Mode
	  The latest and oldest panic dumps are saved.
	• Fortnight Mode
	  The first and second panic dumps are saved.
	• Off
	  Does not save panic dumps.

Utility Management

Backup Configuration

For details about this function, refer to "Backup Configuration" (page 87).
For the factory default settings for this function, refer to "B. Backup Configuration" (page 1255).

● Select Configuration Definition

- Configuration Definition Data

Description	Select configuration definition data that is to be backed up. If "Configuration (1 time before)", or "Configuration (2 times before)" do not exist, the corresponding configuration definition data cannot be selected.
Input condition/ Display contents	• Configuration (Latest) • Configuration (1 time before) • Configuration (2 times before)

- Note (text box)

Description	In the "Note" field, remarks which have been added to the selected configuration definition data to be backed up are displayed. If no remarks exist, this field is blank. The "Note" field can be edited (input).
Input condition/ Display contents	Up to 16 alphanumeric characters and symbols (except "," (comma) and "?")

● Select Backup Slot

- Configuration Definition Data

Description	Select backup destination of the configuration definition data. If a backup destination, on which configuration definition data has already been stored, is selected, the old configuration definition data will be overwritten.
Input condition/ Display contents	• Backup #1 • Backup #2 • Backup #3 • Backup #4

Start/Stop Performance Monitoring

For details about this function, refer to "Start/Stop Performance Monitoring" (page 90).
For the factory default settings for this function, refer to "B. Start/Stop Performance Monitoring" (page 1255).

● Performance Monitoring (when starting performance monitoring)

- Interval (sec.)

Description	Input the interval to acquire the performance information.
Input condition/ Display contents	30 - 300 (units of 30 seconds)

Clear Cache

For details about this function, refer to "Clear Cache" (page 91).
For the factory default settings for this function, refer to "B. Clear Cache" (page 1255).

● Target Cache Settings

• Target Cache

Description	Select the cache to clear. Select the checkbox for the cache that is to be cleared.

Input condition/
Display contents
	• "CM" checkbox
	  - Selected
	  - Cleared
	• "Extreme Cache" checkbox (*1)
	  - Selected
	  - Cleared
	• "Extreme Cache Pool" checkbox (*2)
	  - Selected
	  - Cleared
	*1: This item is only displayed when EXC is enabled.
	*2: This item is only displayed when EXCP is enabled.

Eco-mode Management

Modify Eco-mode General Setting

For details about this function, refer to "Modify Eco-mode General Setting" (page 94).
For the factory default settings for this function, refer to "B. Modify Eco-mode General Setting" (page 1255).

● Eco-mode General Setting

• Eco-mode

Description	Select whether to "Enable" or "Disable" the Eco-mode for the ETERNUS DX.
Input condition/ Display contents	• Enable • Disable

Create Eco-mode Schedule

For details about this function, refer to "Create Eco-mode Schedule" (page 95).
For the factory default settings for this function, refer to "B. Create Eco-mode Schedule" (page 1256).

● Schedule

• Schedule Name

Description	Enter the schedule name. An existing schedule name cannot be used.
Input condition/ Display contents	• 1 - 16 alphanumeric characters and symbols (except ", (comma)" and "?") • Spaces

● **Set Event**

• Event Type

Description	Select the event type. The settings vary depending on the event type.

Input condition/
Display contents
	• everyday
	Select this to add or edit the daily schedule.
	When "everyday" is selected, enter the start time ("From Time") and the end time ("To Time").
	If the "From Time" is later than the "To Time", the end time is treated as the next day.
	  - From Time: 00:00 - 23:30 (can be specified at intervals of 30 minutes)
	  - To Time: 00:00 - 23:30 (can be specified at intervals of 30 minutes)
	• Every week
	Select this to add or edit the weekly schedule.
	When "Every week" is selected, enter the term ("Period"), the start time ("From Time"), and the end time ("To Time").
	If the "From Time" is later than the "To Time", the end time is treated as the next day.
	  - Period (start day): Monday - Sunday
	  - Period (end day): Monday - Sunday
	  - From Time: 00:00 - 23:30 (can be specified at intervals of 30 minutes)
	  - To Time: 00:00 - 23:30 (can be specified at intervals of 30 minutes)
	• Specific days
	Select this to add or edit the schedule based on specific days.
	When "Specific days" is selected, enter the month ("Month"), the term ("Period"), the start time ("From Time"), and the end time ("To Time").
	If the "From Time" is later than the "To Time", the end time is treated as the next day.
	  - Month: Every Month, January - December
	  - Period (start date): 01 - 31
	  - Period (term): One day only, 2 days - 7 days
	  - From Time: 00:00 - 23:30 (can be specified at intervals of 30 minutes)
	  - To Time: 00:00 - 23:30 (can be specified at intervals of 30 minutes)

Input condition/
Display contents
(Cont'd)
	• Specific week
	Select this to add or edit the schedule based on a specific week.
	When "Specific week" is selected, enter the month ("Month"), the term ("Period"), the start time ("From Time"), and the end time ("To Time").
	If the "From Time" is later than the "To Time", the end time is treated as the next day.
	  - Month: Every Month, January - December
	  - Period (nth week): 1st - 4th, Last
	  - Period (start day): Monday - Sunday
	  - Period (end day): Monday - Sunday
	  - From Time: 00:00 - 23:30 (can be specified at intervals of 30 minutes)
	  - To Time: 00:00 - 23:30 (can be specified at intervals of 30 minutes)

> **▷ Caution**
>
> An error screen appears under the following conditions.
> - "everyday" is selected for the event type when the start time and end time are the same
> - When "Every week" is selected for the event type
>   - The start day is later than the end day
>   - The start day and the end day are the same, and the start time and the end time are also the same
>   - The start day and the end day are the same, and the start time is later than the end time
> - When "Specific days" is selected for the event type
>   - A non-existent date (for example, February 30) is set
>   - "One day only" is selected for the period and the start time and end time are the same
>   - "One day only" is selected for the period and the start time is later than the end time
> - When "Specific week" is selected for the event type
>   - The start day is later than the end day
>   - The start day and the end day are the same, and the start time and the end time are also the same
>   - The start day and the end day are the same, and the start time is later than the end time
> - The period is set to include Sunday
> - The period is one week or longer (the end date is set to "7 days" when the end time is later than the start time)

Modify Eco-mode Schedule

For details about this function, refer to "Modify Eco-mode Schedule" (page 98).

● Schedule

- Schedule Name

Description	Edit the schedule name. The existing schedule name is displayed. An existing schedule name cannot be used. The Eco-mode schedule name that is assigned to the RAID group or TPP can be changed.
Input condition/ Display contents	• 1 - 16 alphanumeric characters and symbols (except ", (comma)" and "?") • Spaces

● Event List

- Checkbox to select an event

Description	Select the event that is to be edited. Select the checkbox for the target event.
Input condition/ Display contents	Checkbox • Selected • Cleared

● Set Event

- Event Type

> **◉ Ｎ ｏ ｔ ｅ**
>
> Refer to "Event Type" (page 992) in "Create Eco-mode Schedule" for details.

User Management

Setup User Account

For details about this function, refer to .
For the factory default settings for this function, refer to .

● Registered User Account List

- Checkbox

Description	• Edit user account
	  Select the checkbox for the user account that is to be modified.
	
	• Delete user account
	  Select the checkbox for the user account that is to be deleted.

Input condition/ Display contents	Checkbox • Selected • Cleared

● Add User Account

- User ID

Description	Input a user ID. An existing user ID cannot be used. Entered letters are case-sensitive.
Input condition/ Display contents	1 - 32 alphanumeric characters and symbols ('!', '-', '_', '.')

> **🔵 N o t e**
>
> The number of characters that can be used for the user ID is displayed to the right of the input field.

• Password

Description	Input a password. Entered letters are case-sensitive. If "Password Policy" for the target user account is enabled, the following input conditions are added according to the configuration with the [Modify User Policy] function. • Minimum Password Length • Password Complexity • Password History

Input condition/
Display contents
	• If "Disable" is selected for "Password Policy"
	4 - 64 alphanumeric characters and symbols ('!', '"', '#', '$', '%', '&', ''', '(', ')', '*', '+', ',', '-', '.', '/', '@', '[', '\', ']', '^', '_', '`', '{', '|', '}', '~', ':', ';', '<', '=', '>', '?')
	• If "Enable" is selected for "Password Policy"
	  - When "Password Complexity" is enabled
	    "Minimum password length" to 64 (minimum password length: 4 - 64)
	    At least three of the following character types must be used
	      • Uppercase letters (A - Z)
	      • Lowercase letters (a - z)
	      • Numeric characters (0 - 9)
	      • Symbols ('!', '"', '#', '$', '%', '&', ''', '(', ')', '*', '+', ',', '-', '.', '/', '@', '[', '\', ']', '^', '_', '`', '{', '|', '}', '~', ':', ';', '<', '=', '>', '?')
	  - When "Password Complexity" is disabled
	    "Minimum password length" to 64 (minimum password length: 4 - 64)
	    Alphanumeric characters and symbols ('!', '"', '#', '$', '%', '&', ''', '(', ')', '*', '+', ',', '-', '.', '/', '@', '[', '\', ']', '^', '_', '`', '{', '|', '}', '~', ':', ';', '<', '=', '>', '?')

▷ **Caution**

An error screen appears if the password does not satisfy the input conditions described below. The following shows procedures corresponding to each error.

• If "Minimum Password Length" is not satisfied
The entered password is less than the required number of characters. Check the minimum length ("x") displayed in the "x - 64" format to the right of the password input field.

• If "Password Complexity" is not satisfied
The required character types have not been used in the entered password. At least three of the following character types must be used; "uppercase letters", "lowercase letters", "numeric characters", and "symbols".

• If "Password History" is not satisfied
The entered password does not meet the reuse condition. The same password that was previously set (between the latest and the specified number of generations) cannot be used. Set a different password.

◯ **N o t e**

Refer to the "Password Policy" settings in advance for details about "Password Complexity" and "Password History". Refer to "Modify User Policy" (page 107) for details.

• Confirm New Password

Description	Input the same character string as the value entered in the "New Password" field for confirmation.
Input condition/ Display contents	Refer to "Password" (page 995) in "Add User Account" for details.

- Role

Description	Select the user role that is to be assigned to the user ID. The default and custom roles registered in the ETERNUS DX/AF are displayed as the options.
Input condition/ Display contents	• Monitor • Admin • StorageAdmin • AccountAdmin • SecurityAdmin • Maintainer • Software • Custom role

▶ **Caution**

"Software" is the role that is used for external software. A user account with the "Software" role cannot log in to ETERNUS Web GUI.

- Account

Description	Select whether to "Enable" or "Disable" the user account. If the user account is disabled, that user account is registered but cannot be used.
Input condition/ Display contents	• Enable • Disable

- SSH Public Key

Description	Register the SSH client public key used for login authentication from ETERNUS CLI in the ETER-NUS DX/AF. Click the [Browse...] button and specify the public key to be registered. When using the SSH client key authentication, register the SSH public key in the ETERNUS DX/AF and prepare the SSH secret key, corresponding to the public key in the client PC in advance.
Input condition/ Display contents	Click the [Browse...] button and specify the public key to be registered.

- Password Policy

Description	Select whether to "Enable" or "Disable" the password policy. If "Enable" is selected, the following input conditions are added according to the "Password Policy" setting that is specified with the [Modify User Policy] function. • Minimum Password Length • Password Complexity • Password History
Input condition/ Display contents	• Enable • Disable

▶ **Caution**

The "Password Policy" is not applied to a user account with the "Software" role because it is used for external software. Note that "Enable" cannot be selected in this case.

🔵 **N o t e**

Check the "Password Policy" setting before selecting "Enable" for this item. Refer to "Modify User Policy" (page 107) for details.

- Lockout Policy

Description	Select whether to "Enable" or "Disable" the lockout policy. If "Enable" is selected, the following items are applied to a user account according to the "Lockout Policy" setting that is specified with the [Modify User Policy] function. • Lockout Threshold • Lockout Duration
Input condition/ Display contents	• Enable • Disable

▶ **Caution**

The "Lockout Policy" is not applied to a user account with the "Software" role because it is used for external software. Note that "Enable" cannot be selected in this case.

🔵 **N o t e**

Check the "Lockout Policy" setting before selecting "Enable" for this item. Refer to "Modify User Policy" (page 107) for details.

⬤ **Edit User Account**

- Change Password

Description	Only when changing the password, select the "Change Password" checkbox. When the "Change Password" checkbox is selected, enter a new password in "New Password" and "Confirm New Password".
Input condition/ Display contents	"Change Password" checkbox • Selected • Cleared

- Password

Description	Input a new password. Entered letters are case-sensitive. If "Password Policy" for the target user account is enabled, the following input conditions are added according to the configuration with the [Modify User Policy] function. • Minimum Password Length • Password Complexity • Password History
Input condition/ Display contents	Refer to "Password" (page 995) in "Add User Account" for details.

▶ **Caution**

- Passwords must be changed for user IDs with "Expired" displayed in the "Days To Expiration" field of "Registered User Account List".

- Passwords can be changed for user IDs with "Changeable" displayed in the "Days To Password Change" field of "Registered User Account List".

• Confirm New Password

Description	Input the same character string as the value entered in the "New Password" field for confirmation.
Input condition/ Display contents	Refer to "Password" (page 995) in "Add User Account" for details.

• Role

🔵 **N o t e**

Refer to "Role" (page 996) in "Add User Account" for details.

• Account

🔵 **N o t e**

Refer to "Account" (page 996) in "Add User Account" for details.

• SSH Public Key

🔵 **N o t e**

Refer to "SSH Public Key" (page 996) in "Add User Account" for details.

• Password Policy

🔵 **N o t e**

Refer to "Password Policy" (page 996) in "Add User Account" for details.

• Lockout Policy

🔵 **N o t e**

Refer to "Lockout Policy" (page 997) in "Add User Account" for details.

Modify User Policy

For details about this function, refer to "Modify User Policy" (page 107).
For the factory default settings for this function, refer to "B. Modify User Policy" (page 1257).

● **Password Policy**

• Minimum Password Length

Description	Specify the minimum length of the password.
Input condition/ Display contents	4 - 64

🔵 **N o t e**

If "Password Policy" is enabled, "Minimum Password Length" is displayed in the [Setup User Account] screen and the [Change User Password] screen. Refer to "Setup User Account" (page 101) or "Change User Password" (page 48) for details.

• Password Complexity

Description	Select whether to "Enable" or "Disable" the complexity setting for the password. If "Enable" is selected, at least three of the following character types must be used for the password. • Uppercase letters (A - Z) • Lowercase letters (a - z) • Numeric characters (0 - 9) • Symbols ('!', '"', '#', '$', '%', '&', ''', '(', ')', '*', '+', ',', '-', '.', '/', '@', '[, '\', ']', '^', '_', '`', '{, '|', '}', '~', ':', ';', '<', '=', '>', '?')
Input condition/ Display contents	• Enable • Disable

• Password History

Description	Specify the number of password generations to save in the ETERNUS DX/AF. If the number of generations is specified, the previously set password is stored to prevent reuse. If "0" is specified, a history of the passwords used is not managed. This means that the same password that was used in the previous generation can be reused.
Input condition/ Display contents	• 0 (Unrestricted) • 1 - 16

• Minimum Password Age

Description	Specify the minimum number of days before the password can be changed from the last time the password was specified. The password cannot be changed during the specified days. If "0" is specified, the password can be changed at anytime.
Input condition/ Display contents	• 0 (Unrestricted) • 1 - 999

▷ **Caution**

The value of this item must be smaller than the value of the "Maximum Password Age".

⬤ **N o t e**

If "Password Policy" is enabled, "Days To Password Change" is displayed in the [Setup User Account] screen and the [Change User Password] screen. Refer to or for details.

• Maximum Password Age

Description	Specify the maximum number of days the password can be used. The relevant password becomes unavailable when the specified number of days has been exceeded. If "0" is specified, the password can be used indefinitely.
Input condition/ Display contents	• 0 (Unrestricted) • 1 - 999

⬤ **N o t e**

- If "Password Policy" is enabled, "Days To Expiration" is displayed in the [Setup User Account] screen and the [Change User Password] screen. Refer to "Setup User Account" (page 101) or "Change User Password" (page 48) for details.
- If "Password Policy" is enabled, a system message appears in the [Overview] screen when the password will expire in 14 days. Refer to "Overview" (page 24) for details.

● **Lockout Policy**

- Lockout Threshold

Description	Specify the number of consecutive failed logins before the user account is locked out. If "0" is specified, the lockout function for the user account is disabled.
Input condition/ Display contents	• 0 (Unrestricted) • 1 - 999

⬤ **N o t e**

If "0" is specified for this item, "30" minutes is set for the "Lockout Duration" setting.

- Lockout Duration

Description	Specify the time (minutes) before the user account that was locked out due to failed logins is automatically released. After the specified time has passed, the lockout is released automatically. If "0" is specified, lockouts are not automatically released.
Input condition/ Display contents	• 0 (Unrestricted) • 1 - 99999

▷ **Caution**

If the lockout state of the user account cannot be released automatically, release the lockout state using one of the following operations.

- Ask the administrator who manages the user account to disable the "Lockout Policy" for the locked out user account. (Refer to "Setup User Account" (page 101) for details.)
- Reboot the ETERNUS DX/AF to initialize the lockout state.

Modify RADIUS

For details about this function, refer to "Modify RADIUS" (page 109).
For the factory default settings for this function, refer to "B. Modify RADIUS" (page 1257).

● **RADIUS Setting**

- RADIUS Authentication

Description	Select whether to "Enable" or "Disable" RADIUS Authentication.

Input condition/
Display contents
	• Enable
	  Use RADIUS Authentication.
	• Disable
	  Use the internal authentication.

- Recovery Mode

Description	When "Enable" has been specified in the "RADIUS Authentication" field, select the desired operation if RADIUS Authentication fails. If RADIUS Authentication fails when "No" has been selected for "Recovery Mode", logging on to ETERNUS Web GUI will not be available. Selecting "Yes" is recommended.

Input condition/
Display contents
	• Yes (Communication error / Authentication error)
	  When communication with the RADIUS server fails or communication with the RADIUS server succeeds but authentication fails, internal authentication is performed.
	• Yes (Communication error)
	  When communication with the RADIUS server fails, internal authentication is performed.
	• No
	  Even when communication with the RADIUS server fails, or communication with the RADIUS server succeeds but authentication fails, internal authentication is not performed.

● **Primary Server (required) / Secondary Server**

- Domain Name / IP Address

Description	Input the domain name or the IP address of the RADIUS server. There are two methods to specify an IP address; "IPv4" and "IPv6". The following IPv6 addresses can be used; "link local address", "global address", "unique local address", or "6to4 address". Refer to "Available IPv6 Address" (page 122) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation.

Input condition/
Display contents
	• For IPv4 address
	  xxx.xxx.xxx.xxx
	  xxx: 1 - 255 for the top field (decimal)
	  xxx: 0 - 255 for other fields (decimal)
	• For IPv6 address
	  xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
	  xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
	  Refer to "IPv6 Address Notation" (page 371) for details.
	• For domain name
	  Up to 63 alphanumeric characters and symbols

▷ **Caution**

An error screen appears if the "Domain Name / IP Address" of the Primary server overlaps with that of the Secondary server.

- Port No.

Description	Input the port number that is used for RADIUS Authentication.
Input condition/ Display contents	• Numeric characters • 1 - 65535

- LAN Port

Description	Input the LAN port number that is used for RADIUS Authentication.
Input condition/ Display contents	• MNT • RMT

• Authentication Mode

Description	Select the authentication mode for RADIUS Authentication.
Input condition/ Display contents	• CHAP • PAP

• Shared Secret

Description	Input the same Shared Secret as the RADIUS server.
Input condition/ Display contents	Up to 64 alphanumeric characters and symbols

• Retry Out Time

Description	Select the total time (seconds) for waiting for a response from the RADIUS server. The ETERNUS DX/AF retries authentication during the specified time (seconds), and if there is no response in the specific time, regards the situation as a network error.
Input condition/ Display contents	• 10 • 20 • 30 • 40 • 50 • 60

Add Role

For details about this function, refer to .
For the factory default settings for this function, refer to .

● Role Setting

• Name

Description	Input a role name. The role name, which has previously been used (including the default role name), cannot be used.
Input condition/ Display contents	Up to 16 alphanumeric characters and symbols (except "," (comma) and "?")

● **Target Policy**

• Policies

Description	Select the user policies that are to be allocated to the user roles. • Status Display • RAID Group Management • Volume - Create / Modify • Volume - Delete / Format • Host Interface Management • NAS Management • Advanced Copy Management • Copy Session Management • Storage Migration Management • Storage Management • User Management • Authentication / Role • Security Setting • Maintenance Information • Firmware Management • Maintenance Operation

Input condition/
Display contents
	Checkbox
	• Selected
	  Allocate the role
	• Cleared
	  Do not allocate a role

Modify Role

For details about this function, refer to "Modify Role" (page 112).

● **Target Policy**

• Policies

Description	Checkboxes of the current user policies are selected. Set the new policies that are to be added. Refer to "Policies" (page 1003) in "Add Role" for details.

Input condition/
Display contents
	Checkbox
	• Selected
	  Allocate the role
	• Cleared
	  Do not allocate a role

Network Management

Setup Network Environment

For details about this function, refer to "Setup Network Environment" (page 114).
For the factory default settings for this function, refer to "B. Setup Network Environment" (page 1257).

■ When using IPv4

● LAN

• Speed and Duplex

Description	Select the communication speed and mode.
Input condition/ Display contents	• Automatic • 1 Gbit/s • 100 Mbit/s Half • 100 Mbit/s Full • 10 Mbit/s Half • 10 Mbit/s Full

• Wake on LAN

Description	Select whether to "Enable" or "Disable" the WOL function (*1). *1: The WOL function starts up the ETERNUS DX/AF, which is connected to LAN, from another server or a PC via network.
Input condition/ Display contents	• Enable • Disable

▶ Caution

This item is not displayed when an FST port is selected.

● Interface

• Master IP Address

Description	Input the IP address for the Master CM of the ETERNUS DX/AF.
Input condition/ Display contents	• Numeric characters • 0 - 255

• Slave IP Address

Description	Input the IP address for the Slave CM of the ETERNUS DX/AF. The IP address of the Slave CM is used when an error occurs in the Master CM. This item is not displayed for the 1CM model.
Input condition/ Display contents	• Numeric characters • 0 - 255

> ⬤ **N o t e**
>
> When two CMs are installed, a CM, to which authority to manage the ETERNUS DX/AF has been given, is called a "Master CM". The other CM is called a "Slave CM". When an error occurs in a CM or a LAN, the Master CM is automatically switched, and the IP address of the old Master CM is passed to the new Master CM. By specifying the IP address of the Slave CM, the Master CM can be forcibly switched to the Slave CM when an error occurs and the Master CM cannot be connected.

• Subnet Mask

Description	Input the subnet mask of the ETERNUS DX/AF.
Input condition/ Display contents	• Numeric characters • 255.0.0.0 - 255.255.255.252

• Gateway

Description	Input the IP address of the gateway.
Input condition/ Display contents	• Numeric characters • 0 - 255

> ▶ **Caution**
>
> This item is not displayed when an FST port is selected.

⬤ DNS

• Primary DNS, Secondary DNS

Description	Input the IP address of the DNS server that is used for the management LAN. The Secondary DNS server must be specified after the Primary DNS server.
Input condition/ Display contents	• Numeric characters • 0 - 255

> ▶ **Caution**
>
> This item is not displayed when an FST port is selected.

⬤ Allowable IP Address

• IP Address

Description	Input the IP address (or the network address) for the remote storage system. Up to 16 addresses can be registered. Make sure to input the IP address (or the network address) and subnet mask in pairs.
Input condition/ Display contents	• Numeric characters • 0 - 255

• Subnet Mask

Description	Input the subnet mask for the IP address (or the network address) of the remote storage system.
Input condition/ Display contents	• Numeric characters • 255.0.0.0 - 255.255.255.252

■ When using IPv6

● LAN

• Speed and Duplex

Description	Select the communication speed and mode.
Input condition/ Display contents	• Automatic • 1 Gbit/s • 100 Mbit/s Half • 100 Mbit/s Full • 10 Mbit/s Half • 10 Mbit/s Full

• Wake on LAN

Description	Select whether to "Enable" or "Disable" the WOL function (*1). *1: The WOL function starts up the ETERNUS DX/AF, which is connected to LAN, from another server or a PC via network.
Input condition/ Display contents	• Enable • Disable

▶ **Caution**

This item is not displayed when an FST port is selected.

● Interface

• Master IP Link Local Address

Description	Input the link local address (interface ID) for the Master CM of the ETERNUS DX/AF. Note that the link local address is only available within the same network and cannot be connected to the Internet. Connection via a router is not available. Refer to "Available IPv6 Address" (page 122) for details. Note that the current setting is displayed by an abbreviation.
Input condition/ Display contents	fe80::xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation (Setup Network Environment)" (page 122) for details.

• Master Connect IP Address

Description	Input the connect IP address for the Master CM of the ETERNUS DX/AF. "Master Connect IP Address" corresponds to "Master IP Address" for IPv4. "Global address", "unique local address", or "6to4 address" can be input for the IP address. Refer to "Available IPv6 Address" (page 122) for details. Note that the current setting is displayed by an abbreviation.
Input condition/ Display contents	xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation (Setup Network Environment)" (page 122) for details.

• Slave IP Link Local Address

Description	Input the link local address (interface ID) for the Slave CM of the ETERNUS DX/AF. The link local address of the Slave CM is used when an error occurs in the Master CM. Refer to "Available IPv6 Address" (page 122) for details. This item is not displayed for the 1CM model. Note that the current setting is displayed by an abbreviation.
Input condition/ Display contents	fe80::xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation (Setup Network Environment)" (page 122) for details.

• Slave Connect IP Address

Description	Input the connect IP address for the Slave CM of the ETERNUS DX/AF. The connect IP address of the Slave CM is used when an error occurs in the Master CM. "Slave Connect IP Address" corresponds to "Slave IP Address" for IPv4. "Global address", "unique local address", or "6to4 address" can be input for the IP address. Refer to "Available IPv6 Address" (page 122) for details. This item is not displayed for the 1CM model. Note that the current setting is displayed by an abbreviation.
Input condition/ Display contents	xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation (Setup Network Environment)" (page 122) for details.

• Length of Subnet Prefix

Description	Input the prefix length of the connect IP address (unit: bit). "Length of Subnet Prefix" corresponds to "Subnet Mask" for IPv4. Refer to "Available IPv6 Address" (page 122) for details.
Input condition/ Display contents	• Numeric characters • 3 - 128

• Gateway

Description	Input the IP address of the gateway. The following IPv6 addresses can be used; "link local address", "global address", "unique local address", or "6to4 address". Refer to "Available IPv6 Address" (page 122) for details. Note that the current setting is displayed by an abbreviation.
Input condition/ Display contents	xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation (Setup Network Environment)" (page 122) for details.

● DNS

• Primary DNS, Secondary DNS

Description	Input the IP address of the DNS server that is used for the management LAN. "Global address", "unique local address", or "6to4 address" can be input for the IPv6 address. Refer to "Available IPv6 Address" (page 122) for details. Note that the current setting is displayed by an abbreviation. The Secondary DNS server must be specified after the Primary DNS server.
Input condition/ Display contents	xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation (Setup Network Environment)" (page 122) for details.

● Allowable IP Address

• Connect IP Address

Description	Input the connect IP address for the remote storage system. "Global address", "unique local address", or "6to4 address" can be input for the IP address. Refer to "Available IPv6 Address" (page 122) for details. Make sure to input "Connect IP Address" and "Length of Subnet Prefix" together.
Input condition/ Display contents	xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation (Setup Network Environment)" (page 122) for details.

• Length of Subnet Prefix

Description	Input the prefix length of the connect IP address for the remote storage system (unit: bit). Refer to "Available IPv6 Address" (page 122) for details.
Input condition/ Display contents	• Numeric characters • 3 - 128

Setup Firewall

For details about this function, refer to "Setup Firewall" (page 123).
For the factory default settings for this function, refer to "B. Setup Firewall" (page 1259).

● Firewall Settings

Configure a firewall for each acceptable protocol.
The input conditions and the display contents for the firewall settings are as follows:

Input condition/
Display contents
	Checkbox
	• Selected
	  Enable
	• Cleared
	  Disable

• HTTP

Description	Specify whether to enable or disable the HTTP connection. HTTP is used when accessing from ETERNUS Web GUI.

• HTTPS

Description	Specify whether to enable or disable the HTTPS connection. HTTPS is used when accessing from ETERNUS Web GUI. This connection uses the data encryption for data transferring.

• Telnet

Description	Specify whether to enable or disable the Telnet connection. Telnet is used when accessing from ETERNUS CLI.

- SSH

Description	Specify whether to enable or disable the SSH connection. SSH is used when accessing from ETERNUS CLI. This connection uses the data encryption for data transferring.

- ICMP

Description	Specify whether to enable or disable the ICMP connection. ICMP is used when sending the "ping" command from a PC.

- Maintenance-Secure

Description	Specify whether to enable or disable the Maintenance-Secure connection. Maintenance-Secure is used when connecting with the monitoring software, or performing a firmware update from the peer storage system using the Remote Support function. This connection uses the data encryption for data transferring.

- SNMP

Description	Specify whether to enable or disable the SNMP connection. The SNMP is used when accessing from SNMP Agent Manager.

- RCIL

Description	Specify whether to enable or disable the RCIL connection. Whether to enable or disable RCIL can only be set for the MNT port. The RCIL controls the power of the ETERNUS DX/AF from a host via Ethernet by using the Intelligent Platform Management Interface (IPMI), which is a general protocol.

- ETERNUS DX Discovery

Description	Specify whether to enable or disable the ETERNUS DX Discovery connection. Whether to enable or disable this parameter can only be set for the MNT port. The ETERNUS DX Discovery is a port to connect ETERNUS DX/AF storage systems in the network by using the Remote Installation function.

Setup SNMP Agent Basic Interface

For details about this function, refer to .
For the factory default settings for this function, refer to .

● Basic Interface

- SNMP Function

Description	Select whether to "Enable" or "Disable" the SNMP function.
Input condition/ Display contents	• Enable • Disable

- LAN Port used for SNMP

Description	When enabling the SNMP function, select the port used for SNMP. When sending a SNMPv1 trap, the agent-address of the trap sender is the Master CM IP address of the selected port.
Input condition/ Display contents	• MNT • RMT

- Authentication Failure

Description	When enabling the SNMP function, select "Send SNMP Trap" or "Do not send SNMP Trap" when authentication fails.
Input condition/ Display contents	• Send SNMP Trap • Do not send SNMP Trap

- Engine ID

Description	When enabling the SNMP function, input the engine ID of the SNMP.
	
	The engine ID is a unique identifier used to distinguish the connection target storage system between the SNMP Agent Manager and the SNMP Agent.
	It is not necessary change the default setting for normal use. The default engine ID of the ETERNUS DX/AF is as follows:
	• Octet 1 - 4
	  Bitwise OR between the company code (fujitsu=211) and 0x80000000
	• Octet 5
	  0x80 (fixed)
	• Octet 6 - 13
	  WWN of the ETERNUS DX/AF (8 bytes)

Input condition/
Display contents
	• Default
	• Customize
	  Input condition when selecting "Customize"
	  - Alphanumeric characters (0 - 9, A - F, a - f)
	  - Inputting only "0" or "F" for the "Engine ID" field is not allowed
	  - 10 - 64 characters (even number)

- MIB-II RFC Version

Description	When enabling the SNMP function, select the MIB-II support RFC version. Although it is not necessary to change the default setting ("RFC1213") for normal use, select the RFC version that is supported by the SNMP manager.

Input condition/
Display contents
	• RFC1213
	  This mode is used for MIB-II that supports RFC1213.
	  This RFC supports IPv4 addresses.
	• RFC4293
	  This mode is used for MIB-II that supports RFC4293.
	  This RFC supports IPv4 addresses and IPv6 addresses. This RFC is an extended definition for RFC1213.

Setup SNMP Manager

For details about this function, refer to "Setup SNMP Manager" (page 127).
For the factory default settings for this function, refer to "B. Setup SNMP Manager" (page 1259).

● Manager

- IP Version

Description	Specify the IP address of the SNMP Manager.
Input condition/ Display contents	• IPv4 • IPv6

- Manager IP Address (IPv4)

Description	Input the IP address of the SNMP Manager with the IPv4 format. The IP address which has already been used cannot be entered. This setting is enabled when "IPv4" is selected for "IP Version".
Input condition/ Display contents	xxx.xxx.xxx.xxx xxx: 1 - 255 for the top field (decimal) xxx: 0 - 255 for other fields (decimal)

- Manager IP Address (IPv6)

Description	Input the IP address of the SNMP Manager with the IPv6 format. The following IPv6 addresses can be used; "link local address", "global address", "unique local address", or "6to4 address". Refer to "Available IPv6 Address" (page 122) for details. The IP address which has already been used cannot be entered. This setting is enabled when "IPv6" is selected for "IP Version".
Input condition/ Display contents	xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation" (page 371) for details.

Setup SNMP Agent MIB Access View

For details about this function, refer to "Setup SNMP Agent MIB Access View" (page 129).
For the factory default settings for this function, refer to "B. Setup SNMP Agent MIB Access View" (page 1260).

● MIB Access View

- View Name

Description	Input the MIB View name. The view name which has already been used cannot be entered.
Input condition/ Display contents	• Up to 32 alphanumeric characters and symbols ("! (exclamation mark)", "# (hash mark)", "& (ampersand)", "_ (underscore)", "+ (plus)", "- (hyphen)", "* (asterisk)" and "/ (slash)") • Spaces

• Subtree#1 - Subtree#10

Description	Specify the MIB access range of the corresponding view in the subtree. Input the subtree in the Object ID format (*1). Select whether to include as or exclude from each subtree as the MIB access range. One or more subtrees are required per view. The same subtree cannot be specified multiple times in a single view. However, the same subtree can be configured to different views. *1: The "Object ID" is indicated by using "." (periods) in a format such as "1.3.6.1.2.1.1". The setting range of each value that is separated using "."(periods) is 1 - 65535. A total of up to 251 characters can be entered (including periods). The following values cannot be entered in the ETERNUS DX/AF: (1) Values starting with a period: ".1.3.6.1.2.1.1" (2) Value ending with a period: "1.3. 6.1.2.1.1." (3) Values with two consecutive periods: "1. . 3. 6. 1. 2. 1. 1" (4) Values including "0": "1.3.6.1.2.0.1"

Input condition/
Display contents
	• Subtree
	  - Alphabetic characters, numeric characters ("1" - "65535"), and symbols
	  - Spaces
	  - Up to 251 characters
	• Inclusion
	• Exclude

Setup SNMP Agent User

For details about this function, refer to .
For the factory default settings for this function, refer to .

● Setup SNMP Agent User

• User Name

Description	Input the user name which accesses the SNMP Agent. The user name which has already been used cannot be entered.
Input condition/ Display contents	• 8 - 32 alphanumeric characters and symbols ("! (exclamation mark)", "# (hash mark)", "& (ampersand)", "_ (underscore)", "+ (plus)", "- (hyphen)", "* (asterisk)" and "/ (slash)") • Spaces

• MIB View Setting

Description	Select the view name to specify the MIB access range for the user. A "blank" means accessing the MIB is not allowed.
Input condition/ Display contents	• ViewALL • View-mib2 • View-exmib • The view name, which has been registered using the [Setup SNMP Agent MIB Access View] function

🔵 **N o t e**

If "ViewALL", "View-mib2", or "View-exmib" is deleted with the procedure in , the deleted options are not displayed in the [MIB View Setting] screen.

- Authentication

Description	Select whether to "Enable" or "Disable" the authentication.
Input condition/ Display contents	• Enable • Disable

- Authentication Method

Description	To enable the authentication, select the authentication method.
Input condition/ Display contents	• MD5 (Message Digest 5) • SHA (Secure Hash Algorithm)

- Authentication Password

Description	When enabling authentication, input the authentication password.
Input condition/ Display contents	• 8 - 64 alphanumeric characters and symbols ("! (exclamation mark)", "# (hash mark)", "& (ampersand)", "_ (underscore)", "+ (plus)", "- (hyphen)", "* (asterisk)" and "/ (slash)") • Spaces

- Retype Authentication Password

Description	When enabling authentication, input the authentication password again.
Input condition/ Display contents	• 8 - 64 alphanumeric characters and symbols ("! (exclamation mark)", "# (hash mark)", "& (ampersand)", "_ (underscore)", "+ (plus)", "- (hyphen)", "* (asterisk)" and "/ (slash)") • Spaces

- Encryption

Description	Select whether to "Enable" or "Disable" the encryption function. If the "Authentication" setting is "Disable", the encryption setting cannot be selected.
Input condition/ Display contents	• Enable • Disable

- Encryption Method

Description	To enable encryption, select the encryption method.
Input condition/ Display contents	• DES Data Encryption Standard • AES Advanced Encryption Standard

- Encryption Password

Description	When enabling encryption, input the encryption password.
Input condition/ Display contents	• 8 - 64 alphanumeric characters and symbols ("! (exclamation mark)", "# (hash mark)", "& (ampersand)", "_ (underscore)", "+ (plus)", "- (hyphen)", "* (asterisk)" and "/ (slash)") • Spaces

- Retype Encryption Password

Description	When enabling the encryption, input the encryption password again.
Input condition/ Display contents	8 - 64 alphanumeric characters and symbols ("! (exclamation mark)", "# (hash mark)", "& (ampersand)", "_ (underscore)", "+ (plus)", "- (hyphen)", "* (asterisk)" and "/ (slash)") - Spaces

Setup SNMP Agent Community

For details about this function, refer to "Setup SNMP Agent Community" (page 133).
For the factory default settings for this function, refer to "B. Setup SNMP Agent Community" (page 1260).

● Setup SNMP Agent Community

- Community Name

Description	Input the community name to be used when accessing a MIB or sending a trap. The community name which has already been used cannot be entered.
Input condition/ Display contents	- Up to 32 alphanumeric characters and symbols ("! (exclamation mark)", "# (hash mark)", "& (ampersand)", "_ (underscore)", "+ (plus)", "- (hyphen)", "* (asterisk)" and "/ (slash)") - Spaces

- View Name

Description	Select the view name to specify the MIB access range for the community. A "blank" means accessing the MIB is not allowed.
Input condition/ Display contents	- ViewALL - View-mib2 - View-exmib - The view name, which has been registered using the [Setup SNMP Agent MIB Access View] function

🔵 **N o t e**

If "ViewALL", "View-mib2", or "View-exmib" is deleted with the procedure in "Setup SNMP Agent MIB Access View" (page 129), the deleted options are not displayed in "View Name".

- Allowed SNMP Manager List

Description	Select the IP address of the SNMP Manager which is allowed to access in the community. Only the selected SNMP Manager is allowed to access. However, if the Allowed SNMP Agent Manager List has been left blank, all of the SNMP Agent Managers (*1) are allowed to access. *1: Not only the SNMP Agent Manager which has been registered in "Setup SNMP Manager" (page 127), but also the other SNMP Agent Managers are allowed to access.
Input condition/ Display contents	Checkbox - Selected - Cleared

Setup SNMP Agent Trap

For details about this function, refer to "Setup SNMP Agent Trap" (page 135).
For the factory default settings for this function, refer to "B. Setup SNMP Agent Trap" (page 1260).

● **Setup SNMP Agent Trap**

• Manager No.

Description	Select a manager number. The management number of the SNMP Agent Manager, which has been registered in "Setup SNMP Manager" (page 127), is displayed as an option.
Input condition/ Display contents	Manager01 - Manager10

• SNMP Version

Description	Select the trap SNMP version.
Input condition/ Display contents	• v1 • v2c • v3

• Community Name

Description	Select the community name used when sending a trap. The community name, which has been registered in "Setup SNMP Agent Community" (page 133), is displayed as an option. If the SNMP version is "v1" or "v2c", the "Community Name" must be specified.
Input condition/ Display contents	Community names that are registered by using the [Setup SNMP Agent Community] function

• User Name

Description	Select the user name used when sending a trap. The user name, which has been registered in "Setup SNMP Agent User" (page 131), is displayed as an option. If the SNMP version is "v3", the "User Name" must be specified.
Input condition/ Display contents	User names that are registered by using the [Setup SNMP Agent User] function

• Port No.

Description	Input the port number of the trap destination. When changing a port number, input a unique port number.
Input condition/ Display contents	1 - 65535

Download MIB File

For details about this function, refer to "Download MIB File" (page 137).
For the factory default settings for this function, refer to "B. Download MIB File" (page 1260).

● Download MIB File

- Option

Description	Select the "The ServerView control code is added to the comment line of the MIB definition file" checkbox when downloading the MIB file used for device monitoring by ServerView.
Input condition/ Display contents	"The ServerView control code is added to the comment line of the MIB definition file" checkbox • Selected • Cleared

- Version

Description	Select the SNMP version used for device monitoring.
Input condition/ Display contents	• v1 • v2c/v3

Setup E-Mail Notification

For details about this function, refer to "Setup E-Mail Notification" (page 141).
For the factory default settings for this function, refer to "B. Setup E-Mail Notification" (page 1261).

● Notification E-Mail Settings

- Notification E-Mail

Description	Select whether to enable ("Yes") or disable ("No") the E-Mail notification function.
Input condition/ Display contents	• Enable • Disable

- Destination E-Mail Address

Description	Specify the E-Mail destination address. At least one address must be specified. Up to five addresses can be specified.
Input condition/ Display contents	Up to 63 alphanumeric characters and symbols (except space)

- Comment

Description	Input the message (comment) to be added to the E-Mail. The comment can be omitted.
Input condition/ Display contents	• Up to 255 alphanumeric characters, symbols, and spaces • Within ten lines

● E-Mail Server Settings

- LAN Port used for SMTP Connection

Description	Input the LAN port number that is used for SMTP server.
Input condition/ Display contents	• MNT • RMT

- SMTP Server

Description	Specify the IP address or domain name of the SMTP server that is to be used. There are two methods to specify an IP address; "IPv4" and "IPv6". The following IPv6 addresses can be used; "link local address", "global address", "unique local address", or "6to4 address". Refer to "Available IPv6 Address" (page 122) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation.

Input condition/
Display contents
	• For IPv4 address
	  xxx.xxx.xxx.xxx
	  xxx: 1 - 255 for the top field (decimal)
	  xxx: 0 - 255 for other fields (decimal)
	• For IPv6 address
	  xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
	  xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
	  Refer to "IPv6 Address Notation" (page 371) for details.
	• For domain name
	  Up to 63 alphanumeric characters and symbols

- SMTP Port No.

Description	Input the port number used by the SMTP server.
Input condition/ Display contents	1 - 65535

- Sender E-Mail Address

Description	Input the E-Mail address of the ETERNUS DX/AF.
Input condition/ Display contents	Up to 63 alphanumeric characters and symbols (except space)

- SMTP over SSL

Description	Select the SMTP over SSL method.
Input condition/ Display contents	• None • STARTTLS • SSL/TLS

- SMTP requires authentication

Description	Select the authentication method to connect to the SMTP server.
Input condition/ Display contents	• None • AUTH SMTP

- Authentication Method

Description	If "AUTH SMTP" is selected for "SMTP Authentication Information", select the authentication method.
Input condition/ Display contents	• Automatic • CRAM-MD5 • PLAIN • LOGIN

• User Name

Description	When "AUTH SMTP" is selected for "SMTP requires authentication", input the sender user name.
Input condition/ Display contents	Up to 32 alphanumeric characters and symbols

• Password

Description	When "AUTH SMTP" is selected for "SMTP requires authentication", input the sender password.
Input condition/ Display contents	Up to 64 alphanumeric characters and symbols

● **Advanced Settings**

• "Change following Timing Parameter items" checkbox

Description	To change the timing parameters, select the checkbox.
Input condition/ Display contents	• Selected • Cleared

• Connection Timeout

Description	Input the timeout limit for SMTP connection.
Input condition/ Display contents	1 - 300 sec.

• Response Timeout

Description	Input the timeout limit for SMTP response.
Input condition/ Display contents	1 - 300 sec.

• Maximum Retries

Description	Specify the maximum retry count.
Input condition/ Display contents	0 - 5 count

• Retry Interval

Description	Input the interval between each retry attempt.
Input condition/ Display contents	1 - 300 sec.

Setup Syslog

For details about this function, refer to "Setup Syslog" (page 142).
For the factory default settings for this function, refer to "B. Setup Syslog" (page 1261).

● Syslog Server1, Syslog Server2

- Send Log

Description	Select the Syslog sending parameters. Logs are sent in the selected RFC message format.
Input condition/ Display contents	• on (RFC3164) • on (RFC5424) • off

- Domain Name / IP Address

Description	Input the domain name or the IP address of the Syslog server. There are two methods to specify an IP address; "IPv4" and "IPv6". The following IPv6 addresses can be used; "link local address", "global address", "unique local address", or "6to4 address". Refer to "Available IPv6 Address" (page 122) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation.
Input condition/ Display contents	• For IPv4 address xxx.xxx.xxx.xxx xxx: 1 - 255 for the top field (decimal) xxx: 0 - 255 for other fields (decimal) • For IPv6 address xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation" (page 371) for details. • For domain name Up to 63 alphanumeric characters and symbols

- Port No.

Description	Input the port number used to send a Syslog.
Input condition/ Display contents	• Numeric characters • 1 - 65535

- LAN Port

Description	Input the LAN port number that is used to send Syslog.
Input condition/ Display contents	• MNT • RMT

Setup SSH Server Key

For details about this function, refer to "Setup SSH Server Key" (page 144).
For the factory default settings for this function, refer to "B. Setup SSH Server Key" (page 1261).

● **SSH Server Key Setting**

• Key Length

Description	Select the SSH server key length. The SSH server key length is equivalent to the encryption level. In general, the longer the key is, the higher the encryption level becomes (meaning that decrypting the encrypted data is difficult).
Input condition/ Display contents	• 1024 bit • 2048 bit • 4096 bit

Create Self-signed SSL Certificate

For details about this function, refer to "Create Self-signed SSL Certificate" (page 145).
For the factory default settings for this function, refer to "B. Create Self-signed SSL Certificate" (page 1261).

● **Create Self-signed SSL Certificate Setting**

• Key Length

Description	Select the SSL server key length. The SSL server key length is equivalent to the encryption level. In general, the longer the key is, the higher the encryption level becomes (meaning that decrypting the encrypted data is difficult).
Input condition/ Display contents	• 1024 bit • 2048 bit • 4096 bit

• Common Name

Description	Enter the main IP address or an FQDN of the port (an MNT port, an RMT port, or an FST (*1) port) for using with HTTPS access from ETERNUS Web GUI (required). *1: FST can be used for the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, the ETERNUS AF650 S2, and the ETER-NUS AF650. There are two methods to specify the main IP address; "IPv4" and "IPv6". The following IPv6 addresses can be used; "link local address", "global address", "unique local address", or "6to4 address". Refer to "Available IPv6 Address" (page 122) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation.

| Input condition/
Display contents | • For IPv4 address
   − xxx.xxx.xxx.xxx
      xxx: 1 - 255 for the top field (decimal)
      xxx: 0 - 255 for other fields (decimal)
   − Class must be A, B, or C
• For IPv6 address
   xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
   xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
   Refer to "IPv6 Address Notation" (page 371) for details.
• For FQDN
   Up to 63 alphanumeric characters and symbols (except "<", ">", "~", "!", "@", "#", "$", "%",
   "^", "\", "?", "&" and space) |

• Subject Alt Name

| Description | Enter IP addresses or FQDNs of the ports (multiple MNT ports, RMT ports, and FST (*1) ports) to use with HTTPS access from ETERNUS Web GUI. For the IP address or the FQDN, the primary IP address or FQDN that is entered in the "Common Name" field is included.
*1:   FST can be used for the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, the ETERNUS AF650 S2, and the ETER-NUS AF650.

There are two methods to specify an IP address; "IPv4" and "IPv6". The following IPv6 addresses can be used; "link local address", "global address", "unique local address", or "6to4 address". Refer to "Available IPv6 Address" (page 122) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation. |
| Input condition/
Display contents | • For IPv4 address
   − xxx.xxx.xxx.xxx
      xxx: 1 - 255 for the top field (decimal)
      xxx: 0 - 255 for other fields (decimal)
   − Class must be A, B, or C
• For IPv6 address
   xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
   xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
   Refer to "IPv6 Address Notation" (page 371) for details.
• For FQDN
   − Alphanumeric characters and symbols (except "<", ">", "~", "!", "@", "#", "$", "%", "^", "\",
      "?", "&", and space)
   − 1 - 511 characters (a linefeed code is also counted as one character)

Multiple IP addresses and FQDNs can be specified. Start a new line for each IP address or FQDN when specifying multiple IP addresses and FQDNs.
If IPv4 addresses, IPv6 addresses, and FQDNs exist in the setting field, up to 511 characters that include a "." (dot), a ":" (colon), and a linefeed code can be entered. |

Create Key/CSR

For details about this function, refer to "Create Key/CSR" (page 146).
For the factory default settings for this function, refer to "B. Create Key/CSR" (page 1261).

● Create Key/CSR Setting

• Key Length

Description	Select the SSL server key length. The SSL server key length is equivalent to the encryption level. In general, the longer the key is, the higher the encryption level becomes (meaning that decrypting the encrypted data is difficult).
Input condition/ Display contents	• 1024 bit • 2048 bit • 4096 bit

• Country Name

Description	Input the country code which conforms to ISO-3166 A2 (required). [Example] Japan: JP
Input condition/ Display contents	• Alphabetic characters (upper case) (A - Z) • Two fixed letters

• State or Province Name

Description	Input the prefecture where the organization is located (required). [Example] Kanagawa
Input condition/ Display contents	• Up to 63 alphabetic characters (A - Z, a - z) • Spaces

• Locality Name

Description	Input the municipality where the organization is located (required). [Example] Kawasaki
Input condition/ Display contents	• Up to 63 alphabetic characters (A - Z, a - z) • Spaces

• Organization Name

Description	Input the organization name (required). [Example] XXX LIMITED
Input condition/ Display contents	• Up to 63 alphanumeric characters (A - Z, a - z, 0 - 9) • Spaces

• Organization Unit Name

Description	Input the department/division name of the organization (required). [Example] YYYYY Division
Input condition/ Display contents	• Up to 63 alphanumeric characters (A - Z, a - z, 0 - 9) • Spaces

• Common Name

> ● **N o t e**
>
> Refer to "Common Name" (page 1020) in "Create Self-signed SSL Certificate" for details.

• Subject Alt Name

> ● **N o t e**
>
> Refer to "Subject Alt Name" (page 1021) in "Create Self-signed SSL Certificate" for details.

● **Select Export File**

• Select Export File

Description	Select the file that is to be downloaded.
Input condition/ Display contents	• Key File • CSR File

Register SSL Certificate

For details about this function, refer to "Register SSL Certificate" (page 148).

● **Register SSL Certificate Setting**

• SSL Server Key File

Description	Click the [Browse...] button to specify the SSL server key file, or directly input the path to the SSL server key file. Click the [Import] button to import the SSL server key file to ETERNUS Web GUI. When importing has been completed, "Imported" is displayed.
Input condition/ Display contents	• Click the [Browse...] button to specify the SSL server key file • Directly input the path to the SSL server key file

• SSL Server Certificate File

Description	Click the [Browse...] button to specify the SSL server certificate file, or directly input the path to the SSL server certificate file. Click the [Import] button to import the SSL server certificate file to ETERNUS Web GUI. When importing has been completed, "Imported" is displayed.
Input condition/ Display contents	• Click the [Browse...] button to specify the SSL server certificate file • Directly input the path to the SSL server certificate file

Setup SSL Version

For details about this function, refer to "Setup SSL Version" (page 153).
For the factory default settings for this function, refer to "B. Setup SSL Version" (page 1262).

● SSL Version Settings

Select the SSL version to enable for each protocol.
The input condition and the display contents for each protocol are as follows.

Input condition/ Display contents	Checkbox • Selected • Cleared

• HTTPS (GUI)

Description	Select the SSL version to enable for the HTTPS (ETERNUS Web GUI) protocol.

• HTTPS (SMI-S)

Description	Select the SSL version to enable for the HTTPS (SMI-S) protocol.

• Maintenance-Secure

Description	Select the SSL version to enable for the Maintenance-Secure protocol.

Event / Dump Management

Setup Event Notification

For details about this function, refer to "Setup Event Notification" (page 155).
For the factory default settings for this function, refer to "B. Setup Event Notification" (page 1262).

● Setting based on Severity

Select whether to notify of an event by levels. Checkboxes are displayed for selectable notification methods.

• ⊗ All Error Events

Description	Select whether to notify when an error level event occurs. When notifying, select the notification method. By selecting or clearing the checkbox, the same setting can be applied for all the events displayed in the [Error Severity Level] tab.

Input condition/
Display contents
	Checkbox
	• Selected
	  Notify all the events
	• Selected (lighter colored checkbox)
	  Some events are notified and some events are not notified
	• Cleared
	  No events are notified
	• -
	  Not applicable to notification

- ⚠ All Warning Events

Description	Select whether to notify when a warning level event occurs. When notifying, select the notification method. By selecting or clearing the checkbox, the same setting can be applied for all the events displayed in the [Warning Level] tab.

Input condition/
Display contents
	Checkbox
	• Selected
	  Notify all the events
	• Selected (lighter colored checkbox)
	  Some events are notified and some events are not notified
	• Cleared
	  No events are notified
	• -
	  Not applicable to notification

- ⓘ All Informational Events

Description	Select whether to notify when an informational level event occurs. When notifying, select the notification method. By selecting or clearing the checkbox, the same setting can be applied for all the events displayed in the [Informational Level] tab.

Input condition/
Display contents
	Checkbox
	• Selected
	  Notify all the events
	• Selected (lighter colored checkbox)
	  Some events are notified and some events are not notified
	• Cleared
	  No events are notified
	• -
	  Not applicable to notification

- Individual Settings within Severity Level

Description	"Yes" is displayed when the target notification method ("Host Sense Key Code Qualifier", "SNMP Trap", "E-Mail", "syslog", "REMCS" or "AIS Connect") is specified for any event in "Error Severity Level", "Warning Level", or "Informational Level", if not, "No" is displayed.
Input condition/ Display contents	• Yes • No

- Blink Fault LED at warning

Description	Select "Enable" when setting the Fault LED in the front panel to blink while a warning level event occurs, or select "Disable" when setting the Fault LED not to blink.
Input condition/ Display contents	• Enable • Disable

● Turn on Fault LED when redundant copy is completed

Description	Select "Enable" when setting the Fault LED of the drive to turn on when a redundant copy is complete, or select "Disable" when setting the Fault LED not to turn on.
Input condition/ Display contents	● Enable ● Disable

▷ **Caution**

If the Copybackless function is enabled, Fault LED for the failed drive is turned on regardless of this setting after the redundant copy is complete.

● Display parts (except drive) with error status on LCD

Description	Select "Enable" when displaying the part (other than drive) error message on the LCD, or select "Disable" not to display the message on the LCD. This is displayed for the ETERNUS DX8700 S3/DX8900 S3.
Input condition/ Display contents	● Enable ● Disable

● Display parts (except drive) with warning status on LCD

Description	Select "Enable" when displaying the part (other than drive) warning message on the LCD, or select "Disable" not to display the message on the LCD. This is displayed for the ETERNUS DX8700 S3/DX8900 S3.
Input condition/ Display contents	● Enable ● Disable

● Display drives with error status on LCD

Description	Select whether to display the drive error message on the LCD. This is displayed for the ETERNUS DX8700 S3/DX8900 S3. ● Any Time Select "Enable" when displaying the drive error message on the LCD at any time regardless of whether the hot spare disk exists, or select "Disable" if the message should not be displayed. ● when HS<0 Select "Enable" when displaying the drive error message only if a drive error occurs when the available hot spare disk is "0", or select "Disable" if the message should not be displayed. This item can be selected only when the "Display drives with error status on LCD (Any Time)" checkbox is cleared.

Input condition/ Display contents	● Any Time
	  - Enable
	  - Disable
	● when HS<0
	  - Enable
	  - Disable

• Display drives with warning status on LCD

Description	Select whether to display the drive warning message on the LCD. This is displayed for the ETERNUS DX8700 S3/DX8900 S3. • Any Time Select "Enable" when displaying the drive warning message on the LCD at any time regardless of whether the hot spare disk exists, or select "Disable" if the message should not be displayed. • when HS<0 Select "Enable" when displaying the drive warning message only if a drive warning occurs when the available hot spare disk is "0", or select "Disable" if the message should not be displayed. This item can be selected only when the "Display drives with warning status on LCD (Any Time)" checkbox is cleared.
Input condition/ Display contents	• Any Time - Enable - Disable • when HS<0 - Enable - Disable

● Error Severity Level

Select whether to notify an error event for each event type.
The input conditions and the display contents for the error severity level are as follows:

Input condition/ Display contents	Checkbox • Selected Notify • Cleared Not notify • - Not applicable to notification

• ❌ Parts Error

Description	Select whether to notify when a failure occurs in a part other than the drive. When notifying, select the notification method.

• ❌ Drive Error

Description	Select whether to notify when a failure occurs in a non-protected (non-shielded) drive for each condition that is described below. When notifying, select the notification method. • Any Time Notifies always when a drive failure occurs. • when HS<0 Notifies only when a drive failure occurs while available hot spare disk is " 0" (*1). *1: When rebuilding cannot be performed because there are no hot spares that can be used as a substitute for the failed drive.

- ❌ Drive Error of HDD Shield

Description	Select whether to notify when a failure occurs in a protected (shielded) drive for each condition that is described below. When notifying, select the notification method.
	
	• Any Time
	  Notifies always when a failure occurs in a protected (shielded) drive.
	• when HS<0
	  Notifies only when a failure occurs in a protected (shielded) drive while available hot spare disk is " 0" (*1).
	*1: When rebuilding cannot be performed because there are no hot spares that can be used as a substitute for the failed drive.

🔵 **N o t e**

When the SNMP trap setting is changed from "OFF" to "ON", a message is displayed in the ETERNUS SF event log.

- ❌ Succeeded HDD Shield

Description	Select whether to notify when a failed drive is diagnosed as being available by the protect (shield) function and is activated in the ETERNUS DX/AF. When notifying, select the notification method.

🔵 **N o t e**

When the SNMP trap setting is changed from "OFF" to "ON", a message is displayed in the ETERNUS SF event log.

- ❌ Temperature Error

Description	Select whether to notify when a temperature error status is detected by the sensor. When notifying, select the notification method.

- ❌ End of battery life

Description	Select whether to notify when a battery expires. When notifying, select the notification method. This item is displayed for the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, the ETERNUS AF250 S2/AF650 S2, and the ETERNUS AF650.

- ❌ Rebuild/Copyback w/ redundant

Description	Select whether to notify when rebuilding or copy backing (with redundancy) (*1) is performed. When notifying, select the notification method. *1: "Rebuilding to hot spare disk is complete", "Copyback starts" and "Copyback complete" are equivalent to "Redundancy".

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- ❌ Rebuild/Copyback w/o redundant

Description	Select whether to notify when rebuilding or copy backing (without redundancy) (*1) occurs for each condition shown below. When notifying, select the notification method.
	
	• Any Time
	  Notifies always when rebuilding or copy backing (without redundancy) occurs.
	• when HS<0
	  Notifies only when rebuilding or copy backing (without redundancy) occurs while available hot spare disk is "0".
	*1: "Rebuild to hot spare disk is started", "Rebuild to hot spare disk failed" and "Copyback failed" are equivalent to "Without redundancy".

- ❌ Redundant

Description	Select whether to notify when a redundant copy starts or ends abnormally for each condition shown below. When notifying, select the notification method.
	
	• Any Time
	  Notifies always when a redundant copy starts or ends abnormally.
	• when HS<0
	  Notifies only if a redundant copy starts or ends abnormally when the available hot spare disk is "0".

- ❌ Complete Redundant Copy

Description	Select whether to notify when a redundant copy and isolation of the non-protected (non-shielded) drive from the ETERNUS DX/AF are complete. When notifying, select the notification method.

- ❌ Complete Redundant Copy of HDD Shield

Description	Select whether to notify when a redundant copy and isolation of the protected (shielded) drive from the ETERNUS DX/AF are complete. When notifying, select the notification method.

🔵 N o t e

When the SNMP trap setting is changed from "OFF" to "ON", a message is displayed in the ETERNUS SF event log.

- ❌ Complete rebuild

Description	Select whether to notify when a bad sector (*1) is detected in the hot spare where rebuilding is completed. When notifying, select the notification method. *1: A bad sector is the location information (address and length) where an error such as data reading error occurs during rebuild, copyback, or redundant copy.

- ❌ Bad data

Description	Select whether to notify when a bad sector is detected in the drive. When notifying, select the notification method.

- ❌ Pinned data

Description	Select whether to notify when pinned data (*1) is detected or disappears. When notifying, select the notification method. *1: "Pinned data" is the data left in the cache due to unsuccessful write-back to the drive from the cache area.

- ❌ Not Ready

Description	Select whether to notify when the ETERNUS DX/AF is in the "Not ready" state (*1). When notifying, select the notification method. *1: "Not ready" is the state in which the ETERNUS DX/AF cannot operate properly due to a cause such as failures in multiple parts.

- ❌ Remote Path Error during Data Transfer

Description	Select whether to notify when an error occurs in a copy path and a copy session that is not suspended exists. When notifying, select the notification method.

- ❌ Remote Path Error of no Data Transfer

Description	Select whether to notify when an error occurs in a copy path and a copy session that is in one of the following conditions exists. When notifying, select the notification method. • No REC sessions exist • All of the REC sessions are suspended

- ❌ REC Buffer Halt (Path Error)

Description	Select whether to notify when an REC buffer halt caused by copy path error occurs. When notifying, select the notification method.

- ❌ REC Buffer Halt (Overload)

Description	Select whether to notify when an REC buffer halt caused by overload occurs. When notifying, select the notification method.

- ❌ REC Buffer Halt (Other Error)

Description	Select whether to notify when an REC buffer halt caused by an error occurs. When notifying, select the notification method.

- ❌ Copy Session Error

Description	Select whether to notify when an error is detected in the Advanced Copy session or when a failed Advanced Copy session is recovered. When notifying, select the notification method.

- ❌ Thin Provisioning Pool Rate

Description	Select whether to notify when the TPP usage changes (*1). When notifying, select the notification method.
	
	*1: Notify when the TPP usage (or DEDUP_SYS Volume usage for TPPs where the Deduplication/Compression setting is enabled) changes as follows:
	
	- For TPPs where the Deduplication/Compression setting is enabled
	  • From "Normal" or "Attention" to "Warning"
	  • The TPP capacity is exhausted
	- For the other TPPs
	  • From "Normal" to "Attention"
	  • From "Normal" or "Attention" to "Warning"
	  • The TPP capacity is exhausted

- ❌ SED Network Error

Description	Select whether to notify when the communication between the ETERNUS DX/AF and the key server is disconnected. When notifying, select the notification method.

- ❌ NAS I/O Error

Description	Select whether to notify when an I/O error is detected in the NAS system. When notifying, select the notification method. This item is only displayed in a Unified Storage environment.

- ❌ NAS Snapshot Error

Description	Select whether to notify when a snapshot acquisition error is detected in the NAS system. When notifying, select the notification method. This item is only displayed in a Unified Storage environment.

- ❌ Extended System Volume Error

Description	Select whether to notify the error status of the NAS expanded system volume (such as the unmount state, access error, or out of capacity) for the NAS system. When notifying, select the notification method. This item is only displayed in a Unified Storage environment.

- ❌ Disconnect Storage Cluster Controller

Description	Select whether to notify when communication error with the paired storage system is detected if the Storage Cluster controller has been specified. When notifying, select the notification method. This item is only displayed when "Enable" is selected for the Storage Cluster function.

● **Warning Level**

Select whether to notify of a warning event for each event type.
The input conditions and the display contents for the warning level are as follows:

Input condition/
Display contents
	Checkbox
	• Selected
	  Notify
	• Cleared
	  Not notify
	• -
	  Not applicable to notification

- ⚠ Parts Warning

Description	Select whether to notify when a warning level event occurs in a part other than the drive. When notifying, select the notification method.

- ⚠ Drive Warning

Description	Select whether to notify when a warning level event occurs in a non-protected (non-shielded) drive for each condition that is described below. When notifying, select the notification method.
	
	• Any Time
	  Notifies always when a warning level event occurs in the drive.
	• when HS<0
	  Notifies only if a warning level event occurs in the drive when available hot spare disk is "0" (*1).
	*1: When rebuilding cannot be performed because there are no hot spares that can be used as a substitute for the failed drive.

- ⚠ Drive Warning of HDD Shield

Description	Select whether to notify when a warning level event occurs in a protected (shielded) drive for each condition that is described below. When notifying, select the notification method.
	
	• Any Time
	  Notifies always when a warning level event occurs in a protected (shielded) drive.
	• when HS<0
	  Notifies only when a warning level event occurs in a protected (shielded) drive failure while available hot spare disk is "0" (*1).
	*1: When rebuilding cannot be performed because there are no hot spares that can be used as a substitute for the failed drive.

🔵 **N o t e**

When the SNMP trap setting is changed from "OFF" to "ON", a message is displayed in the ETERNUS SF event log.

- ⚠ Temperature Warning

Description	Select whether to notify when a temperature warning status is detected by the sensor. When notifying, select the notification method.

- ⚠ Battery life Warning

Description	Select whether to notify a battery expiration in advance (*1). When notifying, select the notification method. This item is displayed for the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, the ETERNUS AF250 S2/AF650 S2, and the ETERNUS AF650. *1: Advance notice of battery expiration is issued once "6 months before", once "a week before", and once a day during the period from "6 days before" to "the expiration date".

- ⚠ NAS I/O Warning

Description	Select whether to notify when a warning level I/O error (read error from or write error to the metadata area or the bitmap area) is detected in the NAS system. When notifying, select the notification method. This item is only displayed in a Unified Storage environment.

- ⚠ NAS Connection Error

Description	Select whether to notify when a NAS connection error (receiving incorrect message or blocked file system) is detected in the NAS system. When notifying, select the notification method. This item is only displayed in a Unified Storage environment.

- ⚠ Out of NAS Capacity

Description	Select whether to notify when one of the events described below occurs. When notifying, select the notification method. • The capacity in the file system (or data area) that is assigned in NAS is insufficient • The used capacity of the NAS user volume exceeds 95% or 98% This item is only displayed in a Unified Storage environment.

- ⚠ NAS Quota Limit Exceeded

Description	Select whether to notify when the quota setting information (such as Drive Used Size or File Count) for NAS user volumes or shared folders exceeds the threshold in the NAS system. When notifying, select the notification method. This item is only displayed in a Unified Storage environment.

⬤ N o t e

- The relevant event is notified when both the warning and limit values are specified and the status changes as described below.
  - Less than the warning value → Exceeds the warning value
  - Less than the warning value → Exceeds the limit value
  - More than the warning value and less than the limit value → Exceeds the limit value
- The relevant event is notified when only the limit value is specified and the status changes as described below.
  - Less than the limit value → Exceeds the limit value
- The relevant event is notified when only the warning value is specified and the status changes as described below.
  - Less than the warning value → Exceeds the warning value

- ⚠ Extended System Volume Warning

Description	Select whether to notify when used capacity of the NAS expanded system volume in the NAS system exceeds 90% or more. When notifying, select the notification method. This item is only displayed in a Unified Storage environment.

● **Informational Level**

Select whether to notify of an informational event for each event type.
The input conditions and the display contents for the informational level are as follows:

Input condition/
Display contents
	Checkbox
	  • Selected
	    Notify
	  • Cleared
	    Not notify
	  • -
	    Not applicable to notification

- ⓘ Recovery module

Description	Select whether to notify when the failed part is recovered by taking actions such as replacement. When notifying, select the notification method.

- ⓘ Temperature restoration

Description	Select whether to notify when a temperature error or warning status is recovered to the normal status. When notifying, select the notification method.

- ⓘ User login/logout

Description	Select whether to notify when a user login/logout is detected. When notifying, select the notification method.

- ⓘ Operated RAID Group

Description	Select whether to notify when the RAID group is created or deleted. When notifying, select the notification method.

- ⓘ Added/Released Hot Spare

Description	Select whether to notify when the hot spare disk is registered or released. When notifying, select the notification method.

- ⓘ Operated Volume

Description	Select whether to notify when the volume is created or deleted. When notifying, select the notification method.

- ⓘ Power off/on Apply Firmware

Description	Select whether to notify when the ETERNUS DX/AF is turned off/on or when the hot controller firmware upgrade is performed. When notifying, select the notification method.

- ⓘ SDP Usage Rate Over Lv1

Description	Select whether to notify when an SDP Policy Level 1 (Informational) event occurs. When notifying, select the notification method.

🔵 **N o t e**

Threshold of SDP usage (SDP Usage Rate Over Lv1, SDP Usage Rate Over Lv2, SDP Usage Rate Over Lv3) can be specified using the procedure in "Modify Copy Parameters" (page 586).

- ⓘ SDP Usage Rate Over Lv2

Description	Select whether to notify when an SDP Policy Level 2 (Warning) event occurs. When notifying, select the notification method.

- ⓘ SDP Usage Rate Over Lv3

Description	Select whether to notify when an SDP Policy Level 3 (Error) event occurs. When notifying, select the notification method.

- ⓘ Copy Table Size Usage Rate Over

Description	Select whether to notify when the copy table usage exceeds the threshold. When notifying, select the notification method.

🔵 N o t e

Threshold of copy table size usage can be specified using the procedure in "Modify Copy Table Size" (page 581).

- ⓘ Trial copy license expired

Description	Select whether to notify when a copy trial license expiration event occurs. When notifying, select the notification method.

- ⓘ Remote Path Recovery

Description	Select whether to notify when a remote path is recovered after a remote path error (*1) is notified. When notifying, select the notification method. *1: The remote path error indicates "Remote Path Error during Data Transfer" or "Remote Path Error of no Data Transfer".

- ⓘ No Free Space on ODX Buffer Volume

Description	Select whether to notify when an insufficient free space event for an ODX Buffer volume occurs. When notifying, select the notification method.

🔵 N o t e

If free space of an ODX Buffer volume is insufficient, expand the volume capacity as required. For details, refer to the following sections:
- "Expand Volume" (page 274)
- "Expand Thin Provisioning Volume" (page 281)
- "Start RAID Migration" (page 296)

- ⓘ SED Network Error Recovered

Description	Select whether to notify when the communication between the ETERNUS DX/AF and the key server is recovered. When notifying, select the notification method.

- ⓘ FC CA Port Link Status Changed

Description	Select whether to notify when a link down occurs after an FC link is established and the link status is changed. When notifying, select the notification method. Note that a change in the link status due to user operation is not notified. A change in the link status for all FC ports is notified. The notification is reported regardless of the type (FC), the port mode (CA, RA, CA/RA, Initiator), and the transfer rate. The following FC link status types can be detected and notified: 　• The link status between the ETERNUS DX/AF and a directly connected server 　• The link status between the ETERNUS DX/AF and switches The FC link status can be checked in the [Port Detail] screen. Refer to "Port Detail" (page 757) for details.

⬤ N o t e

- Link up and link down that occur due to the following user operations are not notified.
  - Rebooting of the ETERNUS DX/AF
  - Hot maintenance of a CA or a CM in which a CA is installed
  - Preventive maintenance of a CA or a CM in which a CA is installed
  - Chip reset due to a change in the FC port parameters
- If the occurrence of link down and link up repeats within a 10 second interval, the first two sets of link down and link up are notified. Notification of this event is suspended for 20 minutes after the notification.
- Note that the link status between a server and a switch cannot be detected.

- ⓘ iSCSI CA Port Link Status Changed

Description	Select whether to notify when a link down occurs after an iSCSI link is established and the link status is changed. When notifying, select the notification method. Note that a change in the link status due to user operation is not notified. A change in the link status for all iSCSI ports is notified. The notification is reported regardless of the port mode (CA, RA, CA/RA) and transfer rate. The following iSCSI link status types can be detected and notified: 　• The link status between the ETERNUS DX/AF and a directly connected server 　• The link status between the ETERNUS DX/AF and switches The iSCSI link status can be checked in the [Port Detail] screen. Refer to "Port Detail" (page 757) for details.

⬤ N o t e

- Link up and link down that occur due to the following user operations are not notified.
  - Rebooting of the ETERNUS DX/AF
  - Hot maintenance of a CA or a CM in which a CA is installed
  - Preventive maintenance of a CA or a CM in which a CA is installed
  - Chip reset due to a change in the iSCSI port parameters
- If the occurrence of link down and link up repeats within a 10 second interval, the first two sets of link down and link up are notified. Notification of this event is suspended for 20 minutes after the notification.
- Note that the link status between a server and a switch cannot be detected.

- ⓘ Host Login Over

Description	Select whether to notify when the number of connected hosts for each CA port exceeds the maximum value (256 hosts). When notifying, select the notification method. This item is notified regardless of the CA type (FC, iSCSI, SAS, and FCoE).

- ⓘ NAS Connection Status

Description	Select whether to notify when the link status for a NAS connection is changed (such as mount, unmount, or recovery of the file system) in the NAS system. When notifying, select the notification method. This item is only displayed in a Unified Storage environment.

- ⓘ Out of NAS Capacity

Description	Select whether to notify when insufficient capacity in the file system (data area) that is allocated by the NAS is detected in the NAS system. When notifying, select the notification method. This item is only displayed in a Unified Storage environment.

- ⓘ Out of NAS File Management Domain

Description	Select whether to notify when insufficient capacity in the management area for the files and the directories of the NAS function is detected in the NAS system. When notifying, select the notification method. This item is only displayed in a Unified Storage environment.

- ⓘ Succeed NAS Snapshot

Description	Select whether to notify when a snapshot acquisition has succeeded in the NAS system. When notifying, select the notification method. This item is only displayed in a Unified Storage environment.

- ⓘ Fall below NAS Quota Limit

Description	Select whether to notify when the quota setting information (such as Drive Used Size or File Count) for NAS user volumes or shared folders becomes less than the threshold in the NAS system. When notifying, select the notification method. This item is only displayed in a Unified Storage environment.

⬤ N o t e

- The relevant event is notified when both the warning and limit values are specified and the status changes as described below.
    - Exceeds the warning value → Less than the warning value
    - Exceeds the limit value → Less than the warning value
- The relevant event is notified when only the limit value is specified and the status changes as described below.
    - Exceeds the limit value → Less than the limit value
- The relevant event is notified when only the warning value is specified and the status changes as described below.
    - Exceeds the warning value → Less than the warning value

- ⓘ NAS CPU Warning

Description	Select whether to notify when the used rate of the whole CPU in the NAS system exceeds 90% or more. When notifying, select the notification method. This item is only displayed in a Unified Storage environment.

- ⓘ NAS CPU Recovered

Description	Select whether to notify when the used rate of the whole CPU in the NAS system goes from 90% or more to less than 80%. When notifying, select the notification method. This item is only displayed in a Unified Storage environment.

- ⓘ Extended System Volume Recovered

Description	Select whether to notify when the used capacity of the NAS expanded system volume in the NAS system goes from 90% or more to less than 80%. When notifying, select the notification method. This item is only displayed in a Unified Storage environment.

- ⓘ Multipath Status

Description	Select whether to notify when the NAS port status in the Multipath configuration has changed. When notifying, select the notification method. This item is only displayed in a Unified Storage environment.

- ⓘ Automatic Change Storage Cluster Active/Standby State

Description	Select whether to notify when the Storage Cluster status is changed from "Standby" to "Active" or from "Active" to "Standby" with automatic failover or failback. When notifying, select the notification method. This item is only displayed when "Enable" is selected for the Storage Cluster function.

▶ **Caution**

- The following events have been changed from "❌ Error Severity Level" to "ⓘ Informational Level" in the [Setup Event Notification] function of the controller firmware version V10L30 or later.
  - Automatic Change Storage Cluster Active/Standby State
  - Manual Change Storage Cluster Active/Standby State
- If the controller firmware version is updated from V10L2x to V10L30 or later, the event notification settings (whether to notify and the notification method) that were set in V10L2x are retained.

- ⓘ Manual Change Storage Cluster Active/Standby State

Description	Select whether to notify when the Storage Cluster status is changed from "Standby" to "Active" or from "Active" to "Standby" with manual failover or failback. When notifying, select the notification method. This item is only displayed when "Enable" is selected for the Storage Cluster function.

- ⓘ Connect Storage Cluster Controller

Description	Select whether to notify when communication with the paired storage system is recovered if the Storage Cluster controller has been specified. When notifying, select the notification method. This item is only displayed when "Enable" is selected for the Storage Cluster function.

Initial setting list

The initial setting of event notification is described below.

Item	Notification method					
	Host Sense Key Code Qualifier	SNMP Trap	E-Mail	syslog	REMCS	AIS Connect
All Error Events	Selected/ Cleared	Selected/ Cleared	Selected/ Cleared	Cleared	Selected/ Cleared	Selected/ Cleared
All Warning Events	Selected	Selected	Selected	Cleared	Cleared	Selected
All Informational Events	–	Selected/ Cleared	Selected/ Cleared	Cleared	Cleared	Selected/ Cleared
Individual Settings within Severity Level	Yes	Yes	Yes	No	Yes	Yes

Selected: Notify
Cleared: Not notify
Selected/Cleared: Some events are notified and other events are not notified
–: Not applicable to notification

Event		Notification	Remarks
Blink Fault LED at warning		Enable	–
Turn on Fault LED when redundant copy is completed		Disable	–
Display parts (except drive) with error status on LCD		Enable	They are displayed for the ETERNUS DX8700 S3/DX8900 S3.
Display parts (except drive) with warning status on LCD		Enable	
Display drives with error status on LCD	Any Time	Enable	
	when HS<0	Disable	
Display drives with warning status on LCD	Any Time	Enable	
	when HS<0	Disable	

Level	Event		Notification method					
			Host Sense Key Code Qualifier	SNMP Trap	E-Mail	syslog	REMCS	AIS Connect
Error	Parts Error		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Drive Error	Any Time	Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
		when HS<0	Cleared	Cleared	Cleared	Cleared	–	Cleared
	Drive Error of HDD Shield	Any Time	Cleared	Cleared	Cleared	Cleared	Cleared	Cleared
		when HS<0	Cleared	Cleared	Cleared	Cleared	–	Cleared
	Succeeded HDD Shield		–	Cleared	Cleared	Cleared	Cleared	Cleared
	Temperature Error		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	End of battery life		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Rebuild/Copyback w/ redundant		Selected	Cleared	Cleared	Cleared	Cleared	Cleared
	Rebuild/Copy-back w/o redundant	Any Time	Selected	Cleared	Cleared	Cleared	Cleared	Cleared
		when HS<0	Cleared	Cleared	Cleared	Cleared	–	Cleared

Level	Event		Notification method					
			Host Sense Key Code Qualifier	SNMP Trap	E-Mail	syslog	REMCS	AIS Connect
Error	Redundant	Any Time	Cleared	Cleared	Cleared	Cleared	Cleared	Cleared
		when HS<0	Cleared	Cleared	Cleared	Cleared	–	Cleared
	Complete Redundant Copy		Cleared	Cleared	Cleared	Cleared	Selected	Selected
	Complete Redundant Copy of HDD Shield		Cleared	Cleared	Cleared	Cleared	Cleared	Cleared
	Complete rebuild		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Bad data		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Pinned data		Selected (*1)	Selected	Selected	Cleared	Selected (fixed)	Selected
	Not Ready		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Remote Path Error during Data Transfer		Selected	Selected	Selected	Cleared	Selected	Selected
	Remote Path Error of no Data Transfer		Cleared	Cleared	Cleared	Cleared	Cleared	Cleared
	REC Buffer Halt (Path Error)		–	Selected	Selected	Cleared	Selected	Selected
	REC Buffer Halt (Overload)		–	Selected	Selected	Cleared	Selected	Selected
	REC Buffer Halt (Other Error)		–	Selected	Selected	Cleared	Selected	Selected
	Copy Session Error		–	Cleared	Cleared	Cleared	Cleared	Cleared
	Thin Provisioning Pool Rate		–	Selected	Selected	Cleared	–	Cleared
	SED Network Error		–	Selected	Selected	Cleared	Cleared	Cleared
	NAS I/O Error		–	Selected	Selected	Cleared	Selected (fixed)	Selected
	NAS Snapshot Error		–	Selected	Selected	Cleared	Cleared	Cleared
	Extended System Volume Error		–	Selected	Selected	Cleared	Selected (fixed)	Selected
	Disconnect Storage Cluster Controller		–	Selected	Cleared	Cleared	Cleared	Cleared
Warning	Parts Warning		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Drive Warning	Any Time	Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
		when HS<0	Cleared	Cleared	Cleared	Cleared	–	Cleared
	Drive Warning of HDD Shield	Any Time	Cleared	Cleared	Cleared	Cleared	Cleared	Cleared
		when HS<0	Cleared	Cleared	Cleared	Cleared	–	Cleared
	Temperature Warning		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Battery life Warning		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	NAS I/O Warning		–	Selected	Selected	Cleared	Selected (fixed)	Selected
	NAS Connection Error		–	Selected	Selected	Cleared	Selected (fixed)	Selected

Level	Event	Notification method					
		Host Sense Key Code Qualifier	SNMP Trap	E-Mail	syslog	REMCS	AIS Connect
Warning	Out of NAS Capacity	–	Selected	Selected	Cleared	Selected (fixed)	Selected
	NAS Quota Limit Exceeded	–	Selected	Selected	Cleared	Cleared (fixed)	Cleared
	Extended System Volume Warning	–	Selected	Selected	Cleared	–	–
Informational	Recovery module	–	Cleared	Cleared	Cleared	–	Cleared
	Temperature restoration	–	Cleared	Cleared	Cleared	–	Cleared
	User login/logout	–	Cleared	Cleared	Cleared	–	Cleared
	Operated RAID Group	–	Cleared	Cleared	Cleared	–	Cleared
	Added/Released Hot Spare	–	Cleared	Cleared	Cleared	–	Cleared
	Operated Volume	–	Cleared	Cleared	Cleared	–	Cleared
	Power off/on Apply Firmware	–	Cleared	Cleared	Cleared	–	Cleared
	SDP Usage Rate Over Lv1	–	Cleared	Cleared	Cleared	–	Cleared
	SDP Usage Rate Over Lv2	–	Cleared	Cleared	Cleared	–	Cleared
	SDP Usage Rate Over Lv3	–	Cleared	Cleared	Cleared	–	Cleared
	Copy Table Size Usage Rate Over	–	Cleared	Cleared	Cleared	–	Cleared
	Trial copy license expired	–	Selected	Selected	Cleared	–	Cleared
	Remote Path Recovery	–	Cleared	Cleared	Cleared	Cleared	Cleared
	No Free Space on ODX Buffer Volume	–	Cleared	Cleared	Cleared	–	Cleared
	SED Network Error Recovered	–	Selected	Selected	Cleared	–	–
	FC CA Port Link Status Changed	–	Cleared	Cleared	Cleared	–	Cleared
	iSCSI CA Port Link Status Changed	–	Cleared	Cleared	Cleared	–	Cleared
	Host Login Over	–	Cleared	Cleared	Cleared	–	Cleared
	NAS Connection Status	–	Cleared	Cleared	Cleared	–	Cleared
	Out of NAS Capacity	–	Cleared	Cleared	Cleared	–	Cleared
	Out of NAS File Management Domain	–	Cleared	Cleared	Cleared	–	Cleared
	Succeed NAS Snapshot	–	Selected	Cleared	Cleared	–	Cleared
	Fall below NAS Quota Limit	–	Selected	Cleared	Cleared	–	Cleared
	NAS CPU Warning	–	Cleared	Cleared	Cleared	–	–
	NAS CPU Recovered	–	Cleared	Cleared	Cleared	–	–
	Extended System Volume Recovered	–	Selected	Selected	Cleared	–	–
	Multipath Status	–	Cleared	Cleared	Cleared	–	–
	Automatic Change Storage Cluster Active/Standby State	–	Selected	Selected	Cleared	Selected	Selected

Level	Event	Notification method					
		Host Sense Key Code Qualifier	SNMP Trap	E-Mail	syslog	REMCS	AIS Connect
Informational	Manual Change Storage Cluster Active/Standby State	–	Selected	Cleared	Cleared	Cleared	Cleared
	Connect Storage Cluster Controller	–	Selected	Cleared	Cleared	Cleared	Cleared

Selected: Notify
Cleared: Not notify
Selected (fixed): Always notify (This setting cannot be changed with this function.)
–: Not applicable to notification
*1:   Host Sense Key Code Qualifier is not notified when pinned data disappears.

REMCS recommended setting list

The REMCS recommended setting of event notification is described below. For the notification methods indicated with "*", notification setting has been changed from the system default.

Item	Notification method					
	Host Sense Key Code Qualifier	SNMP Trap	E-Mail	syslog	REMCS	AIS Connect
All Error Events	Selected/ Cleared	Selected/ Cleared	Selected/ Cleared	Cleared	Selected/ Cleared	Selected/ Cleared
All Warning Events	Cleared *	Cleared *	Cleared *	Cleared	Cleared	Cleared *
All Informational Events	–	Selected/ Cleared	Selected/ Cleared	Cleared	Cleared	Selected/ Cleared
Individual Settings within Severity Level	Yes	Yes	Yes	No	Yes	Yes

Selected: Notify
Cleared: Not notify
Selected/Cleared: Some events are notified and other events are not notified
–: Not applicable to notification

Event		Notification	Remarks
Blink Fault LED at warning		Disable *	–
Turn on Fault LED when redundant copy is completed		Disable	–
Display parts (except drive) with error status on LCD		Enable	They are displayed for the ETERNUS DX8700 S3/DX8900 S3.
Display parts (except drive) with warning status on LCD		Disable *	
Display drives with error status on LCD	Any Time	Disable *	
	when HS<0	Enable *	
Display drives with warning status on LCD	Any Time	Disable *	
	when HS<0	Disable	

Level	Event		Notification method					
			Host Sense Key Code Qualifier	SNMP Trap	E-Mail	syslog	REMCS	AIS Connect
Error	Parts Error		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Drive Error	Any Time	Cleared *	Cleared *	Cleared *	Cleared	Selected (fixed)	Cleared *
		when HS<0	Cleared	Selected *	Selected *	Cleared	–	Selected *

Level	Event		Notification method					
			Host Sense Key Code Qualifier	SNMP Trap	E-Mail	syslog	REMCS	AIS Connect
Error	Drive Error of HDD Shield	Any Time	Cleared	Cleared	Cleared	Cleared	Cleared	Cleared
		when HS<0	Cleared	Cleared	Cleared	Cleared	–	Cleared
	Succeeded HDD Shield		–	Cleared	Cleared	Cleared	Cleared	Cleared
	Temperature Error		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	End of battery life		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Rebuild/Copyback w/ redundant		Cleared *	Cleared	Cleared	Cleared	Cleared	Cleared
	Rebuild/Copy-back w/o redundant	Any Time	Cleared *	Cleared	Cleared	Cleared	Cleared	Cleared
		when HS<0	Selected *	Cleared	Cleared	Cleared	–	Cleared
	Redundant	Any Time	Cleared	Cleared	Cleared	Cleared	Cleared	Cleared
		when HS<0	Cleared	Cleared	Cleared	Cleared	–	Cleared
	Complete Redundant Copy		Cleared	Cleared	Cleared	Cleared	Selected	Selected
	Complete Redundant Copy of HDD Shield		Cleared	Cleared	Cleared	Cleared	Cleared	Cleared
	Complete rebuild		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Bad data		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Pinned data		Selected (*1)	Selected	Selected	Cleared	Selected (fixed)	Selected
	Not Ready		Selected	Selected	Selected	Cleared	Selected (fixed)	Selected
	Remote Path Error during Data Transfer		Selected	Selected	Selected	Cleared	Selected	Selected
	Remote Path Error of no Data Transfer		Cleared	Cleared	Cleared	Cleared	Cleared	Cleared
	REC Buffer Halt (Path Error)		–	Selected	Selected	Cleared	Selected	Selected
	REC Buffer Halt (Overload)		–	Selected	Selected	Cleared	Selected	Selected
	REC Buffer Halt (Other Error)		–	Selected	Selected	Cleared	Selected	Selected
	Copy Session Error		–	Cleared	Cleared	Cleared	Cleared	Cleared
	Thin Provisioning Pool Rate		–	Selected	Selected	Cleared	–	Cleared
	SED Network Error		–	Selected	Selected	Cleared	–	Cleared
	NAS I/O Error		–	Selected	Selected	Cleared	Selected (fixed)	Selected
	NAS Snapshot Error		–	Selected	Selected	Cleared	Cleared	Cleared
	Extended System Volume Error		–	Selected	Selected	Cleared	Selected (fixed)	Selected
	Disconnect Storage Cluster Controller		–	Selected	Cleared	Cleared	Cleared	Cleared

Level	Event		Notification method					
			Host Sense Key Code Qualifier	SNMP Trap	E-Mail	syslog	REMCS	AIS Connect
Warning	Parts Warning		Cleared *	Cleared *	Cleared *	Cleared	Selected (fixed)	Cleared *
	Drive Warning	Any Time	Cleared *	Cleared *	Cleared *	Cleared	Selected (fixed)	Cleared *
		when HS<0	Cleared	Cleared	Cleared	Cleared	–	Cleared
	Drive Warning of HDD Shield	Any Time	Cleared	Cleared	Cleared	Cleared	Cleared	Cleared
		when HS<0	Cleared	Cleared	Cleared	Cleared	–	Cleared
	Temperature Warning		Cleared *	Cleared *	Cleared *	Cleared	Selected (fixed)	Cleared *
	Battery life Warning		Cleared *	Cleared *	Cleared *	Cleared	Selected (fixed)	Cleared *
	NAS I/O Warning		–	Cleared *	Cleared *	Cleared	Selected (fixed)	Cleared *
	NAS Connection Error		–	Cleared *	Cleared *	Cleared	Selected (fixed)	Cleared *
	Out of NAS Capacity		–	Cleared *	Cleared *	Cleared	Selected (fixed)	Cleared *
	NAS Quota Limit Exceeded		–	Selected	Cleared *	Cleared	Cleared (fixed)	Cleared
	Extended System Volume Warning		–	Selected	Selected	Cleared	–	–
Informational	Recovery module		–	Cleared	Cleared	Cleared	–	Cleared
	Temperature restoration		–	Cleared	Cleared	Cleared	–	Cleared
	User login/logout		–	Cleared	Cleared	Cleared	–	Cleared
	Operated RAID Group		–	Cleared	Cleared	Cleared	–	Cleared
	Added/Released Hot Spare		–	Cleared	Cleared	Cleared	–	Cleared
	Operated Volume		–	Cleared	Cleared	Cleared	–	Cleared
	Power off/on Apply Firmware		–	Cleared	Cleared	Cleared	–	Cleared
	SDP Usage Rate Over Lv1		–	Cleared	Cleared	Cleared	–	Cleared
	SDP Usage Rate Over Lv2		–	Cleared	Cleared	Cleared	–	Cleared
	SDP Usage Rate Over Lv3		–	Cleared	Cleared	Cleared	–	Cleared
	Copy Table Size Usage Rate Over		–	Cleared	Cleared	Cleared	–	Cleared
	Trial copy license expired		–	Selected	Selected	Cleared	–	Cleared
	Remote Path Recovery		–	Cleared	Cleared	Cleared	Cleared	Cleared
	No Free Space on ODX Buffer Volume		–	Cleared	Cleared	Cleared	–	Cleared
	SED Network Error Recovered		–	Selected	Selected	Cleared	–	–
	FC CA Port Link Status Changed		–	Cleared	Cleared	Cleared	–	Cleared
	iSCSI CA Port Link Status Changed		–	Cleared	Cleared	Cleared	–	Cleared
	Host Login Over		–	Cleared	Cleared	Cleared	–	Cleared
	NAS Connection Status		–	Cleared	Cleared	Cleared	–	Cleared

Level	Event	Notification method					
		Host Sense Key Code Qualifier	SNMP Trap	E-Mail	syslog	REMCS	AIS Connect
Informational	Out of NAS Capacity	–	Cleared	Cleared	Cleared	–	Cleared
	Out of NAS File Management Domain	–	Cleared	Cleared	Cleared	–	Cleared
	Succeed NAS Snapshot	–	Selected	Cleared	Cleared	–	Cleared
	Fall below NAS Quota Limit	–	Selected	Cleared	Cleared	–	Cleared
	NAS CPU Warning	–	Cleared	Cleared	Cleared	–	–
	NAS CPU Recovered	–	Cleared	Cleared	Cleared	–	–
	Extended System Volume Recovered	–	Selected	Selected	Cleared	–	–
	Multipath Status	–	Cleared	Cleared	Cleared	–	–
	Automatic Change Storage Cluster Active/Standby State	–	Selected	Selected	Cleared	Selected	Selected
	Manual Change Storage Cluster Active/Standby State	–	Selected	Cleared	Cleared	Cleared	Cleared
	Connect Storage Cluster Controller	–	Selected	Cleared	Cleared	Cleared	Cleared

Selected: Notify
Cleared: Not notify
Selected (fixed): Always notify (This setting cannot be changed with this function.)
–: Not applicable to notification
*1:   Host Sense Key Code Qualifier is not notified when pinned data disappears.

Export/Delete Log

For details about this function, refer to "Export/Delete Log" (page 160).
For the factory default settings for this function, refer to "B. Export/Delete Log" (page 1262).

● Option

• Export Mode

Description	Specify the collection target of the CM log from "All" or "Only Disk Drive Log".
Input condition/ Display contents	• All • Only Disk Drive Log

• Specify Time Range

Description	Specify a time range for exporting logs.
Input condition/ Display contents	• Yes Specify a time range for exporting logs. • No Do not specify a time range for exporting logs. • Last 24 hours Export logs from the last 24 hours. • Last week Export logs from the last one week. • Last month Export logs from the last one month.

• Start Time

Description	When a time range is to be specified, specify the date and time to start exporting logs.
Input condition/ Display contents	YYYY-MM-DD hh:mm:ss (YYYY: Year, MM: Month (01 - 12), DD: Date (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))

• End Time

Description	When a time range is to be specified, specify the date and time to finish exporting logs.
Input condition/ Display contents	YYYY-MM-DD hh:mm:ss (YYYY: Year, MM: Month (01 - 12), DD: Date (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))

• Include I/O Module log

Description	When exporting the I/O module logs, select "Yes". When not exporting, select "No".
Input condition/ Display contents	• Yes • No

• Include NAS Engine log

Description	When exporting the NAS Engine logs, select "Yes". When not exporting, select "No". If "Yes" is selected for "Delete of Customer Information", this item is fixed to "No". This item is only displayed in a Unified Storage environment.
Input condition/ Display contents	• Yes • No

• Log File Size

Description	Select the log file size (segment size) when saving the exported log.
Input condition/ Display contents	• Non-segmentation • 4.27 MB • 1.44MB (Floppy Disk) • 640KB (E-Mail)

- • Delete of Customer Information

Description	When deleting the customer information (information to identify the customer such as; user name, box ID, and IP address) from the exported log, select "Yes". When not deleting, select "No".
Input condition/ Display contents	• Yes • No

Export/Delete Panic Dump

For details about this function, refer to "Export/Delete Panic Dump" (page 163).
For the factory default settings for this function, refer to "B. Export/Delete Panic Dump" (page 1262).

● Panic Dumps

- • Panic Dumps

Description	Select a checkbox for the panic dump to be exported (only one panic dump can be selected).
Input condition/ Display contents	Checkbox • Selected • Cleared

● Option

- • Dump File Segment Size

Description	Select the file size (segment size) when saving the exported panic dump.
Input condition/ Display contents	• Non-segmentation • 4.27 MB • 1.44MB (Floppy Disk) • 640KB (E-Mail)

Audit Log Management

Setup Audit Log

For details about this function, refer to "Setup Audit Log" (page 168).
For the factory default settings for this function, refer to "B. Setup Audit Log" (page 1263).

● Syslog Server1, Syslog Server2

- • Send Audit Log

Description	Select the audit log sending parameters. Logs are sent in the selected RFC message format.
Input condition/ Display contents	• on (RFC3164) • on (RFC5424) • off

• Domain Name / IP Address

Description	Input the domain name or the IP address of the Syslog server. There are two methods to specify an IP address; "IPv4" and "IPv6". The following IPv6 addresses can be used; "link local address", "global address", "unique local address", or "6to4 address". Refer to "Available IPv6 Address" (page 122) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation.

Input condition/
Display contents
	• For IPv4 address
	  xxx.xxx.xxx.xxx
	  xxx: 1 - 255 for the top field (decimal)
	  xxx: 0 - 255 for other fields (decimal)
	• For IPv6 address
	  xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
	  xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
	  Refer to "IPv6 Address Notation" (page 371) for details.
	• For domain name
	  Up to 63 alphanumeric characters and symbols

• Port No.

Description	Input the port number used to send an audit log.
Input condition/ Display contents	• Numeric characters • 1 - 65535

• LAN Port

Description	Input the LAN port number that is used to send an audit log.
Input condition/ Display contents	• MNT • RMT

Key Management

Setup Key Management Machine Name

For details about this function, refer to "Setup Key Management Machine Name" (page 170).

● Key Management Machine Name Setting

• Key Management Machine Name

Description	Input the name of the device that is to be used to connect to the key server. The key management device name corresponds to "Machine ID" in the key server.
Input condition/ Display contents	• Alphanumeric characters • Symbols (underscore "_") • The first letter must be an alphabetic character • Up to 48 characters

Add Key Server

For details about this function, refer to "Add Key Server" (page 171).
For the factory default settings for this function, refer to "B. Add Key Server" (page 1263).

● Key Server Setting

- Domain Name / IP Address

Description	Input the domain name (FQDN) or the IP address of the key server. There are two methods to specify an IP address; "IPv4" and "IPv6". The following IPv6 addresses can be used; "link local address", "global address", "unique local address", or "6to4 address". Refer to "Available IPv6 Address" (page 122) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation.
Input condition/ Display contents	• For IPv4 address xxx.xxx.xxx.xxx xxx: 1 - 255 for the top field (decimal) xxx: 0 - 255 for other fields (decimal) • For IPv6 address xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation (Setup Network Environment)" (page 122) for details. • For domain name Up to 63 alphanumeric characters and symbols

- Port No.

Description	Input the port number used to communicate with the key server.
Input condition/ Display contents	• Numeric characters • 1 - 65535

- LAN Port

Description	Select the LAN port used to communicate with the key server.
Input condition/ Display contents	• MNT • RMT

Modify Key Server

For details about this function, refer to "Modify Key Server" (page 173).
For details on the parameters for this function, refer to "A. Add Key Server" (page 1049).

Create Key Group

For details about this function, refer to "Create Key Group" (page 174).
For the factory default settings for this function, refer to "B. Create Key Group" (page 1263).

● Key Group Setting

• Name

Description	Input a key group name. The key group name corresponds to "Serial Number", which is managed in the key server.
Input condition/ Display contents	• Alphanumeric characters • Symbols (underscore "_") • The first letter must be an alphabetic character • Up to 32 characters

> **Caution**

Specify a unique key group name that is different from the other storage systems that use the same key server.
Do not change the key group name after the key status changes to "Normal". The key status can be checked on the [Key Group] screen. Refer to "Key Group" (page 653) for details.

• Storage System Group Name

Description	Input the storage system group name. The storage system group combines the key management device (Key Management Machine) name that is managed by the user with the key groups. The storage system group name corresponds to "Device Group Name", which is managed in the key server. If the default setting is used, input "ETERNUS_DX". The "default setting" uses the factory default device group name for "ETERNUS SF KM" (key management software).
Input condition/ Display contents	• Alphanumeric characters • Symbols (underscore "_") • The first letter must be an alphabetic character • Up to 16 digits • "ETERNUS_DX" (When using the default setting)

> **Caution**

For the storage system group name, specify the same name as "Device Group Name", which is registered in the key server.
Do not change the storage system group name after the key status changes to "Normal". The key status can be checked on the [Key Group] screen. Refer to "Key Group" (page 653) for details.

- Security Level

Description	Select the security level of the key group.
	"Security Level" indicates the handling level when application of the SED key to the target RAID group fails. If the key for the relevant RAID group cannot be obtained from the key server due to a communication error and the SEDs that configure the RAID group are changed to hot spares or changed to new SEDs due to failure or maintenance, the ETERNUS DX/AF performs operations according to the selected security level.
	Even if the security level is changed from "High" to "Low", the rebuilding process does not start immediately after the level is changed. Rebuilding processes start after the ETERNUS DX/AF recognizes that changing of the security level and key is complete.
Input condition/ Display contents	• High Rebuilding to hot spares for which the key cannot be changed after SED failure is not performed. The RAID group loses its redundancy ("⚠ Exposed" or "⚠ Partially Exposed" (only for High Reliability (RAID6)), "⚠ Exposed (Fast)" (only for High Reliability (RAID6-FR)), or "⚠ Partially Exposed (Fast)" (only for High Reliability (RAID6-FR))). When SED maintenance is being performed, replacing a SED with a new SED for which the key cannot be changed does not complete successfully. If this action is performed, the status of the new SED changes to "✖ Not Exist". When communication between the key server and the ETERNUS DX/AF returns to normal and the key can be obtained, the SED status changes to normal. Rebuilding to the SED for which the status changed to normal is performed after the key is changed. Note that "Modifying" may be displayed for the key status for few minutes even though the SED key has already changed. After changing the key, maintenance of the SEDs is complete.
	• Low Rebuilding or maintenance is performed by using the common key if changing of the key in the key server fails due to a network error.

- Recovery Mode

Description	Select the recovery mode of the key group.
	The recovery mode is a method to recover locked (*1) RAID groups or SEDs after communication with the key server is resolved. For RAID groups in locked status, "✖ SED Locked" is displayed. For SEDs in locked status, "✖ Not Exist" is displayed.
	*1: A blocked status that occurs when the key of the RAID groups cannot be obtained.
Input condition/ Display contents	• Automatic This mode recovers locked RAID groups or SEDs when the communication error with the key server is resolved.
	• Manual Use the [Recovery SED] function of ETERNUS Web GUI to recover the locked RAID groups or SEDs when the communication error with the key server is resolved.

- Key Valid Period

Description	Select a key expiration period that is based on the date when the key from the server is obtained for the first time (beginning of use).
	When the key expires, a new key is obtained from the key server and the expired key is automatically replaced. The key expiration period is checked every eight hours.
Input condition/ Display contents	• Unlimited The same key is used until exactly 20 years elapses since the key was first used.
	• 1 month - 12 month The same key is used until the date and time in the specified month elapses since the key was first used. If the same date does not exist in the specified month (such as April 31st), the expiration date of the key becomes the last date of the specified month.

> **◉ N o t e**
>
> If the key expiration period is changed, the same key is used until the date and time of the specified month elapses since the key was first used. Note that the expiration period starts when the key is first used (not when the key expiration period is changed).

- Key Server

Description	Select the key server ID that is assigned for the master or slave server. "None" and the registered key server ID are displayed as options.

Input condition/ Display contents	• Master
	  - None
	  - 1
	  - 2
	• Slave
	  - None
	  - 1
	  - 2

> **▷ Caution**
>
> The same server ID (except for "None") cannot be selected for both the master and slave servers. Note that "None" cannot be selected for both of the servers when RAID groups are registered in the key group.
> The key can only be updated when the master server is specified. Refer to "Update SED Authentication Key" (page 177) for details.
> To perform maintenance of the key server, the key server setting parameters must be released temporality. Select "None" for the target key server before starting maintenance. After maintenance is complete, set the key server parameters again.

Modify Key Group

For details about this function, refer to "Modify Key Group" (page 176).
For details on the parameters for this function, refer to "A. Create Key Group" (page 1050).

Update SED Authentication Key

For details about this function, refer to "Update SED Authentication Key" (page 177).
For the factory default settings for this function, refer to "B. Update SED Authentication Key" (page 1263).

● **Current SED Authentication Key Setting**

- Current Key

Description	Select whether to enable ("Enabled Key") or disable ("Disabled Key") the current key.
Input condition/ Display contents	• Enabled Key • Disabled Key

Import SSL/KMIP Certificate

For details about this function, refer to "Import SSL/KMIP Certificate" (page 179).

● SSL/KMIP Certificate Setting

- SSL/KMIP Certificate File

Description	Click the [Browse...] button to specify the SSL/KMIP certificate file, or directly input the path to the SSL/KMIP certificate file.
Input condition/ Display contents	• Click the [Browse...] button to specify the SSL/KMIP certificate file • Directly input the path to the SSL/KMIP certificate file

Storage Migration Management

Start Storage Migration

For details about this function, refer to "Start Storage Migration" (page 181).

● Storage Migration

- Storage migration setting file

Description	Input the location where the Storage Migration setting file is stored. Click the [Browse...] button to specify the location, or input the location directly.
Input condition/ Display contents	• Click the [Browse...] button to specify the location • Directly input the location

External Drive Management

Create External Drives

For details about this function, refer to "Create External Drive" (page 192).
For the factory default settings for this function, refer to "B. Create External Drive" (page 1263).

● External Drive Setting

- External LU Information

Description	Select whether External Drives inherit volume information (External LU Information) from the external storage system when created. To inherit the External LU Information, select the "Inherit" checkbox. This setting is applied to all External Drives that are created by this operation.
Input condition/ Display contents	"Inherit" checkbox • Selected • Cleared

▶ **Caution**

To use the data migration destination volume for the Storage Cluster function, clear the "Inherit" checkbox.

● **Select External Storage**

• Radio button to select an external storage system

Description	Select the radio button of an external storage system for the migration source.
Input condition/ Display contents	External storage system

● **Select LUs of the External Storage**

• Checkbox to select External LUs

Description	Select a checkbox for a volume that transfers the External LU Information to the local storage system. To select all the displayed volumes, select the checkbox to the left of "LUN".
Input condition/ Display contents	Checkbox • Selected • Cleared

🔵 **N o t e**

LUNs with the same UID as the External Drives that are already created in the local storage system are not displayed in this list.

Remote Support Management

Setup Remote Support

For details about this function, refer to .
For the factory default settings for this function, refer to .

● **Information File**

• Customer Information File

Description	Import the "Customer Information File", which was created using the REMCS ESAT, to the ETERNUS DX/AF. Click the [Browse...] button to specify the "Customer Information File", or directly input the path to the "Customer Information File".
Input condition/ Display contents	• Click the [Browse...] button to specify the "Customer Information File" • Directly input the path to the "Customer Information File"

• Communication Environment Information File

Description	Import the "Communication Environment Information File", which was created using the REMCS ESAT, to the ETERNUS DX/AF. Click the [Browse...] button to specify the "Communication Environment Information File", or directly input the path to the "Communication Environment Information File".
Input condition/ Display contents	• Click the [Browse...] button to specify the "Communication Environment Information File" • Directly input the path to the "Communication Environment Information File"

🔵 **N o t e**

When importing Remote Support settings to the ETERNUS DX/AF all at once, click the [Browse...] button to specify the location where the settings file has been stored, and click the [Import] button.

● **Customer Information**

> ⬤ **N o t e**
>
> For setting items, refer to Step 2 in "Update Customer Information" (page 200).

● **Communication Environment Information**

> ⬤ **N o t e**
>
> For setting items, refer to Step 2 in "Update Communication Environment Information" (page 202).

● **Detailed Configuration Information**

- Data Transmission Method

Description	Select whether to "Split" or "Do not Split" into the specified size. Select "Split large E-Mail into multiple E-Mails" or "Split large data into multiple E-Mails", and specify the segment size, when segmenting outgoing mail. If the mail server does not allow the sending of segmented mail using "Split large E-Mail into multiple E-Mails", select "Split large data into multiple E-Mails" or "Do not Split".

Input condition/
Display contents
	• Split
	Outgoing mail is segmented.
	  - Split large E-Mail into multiple E-Mails
	    Outgoing mail is segmented into the specified size (64 - 6400KB).
	  - Split large data into multiple E-Mails
	    The file attached to the E-mail is segmented into several pieces, turned into one E-mail in the specified size (64 - 512KB), and sent in several transmissions.
	• Do not Split
	The message is sent as one E-mail without being segmented.

- Specify Storage System Name for HELO/EHLO Announcement when Sending E-Mail

Description	Select "Specify" or "Do not specify" for the ETERNUS DX/AF name for HELO/EHLO announcement when sending mail. When "Specify" is selected, input the domain. The domain of the HELO/EHLO Announcement must be specified in the mail protocol. If "Do not specify" has been selected, E-mails are sent using the strings after the "@" of the sender mail addresses as domains. If the mail server does not allow using the section after the "@" of the sender mail address as the domain, select "Specify" and input the appropriate domain.
Input condition/ Display contents	• Specify Up to 63 alphanumeric characters and symbols (except space) • Do not specify

- Use S/MIME

Description	Select whether or not to use S/MIME. S/MIME is a standard relating to encryption of E-mails and electronic signatures. Using S/MIME prevents E-mails from being sniffed, spoofed, and falsified. This item is available when one of the following conditions applies: • "Do not Split" is selected for the data transmission method • "Split" is selected for the data transmission method and "Split large data into multiple E-Mails" is specified
Input condition/ Display contents	• Use • Not use

● **Result Notification Information**

- Administrator

Description	Select "Notification" or "Not Notification" for your administrator of the setting confirmation result at the REMCS center. Select "Notification" for the "Administrator" or the "Connection check operator" and confirm the result.
Input condition/ Display contents	• Notification • Not Notification

- Connection check operator

Description	Select "Notification (Standard E-Mail format)", "Notification (Simple E-Mail format for cell phone)" or "Not Notification" for the connection check operator of the setting confirmation result at the REMCS center. If notifying, input the "Connection check operator E-Mail Address". Specify the "Connection check operator" if there is another person who needs to be notified of the setting confirmation result, other than the administrator.

Input condition/
Display contents
	• Notification (Standard E-Mail format)
	  Input the "Connection check operator E-Mail Address"
	• Notification (Simple E-Mail format for cell phone)
	  Input the "Connection check operator E-Mail Address"
	• Not Notification

- Connection check operator E-Mail Address

Description	If notifying the connection check operator of the setting confirmation result at the REMCS center, input the E-mail address.
Input condition/ Display contents	Up to 60 alphanumeric characters and symbols (except space)

● **Time Information**

▶ **Caution**

The timer parameter settings do not normally require modification.
If changing the default value, select the "Change following Timing Parameter items" checkbox.

- SMTP Connection Timeout

Description	Input the timeout limit when using SMTP connection.
Input condition/ Display contents	• Numeric characters • 1 - 600 sec.

- SMTP Response Timeout

Description	Input the timeout limit for SMTP response.
Input condition/ Display contents	• Numeric characters • 1 - 3600 sec.

- SMTP Retry Count

Description	Input the retry number of SMTP.
Input condition/ Display contents	• Numeric characters • 1 - 60

- SMTP Retry Interval

Description	Input the intervals for retrying SMTP.
Input condition/ Display contents	• Numeric characters • 1 - 3600 sec.

- HTTP Timeout

Description	Input the timeout limit when using HTTP connection.
Input condition/ Display contents	• Numeric characters • 1 - 3600 sec.

- HTTP Retry Count

Description	Input the retry number of HTTP.
Input condition/ Display contents	• Numeric characters • 1 - 60

- HTTP Retry Interval

Description	Input the intervals for retrying HTTP.
Input condition/ Display contents	• Numeric characters • 1 - 3600 sec.

- Queue Time before Sending E-Mails (only when POP Before SMTP authentication is enabled)

Description	Input the waiting time for sending mail.
Input condition/ Display contents	• Numeric characters • 1 - 3600 msec.

Update Customer Information

For details about this function, refer to "Update Customer Information" (page 200).

● **Information File**

• Customer Information File

Description	Import the "Customer Information File", which was created using the REMCS ESAT, to the ETER-NUS DX/AF. Click the [Browse...] button to specify the "Customer Information File", or directly input the path to the "Customer Information File".
Input condition/ Display contents	• Click the [Browse...] button to specify the "Customer Information File" • Directly input the path to the "Customer Information File"

> ◉ **N o t e**
>
> When importing customer information to the ETERNUS DX/AF all at once, click the [Browse...] button to specify the location where the customer information file has been stored, and click the [Import] button.

■ **Customer Information**

● **Detailed Settings**

• Checkbox

Description	If the "Delete any Customer Identity information from the storage system after the information is sent to the 'REMCS Center'." checkbox is selected, customer information saved on the ETERNUS DX/AF is deleted after transmitting the information to the REMCS center.
Input condition/ Display contents	"Delete any Customer Identity information from the storage system after the information is sent to the 'REMCS Center'." checkbox • Selected • Cleared

• Company Name (required)

Description	Input the company name that owns the ETERNUS DX/AF.
Input condition/ Display contents	Up to 60 alphanumeric characters and symbols

• Department/Division

Description	Input the department or division that owns the ETERNUS DX/AF.
Input condition/ Display contents	Up to 40 alphanumeric characters and symbols

• Address (required)

Description	Input the address of the company that owns the ETERNUS DX/AF.
Input condition/ Display contents	Up to 60 alphanumeric characters and symbols

- Building Name

Description	Input the building name where the company that owns the ETERNUS DX/AF is located.
Input condition/ Display contents	Up to 40 alphanumeric characters and symbols

- Administrator Name (required)

Description	Input the system administrator's name that manages the ETERNUS DX/AF.
Input condition/ Display contents	Up to 40 alphanumeric characters and symbols

- Administrator E-Mail Address (required)

Description	Input the E-mail address of the system administrator who manages the ETERNUS DX/AF.
Input condition/ Display contents	Up to 60 alphanumeric characters and symbols (except space)

- Postal Code (Zip Code)

Description	Input the postal code for the company that owns ETERNUS DX/AF.
Input condition/ Display contents	Up to 10 alphanumeric characters and symbols (except space)

- Phone Number (required)

Description	Input the phone number for the company that owns the ETERNUS DX/AF.
Input condition/ Display contents	Up to 20 numeric characters and symbols (except space)

- FAX Number

Description	Input the FAX number for the company that owns the ETERNUS DX/AF.
Input condition/ Display contents	Up to 20 numeric characters and symbols (except space)

- Storage System Unique Name

Description	Input the nickname for the ETERNUS DX/AF.
Input condition/ Display contents	Up to 32 alphanumeric characters and symbols (except space)

- Country of Installation (ISO3166 A2) (required) [Example] JP, US, DE, etc.

Description	Input the country code for the country where the ETERNUS DX/AF is located.
Input condition/ Display contents	- Two fixed letters - Capital letters or "99"

● **Installation Location**

- Address

Description	Input the address where the ETERNUS DX/AF is located.
Input condition/ Display contents	Up to 60 alphanumeric characters and symbols

• Building Name

Description	Input the building name where the ETERNUS DX/AF is located.
Input condition/ Display contents	Up to 40 alphanumeric characters and symbols

● **Information filled by Field Engineers**

• Installation Date

Description	Input the date when the ETERNUS DX/AF is installed.
Input condition/ Display contents	YYYY-MM (YYYY: Year (AD), MM: Month (01 - 12))

• Field Engineer E-Mail Address

Description	Input the E-mail address for the field engineer who installed the ETERNUS DX/AF.
Input condition/ Display contents	Up to 60 alphanumeric characters and symbols (except space)

• Customer Code

Description	Input the customer code.
Input condition/ Display contents	Up to 8 alphanumeric characters and symbols (except space)

Update Communication Environment Information

For details about this function, refer to .

● **Information File**

• Communication Environment Information File

Description	Import the "Communication Environment Information File", which was created using the REMCS ESAT, to the ETERNUS DX/AF. Click the [Browse...] button to specify the "Communication Environment Information File", or directly input the path to the "Communication Environment Information File".
Input condition/ Display contents	• Click the [Browse...] button to specify the "Communication Environment Information File" • Directly input the path to the "Communication Environment Information File"

> 🔵 **N o t e**
>
> When importing Remote Support settings to the ETERNUS DX/AF all at once, click the [Browse...] button to specify the location where the settings file has been stored, and click the [Import] button.

■ **Communication Environment Information**

● **Connection**

• Connection Type

Description	Select the connection type when using the REMCS operation.
Input condition/ Display contents	• Internet Connection • Internet Connection (E-Mail only) • P-P Connection • P-P Connection (E-Mail only) • P-P Connection (VPN Connection) • P-P Connection (VPN Connection E-Mail only)

• LAN Port used for Remote Support

Description	Select the LAN port of the ETERNUS DX/AF that is used for REMCS operation.
Input condition/ Display contents	• MNT • RMT

● **Service**

• Scheduled Connection Time (required)

Description	Input the time for scheduled REMCS connection.
Input condition/ Display contents	• Numeric characters • Hour (00 - 23) • Minute (00 - 59)

• Scheduled Connection Period (required)

Description	Select the term for scheduled REMCS connection.
Input condition/ Display contents	• everyday • Every Day (except Sunday) • Every Day (except Saturday and Sunday) • Once per Week

• Specify the Day of the Week

Description	When "Once per Week" is selected for "Scheduled Connection Period", select the day of the week to execute scheduled REMCS connection.
Input condition/ Display contents	• Sunday • Monday • Tuesday • Wednesday • Thursday • Friday • Saturday

● **Proxy Server**

• Proxy Server

Description	Input the IP address or the domain name of the proxy server that is used for REMCS operation.
Input condition/ Display contents	Up to 63 alphanumeric characters and symbols (except space)

• Port No.

Description	Input the port number of the proxy server.
Input condition/ Display contents	• Numeric characters • 0 - 65535

• User Name

Description	Input the user name when using the proxy server.
Input condition/ Display contents	Up to 32 alphanumeric characters and symbols (except space)

• Password

Description	Input the password of the user name when using the proxy server. The password entered is displayed with a series of symbols to hide the specified values.
Input condition/ Display contents	Up to 64 alphanumeric characters and symbols (except space)

● **SMTP Server**

• SMTP Server (required)

Description	Input the IP address or the domain name of the SMTP server that is used for REMCS operation.
Input condition/ Display contents	Up to 63 alphanumeric characters and symbols (except space)

• Port No. (required)

Description	Input the port number used by the SMTP server.
Input condition/ Display contents	• Numeric characters • 0 - 65535

• Sender E-Mail Address (required)

Description	Input the sender E-Mail address of mails sent by the ETERNUS DX/AF for REMCS operations.
Input condition/ Display contents	Up to 63 alphanumeric characters and symbols (except space)

• SMTP over SSL

Description	Select the SMTP over SSL method.
Input condition/ Display contents	• None • STARTTLS • SSL/TLS

● **SMTP Authentication Information**

- Authentication Type

Description	Select the SMTP authentication type.
Input condition/ Display contents	• No SMTP Authentication • POP Before SMTP Authentication • AUTH SMTP Authentication

- Authentication Method

Description	When "AUTH SMTP Authentication" is selected for "Authentication Type", specify the SMTP authentication method.
Input condition/ Display contents	• Automatic • CRAM-MD5 • PLAIN • LOGIN

- POP Server

Description	When the "Authentication Type" is "POP Before SMTP Authentication", input the domain name or the IP address of the POP server that is used for SMTP Authentication.
Input condition/ Display contents	Up to 63 alphanumeric characters and symbols (except space)

- Port No.

Description	Input the port number that is used when communicating with the POP server.
Input condition/ Display contents	• Numeric characters • 0 - 65535

- User Name

Description	Input the user name that is used when communicating with the POP server. This setting is enabled when selecting "POP Before SMTP Authentication" or "AUTH SMTP Authentication" for the "SMTP Authentication Type".
Input condition/ Display contents	Up to 32 alphanumeric characters and symbols (except space)

- Password

Description	Input the password that is used when communicating with the POP server. The password entered is displayed with a series of symbols to hide the specified values. This setting is enabled when selecting "POP Before SMTP Authentication" or "AUTH SMTP Authentication" for the "SMTP Authentication Type".
Input condition/ Display contents	Up to 64 alphanumeric characters and symbols (except space)

● **REMCS Center**

• REMCS Center (required)

Description	Select the REMCS center (in each country) where the ETERNUS DX/AF is connected.
Input condition/ Display contents	• *Blank • Fujitsu America • Australia • Brazil • Hong-Kong • China • Indonesia • Korea • Malaysia • Philippine • Singapore • Taiwan • Thailand • Vietnam • Individual support in Hawaii • OSC • Direct Input Setting

▷ **Caution**

If "Direct Input Setting" is displayed, the center cannot be changed to another location.

● **Detailed Configuration Information**

◉ **Ｎｏｔｅ**

For setting items, refer to Step 2 in "Setup Remote Support" (page 198).

● **Result Notification Information**

◉ **Ｎｏｔｅ**

For setting items, refer to Step 2 in "Setup Remote Support" (page 198).

● **Time Information**

◉ **Ｎｏｔｅ**

For setting items, refer to Step 2 in "Setup Remote Support" (page 198).

Setup Log Sending Parameters

For details about this function, refer to "Setup Log Sending Parameters" (page 204).
For the factory default settings for this function, refer to "B. Setup Log Sending Parameters" (page 1265).

● Send Log based on Events

- Send Log when Errors Occur

Description	To send logs automatically in the case of a failure, select the "Send" checkbox. The default state of "Send Log when Errors Occur" setting will be changed to "Send" if the Remote Support setting using the [Setup Remote Support] function has been completed.
Input condition/ Display contents	"Send" checkbox • Selected • Cleared

● Send Log Periodically

- Periodical Transmission of Log

Description	To send log periodically, select the "Enable" checkbox. The default state of "Periodical Transmission of Log" will be changed to "Enable" if the Remote Support setting using the [Setup Remote Support] function has been completed.
Input condition/ Display contents	"Enable" checkbox • Selected • Cleared

- Time

Description	Specify the time when sending logs periodically. A time between "10:00" and "15:00" is set for the default setting. (*1) *1: Different days and times are specified in the factory settings in order to disperse the load on the REMCS center.

Input condition/
Display contents
	• Numeric characters
	• 00 - 23
	  Hour
	• 00 - 59
	  Minute
	• Undefined (10:00 - 15:00)
	  Different times are specified in the factory settings.

- Period

Description	Specify the period when sending logs periodically.
Input condition/ Display contents	• Once per Week • everyday

• Day of the Week

Description	Specify the day of the week when sending logs periodically. The day of the week can be specified only when "Once per Week" has been specified as the period when sending logs periodically. A day between "Monday" and "Friday" is set for the default setting. (*1) *1:　Different days and times are specified in the factory settings in order to disperse the load on the REMCS center.
Input condition/ Display contents	• Sunday • Monday • Tuesday • Wednesday • Thursday • Friday • Saturday • Undefined (any day from Monday to Friday) 　Different days are specified in the factory settings.

● **Manual Transmission**

• Incident Number

Description	Input the incident number that is to be added to the log to be sent.
Input condition/ Display contents	Up to 15 alphanumeric characters and symbols (except space)

• Include I/O Module log

Description	When exporting the I/O module logs, select "Yes". When not exporting, select "No".
Input condition/ Display contents	• Yes • No

• Time Range Specified

Description	Select whether to specify the time range to collect logs. To specify the time to send log, select the "Specify" checkbox, and specify the start and end time. If the time range has been specified, some of the logs just before and after the specified time range may also be collected.
Input condition/ Display contents	"Specify" checkbox • Selected • Cleared

▷ **Caution**

An error screen appears when "Specify" is selected for this item and the date specified for start time is earlier than the specified end time.

• Start Time

Description	When "Specify" has been selected for "Time Range Specified", specify the start time for collecting logs.
Input condition/ Display contents	YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Date (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))

- End Time

Description	When "Specify" has been selected for "Time Range Specified", specify the end time for collecting logs.
Input condition/ Display contents	YYYY-MM-DD hh:mm:ss (YYYY: Year (AD), MM: Month (01 - 12), DD: Date (01 - 31), hh: Hour (00 - 23), mm: Minute (00 - 59), ss: Second (00 - 59))

Setup AIS Connect Environment

For details about this function, refer to "Setup AIS Connect Environment" (page 209).
For the factory default settings for this function, refer to "B. Setup AIS Connect Environment" (page 1265).

● AIS Connect Environment Setting

- AIS Connect

Description	Select whether to enable or disable the AIS Connect function.
Input condition/ Display contents	• Enable • Disable

- Country of Installation (Country Code : Country Name)

Description	Select the country name to which the ETERNUS DX/AF is shipped (where the storage system locates). Options for this item are displayed in "Country code : Country name" format. The country name is listed in English alphabetical order. "ISO 3166-1 numeric" is used as the country code.
Input condition/ Display contents	"Country Code : Country Name"

- Use LAN Port

Description	Select the LAN port that is to be used for communication with the AIS Connect server.
Input condition/ Display contents	• MNT • RMT

- SSL Server Certification

Description	To use SSL server certification for communication with the AIS Connect server, select "Use". To not use SSL server certification, select "Not use". When "Use" is selected, server certification is performed with the root certificate that is registered in the ETERNUS DX/AF for AIS Connect server communication. When there is no appropriate root certificate that authenticates server certification that is received from the AIS Connect server or when the root certificate has expired, communication with the AIS Connect server fails. The expiration date of the root certificate can be checked from the [Root Certificate] screen. Refer to "Root Certificate" (page 650) for details.
Input condition/ Display contents	• Use • Not use

• Automatic Log Transmission

Description	Select whether to enable or disable the automatic log transmission. When "Automatic Log Transmission" is enabled and notification of Error Severity Level or Warning Level occurs, a log is collected and sent to the AIS Connect server in approximately five minutes. The maximum size of a log is 1.44MB. Note that I/O Module logs are not included. If a send log request is already performed once log collection is complete, send log requests are not performed. If a communication error occurs and a connection to the AIS Connect server cannot be established, logs cannot be sent. A log that fails to be sent is not resent.
Input condition/ Display contents	• Enable • Disable

• Proxy Server

Description	Input the IPv4 address or the FQDN of the proxy server. Make sure to input "Proxy Server" and "Port No." together. If a proxy server is not used, this item does not need to be set.
Input condition/ Display contents	• For IPv4 address xxx.xxx.xxx.xxx xxx: 1 - 255 for the top field (decimal) xxx: 0 - 255 for other fields (decimal) • For FQDN Up to 63 alphanumeric characters and symbols ("." (dot), ":" (colon), "-" (hyphen), and "_" (underscore) can be used)

• Port No.

Description	Input the port number of the proxy server. Make sure to input "Proxy Server" and "Port No." together. If a proxy server is not used, this item does not need to be set.
Input condition/ Display contents	0 - 65535

• Connection Type

Description	Select the communication method for the proxy server.
Input condition/ Display contents	• HTTP Basic/NTLM HTTP authentication • SOCKS SOCKSv5 authentication

• User Name

Description	Specify the user name for the proxy server authentication. If a proxy server is not used, this item does not need to be set.
Input condition/ Display contents	Up to 32 alphanumeric characters and symbols

• Change Password

Description	To change the proxy server authentication password, select the checkbox.
Input condition/ Display contents	Checkbox • Selected • Cleared

• Authentication Password

Description	Select the "Change Password" checkbox and then input the password for proxy server authentication. When inputting the password, "*" is displayed to hide the specified value. If a proxy server is not used, this item does not need to be set.
Input condition/ Display contents	Up to 64 alphanumeric characters and symbols

• Confirm Password

Description	Select the "Change Password" checkbox and then input the password for proxy server authentication again. When inputting the password, "*" is displayed to hide the specified value. If a proxy server is not used, this item does not need to be set.
Input condition/ Display contents	Up to 64 alphanumeric characters and symbols

Setup Remote Session Permission

For details about this function, refer to .
For the factory default settings for this function, refer to .

● Remote Session Permission Setting

• Remote Session

Description	Select whether to "Permit" or "Forbid" a remote session from the AIS Connect server.
Input condition/ Display contents	• Permit • Forbid

• Remote Session Timeout

Description	Select the timeout limit for remote session connection. When not setting the timeout limit, select "Unlimited". When "Permit" is selected for "Remote Session", monitoring of the remote sessions starts. If the time exceeds the specified value without a remote session connection, remote session permission is automatically disabled and the set state changes to "Forbid". If a remote session connection is detected while monitoring is being performed, the timer is suspended during connection. After connection is complete, the timer is reset to "0" and monitoring starts again. Selecting the timeout limit is only available when "Permit" is selected for "Remote Session".
Input condition/ Display contents	• 1 - 24 hours • Unlimited

Import Root Certificate

For details about this function, refer to "Import Root Certificate" (page 214).

● Root Certificate Setting

• Root certificate file

Description	Click the [Browse...] button to specify the root certificate file, or directly input the path to the root certificate file.
Input condition/ Display contents	• Click the [Browse...] button to specify the root certificate file • Directly input the path to the root certificate file

Firmware Management

Apply Controller Firmware

For details about this function, refer to "Apply Controller Firmware" (page 216).
For the factory default settings for this function, refer to "B. Apply Controller Firmware" (page 1266).

● Controller Firmware Archive Settings

• Controller Firmware Archive

Description	Select the controller firmware archive.
Input condition/ Display contents	• Latest Version Select the latest controller firmware archive. This item is displayed only when the control-ler firmware archive newer than the currently active firmware exists in BUD. • Set File Select the controller firmware archive that is stored in the setting PC. Click the [Browse...] button to specify the location of the archive. The specified controller firmware archive is stored in the BUD.

● Schedule Settings

• Apply Date

Description	Select which application method is used for the controller firmware archive.
Input condition/ Display contents	• Apply Now Start application of the controller firmware immediately. • Set Date Set the date and time to start application of the controller firmware. YYYY-MM-DD hh:mm (YYYY: 2001 - 2037, MM: 01 - 12, DD: 01- 31, hh: 00 - 23, mm: 00 or 30)

▶ **Caution**

• When "Set Date" is selected, the reservation may be automatically canceled if the storage system status before or at the specified time does not allow the application to be performed. Refer to "Delete Controller Firmware Schedule" (page 223) for details.

• An error screen appears when "Set Date" is selected and a date that is earlier than the current date is entered in this item.

● **Apply Mode Check**

• Apply Mode

Description	Select whether to allow the application of a controller firmware that is older than the current one. To allow the application of an older controller firmware, select the "Permit firmware down-grade" checkbox and then click the [Apply] button. This checkbox is only displayed when applying an older controller firmware.
Input condition/ Display contents	"Permit firmware downgrade" checkbox • Selected • Cleared

● **Apply Mode Check**

Component Management

This section provides information on the parameters of the following action for component management.

- Add Drive Enclosure
- Add Channel Adapter Port

Add Drive Enclosure

For details about this function, refer to "Add Drive Enclosure" (page 234).

● Target Drive Enclosure

- Type

Description	Select the DE type that is to be added. When the DE is not a target to be added, select "-" (hyphen). For the ETERNUS AF250 S2/AF250, "2.5" 24DE" can be selected.
Input condition/ Display contents	• 2.5"24DE • 3.5"12DE • 3.5"60DE • "-" (hyphen)

Add Channel Adapter Port

For details about this function, refer to "Add Channel Adapter Port" (page 239).

● Add Channel Adapter Port

- License Key

Description	Input the license key.
Input condition/ Display contents	16 capital letters and numeric characters

Volume Management

This section provides information on the parameters of the following actions for volume management.

- Create Volume
- Rename Volume
- Expand Volume
- Expand Thin Provisioning Volume
- Modify Thin Provisioning Volume Threshold
- Set Allocation
- Start RAID Migration
- Modify Cache Parameters
- Set ALUA
- Set Volume QoS
- Set Snapshot

Create Volume

For details about this function, refer to "Create Volume" (page 246).
For the factory default settings for this function, refer to "B. Create Volume" (page 1267).

● New Volume

- Name

Description	Input the volume name. An existing volume name cannot be specified. Volume names starting with "$SYSVOL", "$VVOL_META", or "$DEDUP" cannot be used. When creating multiple volumes at the same time, the new volumes are named automatically. Refer to "Naming Conventions of Volumes" (page 1338) for details.
Input condition/ Display contents	• Up to 32 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

- Capacity

Description	Specify the volume capacity and select the unit of capacity. Up to a 15-digit number including the "." (decimal point) can be input. Note that when "MB" is selected, the specified value is rounded down to the nearest whole number. When "GB" or "TB" is selected, the specified value is converted to "MB" and rounded down to the nearest whole number.

Input condition/
Display contents
	• For Standard volumes, WSVs, or TPVs
	  24 MB - 128 TB
	• For SDPVs
	  1 GB - 2 TB
	• For NAS
	  - 400GB - 128TB (When the NAS FS block size is "256KB" or "32KB")
	  - 400GB - 32TB (When the NAS FS block size is "8KB")
	• MB/GB/TB

> **▶ Caution**

- An error screen appears if the free space in the RAID group is insufficient.
- If "Use all Largest Free Space" is selected when creating volumes manually, inputting the capacity is not required. The specified value and unit are not used.
- When using SnapOPC or SnapOPC+, create any of the following types of volumes.
    - SDV and SDPVs (the SDV is created with the minimum necessary capacity)
    - TPV
- The NAS user volume uses 300GB of the specified capacity as the system area. Take the system area in consideration and specify the capacity.
- When a NAS user volume is created, three system volumes ($SYSVOL1 - 3) are automatically created in the same TPP for each storage system. If free space for $SYSVOL 1 - 3 (17GB) is not available in the TPP, a NAS user volume cannot be created. If $SYSVOL1 - 3 have already been created in the ETERNUS DX, free space for creating new $SYSVOL1 - 3 is not required.
- The maximum logical capacity of Deduplication/Compression Volumes (or the total logical capacity of Deduplication/Compression Volumes in a TPP) varies depending on the logical capacity of the DEDUP_SYS Volume in the relevant TPP. If the efficiency of the Deduplication/Compression function cannot be estimated, setting the maximum logical capacity of the Deduplication/Compression Volumes smaller than the logical capacity of the DEDUP_SYS Volume is recommended.
- The maximum capacity of NAS user volumes varies depending on the selected "NAS FS Block Size".
- When creating multiple volumes in a RAID group, the maximum number of volumes that can be created for the user capacity may be reduced. To use the entire user capacity, the volume size must be an exact multiple of the basic size (stripe size). Refer to "Basic Size for each RAID Group" (page 1340) for details.
- If all of the following conditions are satisfied, the capacity cannot be entered.
    - "Standard" is selected for "Type"
    - The "Enable" checkbox in the "Use External Drive" field is selected

> **⬤ N o t e**

- To create a volume that is larger than the largest free space, concatenate the free spaces in the RAID group to the existing volume. These volumes cannot be created by only using this function. Refer to "Expand Volume" (page 274) for details.
- When creating an SDV, 24 (MB) + "Volume Capacity ⓘ only SDV" x 0.001 (0.1%) is automatically secured in the ETERNUS DX/AF. Specifying a "Capacity" value is not required. "24MB" is the smallest volume capacity. "Capacity of source volume ⓘ only SDV" x 0.001 (0.1%) is the capacity that is used for the controlling information area in the SDV.
- The same input condition as the TPVs for SAN is applied for the Deduplication/Compression Volume capacity.
- Up to 15 numbers can be used. If a decimal point is included in the input value, up to 14 numbers can be used. [Example] 0.1234567890123 (14 numbers and a decimal point)

- Type

Description	Specify the volume type.
	When the [Create Volume] function is executed from the RAID group list, "Standard", "Snap Data Volume", or "Snap Data Pool Volume" is displayed. If the selected RAID group type is "High Reliability (RAID6-FR)", only "Standard" volumes are displayed. When the [Create Volume] function is executed from the Thin Provisioning Pool list, only "Thin Provisioning Volume" is displayed. When the Advanced Copy function license has been registered, "Snap Data Volume" is displayed. When the Advanced Copy function license has been registered or when the ETERNUS DX/AF is being used in the Unified Storage environment, "Snap Data Pool Volume" is displayed. "NAS Volume" is displayed only when all of the following conditions are satisfied: • The ETERNUS DX is used in the Unified Storage environment. • The logged in (current) user has the "NAS Management" policy. • The maximum number of NAS volumes has not been created in the ETERNUS DX. Note that a NAS user volume can be created when only the NAS backup volume exists in the storage system.
Input condition/ Display contents	• Standard • Wide Striping Volume • Thin Provisioning Volume • Snap Data Volume • Snap Data Pool Volume • NAS Volume

● N o t e

To create a volume in the External RAID Group, select "Standard".

- Capacity of source volume ⓘ only SDV

Description	Specify the copy source volume capacity and select the unit of capacity. This item can only be specified when the volume type is "Snap Data Volume".
Input condition/ Display contents	• 24 MB - 128 TB • MB/GB/TB

- Use External Drive

Description	To create a volume using an External Drive, select the "Enable" checkbox. This checkbox can be selected or cleared only when "Standard" is specified for "Type". If the "Enable" checkbox is selected, the External RAID Group List is displayed. This item is displayed only if the Non-disruptive Storage Migration License has been registered.
Input condition/ Display contents	"Enable" checkbox • Selected • Cleared

● N o t e

- One External RAID Group consists of one External Drive. Refer to "Create External RAID Group" (page 531) for details.
- One External Volume is created in one External RAID Group. If multiple External RAID Groups are selected to create volumes, the number of External Volumes that are created is equal to the number of External RAID Groups.

- Deduplication

Description	Select whether to use the volume as a Deduplication target volume. This item is only displayed when the Deduplication/Compression for the ETERNUS DX/AF is enabled. This item can only be specified when "Thin Provisioning Volume" is selected for "Type". For details about the Deduplication/Compression Volumes that are created according to this item and about the TPPs where the volumes can be created, refer to "Volumes that are created depending on the selection of "Deduplication" and "Compression", and the Deduplication/Compression setting for TPPs where the target volumes can be created" (page 1093).

Input condition/
Display contents
	• Enable
	   Deduplication target Deduplication/Compression Volumes are created.
	• Disable
	   Non-Deduplication target TPVs for SAN are created.

- Compression

Description	Select whether to use the volume as a Compression target volume. This item is only displayed when the Deduplication/Compression for the ETERNUS DX/AF is enabled. This item can only be specified when "Thin Provisioning Volume" is selected for "Type". For details about the Deduplication/Compression Volumes that are created according to this item and about the TPPs where the volumes can be created, refer to "Volumes that are created depending on the selection of "Deduplication" and "Compression", and the Deduplication/Compression setting for TPPs where the target volumes can be created" (page 1093).

Input condition/
Display contents
	• Enable
	   Compression target Deduplication/Compression Volumes are created.
	• Disable
	   Non-Compression target TPVs for SAN are created.

- Allocation

Description	Select the allocation method of the volume. This item can only be specified when all the following conditions are met. • "Type" is "Thin Provisioning Volume" or "NAS Volume" • Both "Deduplication" and "Compression" are "Disable"

Input condition/
Display contents
	• Thin
	   Physical area is allocated to the target area of the volume when a write I/O is received.
	• Thick
	   Physical area is allocated to the whole area of the volume when volumes are created.

- NAS FS Block Size

Description	Select the block size of the NAS file system (NAS user volume). By selecting an appropriate "NAS FS Block Size" for the user data size (file size) to be created, the storage efficiency of the NAS user volume improves. This item is displayed only when "NAS Volume" can be selected as the volume type.
Input condition/ Display contents	• 256 KB • 32 KB • 8 KB

> **Caution**

- The maximum NAS user volume capacity varies depending on the selected "NAS FS Block Size". Refer to "Maximum NAS user volume capacity and the maximum file size of each "NAS FS Block Size"" (page 259) for details.
- If backing up the NAS user volumes, the NAS backup volumes are set with the same "NAS FS Block Size" as the NAS user volumes.
- If restoring the NAS backup volumes, the NAS user volumes are set with the same "NAS FS Block Size" as the NAS backup volumes.
- "NAS FS Block Size" cannot be changed after the NAS user volume is created. To change "NAS FS Block Size", delete the NAS user volume and create it again.

> **Note**

- Multiple NAS user volumes with different "NAS FS Block Size" settings can exist in the same TPP.
- "NAS FS Block Size" for the NAS user volumes that are created with the controller firmware versions V10L2x and earlier is "256KB" (fixed).

- RAID Group / TPP Selection

Description	Specify the selection method for the RAID group or the Thin Provisioning Pool. When the [Create Volume] function is executed from the RAID group list or the Thin Provisioning Pool list, only "Manual" is displayed.
Input condition/ Display contents	- Automatic Automatically select the RAID group or Thin Provisioning Pool in which the volume is to be created. - Manual Manually select the RAID group or Thin Provisioning Pool in which the volume is to be created.

> **Caution**

For the conditions described below, "Manual" is automatically selected for this item. Note that "Automatic" cannot be selected.
- "Wide Striping Volume" is selected for "Type"
- "Standard" is selected for "Type" and the "Enable" checkbox in the "Use External Drive" field is selected

- Data Integrity

Description	Specify the volume protection method. This item can only be specified when meeting all the following conditions. - "Standard" is selected for "Type" - The "Enable" checkbox in the "Use External Drive" field is cleared
Input condition/ Display contents	- Default Data is protected within the ETERNUS DX/AF. - T10-DIF Data is protected with a T10-DIF compatible method in the ETERNUS DX/AF and the host paths. This method is available only when the host interface is FC.

> **Caution**

- The data protection method cannot be changed after the volume is created.
- "T10-DIF" is supported in Oracle Linux 6 and later.

● **Automatic Setting**

- Drive Type

Description	Specify the drive type. The installed drive determines the selectable drive types that are displayed as options. If "Enable" is selected for "Deduplication" or "Compression", the drive types of the TPPs with the same Deduplication/Compression setting are displayed. If "Disable" is selected for "Deduplication" and "Compression", the drive types of all the TPPs that are registered in the ETERNUS DX/AF are displayed.
Input condition/ Display contents	- Online - Nearline - SSD - Online SED - Nearline SED - SSD SED

🔵 **N o t e**

- When "Online" is selected, volumes are created in a RAID group that is configured with only "Online" type drives, or in a RAID group that is configured with both "Online" and "Nearline" type drives.

- When "Online SED" is selected, volumes are created in a RAID group that is configured with only "Online SED" type drives, or in a RAID group that is configured with both "Online SED" and "Nearline SED" type drives.

- When "SSD" is selected, volumes are created in a RAID group that is configured with SSDs regardless of the SSD type (SSD-M/SSD-L/SSD).

- When "SSD SED" is selected, volumes are created in a RAID group that is configured with SSD SEDs regardless of the SSD type (SSD-M SED/SSD-L SED).

- RAID Level

Description	Select the RAID level. The specified volume type and drive type determine the selectable RAID levels that are displayed as options. If "Enable" is selected for "Deduplication" or "Compression", the RAID levels of the TPPs with the same Deduplication/Compression setting are displayed. If "Disable" is selected for "Deduplication" and "Compression", the RAID levels of all TPPs that are registered in the ETERNUS DX/AF are displayed.
Input condition/ Display contents	- High Performance (RAID1+0) - High Capacity (RAID5) - High Reliability (RAID6) - High Reliability (RAID6-FR) - Reliability (RAID5+0) - Mirroring (RAID1) - Striping (RAID0)

- Key Group

Description	When creating volumes in the RAID group that configures the key group (*1), select "Enable". When creating volumes in a RAID group that is not registered in the key group, select "Disable". This setting is available if the volume type is "Standard", "SDV", or "SDPV", and if the drive type is "Online SED". Only the available setting (Enable or Disable) is displayed as an option. For other drive types, the field is blank. *1: The key group combines all of the RAID groups that use the same SED authentication key.
Input condition/ Display contents	• Enable • Disable

- Number of Volumes

Description	Specify the number of volumes to be created. The following shows the maximum number of volumes that can be created for each model. **The maximum number of volumes that can be created for each model** | Model	The maximum numbers of volumes
ETERNUS DX60 S4/DX60 S3	1024
ETERNUS DX100 S4/DX100 S3	2048 (4096) (*1)
ETERNUS DX200 S4/DX200 S3	4096 (8192) (*1)
ETERNUS DX500 S4/DX500 S3 ETERNUS DX600 S4/DX600 S3	16384
ETERNUS DX8100 S3	16384
ETERNUS DX8700 S3 ETERNUS DX8900 S3	65535
ETERNUS AF250 S2/AF250	3072
ETERNUS AF650 S2/AF650	12288
ETERNUS DX200F	1536 | *1: Values in parentheses indicate the maximum number of volumes when "Expand Volume Mode" is "Enable".

Input condition/
Display contents
	• If the volume is not "NAS Volume"
	  - For the ETERNUS DX8700 S3/DX8900 S3
	   1 - 1024
	  - For the other models
	   From 1 to "the maximum number of volumes" (*1)
	• If the volume is "NAS Volumes"
	  1 (fixed)
	*1: For details on the maximum number of volumes that can be created for each model, refer to "The maximum number of volumes that can be created for each model" (page 1079).

> ▶ **Caution**

For the ETERNUS DX100 S4/DX200 S4 and the ETERNUS DX100 S3/DX200 S3, the maximum number of volumes can be increased by selecting "Enable" for "Expand Volume Mode". The "Expand Volume Mode" setting is available in the [Setup Subsystem Parameters] function. If the setting is changed, reboot the ETERNUS DX.
If the ETERNUS DX is not rebooted, the increased number of volumes cannot be created. If the ETERNUS DX is not rebooted, a system message appears in the [Overview] screen. Refer to "Overview" (page 24) for details.

> **◉ N o t e**
>
> - For the ETERNUS DX8700 S3/DX8900 S3, up to 1024 volumes can be created at a time. Note that this limitation does not apply to other models.
> - Only one NAS user volume can be created at a time.

- Start of Suffix

Description	Select the suffix starting number to be added to the name of volumes that are to be created. This item must be set if the default value "0" is changed. If "1" is specified for "Number of Volumes", "Start of Suffix" cannot be selected. This item is not displayed when "NAS Volume" is selected for "Type".
Input condition/ Display contents	0 - 99999

- Digits of Suffix

Description	Select the number of digits to be added to the name of volumes that are to be created. This item must be set if the default value "1" is changed. If "1" is specified for "Number of Volumes", "Digits of Suffix" cannot be selected. This item is not displayed when "NAS Volume" is selected for "Type".

Input condition/
Display contents
	- For the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F
	  1 - 4
	- For the other models
	  1 - 5

- Encryption by CM

Description	Select the encryption status of new volumes.
	
	When the encryption mode is disabled, "On" cannot be selected. When the drive type is "Online SED", "Nearline SED", or "SSD SED", "On" cannot be selected.
	The combination of the "Encryption by CM" setting and the "Drive Type" setting defines the RAID group or TPP in which the volumes are created.
	For the ETERNUS DX60 S4/DX60 S3, this item is not displayed.
	- When the drive type is "Online SED", "Nearline SED", or "SSD SED":
	  Volumes are created in the RAID group or the TPP configured by the relevant SED type.
	- If other drive types are selected:
	  - When "On" is specified
	    Volumes that are encrypted by CM are created. When creating a TPV, the volume is created in the TPP that is encrypted by CM.
	  - When "Off" is specified
	    Volumes that are not encrypted are created. When creating a TPV, the volume is created in the TPP that is not encrypted.

Input condition/
Display contents
	- On
	  Volumes that are encrypted by using a CM are created or volumes are created in a TPP that was encrypted by a CM.
	- Off
	  Volumes that are not encrypted by a CM are created or volumes are created in a TPP that has not been encrypted by a CM.

● Manual Setting

• Use all Largest Free Space

Description	Select the "Enable" checkbox to create the specified number of volumes with the largest available free space in the RAID group. This checkbox can be selected or cleared only when "Type" is "Standard" or "SDPV". If "Enable" is selected, the specified number of volumes in the "Number of Volumes" field are created in the free space that is displayed as "Largest Free Space" for each RAID group.
Input condition/ Display contents	"Enable" checkbox • Selected • Cleared

> **Caution**

- If volumes are created with a controller firmware V10L6x or earlier, and the "Enable" checkbox for this item is selected, Advanced Copy may fail.
- When the "Enable" checkbox is selected, the input capacity and the selected unit for "New Volume" become unavailable.
- An error screen appears for the following conditions when the "Enable" checkbox is selected for this item.
  - The capacity of the created volume is 23MB or less
  - The capacity of the created volume is larger than the maximum capacity
- The capacity for volumes that are to be created is not displayed. Use the [Volume] screen to check the volume capacity after volume creation is complete.
- If all of the following conditions are satisfied, this item cannot be set.
  - "Standard" is selected for "Type"
  - The "Enable" checkbox in the "Use External Drive" field is selected

• Start of Suffix

Description	Select the suffix starting number to be added to the name of volumes that are to be created. "Start of Suffix" cannot be selected in the following conditions. • "0" or "1" is specified for "Number of Volumes" • "Number of Volumes" is fixed to "1" (number of volumes cannot be specified) • The number of selected checkboxes for the External RAID Group is "0" or "1" This item is not displayed when "NAS Volume" is selected for "Type".
Input condition/ Display contents	0 - 99999

• Digits of Suffix

Description	Select the number of digits to be added to the name of volumes that are to be created. "Digits of Suffix" cannot be selected in the following conditions. • "0" or "1" is specified for "Number of Volumes" • "Number of Volumes" is fixed to "1" (number of volumes cannot be specified) • The number of selected checkboxes for the External RAID Group is "0" or "1" This item is not displayed when "NAS Volume" is selected for "Type".
Input condition/ Display contents	• For the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F 1 - 4 • For the other models 1 - 5

• Volume No.

Description	When specifying the volume number for a new volume, select the "Set Value" checkbox and input the volume number.

Input condition/
Display contents
	• "Set Value" checkbox
	  - Selected
	  - Cleared
	• Volume No.
	Numeric characters (decimal)
	The following volume numbers can be used for each model:
	  - For the ETERNUS DX60 S4/DX60 S3
	    0 - 1023
	  - For the ETERNUS DX100 S4/DX100 S3
	    0 - 2047 (0 - 4095) (*1)
	  - For the ETERNUS DX200 S4/DX200 S3
	    0 - 4095 (0 - 8191) (*1)
	  - For the ETERNUS DX500 S4/DX500 S3 and the ETERNUS DX600 S4/DX600 S3
	    0 - 16383
	  - For the ETERNUS DX8100 S3
	    0 - 16383
	  - For the ETERNUS DX8700 S3 and the ETERNUS DX8900 S3
	    0 - 65534
	  - ETERNUS AF250 S2/AF250
	    0 - 3071
	  - ETERNUS AF650 S2/AF650
	    0 - 12287
	  - ETERNUS DX200F
	    0 - 1535
	  *1: Values in parentheses indicate the available Volume No. when "Expand Volume Mode" is "Enable".

▷ Caution

An existing volume number cannot be specified.

- Encryption by CM

Description	Select the encryption status of new volumes. When the encryption mode is disabled, "On" cannot be selected. • For the ETERNUS DX60 S4/DX60 S3, this item is not displayed.

Input condition/
Display contents
	• On
	  Volumes that are encrypted by a CM are created.
	• Off
	  Volumes that are not encrypted by a CM are created.

▷ **Caution**

- When creating volumes (specifying a number greater than or equal to 1 for "Number of Volumes") for a RAID group with "Online SED", "Nearline SED", or "SSD SED" as the drive type, select "Off" for this item.
- If all of the following conditions are satisfied, this item cannot be selected.
  - "Standard" is selected for "Type"
  - The "Enable" checkbox in the "Use External Drive" field is selected

- Number of Volumes

Description	Specify the number of volumes to be created.
	
	• When creating "Standard", "SDV", or "SDPV" type volumes
	  Specify the number of volumes to be created in each RAID group.
	  Click the [Recalculation of Max Count] button to display the maximum number of volumes that can be created in each RAID group with the specified capacity. When the volume capacity is not specified (including when "Use all Largest Free Space" is selected), the maximum number of volumes that can be created for each RAID group is displayed. When "Encryption by CM" is "On", volumes cannot be created in a RAID group with "Online SED", "Nearline SED", or "SSD SED" for the drive type.
	• When creating "TPV" type volumes
	  Specify the number of volumes to be created in each TPP.
	  If "Enable" is selected for "Deduplication" or "Compression", the number of volumes can only be specified for TPPs with the same Deduplication/Compression setting.

Input condition/
Display contents
	• For Standard volumes, SDVs, or SDPVs
	  1 - 128
	• For TPVs
	  From 1 to "the maximum number of volumes"
	
	For details on the maximum number of volumes that can be created for each model, refer to <u>"The maximum number of volumes that can be created for each model" (page 1079)</u>.

🔵 **N o t e**

- When "Volume No." is specified, only one volume can be created at a time. Input "1" for "Number of Volumes".
- This item is not displayed when "NAS Volume" is selected for "Type". Only one NAS user volume can be created at a time.
- For the ETERNUS DX8700 S3/DX8900 S3, the total number of the volumes that can be created at a time is 1024. Note that this limitation does not apply to other models.

• Checkbox to select an External RAID Group

Description	Select the checkbox for the External RAID Group for creating volumes. One External Volume is created in one External RAID Group. If multiple External RAID Groups are selected to create volumes, the number of External Volumes that are created is equal to the number of External RAID Groups. Select the checkbox to the left of "RAID Group Name" to select all External RAID Groups. **The maximum number of External Volumes that can be created for each model**
	<table><tr><th>Model</th><th>The maximum numbers of External Volumes</th></tr><tr><td>ETERNUS DX60 S4/DX60 S3</td><td>512</td></tr><tr><td>ETERNUS DX100 S4/DX100 S3</td><td>2048</td></tr><tr><td>ETERNUS DX200 S4/DX200 S3</td><td>4096</td></tr><tr><td>ETERNUS DX500 S4/DX500 S3 ETERNUS DX600 S4/DX600 S3</td><td>8192</td></tr><tr><td>ETERNUS DX8100 S3</td><td>8192</td></tr><tr><td>ETERNUS DX8700 S3 ETERNUS DX8900 S3</td><td>16384</td></tr><tr><td>ETERNUS AF250 S2/AF250</td><td>3072</td></tr><tr><td>ETERNUS AF650 S2/AF650</td><td>8192</td></tr><tr><td>ETERNUS DX200F</td><td>1536</td></tr></table>
Input condition/ Display contents	Checkbox • Selected • Cleared

⬤ **N o t e**

External RAID Groups in which an External Volume has already been created are not displayed in the External RAID Group list.

● **Volume Information**

• Use all Largest Free Space

Description	Select the "Enable" checkbox to create the specified number of WSVs with the largest available free space in the selected RAID group. WSVs are created by concatenating spaces with the same capacity in multiple RAID groups. If "Enable" is selected, the specified number of WSVs in the "Number of Volumes" field are cre-ated using the smallest "Largest Free Space" value in the concatenated RAID groups.
Input condition/ Display contents	"Enable" checkbox • Selected • Cleared

> ▶ **Caution**
>
> - If volumes are created with a controller firmware V10L6x or earlier, and the "Enable" checkbox for this item is selected, Advanced Copy may fail.
> - When "Enable" is selected, the capacity and the unit that are specified for "New Volume" are not available.
> - An error screen appears for the following conditions when the "Enable" checkbox is selected for this item.
>   - The capacity of the created volume is 23MB or less
>   - The capacity of the created volume is larger than the maximum capacity
> - The capacity for WSVs that are to be created is not displayed. Use the [Volume] screen to check the volume capacity after volume creation is complete.

- **Number of Volumes**

Description	Specify the number of volumes to be created. Note that "1" is displayed when "Manual" is selected for "Concatenation Order". In this case, the number of volumes cannot be specified. For details on the maximum number of volumes that can be created for each model, refer to <u>"The maximum number of volumes that can be created for each model" (page 1079)</u>.
Input condition/ Display contents	1 - 128

> ▶ **Caution**
>
> When "Volume No." is specified, only one volume can be created at a time. Input "1" for "Number of Volumes".

- **Start of Suffix**

Description	Select the suffix starting number to be added to the name of volumes that are to be created. This item must be set if the default value "0" is changed. If "0" or "1" is specified for "Number of Volumes", "Start of Suffix" cannot be selected. This item is displayed when "Automatic" is selected for "Concatenation Order".
Input condition/ Display contents	0 - 99999

- **Digits of Suffix**

Description	Select the number of digits to be added to the name of volumes that are to be created. This item must be set if the default value "1" is changed. If "0" or "1" is specified for "Number of Volumes", "Digits of Suffix" cannot be selected. This item is displayed when "Automatic" is selected for "Concatenation Order".

Input condition/
Display contents
	- For the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F
	  1 - 4
	- For the other models
	  1 - 5

- **Volume No.**

> ⬤ **N o t e**
>
> Refer to <u>"Volume No." (page 1082)</u> in <u>"Manual Setting"</u> for details.

• Wide Stripe Size

Description	Select the Wide Stripe Size for the volumes. "Wide Stripe Size" is the size of the WSV Unit that is allocated to each RAID group in series. It is not necessary to change the default setting (Normal) for normal use.
Input condition/ Display contents	• Normal An integral multiple of the basic size for each RAID level (*1). The maximum size is 16MB or smaller. The actual size varies according to the RAID group type, the number of member drives, and Stripe Depth. Select "Normal" to improve random write access performance. • Small An integral multiple of the basic size for each RAID level. The maximum size is 2MB or smaller. The actual size varies according to the RAID group type, the number of member drives, and Stripe Depth. Note that because the segment size of the volume is small and many host accesses among multiple RAID groups occur, the performance may be reduced according to the amount of host I/O. *1: The basic size (stripe size) when creating a volume. Refer to "Basic Size for each RAID Group" (page 1340) for details.

▷ **Caution**

• If the basic size of the RAID group is 2MB or more, the basic size is specified for Wide Stripe Size even when "Small" is selected.
• This function cannot be used to change the "Wide Stripe Size" setting after WSVs are created. To change the "Wide Stripe Size" value, use the [Start RAID Migration] function. Refer to "Start RAID Migration" (page 296) for details.

• Concatenation Order

Description	Select the concatenation order of RAID groups. It is not necessary to change the default setting (Automatic) for normal use.
Input condition/ Display contents	• Automatic Automatically specify the concatenation order of RAID groups. If multiple WSVs are already registered, the next available RAID group that enables the Controlling CM allocation to be distributed evenly is selected as [1] for the concatenation order. If multiple RAID groups satisfy this condition, the RAID group with the smallest RAID group number is selected as [1] in the concatenation order. RAID groups are concatenated starting from [1] (first) in ascending order. The last RAID group is concatenated to the first RAID group. Volumes that belong to the RAID group that is first in the concatenation order are called "representative volumes". • Manual Manually specify the concatenation order of the RAID group.

• Encryption by CM

⦿ **N o t e**

Refer to "Encryption by CM" (page 1083) in "Manual Setting" for details.

● **Select RAID Group Information**

• Drive Type

Description	Select the type of drive that configures a RAID group. The installed drive determines the selectable drive types that are displayed. If there are no RAID groups in which volumes can be created, the field is blank.
Input condition/ Display contents	• Online • Nearline • SSD • Online/Nearline • Online SED • Nearline SED • SSD SED • Online SED/Nearline SED

◉ **N o t e**

• When "Online" is selected, a RAID group that is configured with only "Online" type drives, or a RAID group that is configured with both "Online" and "Nearline" type drives is specified.

• When "Online SED" is selected, a RAID group that is configured with only "Online SED" type drives, or a RAID group that is configured with both "Online SED" and "Nearline SED" type drives is specified.

• When "SSD" is selected, the RAID groups that are configured with SSDs are specified regardless of the SSD type (SSD-M/SSD-L/SSD).

• When "Online/Nearline" is selected, a RAID group that is configured with only "Online" type drives, a RAID group that is configured with only "Nearline" type drives, or a RAID group that is configured with both "Online" and "Nearline" type drives is specified.

• When "Online SED/Nearline SED" is selected, a RAID group that is configured with only "Online SED" type drives, a RAID group that is configured with only "Nearline SED" type drives, or a RAID group that is configured with both "Online SED" and "Nearline SED" type drives is specified.

• RAID Level

Description	Select the RAID level. If there are no RAID groups in which volumes can be created, the field is blank.
Input condition/ Display contents	• High Performance (RAID1+0) • High Capacity (RAID5) • High Reliability (RAID6) • Reliability (RAID5+0) • Mirroring (RAID1) • Striping (RAID0)

• Number of Member Drives

Description	Select the number of member drives in the RAID group. The selectable number of member drives, which is determined by the specified RAID level, is displayed. If there are no RAID groups in which volumes can be created, the field is blank.

Input condition/
Display contents
	• For High Performance (RAID1+0)
	   4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32
	• For High Capacity (RAID5)
	   3 - 16
	• For High Reliability (RAID6)
	   5 - 16
	• For Reliability (RAID5+0)
	   6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32
	• For Mirroring (RAID1)
	   2
	• For Striping (RAID0)
	   2 - 16

• Stripe Depth

Description	Select the Stripe Depth of the RAID group. The selectable Stripe Depth varies depending on the specified RAID level. Refer to "Available Stripe Depth value (for RAID group)" (page 1195) for details. If "Mirroring (RAID1)" is selected as the RAID level, a "-" (hyphen) is displayed. If there are no RAID groups in which volumes can be created, the field is blank.
Input condition/ Display contents	• 64 KB • 128 KB • 256 KB • 512 KB • 1024 KB • "-" (hyphen)

● **Select RAID Groups**

• Checkbox to select RAID groups

Description	Select the checkbox for the RAID group to be selected.
Input condition/ Display contents	Checkbox • Selected • Cleared

Setting items for each volume type when selecting "Automatic"

Setting items		Standard	Block-TPV	NAS-TPV	Dedup-TPV	SDV	SDPV
New Volume	Name	✓	✓	✓	✓	✓	✓
	Capacity	✓	✓	✓	✓	–	✓
	Type	✓	✓	✓	✓	✓	✓
	Capacity of source volume ⓘ only SDV	–	–	–	–	✓	–
	Deduplication (*1)	–		–	✓	–	–
	Compression (*1)	–		–	✓	–	–
	Allocation (*2)	–	✓	✓	–	–	–
	NAS FS Block Size	–	–	✓	–	–	–
	RAID Group / TPP Selection	Automatic					
	Data Integrity	✓	–	–	–	–	–

Setting items		Standard	Block-TPV	NAS-TPV	Dedup-TPV	SDV	SDPV
Automatic Setting	Drive Type	✓	✓	✓	✓	✓	✓
	RAID Level	✓	✓	✓	✓	✓	✓
	Key Group (*3)	✓	–	–	–	✓	✓
	Number of Volumes	✓	✓	"1" (fixed)	✓	✓	✓
	Start of Suffix (*4)	✓	✓	–	✓	✓	✓
	Digits of Suffix (*4)	✓	✓	–	✓	✓	✓
	Encryption by CM (*5)	✓	✓	✓	✓	✓	✓

✓: Required settings
Blank: Settings that are not required
-: N/A

*1: This item is only displayed when Deduplication/Compression is enabled in the ETERNUS DX/AF.

*2: This item is only available when both "Deduplication" and "Compression" are "Disable".

*3: This item is available if the drive type is "Online SED", "Nearline SED", or "SSD SED".

*4: This item cannot be selected if "1" is specified for "Number of Volumes".

*5: "Off" (fixed) when the encryption mode is disabled or when the drive type is "Online SED", "Nearline SED", or "SSD SED".

Setting items for each volume type when selecting "Manual"

- Setting items for normal use

Setting items		Standard	External - Standard (*1)	Block-TPV	NAS-TPV	Dedup-TPV	SDV	SDPV	WSV (*2)
New Volume	Name	✓	✓	✓	✓	✓	✓	✓	✓
	Capacity	✓	–	✓	✓	✓	–	✓	✓
	Type	✓	✓	✓	✓	✓	✓	✓	✓
	Capacity of source volume ⓘ only SDV	–	–	–	–	–	✓	–	–
	Use External Drive (*3)		✓	–	–	–	–	–	–
	Deduplication (*4)	–	–		–	✓	–	–	–
	Compression (*4)	–	–		–	✓	–	–	–
	Allocation (*5)	–	–	✓	✓	–	–	–	–
	NAS FS Block Size	–	–	–	✓	–	–	–	–
	RAID Group / TPP Selection	Manual	–	Manual					–
	Data Integrity	✓	–	–	–	–	–	–	–

Setting items		Standard	External - Standard (*1)	Block- TPV	NAS- TPV	Dedup -TPV	SDV	SDPV	WSV (*2)
Manual Setting or Manual Setting (Volume Information)	Use all Largest Free Space		–						
	Volume No.								
	Start of Suffix (*6)	✓	✓	✓	–	✓	✓	✓	✓
	Digits of Suffix (*6)	✓	✓	✓	–	✓	✓	✓	✓
	Encryption by CM (*7)	✓	–	–	–	–	✓	✓	✓
	Number of Volumes (RAID group)	✓	–	–	–	–	✓	✓	–
	Number of Volumes (TPP) (*8)	–	–	✓	–	✓	–	–	–
	Number of Volumes (WSV)	–	–	–	–	–	–	–	✓
	Checkbox to select an External RAID Group	–	✓	–	–	–	–	–	–
Manual Setting (Select RAID Group Information)	Drive Type	–	–	–	–	–	–	–	✓
	RAID Level	–	–	–	–	–	–	–	✓
	Number of Member Drives	–	–	–	–	–	–	–	✓

✓: Required settings
Blank: Settings that are not required
-: N/A

*1:   External Volumes that are created in the External RAID Groups. It is referred to as "External-Standard" in this section.
*2:   The following items are advanced settings. It is not necessary to change the default setting for normal use.

- "Wide Stripe Size" and "Concatenation Order" under the "Manual Setting (Volume Information)" field.
- "Stripe Depth" under the "Manual Setting (Select RAID Group Information)" field.

*3:   This item is only displayed when the Non-disruptive Storage Migration License has been registered.
*4:   This item is only displayed when Deduplication/Compression is enabled in the ETERNUS DX/AF.
*5:   This item is only available when both "Deduplication" and "Compression" are "Disable".
*6:   This item cannot be selected in the following conditions.

- For "External-Standard" type volumes
  The number of selected checkboxes is "0" or "1" for the External RAID Group
- For the other volumes
  If "0" or "1" is specified for "Number of Volumes"

*7:   "Off" (fixed) when the encryption mode is disabled or when the drive type is "Online SED", "Nearline SED", or "SSD SED"
*8:   Select a creation destination TPP for NAS-TPVs. The number of volumes cannot be specified.

- Setting items when "Volume No." is specified

Setting items		Standard	External - Standard (*1)	Block- TPV	NAS- TPV	Dedup -TPV	SDV	SDPV	WSV (*2)
New Volume	Name	✓	✓	✓	✓	✓	✓	✓	✓
	Capacity	✓	–	✓	✓	✓	–	✓	✓
	Type	✓	✓	✓	✓	✓	✓	✓	✓
	Capacity of source volume ⓘ only SDV	–	–	–	–	–	✓	–	–
	Use External Drive (*3)		✓	–	–	–	–	–	–
	Deduplication (*4)	–	–		–	✓	–	–	–
	Compression (*4)	–	–		–	✓	–	–	–
	Allocation (*5)	–	–	✓	✓	–	–	–	–
	NAS FS Block Size	–	–	–	✓	–	–	–	–
	RAID Group / TPP Selection	Manual	–	Manual					–
	Data Integrity	✓	–	–	–	–	–	–	–
Manual Setting or Manual Setting (Volume Information)	Use all Largest Free Space		–						
	Volume No.	✓	✓	✓	✓	✓	✓	✓	✓
	Start of Suffix (*6)	–	–	–	–	–	–	–	–
	Digits of Suffix (*6)	–	–	–	–	–	–	–	–
	Encryption by CM (*7)	✓	–	–	–	–	✓	✓	✓
	Number of Volumes (RAID group)	"1" (fixed)	–	–	–	–	"1" (fixed)	"1" (fixed)	–
	Number of Volumes (TPP) (*8)	–	–	"1" (fixed)	–	"1" (fixed)	–	–	–
	Number of Volumes (WSV)	–	–	–	–	–	–	–	"1" (fixed)
	Checkbox to select an External RAID Group (*9)	–	Select one checkbox.	–	–	–	–	–	–
Manual Setting (Select RAID Group Information)	Drive Type	–	–	–	–	–	–	–	✓
	RAID Level	–	–	–	–	–	–	–	✓
	Number of Member Drives	–	–	–	–	–	–	–	✓

✓: Required settings
Blank: Settings that are not required
-: N/A

*1: External Volumes that are created in the External RAID Groups. It is referred to as "External-Standard" in this section.
*2: The following items are advanced settings. It is not necessary to change the default setting for normal use.

- "Wide Stripe Size" and "Concatenation Order" under the "Manual Setting (Volume Information)" field.
- "Stripe Depth" under the "Manual Setting (Select RAID Group Information)" field.

*3: This item is only displayed when the Non-disruptive Storage Migration License has been registered.

*4: This item is only displayed when Deduplication/Compression is enabled in the ETERNUS DX/AF.

*5: This item is only available when both "Deduplication" and "Compression" are "Disable".

*6: This item cannot be selected in the following conditions.

- For "External-Standard" type volumes
  The number of selected checkboxes is "0" or "1" for the External RAID Group

- For the other volumes
  If "0" or "1" is specified for "Number of Volumes"

*7: "Off" (fixed) when the encryption mode is disabled or when the drive type is "Online SED", "Nearline SED", or "SSD SED"

*8: Select a creation destination TPP for NAS-TPVs. The number of volumes cannot be specified.

*9: To specify "Volume No.", select one checkbox for External RAID Group.

- Setting items when "Use all Largest Free Space" is specified

Setting items		Standard	SDPV	WSV (*1)	Remarks
New Volume	Name	✓	✓	✓	
	Capacity	–	–	–	
	Type	✓	✓	✓	
	Capacity of source volume ⓘ only SDV	–	–	–	
	Allocation	–	–	–	
	RAID Group / TPP Selection	Manual		–	
	Data Integrity	✓	–	–	
Manual Setting or Manual Setting (Volume Information)	Use all Largest Free Space	✓	✓	✓	
	Volume No.				
	Start of Suffix	✓	✓	✓	If "0" or "1" is specified for "Number of Volumes", "Start of Suffix" cannot be selected.
	Digits of Suffix	✓	✓	✓	If "0" or "1" is specified for "Number of Volumes", "Digits of Suffix" cannot be selected.
	Encryption by CM	✓	✓	✓	"Off" (fixed) when the encryption mode is disabled or when the drive type is "Online SED", "Nearline SED", or "SSD SED"
	Number of Volumes (RAID group)	✓	✓	–	
	Number of Volumes (TPP)	–	–	–	
	Number of Volumes (WSV)	–	–	✓	
Manual Setting (Select RAID Group Information)	Drive Type	–	–	✓	
	RAID Level	–	–	✓	
	Number of Member Drives	–	–	✓	

✓: Required settings
Blank: Settings that are not required
-: N/A

*1: The following items are advanced settings. It is not necessary to change the default setting for normal use.

- "Wide Stripe Size" and "Concatenation Order" under the "Manual Setting (Volume Information)" field.

- "Stripe Depth" under the "Manual Setting (Select RAID Group Information)" field.

Volumes that are created depending on the selection of "Deduplication" and "Compression", and the Deduplication/Compression setting for TPPs where the target volumes can be created

- Volumes that are to be created

Condition		Volumes that are to be created
Deduplication	Compression	
Enable	Enable	Deduplication/Compression Volumes where both Deduplication and Compression are enabled
Enable	Disable	Deduplication/Compression Volumes where only Deduplication is enabled
Disable	Enable	Deduplication/Compression Volumes where only Compression is enabled
Disable	Disable	TPVs for SAN where both Deduplication and Compression are disabled

- Deduplication/Compression setting for TPPs where the volumes can be created

Condition		Deduplication/Compression setting for the destination TPP			
Deduplication	Compression	Only Deduplication is enabled	Only Compression is enabled	Both Deduplication and Compression are enabled	Both Deduplication and Compression are disabled
Enable	Enable	N/A	N/A	Available	N/A
Enable	Disable	Available	N/A	N/A	N/A
Disable	Enable	N/A	Available	N/A	N/A
Disable	Disable	Available	Available	Available	Available

Available: Volumes can be created
N/A: Volumes cannot be created

Rename Volume

For details about this function, refer to .
For the factory default settings for this function, refer to .

● **Rename Volume**

- Name

Description	Input a new volume name. When one volume is selected, an existing volume name cannot be used. Volume names starting with "$SYSVOL", "$VVOL_META", or "$DEDUP" cannot be used.
Input condition/Display contents	Up to 32 alphanumeric characters and symbols (except "," (comma) and "?")

- Start of Suffix

Description	Select the suffix starting number to be added to the new volume name. When changing multiple volume names, the suffix number is added to the volume names with consecutive numbers in ascending order starting with the selected suffix number. Refer to "Naming Conventions of Volumes" (page 1338) for details. When changing only one volume name, "Start of Suffix" is not displayed.
Input condition/Display contents	0 - 99999

• Digits of Suffix

Description	Select the number of digits to be added to the new volume name. When changing only one volume name, "Digits of Suffix" is not displayed.

Input condition/
Display contents
	• For the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F
	  1 - 4
	• For the other models
	  1 - 5

Expand Volume

For details about this function, refer to .

● Capacity

• Capacity

Description	Input the capacity that is to be concatenated and select the units of capacity (MB/GB/TB). Up to a 15-digit number including the "." (decimal point) can be input. Note that when "MB" is selected, the specified value is rounded down to the nearest whole number. When "GB" or "TB" is selected, the specified value is converted to "MB" and rounded down to the nearest whole number.
Input condition/ Display contents	• 1GB - The "Largest Free Space" of the relevant RAID group • Numeric characters • MB/GB/TB

▷ Caution

If the same capacity is entered in the same format (digits and units (GB/TB)) as a RAID group's "Largest Free Space", a capacity corrected to use all of the RAID group's largest free space is added. To add the capacity without adjustments, input the capacity in units of MB.
Refer to "Note" of this setting for details.

● N o t e

• In the "Largest Free Space" field for the RAID group, the largest free space that is managed in the ETERNUS DX/AF is displayed after rounding off to two decimal places.
For example, if "10.00GB" is displayed for "Largest Free Space", the actual largest free space managed in the ETERNUS DX/AF may be between "9.995GB" and "10.004GB". The ETERNUS DX/AF replaces (adjusts) the value entered by the user to the actual largest free space value managed in the ETERNUS DX/AF. This adjustment enables the use of the largest free space with minimal waste.
However, if the value is entered in a different format (unit or digits) for the "Largest Free Space", the capacity is not adjusted. Depending on the largest free space managed on the ETERNUS DX/AF, there may be situations when adding a specified capacity may not be possible.
[Example 1] If the "Largest Free Space" is "10.00GB" and the largest free space managed in the ETERNUS DX/AF is "9.995GB", the following situations occur.
  - When entering "10.00GB" for the capacity, "9.995GB" is added.
  - When entering "10.000GB" or "10240MB" for the capacity, an input error occurs.
[Example 2] If the "Largest Free Space" is "10.00GB" and the largest free space managed in the ETERNUS DX/AF is "10.004GB", the following situations occur.
  - When entering "10.00GB" for the capacity, "10.004GB" is added.
  - When entering "10240MB" for the capacity, "10240MB (10.00GB)" is added.
• Up to 15 numbers can be used. If a decimal point is included in the input value, up to 14 numbers can be used.
[Example] 0.1234567890123 (14 numbers and a decimal point)

- Select RAID Groups

Description	Select the RAID group to obtain free space from.
Input condition/ Display contents	RAID group

> ▶ **Caution**

When the drive type is "Online SED", "Nearline SED", or "SSD SED", selecting a RAID group with the same key group setting (Enabled Key Group/Disabled Key Group) as the RAID group to which the concatenation source volume belongs is recommended.

Expand Thin Provisioning Volume

For details about this function, refer to "Expand Thin Provisioning Volume" (page 281).

● **Volume Setting**

- Volume Capacity after expand

Description	Input the TPV capacity after expansion and select the units of capacity (MB/GB/TB). Up to a 15-digit number including the "." (decimal point) can be input. Note that when "MB" is selected, the specified value is rounded down to the nearest whole number. When "GB" or "TB" is selected, the specified value is converted to "MB" and rounded down to the nearest whole number.

Input condition/
Display contents
	• For ODX Buffer volumes
	  1025MB - 1TB
	• For DEDUP_SYS Volumes
	  8388609MB - 128TB
	• For NAS user volume where the NAS FS version is "2"
	  409601MB - 128TB
	• For NAS user volume where the NAS FS version is "3"
	    - 409601MB - 16TB (when the NAS FS block size is "32KB")
	    - 409601MB - 4TB (when the NAS FS block size is "8KB")
	• For NAS user volume where the NAS FS version is "4"
	    - 409601MB - 128TB (when the NAS FS block size is "256KB" or "32KB")
	    - 409601MB - 32TB (when the NAS FS block size is "8KB")
	• For other volumes
	  25MB - 128TB
	• MB/GB/TB
	• Current TPV capacity < TPV capacity after expansion

> ⬤ **N o t e**

Up to 15 numbers can be used. If a decimal point is included in the input value, up to 14 numbers can be used.
[Example] 0.1234567890123 (14 numbers and a decimal point)

Modify Thin Provisioning Volume Threshold

For details about this function, refer to "Modify Thin Provisioning Volume Threshold" (page 284).
For the factory default settings for this function, refer to "B. Modify Thin Provisioning Volume Threshold" (page 1268).

● **Threshold Setting**

• New Threshold

Description	Set a new threshold (%) for the TPV. If the TPV usage ratio exceeds the threshold, a Host Sense Key Code Qualifier is notified.
Input condition/ Display contents	1 - 100%

Set Allocation

For details about this function, refer to "Set Allocation" (page 290).
For the factory default settings for this function, refer to "B. Set Allocation" (page 1268).

● **Allocation Settings**

• Allocation

Description	Select the allocation method.
Input condition/ Display contents	• Thin • Thick

> ⊳ **Caution**

Regardless of the allocation method (Thin or Thick) of the selected volume, "Thin" is selected when this function starts.

Start RAID Migration

For details about this function, refer to "Start RAID Migration" (page 296).
For the factory default settings for this function, refer to "B. Start RAID Migration" (page 1269).

● **Setting Volume**

• Migration Destination

Description	Select the migration destination of the volume.
Input condition/ Display contents	• RAID Group / Thin Provisioning Pool / Flexible Tier Pool • Wide Striping Volume

> ⊳ **Caution**

• In the following conditions, select "RAID Group / Thin Provisioning Pool / Flexible Tier Pool" for "Migration Destina-
tion".
    - An ODX Buffer volume is selected as a migration source volume.
    - A NAS user volume, a NAS backup volume, or a NAS system volume is selected as a migration source volume
      (only "Thin Provisioning Pool" can be selected as the migration destination.)
    - A migration source FTV usage is "System"
      (only "Flexible Tier Pool" can be selected as the migration destination.)
• For the volume used by the Storage Cluster function, the type (Standard/WSV/TPV/FTV) cannot be changed. Select the
  migration destination to match the migration source volume type.

• Volume Capacity

Description	The capacity of the migration source volume is displayed as the initial state. When expanding the volume capacity after migration, enter the volume capacity and select the unit (MB/GB/TB) of capacity. When this function starts, the capacity of the migration source volume is displayed. Up to a 15-digit number including the "." (decimal point) can be input. Note that when "MB" is selected, the specified value is rounded down to the nearest whole number. When "GB" or "TB" is selected, the specified value is converted to "MB" and rounded down to the nearest whole number. When the migration destination volume type is "Standard", "TPV", or "FTV" Migration source volume capacity $\leq$ Volume capacity $\leq$ The maximum free space in the migration destination When the migration destination volume is "WSV" Migration source volume capacity $\leq$ Volume capacity
Input condition/ Display contents	• Numeric characters • MB/GB/TB

▷ **Caution**

• The ODX Buffer volume capacity can be expanded up to 1TB.

• For migrations where the migration source volume is an External Volume (or a volume whose "Usage" is "Migration"), setting the same capacity as the migration source volume for the migration destination volume is recommended.

• Volume capacity cannot be expanded in the following conditions:

  – "TPV" or "FTV" is selected as the migration source volume

  – The migration source volume is used for the Storage Cluster function

  – "Thin Provisioning Pool" or "Flexible Tier Pool" is selected as the migration destination

• An error screen appears if this item is blank.

⬤ **N o t e**

Up to 15 numbers can be used. If a decimal point is included in the input value, up to 14 numbers can be used.
[Example] 0.1234567890123 (14 numbers and a decimal point)

• FTSP Priority

Description	Select either "Automatic" or the FTSP number that belongs to the migration destination FTRP for the FTSP number to which priority is given. When FTRP is not selected from the migration destination list, only "Automatic" is displayed as the available option. If FTRP is specified, "Automatic" and the FTSP numbers that belong to the migration destination FTRP are displayed. If "FTSP number" is selected and the specified FTRP is changed, the "FTSP Priority" setting returns to the default value ("Automatic"). "FTSP Priority" indicates the FTSP number to which priority is given for allocating physical capacity as the volume migration destination when multiple FTSPs exist in the migration destination FTRP.

Input condition/
Display contents
	• When FTRP is not selected from the Select Migration Destination list
	  Automatic
	• When FTRP is selected from the Select Migration Destination list
	  - Automatic
	  - The FTSP number that belongs to the migration destination FTRP

🔵 N o t e

- When "Automatic" is selected, the physical area is allocated to an FTSP for which the drive type is "Online". If no free space exists in "Online" type disks and migration is not available, the physical area is allocated to an FTSP for which the drive type is "Nearline". If "Nearline" is also not available for migration, the physical area is allocated to an FTSP for which the drive type is "SSD". Migration to an FTRP cannot be performed if "SSD" is not available for migration. "Online SED", "Nearline SED", and "SSD SED" type FTSPs are treated as follows.
  - "Online SED" type FTSPs are used as "Online" type FTSPs
  - "Nearline SED" type FTSPs are used as "Nearline" type FTSPs
  - "SSD SED" type FTSPs are used as "SSD" type FTSPs
- When "FTSP number" is selected, the physical area is allocated to the selected FTSP. If there is no free space in the selected FTSP and migration is not available, the migration destination FTSP number is determined as having the same priority ("Online" → "Nearline" → "SSD") as when "Automatic" is selected.
- The drive type for FTSPs can be checked from the [Flexible Tier Pool Detail] screen (Flexible Tier Sub Pool). Refer to "Flexible Tier Pool Detail (Flexible Tier Sub Pool)" (page 914) for details.

- Encryption

Description	Select the encryption status of the volume after migration. When this function starts, the encryption status of the migration source volume is displayed. There are no limitations for the encryption status of migration source and destination volumes. Note that when migrating an encrypted volume to an unencrypted volume, the user must have the "Security Setting" policy. Refer to "Combinations of encryption conditions for which migration is available" (page 299) for details. For the ETERNUS DX60 S4/DX60 S3, this item is not displayed.
Input condition/ Display contents	• None • by CM • use SED (Disabled Key Group) • use SED (Enabled Key Group)

▶ Caution

- When "use SED (Disabled Key Group)" or "use SED (Enabled Key Group)" is specified for "Encryption", select "Online SED", "Nearline SED", or "SSD SED" for the migration destination.
- When "None" or "by CM" is specified for "Encryption", select "Online", "Nearline", or "SSD" for the migration destination.
- When the encryption mode is disabled, "by CM" cannot be selected.

• Deduplication

Description	Select whether to "Enable" or "Disable" Deduplication for the volume after the migration.
	When this function starts, information that indicates whether the migration source volume is a target for Deduplication is displayed. This item is only displayed when Deduplication/Compression for the ETERNUS DX/AF is enabled. This item is only available when "RAID Group / Thin Provisioning Pool / Flexible Tier Pool" is selected for "Migration Destination". The selectable migration destination changes depending on whether this setting is enabled or disabled. Refer to "Combinations of the Deduplication and Compression settings for which migration is available" (page 298) for details.
Input condition/ Display contents	• Enable Use the migration destination volume as a Deduplication target Deduplication/Compression Volume • Disable Use the migration destination volume as a non-Deduplication target volume

• Compression

Description	Select whether to "Enable" or "Disable" Compression for the volume after the migration.
	When this function starts, information that indicates whether the migration source volume is a target for Compression is displayed. This item is only displayed when Deduplication/Compression for the ETERNUS DX/AF is enabled. This item is only available when "RAID Group / Thin Provisioning Pool / Flexible Tier Pool" is selected for "Migration Destination". The selectable migration destination changes depending on whether this setting is enabled or disabled. Refer to "Combinations of the Deduplication and Compression settings for which migration is available" (page 298) for details.
Input condition/ Display contents	• Enable Use the migration destination volume as a Compression target Deduplication/Compression Volume • Disable Use the migration destination volume as a non-Compression target volume

• Allocation

Description	Select the allocation method of the volume after migration.
	This item can only be specified when all the following conditions are met. • Both "Deduplication" and "Compression" are "Disable" • "Migration Destination" is "RAID Group / Thin Provisioning Pool / Flexible Tier Pool" • "Select Migration Destination" is "Thin Provisioning Pool" or "Flexible Tier Pool"
Input condition/ Display contents	• Thin Physical area is allocated to the target area of the volume when a write I/O is received. • Thick Physical area is allocated to the whole area of the volume when volumes are created.

▶ **Caution**

If the migration source FTV usage is "System", this item is fixed to "Thick".

- • Data Sync after Migration

Description	Select how to stop the data synchronization between the migration source volume and the migration destination volume. This item is displayed only if the External Volume (or a volume whose "Usage" is "Migration") is selected as the migration source volume.
Input condition/ Display contents	• Automatic Stop The data synchronization is automatically stopped when the migration is completed. The migration source External Volume is automatically deleted. Select "Automatic Stop" if the data synchronization between the migration source and migration destination volumes can be stopped every time a data migration of the Non-disruptive Storage Migration is completed. • Manual Stop The data synchronization is manually stopped when the migration is completed. If the data must be synchronized between the migration source and migration destination volumes until all data migrations of the Non-disruptive Storage Migration are completed, select "Manual Stop".

▶ Caution

Up to 32 RAID migration processes can be performed simultaneously. If "Manual Stop" is selected, the total number of External Volumes to be migrated must be 32 or less.

⬤ N o t e

If "Manual Stop" is selected, the migration source volume is not deleted even if the migration is completed. Migration source volumes and migration destination volumes are displayed in the volume list.

Item	Migration source volume	Migration destination volume
No.	Migration source volume number	Temporary volume number (smallest unused number)
Name	Migration source volume name	Temporary volume name (volume names that start with "RMIG")
Type	Standard	Standard
Usage	Migration	Block

If the data synchronization is stopped after all migrations are completed, the migration source External Volume is deleted. At that time, the volume number and the volume name of the migration destination is changed to the volume number and volume name of the migration source. Refer to for details.

- • Start Optimizing TPV/FTV Capacity after migration

Description	Select "Enable" or "Disable" for the capacity optimization of source volumes after migration is complete. When Start Optimizing TPV/FTV Capacity after migration is enabled, the destination volume will be reserved for capacity optimization. "Capacity optimization" is a function that releases the physical area when data in the block (*1) that is allocated to a TPV or an FTV is filled with zeros. *1: Volume allocation unit This item can only be specified when all the following conditions are met. • Both "Deduplication" and "Compression" are "Disable" • "Allocation" is "Thin" • "Migration Destination" is "RAID Group / Thin Provisioning Pool / Flexible Tier Pool" • "Select Migration Destination" is "Thin Provisioning Pool" or "Flexible Tier Pool"
Input condition/ Display contents	• Enable • Disable

> ◤ **Caution**

- Do not select "Enable" if the migration source is a NAS user volume, a NAS backup volume, or a NAS system volume.
- An error screen appears for the following conditions when "Enable" is selected for this item.
  - Capacity optimization is being performed in the migration source volume
  - The migration source volume is an ODX Buffer volume

- Data Integrity

Description	Select the data protection method of the volume after migration. When this function starts, the data protection method of the migration source volume is displayed. This item can only be specified when all the following conditions are met. • The selected migration source volume is a volume other than the External Volume (or a volume whose "Usage" is not "Migration") • Both "Deduplication" and "Compression" are "Disable" • "Migration Destination" is "RAID Group / Thin Provisioning Pool / Flexible Tier Pool" • "Select Migration Destination" is "RAID Group" If this item is disabled, "Default" is set for the ETERNUS DX/AF.

Input condition/
Display contents
	• Default
	  Data is protected within the ETERNUS DX/AF.
	
	• T10-DIF
	  Data is protected with a T10-DIF compatible method in the ETERNUS DX/AF and the host paths. This method is available only when the host interface is FC.

> ◤ **Caution**

- When "T10-DIF" is selected for "Data Integrity", a migration to WSV, TPV, or FTV cannot be performed.
- "T10-DIF" is supported in Oracle Linux 6 and later.

● Select Migration Destination

- Select Migration Destination

Description	Specify the destination RAID group, the TPP, or the FTRP. The selectable RAID groups, TPPs, or FTRPs for the migration destination are displayed. The RAID groups, TPPs, or FTRPs that are displayed depend on the volume capacity and encryption status. The following are not displayed as a migration destination • RAID groups, TPPs (*1), or FTRPs where the migration source volume belongs • External RAID Groups *1: If the migration source or migration destination is a "Deduplication/Compression Volume", there are cases when the same TPP as the migration source volume can be selected. Refer to "Requirements for a migration destination TPP" (page 301) for details.
Input condition/ Display contents	The RAID groups, the TPPs, or the FTRPs that are available as the migration destination

■ Wide Striping Volume Setting

● Volume Information

• Wide Stripe Size

Description	Select the Wide Stripe Size for the migration destination WSV. "Wide Stripe Size" is the size of the WSV Unit that is allocated to each RAID group in series. It is not necessary to change the default setting (Normal) for normal use.
Input condition/ Display contents	• Normal An integral multiple of the basic size for each RAID group (*1). The maximum size is 16MB or smaller. The actual size varies according to the RAID group type, the number of member drives, and Stripe Depth. Select "Normal" to improve random write access performance. • Small An integral multiple of the basic size for each RAID group. The maximum size is 2MB or smaller. The actual size varies according to the RAID group type, the number of member drives, and Stripe Depth. Note that because the segment size of the volume is small and many host accesses among multiple RAID groups occur, the performance may be reduced according to the amount of host I/O. *1: The basic size (stripe size) when creating a volume. Refer to "Basic Size for each RAID Group" (page 1340) for details.

> ▶ **Caution**

- If the basic size of the RAID group is 2MB or more, the basic size is specified for Wide Stripe Size even when "Small" is selected.
- When changing the number of concatenations for a WSV, select the same "Wide Stripe Size" as the migration source WSV. For procedure to check "Wide Stripe Size" for the destination source WSV, refer to "Remarks" in "When the migration destination volume is "WSV"" (page 306).

> ⬤ **N o t e**

"Wide Stripe Size" for an existing WSV can be changed by using the migration function.

• Concatenation Order

Description	Select the concatenation order of RAID groups. It is not necessary to change the default setting (Automatic) for normal use.
Input condition/ Display contents	• Automatic Automatically specify the concatenation order of RAID groups. If multiple WSVs are already registered, the next available RAID group that enables the Controlling CM allocation to be distributed evenly is selected as [1] for the concatenation order. If multiple RAID groups satisfy this condition, the RAID group with the smallest RAID group number is selected as [1] in the concatenation order. RAID groups are concatenated starting from [1] (first) in ascending order. The last RAID group is concatenated to the first RAID group. Volumes that belong to the RAID group that is first in the concatenation order are called "representative volumes". • Manual Manually specify the concatenation order of the RAID group.

▶ **Caution**

When changing the number of concatenations for a WSV, specify the same concatenation order as the migration source WSV. For the procedure to check the concatenation order of migration source WSVs, refer to "Remarks" in "When the migration destination volume is "WSV"" (page 306). When "Manual" is selected for "Concatenation Order", the concatenation order can be changed. It is not necessary to change the default setting (Automatic) if the concatenation order after migration can be changed.

● **Select RAID Group Information**

• Drive Type

Description	Select the type of drives that configure the RAID groups in the migration destination WSV. The installed drive determines the selectable drive types that are displayed. If there are no RAID groups in which volumes can be created, the field is blank.
Input condition/ Display contents	• Online • Nearline • SSD • Online/Nearline • Online SED • Nearline SED • SSD SED • Online SED/Nearline SED

◉ N o t e

• When "Online" is selected, a RAID group that is configured with only "Online" type drives, or a RAID group that is configured with both "Online" and "Nearline" type drives is specified.

• When "Online SED" is selected, a RAID group that is configured with only "Online SED" type drives, or a RAID group that is configured with both "Online SED" and "Nearline SED" type drives is specified.

• When "SSD" is selected, the RAID groups that are configured with SSDs are specified regardless of the SSD type (SSD-M/SSD-L/SSD).

• When "Online/Nearline" is selected, a RAID group that is configured with only "Online" type drives, a RAID group that is configured with only "Nearline" type drives, or a RAID group that is configured with both "Online" and "Nearline" type drives is specified.

• When "Online SED/Nearline SED" is selected, a RAID group that is configured with only "Online SED" type drives, a RAID group that is configured with only "Nearline SED" type drives, or a RAID group that is configured with both "Online SED" and "Nearline SED" type drives is specified.

• RAID Level

Description	Select the RAID group type that configures the migration destination WSV. If there are no RAID groups in which volumes can be created, the field is blank.
Input condition/ Display contents	• High Performance (RAID1+0) • High Capacity (RAID5) • High Reliability (RAID6) • Reliability (RAID5+0) • Mirroring (RAID1) • Striping (RAID0)

- Number of Member Drives

Description	Select the number of member drives that configure the RAID groups in the migration destination WSV. The selectable number of member drives, which is determined by the specified RAID level, is displayed. If there are no RAID groups in which volumes can be created, the field is blank.

Input condition/
Display contents
	• For High Performance (RAID1+0)
	  4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32
	• For High Capacity (RAID5)
	  3 - 16
	• For High Reliability (RAID6)
	  5 - 16
	• For Reliability (RAID5+0)
	  6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32
	• For Mirroring (RAID1)
	  2
	• For Striping (RAID0)
	  2 - 16

- Stripe Depth

Description	Select the Stripe Depth of the drives that configure the RAID groups in the migration destination WSV. The selectable Stripe Depth varies depending on the specified RAID level. Refer to "Available Stripe Depth value (for RAID group)" (page 1195) for details. If "Mirroring (RAID1)" is selected as the RAID level, a "-" (hyphen) is displayed. If there are no RAID groups in which volumes can be created, the field is blank.
Input condition/ Display contents	• 64 KB • 128 KB • 256 KB • 512 KB • 1024 KB

● **Select RAID Groups**

- Checkbox to select RAID groups

Description	Select the checkbox for the RAID group to be selected.
Input condition/ Display contents	Checkbox • Selected • Cleared

Modify Cache Parameters

For details about this function, refer to .
For the factory default settings for this function, refer to .

● Parameters Setting

• Cache Page Capacity

Description	Specify the cache capacity that is used by volumes.
	When "-" (hyphen) is selected, the cache capacity is not limited. It is not necessary to change the default setting for normal use. If multiple volumes with different settings are selected and [Modify Cache Parameters] is clicked, a "-" (hyphen) is displayed for the field. If volumes with a high I/O load exist, data in a low I/O load volume may not stored in the cache memory and the cache hit rate for the low I/O load volume is reduced. By limiting the cache capacity that is used by high I/O load volumes, a reduction in performance when low I/O load volumes are accessed can be prevented. The cache hit rate for high I/O load volumes is lowered and the access performance for the volumes may reduced.
Input condition/ Display contents	• "-" (hyphen) • 32.50 MB • 65.00 MB • 130.00 MB • 260.00 MB • 520.00 MB • 1040.00 MB (Not available for the ETERNUS DX60 S4 and the ETERNUS DX60 S3) • 2080.00 MB (Not available for the ETERNUS DX60 S4/DX100 S4 and the ETERNUS DX60 S3/DX100 S3)

▷ **Caution**

• Note that this parameter is not used to specify the capacity of dedicated cache for the relevant volume. This parameter limits the cache capacity that can be used for the relevant volume. Although a volume with this parameter cannot use a cache memory that exceeds the specified value, other volumes can use the entire cache, which includes the specified capacity.

• The cache page capacity must be changed when the I/O load of the volume is low.

• If write data in the cache memory exceeds the specified cache page capacity for a volume, the cache page capacity cannot be changed.

• The cache page capacity cannot be changed for concatenated volumes that are created by the LUN concatenation function.

• If the cache page capacity is set, EXC and EXCP of the specified volume is not used (the enabling/disabling of the EXC and EXCP settings is not changed).

• When selecting volumes that cannot use this parameter as the target of this function, the "Cache Page Capacity" and "Current Cache Page Capacity" settings are not displayed on the screen.

• The specified cache page capacity includes the mirror area. Note that the maximum available cache memory size used by read I/O is a half the specified value.

• When the cache page capacity is limited, the capacity cannot be expanded for the relevant volume. Reset the cache page capacity to the default value before expanding the volume capacity.

• Prefetch Limit (PL)

Description	Specify the prefetch limit of the volume. The default PL value is "8". If "0" is specified, data prefetch is not performed. It is not necessary to change the default value for normal use. If multiple volumes with different settings are selected and [Modify Cache Parameters] is clicked, the field is blank. When specifying larger PL, the amount of data that is read from a drive for a single read process is increased. As a result, the number of times that data needs to be read (Staging) from the drive is reduced. When a large "Prefetch Limit" value is specified, the amount of data that is read from a drive for a single read process is increased. As a result, the amount of data that is read (Staging) from the drive for a single read process increases and requested data may not be read before the next read or write request from the host is issued.
Input condition/ Display contents	0 - 64

• Force Prefetch Mode (FP)

Description	Select whether to enable (ON) or disable (OFF) the Force Prefetch Mode to forcibly fetch the cache in advance. The default FP value is "OFF". It is not necessary to change the default setting for normal use. If multiple volumes with different settings are selected and [Modify Cache Parameters] is clicked, "OFF" is selected for the field. This setting is required to improve the sequential read access performance. When a number of sequential accesses are performed for one volume, the ETERNUS DX/AF may regard as random accesses occurs. By selecting "ON" for "Force Prefetch Mode", prefetching is forcibly performed in such a case. For random read access, unnecessary data is read from the drive and random read access performance may be reduced.
Input condition/ Display contents	• ON • OFF

• Multi Writeback Count (MWC)

Description	Specify the value of the Multi Writeback Count. It is not necessary to change the default value for normal use. The Multi Writeback Count cannot be specified for volumes that are concatenated by the LUN concatenation function. If multiple volumes with different settings are selected and [Modify Cache Parameters] is clicked, the field is blank. When specifying larger MWC, sequential write access performance is improved. Note that this is not effective when a number of random write accesses occur. Depending on the ratio of read access and write access, read access performance may be reduced.
Input condition/ Display contents	0 - 16

⬤ N o t e

The setting values available for Multi Writeback Count vary depending on the RAID level and drive configuration. Refer to "Input Conditions for MWC" (page 1352) for details.

• Prefetch Sequential Detect Count (PSDC)

Description	Specify the Prefetch Sequential Detect Count. The default PSDC value is "5". It is not necessary to change the default value for normal use. If multiple volumes with different settings are selected and [Modify Cache Parameters] is clicked, the field is blank. If the host splits data into multiple pieces and performs read access in succession, the access may be determined as sequential access even if it is actually random access. When specifying larger PSDC, the required number to detect sequential data for determining sequential data access is increased and a reduction in performance due to incorrect prefetch can be avoided. Depending on the amount of sequential data, a large PSDC slows the determination of sequential data access and performance may be reduced.
Input condition/ Display contents	1 - 255

• Sequential Dirty Detect Count (SDDC)

Description	Specify the value of the Sequential Dirty Detect Count. The default SDDC value is "5". It is not necessary to change the default value for normal use. If multiple volumes with different settings are selected and [Modify Cache Parameters] is clicked, the field is blank. If the host splits data into multiple pieces and performs write access in succession, the access may be determined as sequential access even if it is actually random access. When specifying larger SDDC, the required number to detect sequential data for determining sequential data access is increased and a reduction in performance due to incorrect prefetch can be avoided. Depending on the amount of sequential data, a large SDDC slows the determination of sequential data access and performance may be reduced.
Input condition/ Display contents	1 - 255

• Sequential Slope (SS)

Description	Specify the value of the Sequential Slope. If the following equation is true for sequential data access (Read I/O), the access is determined as sequential access. The default SS value is "128". It is not necessary to change the default value for normal use. If multiple volumes with different settings are selected and [Modify Cache Parameters] is clicked, the field is blank. (End LBA of the previous I/O + 1) + SS (Sequential Slope) $\supseteq$ Start LBA of the current I/O The following conditions can be also determined as sequential access. • A sequential access that does not have successive LBAs. • A sequential access that issues multiple host I/Os at the same time and is unable to be received in the order of LBAs. A larger SS may cause random access to be determined as sequential access, resulting in reduced performance due to incorrect prefetching.
Input condition/ Display contents	0 - 4096

• Sequential Dirty Slope (SDS)

Description	Specify the value of the Sequential Dirty Slope. If the following equation is true for sequential data access (Write I/O), the access is determined as sequential access. The default SDS value is "128". It is not necessary to change the default value for normal use. If multiple volumes with different settings are selected and [Modify Cache Parameters] is clicked, the field is blank. (End LBA of the previous I/O + 1) + SDS (Sequential Dirty Slope) $\supseteq$ Start LBA of the current I/O The following conditions can be also determined as sequential access. • A sequential access that does not have successive LBAs. • A sequential access that issues multiple host I/Os at the same time and is unable to be received in the order of LBAs. A larger SDS may cause random access to be determined as sequential access, resulting in reduced performance due to incorrect prefetching.
Input condition/ Display contents	0 - 4096

• Sequential Parallel Multi I/O Count (SPMC)

Description	Specify the value of the Sequential Parallel Multi I/O Count. It is not necessary to change the default value for normal use. If multiple volumes with different settings are selected and [Modify Cache Parameters] is clicked, the field is blank. For asynchronous I/O (I/O is issued at once regardless of the order), the I/O process in the CM may be switched and discontinuity may occur. SPMC is used to determine the sequential data access (Read I/O and Write I/O) by using the start address for the previous I/O and the start addresses for specified number of I/Os before and after the previous I/O. Compared with "SS" and "SDS" which determines the sequential access by LBA numbers, SPMC can be used for large I/Os. A larger SPMC may cause random access to be determined as sequential access, resulting in reduced performance due to incorrect prefetching. Also, SPMC is not expected to have an effect on data access with multiple I/O sizes.
Input condition/ Display contents	0 - 32

• Extreme Cache Pool

Description	Select whether to "Enable" or "Disable" the EXCP. It is not necessary to change the default setting for normal use. If multiple volumes are selected when starting this function and different EXCP settings have been specified for each volume, "Enable" is selected for this item. This item is displayed when EXCP is enabled for the ETERNUS DX.
Input condition/ Display contents	• Enable • Disable

> **▶ Caution**
>
> - The ETERNUS DX60 S4, the ETERNUS DX60 S3, the ETERNUS AF250 S2/AF650 S2, the ETERNUS AF250/AF650, and the ETERNUS DX200F do not support the Extreme Cache Pool. In this case, "Extreme Cache Pool" and "Current Extreme Cache Pool" are not displayed.
> - When selecting volumes that cannot use this parameter as the target of this function, this item is not selected and cannot be specified.
> - The EXCP setting for the following volumes are fixed to "Disable" and cannot be changed.
>   - Volumes (Standard type volumes, Standard (LUN Concatenation) type volumes, and WSVs) that are created in a RAID group configured with SSDs or SSD SEDs
>   - Volumes (TPVs) that are created in a TPP configured with SSDs or SSD SEDs
>   - ODX Buffer volumes

Set ALUA

For details about this function, refer to .
For the factory default settings for this function, refer to .

● ALUA Settings

- New ALUA

Description	Select the ALUA (access type from the host to the volume) that is specified for volumes. • Follow Host Response 　Use the same "Asymmetric / Symmetric Logical Unit Access" setting as the host response for the host group or the host. • ACTIVE / ACTIVE 　If multiple paths are used to access the volume, use all of the paths with the same priority. • ACTIVE-ACTIVE / PREFERRED_PATH 　If multiple paths access the volume, use the recommended paths. Even though volumes can be accessed by non-recommended paths, the responses to the host may require a longer period of time.

Set Volume QoS

For details about this function, refer to .
For the factory default settings for this function, refer to .

● Volume QoS Setting

- New Bandwidth Limit

Description	Select a new bandwidth limit. If the bandwidth limit is not to be configured (the bandwidth is not to be limited), select "Unlimited".

Input condition/ Display contents	• Unlimited
	• 15000 IOPS (800 MB/s)
	• 12600 IOPS (700 MB/s)
	• 10020 IOPS (600 MB/s)
	• 7500 IOPS (500 MB/s)
	• 5040 IOPS (400 MB/s)
	• 3000 IOPS (300 MB/s)
	• 1020 IOPS (200 MB/s)
	• 780 IOPS (100 MB/s)
	• 600 IOPS (70 MB/s)
	• 420 IOPS (40 MB/s)
	• 300 IOPS (25 MB/s)
	• 240 IOPS (20 MB/s)
	• 180 IOPS (15 MB/s)
	• 120 IOPS (10 MB/s)
	• 60 IOPS (5 MB/s)

● **N o t e**

The bandwidth limit can be changed with the "set qos-bandwidth-limit" ETERNUS CLI command. If the bandwidth limit is changed by using ETERNUS CLI, that value is also applied to the bandwidth limit that is specified with ETERNUS Web GUI.

Set Snapshot

For details about this function, refer to .
For the factory default settings for this function, refer to .

● **Snapshot Setting**

• Name

Description	Input a snapshot destination SDV name.
	If the "Use the volume name to setup snapshot" checkbox is cleared, a "Name" can be specified.
	If the "Use the volume name to setup snapshot" checkbox is selected, the selected NAS user volume name for the snapshot destination SDV is used. In this case, a "Name" cannot be specified.
	The following names are automatically set for SDVs in proportion to the specified number of generations.
	"Name" + "$snap_N" (N: Number of generations between 1 - 128)
	If the volume name that is appended with "$snap_N" exceeds 32 characters, the excess number of characters is deleted from the volume name. Refer to "Naming Conventions of Volumes" (page 1338) for details. The snapshot name can be set only when the snapshot setting is performed for the first time.
Input condition/ Display contents	• "Use the volume name to setup snapshot" checkbox
	- Selected
	- Cleared
	• Name
	- Up to 16 alphanumeric characters and symbols (except "," (comma) and "?")
	- Spaces

- Number of Generations

Description	Specify the number of snapshot generations.
	
	SDVs are automatically created in proportion to the specified number of generations.
	The maximum number of generations for each model is as follows.
	- For the ETERNUS DX100 S4
	  64 (*1)
	- For the ETERNUS DX200 S4
	  128 (*1)
	- For the ETERNUS DX500 S4
	  128
	- For the ETERNUS DX600 S4
	  256
	- For the ETERNUS DX100 S3
	  16 (*2) or 64 (*1)
	- For the ETERNUS DX200 S3
	  64 (*2) or 128 (*1)
	- For the ETERNUS DX500 S3
	  128
	- For the ETERNUS DX600 S3
	  256

Input condition/
Display contents
	- For the ETERNUS DX100 S4
	  - 1 - 64 (*1)
	- For the ETERNUS DX200 S4
	  - 1 - 128 (*1)
	- For the ETERNUS DX500 S4
	  1 - 128
	- For the ETERNUS DX600 S4
	  1 - 128
	- For the ETERNUS DX100 S3
	  - 1 - 16 (*2)
	  - 1 - 64 (*1)
	- For the ETERNUS DX200 S3
	  - 1 - 64 (*2)
	  - 1 - 128 (*1)
	- For the ETERNUS DX500 S3
	  1 - 128
	- For the ETERNUS DX600 S3
	  1 - 128
	*1: The maximum number of generations when "Memory Extension" described below is installed.
	  - ETERNUS DX100 S4/DX100 S3
	    16GB/CM (the controller firmware version is V10L53 or later)
	  - ETERNUS DX200 S4/DX200 S3
	    32GB/CM (the controller firmware version is V10L33 or later)
	*2: The maximum number of generations when "Memory Extension" described below is installed.
	  - ETERNUS DX100 S3
	    8GB/CM
	  - ETERNUS DX200 S3
	    16GB/CM

• Mode

Description	Select the collection mode for the snapshot. The collection mode can be set only when the snapshot setting is performed for the first time.
Input condition/ Display contents	• Automatic 　Snapshots are collected automatically according to the acquisition schedule that is set 　from ETERNUS Web GUI, ETERNUS CLI, or ETERNUS SF Storage Cruiser. • Manual 　This setting is not used for normal operation. 　Snapshots are collected from VMware vSphere Web Client in environments where ETER- 　NUS vCenter Plug-in is used. All snapshot operations are performed from VMware vSphere 　Web Client.

▶ Caution

• Note that "Automatic" and "Manual" cannot be set at the same time for a single NAS user volume.

• To change the collection mode, delete the snapshots for the relevant NAS user volume and then reconfigure to the desired mode.

• Day of the Week (Schedule)

Description	Select the checkboxes of the days to acquire snapshots. This item is only available when "Automatic" is selected for "Mode".
Input condition/ Display contents	Checkboxes for Monday to Sunday • Selected • Cleared

• Time (Schedule)

Description	Specify the acquisition time for snapshots. This item is only available when "Automatic" is selected for "Mode".

Input condition/
Display contents
	• Time Interval
	  - Every Hour
	    Acquire snapshots every hour from 0:00 (0:00, 1:00, 2:00, 3:00, 4:00, 5:00, 6:00, 7:00, 8:00, 9:00, 10:00, 11:00, 12:00, 13:00, 14:00, 15:00, 16:00, 17:00, 18:00, 19:00, 20:00, 21:00, 22:00, 23:00).
	  - 2
	    Acquire snapshots every two hours from 0:00 (0:00, 2:00, 4:00, 6:00, 8:00, 10:00, 12:00, 14:00, 16:00, 18:00, 20:00, 22:00).
	  - 3
	    Acquire snapshots every three hours from 0:00 (0:00, 3:00, 6:00, 9:00, 12:00, 15:00, 18:00, 21:00).
	  - 4
	    Acquire snapshots every four hours from 0:00 (0:00, 4:00, 8:00, 12:00, 16:00, 20:00).
	  - 6
	    Acquire snapshots every six hours from 0:00 (0:00, 6:00, 12:00, 18:00).
	  - 8
	    Acquire snapshots every eight hours from 0:00 (0:00, 8:00, 16:00).
	  - 12
	    Acquire snapshots every 12 hours from 0:00 (0:00, 12:00).
	  - 24
	    Acquire snapshots every 24 hours from 0:00 (0:00).
	• Advanced Setting
	  Click the [Browse...] button to display the [Schedule Time Settings] screen.
	  Select the time to acquire snapshots between 0:00 - 23:00 (multiple selections can be made).
	  - Selected
	  - Cleared

◯ N o t e

Setting a different acquisition time for each day is not possible.

● **Select RAID Group**

• Radio button to select a RAID group

Description	Select the radio button for a RAID group to create the snapshot destination SDVs.
Input condition/ Display contents	Radio button • Selected • Cleared

Connectivity Management

This section provides information on the parameters of the following actions for connectivity management.
- Host Affinity Management
- Host Group Management
- CA Port Group Management
- LUN Group Management
- Host Response Management
- Host-LU QoS Management
- NAS Management

Host Affinity Management

Create Host Affinity

For details about this function, refer to "Create Host Affinity" (page 337).
For the factory default settings for this function, refer to "B. Create Host Affinity" (page 1272).

● Target Connection Setting

- Target Connection

Description	Select the connection target from "Host Group - CA Port Group" or "Host - CA Port".
Input condition/ Display contents	• Host Group - CA Port Group Specify a "Host Group", a "CA Port Group", and a "LUN Group" to create a host affinity. • Host - CA Port Specify a "Host", a "CA Port", and a "LUN Group" to create a host affinity.

■ When "Host Group - CA Port Group" is selected for "Target Connection"

● Select Host Group

- Target Connection

Description	Select the connection target from "Host Group" or "All".
Input condition/ Display contents	• Host Group Specify a specific host group as the connection target. • All Specify all hosts as the connection target.

- Host Group

Description	Select a host group to configure a host affinity. Select this item only when "Host Group" is selected for "Target Connection".
Input condition/ Display contents	A host group to configure a host affinity.

• Host Response

Description	Select the host response that is assigned to all hosts. Select this item only when "All" is selected for "Target Connection".
Input condition/ Display contents	• Solaris MPxIO • HP-UX • AIX • AIX VxVM • VS850/SVC • BS2000 • Host responses registered in the ETERNUS DX/AF • Default

● **Select CA Port Group**

• CA Port Group

Description	Select a CA port group to configure a host affinity.
Input condition/ Display contents	A CA port group to configure a host affinity.

● **Select LUN Group**

• LUN Group

Description	Select a LUN group to configure a host affinity.
Input condition/ Display contents	A LUN group to configure a host affinity.

> ▷ **Caution**
> The LUN range that can be referenced from a host depends on the "LUN Addressing" and "LUN Expand Mode (Peripheral Device Addressing)" settings of the host response that is applied to the selected "Host Group" (specific host group), "Host" (specific host), or "All" (all of the hosts). Refer to "Referable number of LUNs from a host" (page 1115) for details. LUN groups that use LUNs from LUN#256 onward cannot config-ure the host affinity with a host group or a host for which the referable LUNs is "256 LUN" host response. Also, LUN groups that use LUNs from LUN#256 onward cannot configure the host affinity when "Connection Target" is "All" and referable LUNs is "256 LUN" host response.

Referable number of LUNs from a host

Host response		Referable number of LUNs from a host (range of LUNs)	
LUN Addressing	LUN Expand Mode (Peripheral Device Addressing)	When "Host Group" or "Host" is selected	When "All" is selected
PRHL	Disable (Default)	256 LUN LUN#0 - LUN#255	256 LUN LUN#0 - LUN#255
PRHL	Enable	4096 LUN LUN#0 - LUN#4095	512 LUN LUN#0 - LUN#511
FLAT	Disable (Default) Enable	4096 LUN LUN#0 - LUN#4095	512 LUN LUN#0 - LUN#511

The referable number of LUNs varies depending on the recommended pattern of the host response. Refer to "Host response and referable number of LUNs" (page 1118) for details.

● **Select CA Port**

• Checkbox to select a CA port

Description	To enable the paths between hosts and ports, select the port checkboxes. To disable the paths, clear the checkboxes.
	Select this item only when the connection target is "Host Group - CA Port Group".
Input condition/ Display contents	Checkbox
	• Selected
	• Cleared

■ **When "Host - CA Port" is selected for "Target Connection"**

● **Select Host**

• Target Connection

Description	Select the connection target from "Host" or "All".
Input condition/ Display contents	• Host Specify a specific host as the connection target.
	• All Specify all hosts as the connection target.

• Host

Description	Select a host to configure a host affinity.
	Select this item only when "Host" is selected for "Target Connection".
Input condition/ Display contents	A host to configure a host affinity.

• Host Response

> ◉ **N o t e**
>
> Refer to "Host Response" (page 1115) in "When "Host Group - CA Port Group" is selected for "Target Connection"" for details.

● **Select CA Port**

• CA Port

Description	Select a CA port to configure a host affinity.
Input condition/ Display contents	A CA port to configure a host affinity.

● **Select LUN Group**

• LUN Group

> ◉ **N o t e**
>
> Refer to "LUN Group" (page 1115) in "When "Host Group - CA Port Group" is selected for "Target Connection"" for details.

Modify Host Affinity

For details about this function, refer to "Modify Host Affinity" (page 348).
Refer to "Create Host Affinity" (page 1114) for details about the setting items of this function.

Host Group Management

Add FC/FCoE Host Group

For details about this function, refer to "Add FC/FCoE Host Group" (page 359).
For the factory default settings for this function, refer to "B. Add FC/FCoE Host Group" (page 1273).

● **Host Group Setting**

• Host Group Name

Description	Specify the host group name. An existing host group name cannot be used. (Host group names cannot overlap with any other host group names, irrespective of the interface types.) Refer to "Naming Conventions When Adding Hosts" (page 1339) for details.
Input condition/ Display contents	• Up to 16 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

• Host Response

Description	Select a host response that is to be assigned to a host group. The host response list created in the ETERNUS DX/AF is displayed.
Input condition/ Display contents	• Solaris MPxIO • HP-UX • AIX • AIX VxVM • VS850/SVC • BS2000 • Host responses created in the ETERNUS DX/AF • Default

▷ **Caution**

The number of LUNs that can be referenced from the host is determined by the "LUN Addressing" settings and the "LUN Expand Mode (Peripheral Device Addressing)" settings for the host response. When a host that has the host affinity setting is added to a new host group, check the LUN setting state. If a LUN that is LUN#256 onward is used for the host, the relevant host cannot be added to a host group with "256 LUN" for the host response. Refer to "Host response and referable number of LUNs" (page 1118) for details.

Host response and referable number of LUNs

- Recommended Patterns of Host Responses

Item		Default	Solaris MPxIO	HP-UX	AIX	AIX VxVM	VS850/ SVC	BS 2000
Host Response	LUN Addressing (*1)	PRHL	PRHL	FLAT	FLAT	FLAT	PRHL	PRHL
	LUN Expand Mode (Peripheral Device Addressing)	Disable (Default)	Disable (Default)	Disable (Default)	Disable (Default)	Disable (Default)	Disable (Default)	Enable
Referable number of LUNs		256 LUN	256 LUN	4096 LUN	4096 LUN	4096 LUN	256 LUN	4096 LUN
LUN settings for LUN groups with host affinity settings	LUN#0 - LUN#255	OK	OK	OK	OK	OK	OK	OK
	LUN#0 - LUN#4095	N/A	N/A	OK	OK	OK	N/A	OK

OK: Available, N/A: Not available

▷ **Caution**

- If the referable number of LUN is "256 LUN", 256 LUNs (LUN#0 - LUN#255) can be referenced (LUN#256 - LUN#4095 cannot be referenced).
- If the referable number of LUN is "4096 LUN", 4096 LUNs (LUN#0 - LUN#4095) can be referenced.

- Example of host responses in the ETERNUS DX/AF

Item		HR 1	HR 2	HR 3
Host Response	LUN Addressing (*1)	PRHL	PRHL	FLAT
	LUN Expand Mode (Peripheral Device Addressing)	Disable (Default)	Enable	Disable (Default)
Referable number of LUNs		256 LUNs	4096 LUNs	4096 LUNs
LUN settings for LUN groups with host affinity settings	LUN#0 - LUN#255	OK	OK	OK
	LUN#0 - LUN#4095	N/A	OK	OK

OK: Available, N/A: Not available
*1: "PRHL" indicates "Peripheral device addressing (Default)" and "FLAT" indicates "Flat space addressing".

- Checkbox to select a host

Description	Select the corresponding host checkbox in the FC host list, to add a host. Clear the corresponding host checkbox in the FC host list, to delete a host. The checkbox for the FC host that is already registered in the host group is selected by default.
Input condition/ Display contents	Checkbox • Selected • Cleared

◯ N o t e

FC hosts that are set for the host affinity of which the Virtual Volume function is enabled are not displayed.

● **Host Setting**

- WWN

Description	Input the WWN for the FC host. The registered WWN cannot be used.
Input condition/ Display contents	• Hexadecimal numbers (0 - 9, A - F, a - f) • 16 digits (using "F (f)" or "0" in entire 16 digits is not allowed)

Add iSCSI Host Group

For details about this function, refer to "Add iSCSI Host Group" (page 366).
For the factory default settings for this function, refer to "B. Add iSCSI Host Group" (page 1273).

● **Host Group Setting**

- Host Group Name

Description	Specify the host group name. An existing host group name cannot be used. (Host group names cannot overlap with any other host group names, irrespective of the interface types.) Refer to "Naming Conventions When Adding Hosts" (page 1339) for details.
Input condition/ Display contents	• Up to 16 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

- Host Response

Description	Select a host response that is to be assigned to a host group. The host response list created in the ETERNUS DX/AF is displayed.
Input condition/ Display contents	• Solaris MPxIO • HP-UX • AIX • AIX VxVM • VS850/SVC • BS2000 • Host responses created in the ETERNUS DX/AF • Default

> ▶ **Caution**
>
> The number of LUNs that can be referenced from the host is determined by the "LUN Addressing" settings and the "LUN Expand Mode (Peripheral Device Addressing)" settings for the host response. When a host that has the host affinity setting is added to a new host group, check the LUN setting state. If a LUN that is LUN#256 onward is used for the host, the relevant host cannot be added to a host group with "256 LUN" for the host response. Refer to "Host response and referable number of LUNs" (page 1118) for details.

● Checkbox to select a host

Description	Select the corresponding host checkbox in the iSCSI host list, to add a host. Clear the corresponding host checkbox in the iSCSI host list, to delete a host. The checkbox for the iSCSI host that is already registered in the host group is selected by default.
Input condition/ Display contents	Checkbox ● Selected ● Cleared

> ▶ **Caution**
>
> ● If the Internet Storage Name Service (iSNS) server has not been configured in "Modify iSCSI Port Parameters" (page 424), the iSCSI host cannot be automatically acquired.
> ● The following restrictions in the environment that is described below apply for the automatic acquirement of host information (*1) even when the iSNS server is specified.
>   *1:   "iSCSI Name", "IP Version", "IP Address", and "Alias Name"
>   - When one of the following OSs is used and there are multiple hosts that have the same iSCSI name but different IP addresses, only the information of one host can be acquired.
>   ● Windows Server 2008
>   ● Windows Server 2008 R2
>   ● Windows Server 2012
>   ● Windows Server 2012 R2
>   ● Windows Server 2016
>   ● Oracle Solaris 10
>   - When the host OS is Oracle Solaris 11, "IP Version" and "IP Address" cannot be acquired.
> ● The following items can be specified only for the iSCSI hosts that are selected by checkboxes; "IP Version" "IP Address", "Alias Name", "CHAP User ID", "Change CHAP Password", "CHAP Password", and "Confirm CHAP Password".

> ⬤ **N o t e**
>
> iSCSI hosts that are set for the host affinity of which the Virtual Volume function is enabled are not displayed.

● IP Version

Description	Select the IP version of the iSCSI host. If the iSCSI host has already been registered in the host group, the IP version is displayed. To change this item, select the checkbox for the iSCSI host and then select the IP version.
Input condition/ Display contents	● IPv4 ● IPv6

> ▶ **Caution**

To register an iSCSI host without using an IP address, perform IP version selection as follows:
- Select "IPv4" when the IP address format of the iSCSI host is IPv4 (when using an IPv4 host)
- Select "IPv6" when the IP address format of the iSCSI host is IPv6 (when using an IPv6 host)
- If the IP address format of the iSCSI host cannot be checked (when either an IPv4 host or an IPv6 host is used), register two hosts. Select "IPv4" for one host, and select "IPv6" for the other host. Specify the same iSCSI name, CHAP user ID, and CHAP password for each host.

- IP Address

Description	Specify the IP address of the iSCSI host.
	If the iSCSI host has already been registered in the host group, the IP address is displayed. To change this item, select the checkbox for the iSCSI host and then specify the IP address. There are two methods to specify an IP address; "IPv4" and "IPv6". The IP address must be specified with the selected IP version (IPv4 or IPv6). The following IPv6 addresses can be used; "link local address", "global address", "unique local address", or "6to4 address". Refer to "Available IPv6 Address" (page 122) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation. It is not necessary to specify this item if IP address is not used.

Input condition/ Display contents	- For IPv4 address
	  xxx.xxx.xxx.xxx
	  xxx: 1 - 255 for the top field (decimal)
	  xxx: 0 - 255 for other fields (decimal)
	- For IPv6 address
	  xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
	  xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
	  Refer to "IPv6 Address Notation" (page 371) for details.

- Alias Name

Description	Specify the Alias name of the iSCSI host.
	If the iSCSI host has already been registered in the host group, the Alias name is displayed. To change this item, select the checkbox for the iSCSI host and then specify the Alias name. It is not necessary to specify this item if Alias name is not used. An existing Alias name cannot be specified.
Input condition/ Display contents	- Up to 31 alphanumeric characters and symbols (except "," (comma) and "?") - Spaces

- CHAP User ID

Description	Specify the user ID for the CHAP Authentication.
	If the iSCSI host has already been registered in the host group, the CHAP User ID is displayed. To change this item, select the checkbox for the iSCSI host and then specify the CHAP User ID. It is not necessary to specify this item if the CHAP Authentication is not used. Make sure to set the user name and password together.
Input condition/ Display contents	- Up to 255 alphanumeric characters, symbols (except "," (comma) and "?") - Spaces

• Change CHAP Password

Description	To register or edit the CHAP Authentication password, select the checkbox. This item is available only when the checkbox for the iSCSI host is selected.
Input condition/ Display contents	Checkbox • Selected • Cleared

• CHAP Password

Description	Specify the password for the CHAP Authentication. If the iSCSI host is already registered in the host group and CHAP Authentication is used, the password is displayed with "*" (asterisks). To change this item, select the checkbox for the iSCSI host and the checkbox for "Change CHAP Password", and then specify the password. Make sure to set the user name and password together. It is not necessary to specify this item if the CHAP Authentication is not used.
Input condition/ Display contents	• 12 - 100 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

• Confirm CHAP Password

Description	Input the CHAP password again for confirmation. If the iSCSI host is already registered in the host group and CHAP Authentication is used, the password is displayed with "*" (asterisks). To change this item, select the checkbox for the iSCSI host and the checkbox for "Change CHAP Password", and then input the password again. It is not necessary to specify this item if the CHAP Authentication is not used.
Input condition/ Display contents	• 12 - 100 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

● **Host Setting**

• iSCSI Name

Description	Input the iSCSI name of the iSCSI host (required). An iSCSI Name that has already been registered in the ETERNUS DX/AF cannot be used.
Input condition/ Display contents	• 4 - 223 alphanumeric characters and symbols ('-', '.', ':') • The name starts with "iqn." or "eui."

 ► Caution

For setting items, refer to .

Add SAS Host Group

For details about this function, refer to "Add SAS Host Group" (page 371).
For the factory default settings for this function, refer to "B. Add SAS Host Group" (page 1273).

● Host Group Setting

- Host Group Name

Description	Specify the host group name. An existing host group name cannot be used. (Host group names cannot overlap with any other host group names, irrespective of the interface types.) Refer to "Naming Conventions When Adding Hosts" (page 1339) for details.
Input condition/ Display contents	• Up to 16 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

- Host Response

Description	Select a host response that is to be assigned to a host group. The host response list created in the ETERNUS DX is displayed.
Input condition/ Display contents	• Solaris MPxIO • HP-UX • AIX • AIX VxVM • VS850/SVC • BS2000 • Host responses created in the ETERNUS DX • Default

> ▶ **Caution**

The number of LUNs that can be referenced from the host is determined by the "LUN Addressing" settings and the "LUN Expand Mode (Peripheral Device Addressing)" settings for the host response. When a host that has the host affinity setting is added to a new host group, check the LUN setting state. If a LUN that is LUN#256 onward is used for the host, the relevant host cannot be added to a host group with "256 LUN" for the host response. Refer to "Host response and referable number of LUNs" (page 1118) for details.

- Checkbox to select a host

Description	Select the corresponding host checkbox in the SAS host list, to add a host. Clear the corresponding host checkbox in the SAS host list, to delete a host. The checkbox for the SAS host that is already registered in the host group is selected by default.
Input condition/ Display contents	Checkbox • Selected • Cleared

● **Host Setting**

• SAS Address

Description	Input the SAS address for the SAS host. A SAS address that has already been registered in the ETERNUS DX cannot be used.
Input condition/ Display contents	• Hexadecimal numbers (0 - 9, A - F, a - f) • 16 digits (using "F (f)" or "0" in entire 16 digits is not allowed)

Modify Host Group (FC/FCoE)

For details about this function, refer to "Modify Host Group (FC/FCoE)" (page 376).
Refer to "Add FC/FCoE Host Group" (page 1117) for details about the setting items of this function.

Modify Host Group (iSCSI)

For details about this function, refer to "Modify Host Group (iSCSI)" (page 380).
Refer to "Add iSCSI Host Group" (page 1119) for details about the setting items of this function.

Modify Host Group (SAS)

For details about this function, refer to "Modify Host Group (SAS)" (page 385).
Refer to "Add SAS Host Group" (page 1123) for details about the setting items of this function.

Add FC/FCoE Host

For details about this function, refer to "Add FC/FCoE Host" (page 390).
For the factory default settings for this function, refer to "B. Add FC/FCoE Host" (page 1273).

■ **When registering a host by selecting from the host list**

● **Host Setting**

• Checkbox to select a host

Description	Select the checkbox of the FC host that is to be registered in the ETERNUS DX/AF. The host name and host response can only be specified for the selected FC host.
Input condition/ Display contents	Checkbox • Selected • Cleared

• Name

> ◉ **N o t e**
>
> Refer to "Name" (page 1127) in "Modify FC/FCoE Host" for details.

• Host Response

> ◉ **N o t e**
>
> Refer to "Host Response" (page 1128) in "Modify FC/FCoE Host" for details.

■ **When registering a host by manually specifying the host**

● **Host Setting**

- WWN

🔵 **N o t e**

Refer to "WWN" (page 1128) in "Modify FC/FCoE Host" for details.

Add iSCSI Host

For details about this function, refer to "Add iSCSI Host" (page 393).
For the factory default settings for this function, refer to "B. Add iSCSI Host" (page 1273).

■ **When registering a host by selecting from the host list**

● **Host Setting**

- Checkbox to select a host

Description	Select the checkbox of the iSCSI host that is to be registered in the ETERNUS DX/AF.

Input condition/
Display contents
	Checkbox
	  • Selected
	  • Cleared

▷ **Caution**

- If the iSNS server has not been configured in "Modify iSCSI Port Parameters" (page 424), the iSCSI host cannot be automatically acquired.
- The following restrictions in the environment that is described below apply for the automatic acquirement of host information (*1) even when the iSNS server is specified.
  - *1: "iSCSI Name", "IP Version", "IP Address", and "Alias Name"
    - When one of the following OSs is used and there are multiple hosts that have the same iSCSI name but different IP addresses, only the information of one host can be acquired.
      - Windows Server 2008
      - Windows Server 2008 R2
      - Windows Server 2012
      - Windows Server 2012 R2
      - Windows Server 2016
      - Oracle Solaris 10
    - When the host OS is Oracle Solaris 11, "IP Version" and "IP Address" cannot be acquired.
- The following items can be specified only for the iSCSI hosts that are selected by checkboxes; "Name", "Host Response", "IP Version", "IP Address", "Alias Name", "CHAP User ID", "CHAP Password", and "Confirm CHAP Password".

- Name

🔵 **N o t e**

Refer to "Name" (page 1128) in "Modify iSCSI Host" for details.

• Host Response

> **N o t e**
>
> Refer to "Host Response" (page 1129) in "Modify iSCSI Host" for details.

• IP Version

> **N o t e**
>
> Refer to "IP Version" (page 1129) in "Modify iSCSI Host" for details.

• IP Address

> **N o t e**
>
> Refer to "IP Address" (page 1129) in "Modify iSCSI Host" for details.

• Alias Name

> **N o t e**
>
> Refer to "Alias Name" (page 1130) in "Modify iSCSI Host" for details.

• CHAP User ID

> **N o t e**
>
> Refer to "CHAP User ID" (page 1130) in "Modify iSCSI Host" for details.

• CHAP Password

Description	Specify the password for the CHAP Authentication. It is not necessary to specify this item if the CHAP Authentication is not used. Make sure to set the user name and password together.
Input condition/ Display contents	• 12 - 100 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

• Confirm CHAP Password

Description	Input the CHAP password again for confirmation.
Input condition/ Display contents	• 12 - 100 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

■ When registering a host by manually specifying the host

● Host Setting

• iSCSI Name

> **N o t e**
>
> Refer to "iSCSI Name" (page 1128) in "Modify iSCSI Host" for details.

Add SAS Host

For details about this function, refer to "Add SAS Host" (page 398).
For the factory default settings for this function, refer to "B. Add SAS Host" (page 1273).

■ **When registering a host by selecting from the host list**

● **Host Setting**

• Checkbox to select a host

Description	Select the checkbox of the SAS host that is to be registered in the ETERNUS DX. The host name and host response can only be specified for the selected SAS host.
Input condition/ Display contents	Checkbox • Selected • Cleared

• Name

> ◯ **N o t e**
>
> Refer to "Name" (page 1131) in "Modify SAS Host" for details.

• Host Response

> ◯ **N o t e**
>
> Refer to "Host Response" (page 1131) in "Modify SAS Host" for details.

■ **When registering a host by manually specifying the host**

● **Host Setting**

• SAS Address

> ◯ **N o t e**
>
> Refer to "SAS Address" (page 1131) in "Modify SAS Host" for details.

Modify FC/FCoE Host

For details about this function, refer to "Modify FC/FCoE Host" (page 403).

● **FC/FCoE Host Setting**

• Name

Description	Specify a new FC host name. An existing host name cannot be specified. (Host names cannot overlap with any other host names, irrespective of the interface types.)
Input condition/ Display contents	• Up to 16 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

- WWN

Description	Specify a new WWN. The registered WWN cannot be used.
Input condition/ Display contents	• Hexadecimal numbers (0 - 9, A - F, a - f) • 16 digits (using "F (f)" or "0" in entire 16 digits is not allowed)

- Host Response

Description	Select a new host response that is to be assigned to the FC host. The host response list created in the ETERNUS DX/AF is displayed. This item is available only when an FC host is not registered in the host group.
Input condition/ Display contents	• Solaris MPxIO • HP-UX • AIX • AIX VxVM • VS850/SVC • BS2000 • Host responses created in the ETERNUS DX/AF • Default

Modify iSCSI Host

For details about this function, refer to .

● iSCSI Host Setting

- Name

Description	Specify a new iSCSI host name. An existing host name cannot be specified. (Host names cannot overlap with any other host names, irrespective of the interface types.)
Input condition/ Display contents	• Up to 16 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

- iSCSI Name

Description	Specify an iSCSI name of the iSCSI host. An iSCSI Name that has already been registered in the ETERNUS DX/AF cannot be used.
Input condition/ Display contents	• 4 - 223 alphanumeric characters and symbols ('-', '.', ':') • The name starts with "iqn." or "eui."

- Host Response

Description	Select a new host response that is to be assigned to the iSCSI host. The host response list created in the ETERNUS DX/AF is displayed. This item is available only when an iSCSI host is not registered in the host group.
Input condition/ Display contents	• Solaris MPxIO • HP-UX • AIX • AIX VxVM • VS850/SVC • BS2000 • Host responses created in the ETERNUS DX/AF • Default

- IP Version

Description	Select the IP version of the iSCSI host.
Input condition/ Display contents	• IPv4 • IPv6

▶ **Caution**

To register an iSCSI host without using an IP address, perform IP version selection as follows:

- Select "IPv4" when the IP address format of the iSCSI host is IPv4 (when using an IPv4 host)
- Select "IPv6" when the IP address format of the iSCSI host is IPv6 (when using an IPv6 host)
- If the IP address format of the iSCSI host cannot be checked (when either an IPv4 host or an IPv6 host is used), register two hosts. Select "IPv4" for one host, and select "IPv6" for the other host. Specify the same iSCSI name, CHAP user ID, and CHAP password for each host.

- IP Address

Description	Specify the IP address of the iSCSI host. There are two methods to specify an IP address; "IPv4" and "IPv6". The IP address must be specified with the selected IP version (IPv4 or IPv6). The following IPv6 addresses can be used; "link local address", "global address", "unique local address", or "6to4 address". Refer to "Available IPv6 Address" (page 122) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation. It is not necessary to specify this item if IP address is not used.
Input condition/ Display contents	• For IPv4 address xxx.xxx.xxx.xxx xxx: 1 - 255 for the top field (decimal) xxx: 0 - 255 for other fields (decimal) • For IPv6 address xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation" (page 371) for details.

- Alias Name

Description	Specify the Alias name of the iSCSI host. It is not necessary to specify this item if Alias name is not used. An existing Alias name cannot be specified.
Input condition/ Display contents	• Up to 31 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

- CHAP User ID

Description	Specify the user ID for the CHAP Authentication. It is not necessary to specify this item if the CHAP Authentication is not used. Configure a user ID and a password as a pair.
Input condition/ Display contents	• Up to 255 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

- "Change CHAP Password" checkbox

Description	To change the CHAP Authentication password, select the checkbox. Only when the "CHAP User ID" is registered, the field is available.
Input condition/ Display contents	Checkbox • Selected • Cleared

- CHAP Password

Description	Specify the password for the CHAP Authentication. It is not necessary to specify this item if the CHAP Authentication is not used. Configure a user ID and a password as a pair. Only when the "Change CHAP Password" checkbox is selected, the field is available.
Input condition/ Display contents	• 12 - 100 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

- Confirm CHAP Password

Description	Input the CHAP password again for confirmation. Only when the "Change CHAP Password" checkbox is selected, the field is available.
Input condition/ Display contents	• 12 - 100 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

Modify SAS Host

For details about this function, refer to "Modify SAS Host" (page 406).

● **SAS Host Setting**

• Name

Description	Specify a new SAS host name.
	An existing host name cannot be specified. (Host names cannot overlap with any other host names, irrespective of the interface types.)
Input condition/ Display contents	• Up to 16 alphanumeric characters and symbols (except "," (comma) and "?")
	• Spaces

• SAS Address

Description	Specify a new SAS address.
	The registered SAS address cannot be used.
Input condition/ Display contents	• Hexadecimal numbers (0 - 9, A - F, a - f)
	• 16 digits (using "F (f)" or "0" in entire 16 digits is not allowed)

• Host Response

Description	Select a new host response that is to be assigned to the SAS host.
	The host response list created in the ETERNUS DX is displayed. This item is available only when a SAS host is not registered in the host group.
Input condition/ Display contents	• Solaris MPxIO
	• HP-UX
	• AIX
	• AIX VxVM
	• VS850/SVC
	• BS2000
	• Host responses created in the ETERNUS DX
	• Default

CA Port Group Management

Create FC Port Group

For details about this function, refer to "Create FC Port Group" (page 408).

● CA Port Group Setting

- Name

Description	Specify the port group name.
	An existing port group name cannot be used. (Port group names cannot overlap with any other port group names, irrespective of the CA types.)
Input condition/ Display contents	• Up to 16 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

- Checkbox to select a port

Description	Select the checkbox of the port to be registered in a port group.
Input condition/ Display contents	Checkbox • Selected • Cleared

> ▶ Caution

- When a port in the affinity mode enabled (On) is selected, ports in the affinity mode disabled (Off) cannot be selected.
- When a port in the affinity mode disable (Off) is selected, ports in the affinity mode enable (On) cannot be selected.
- Up to eight ports can be selected.

Create iSCSI Port Group

For details about this function, refer to "Create iSCSI Port Group" (page 410).
Refer to "Create FC Port Group" (page 1132) for details about the setting items of this function.

Create SAS Port Group

For details about this function, refer to "Create SAS Port Group" (page 412).
Refer to "Create FC Port Group" (page 1132) for details about the setting items of this function.

Create FCoE Port Group

For details about this function, refer to "Create FCoE Port Group" (page 414).
Refer to "Create FC Port Group" (page 1132) for details about the setting items of this function.

Modify CA Port Group

For details about this function, refer to "Modify CA Port Group" (page 416).

● CA Port Group Setting

- Name

> **◉ N o t e**
>
> Refer to "Name" (page 1132) in "Create FC Port Group" for details.

- Checkbox to select a port

Description	Select the port checkbox to be added to a CA port group. Clear the port checkbox to be deleted from a CA port group. The checkbox of the port, which has been registered in the CA port group, is selected.
Input condition/ Display contents	Checkbox • Selected • Cleared

> **▷ Caution**
>
> - If the CA port group's affinity mode is "On" (the affinity mode of all the selected ports is "On"), the port, of which affinity mode is "OFF", cannot be selected.
> - If the CA port group's affinity mode is "Off" (the affinity mode of all the selected ports is "Off"), the port, of which affinity mode is "On", cannot be selected.
> - Up to eight ports can be selected.

Modify FC Port Parameters

For details about this function, refer to "Modify FC Port Parameters" (page 418).
For the factory default settings for this function, refer to the following sections:
- "B. Modify FC Port Parameters (when the port mode is "CA")" (page 1273)
- "B. Modify FC Port Parameters (when the port mode is "RA" or "CA/RA")" (page 1274)
- "B. Modify FC Port Parameters (when the port mode is "Initiator")" (page 1274)

● Port Settings

- Port

Description	Select the target port or select the copy source port. The selectable port locations (x: CE number, y: CM number, z: CA number, w: Port number) are displayed as options.

Input condition/
Display contents
	• For the ETERNUS DX8700 S3/DX8900 S3
	  CE#x CM#y CA#z Port#w
	• For the other models
	  CM#y CA#z Port#w

• **Connection**

Description	Select the connection type for the target port. When "FC-AL" is selected, it is necessary to assign a Loop ID to the port.
Input condition/ Display contents	• Fabric A connection type that enables simultaneous communication among multiple nodes through a Fibre Channel switch. • FC-AL A connection type that connects multiple nodes in a loop.

▶ **Caution**

- Select "FC-AL" for a direct connection when "Transfer Rate" is "4 Gbit/s" or "8 Gbit/s". Note that there may be cases when "Fabric" must be selected depending on the Fibre Channel card of the connection destination. Refer to "Setting the To-Server Connection Type (Setting the FC Port Parameters)" in "Configuration Guide -Server Connection-" (*1) for details.
  *1:   Configuration Guide -Server Connection- (Fibre Channel) ETERNUS DX S4/S3 series Hybrid Storage Systems, ETERNUS AF series, ETERNUS DX200F All-Flash Arrays Settings
- Select "Fabric" for a direct connection when "Transfer Rate" is "16 Gbit/s" or more. Some destination Fibre Channel cards may require Fibre Channel switches. For details, refer to the Fibre Channel card specifications.

• **Set Loop ID**

Description	When the connection type is "FC-AL", select "Manual" or "Automatic" as the specification method for the Loop ID. "Loop ID" is an identification number of a node in a loop.
Input condition/ Display contents	• Manual • Automatic

• **Loop ID**

Description	When "Set Loop ID" is "Manual", input the Loop ID. When "Set Loop ID" is "Automatic", select "Ascending" or "Descending". The Loop ID must have a value that is different from the values of all the ports.
Input condition/ Display contents	• When "Set Loop ID" is "Manual" 0x0 - 0x7D • When "Set Loop ID" is "Automatic" 　- Ascending 　- Descending

• Transfer Rate

Description	Select the transfer speed for the target port. The available transfer rate varies according to the FC type, the SFP type, and the connection topology.

Type	SFP Type	Connection	Transfer Rate
32G FC	32G SFP+(MMF)	Fabric	Auto-negotiation 8 Gbit/s 16 Gbit/s 32 Gbit/s
		FC-AL	Auto-negotiation 8 Gbit/s
16G FC	16G SFP+(SMF) 16G SFP+(MMF)	Fabric	Auto-negotiation 4 Gbit/s 8 Gbit/s 16 Gbit/s
		FC-AL	Auto-negotiation 4 Gbit/s 8 Gbit/s
8G FC	SFP+(MMF)	Fabric FC-AL	Auto-negotiation 4 Gbit/s 8 Gbit/s
Other	Unknown Unmount		

Input condition/ Display contents	• Auto-negotiation • 4 Gbit/s • 8 Gbit/s • 16 Gbit/s • 32 Gbit/s

▷ **Caution**

"Auto-negotiation" is selected for the transfer rate when the transfer rate is "16 Gbit/s" or "32 Gbit/s" and the connection type is changed from "Fabric" to "FC-AL".

• Frame Size

Description	Select the frame size (bytes) of the target port. "Frame Size" specifies the length of the communication information.
Input condition/ Display contents	• 512 • 1024 • 2048

• Reset Scope

Description	Specify the reset scope of the target port. Reset scope is the range where the command reset request from the server is performed, when the target port is connected to multiple servers.
Input condition/ Display contents	• I_T_L (I: Initiator, T: Target, L: LUN) Reset (cancel) the command request from the server that sent the command reset request. • T_L (T: Target, L: LUN) Reset (cancel) the command request from all of the servers that are connected to the port.

> **▶ Caution**
>
> This item is displayed when the port mode is "CA" or "CA/RA".

- Release Reservation if Chip is Reset

Description	Select whether to "Enable" or "Disable" the function to release the reserved status of the volume when the target port (chip) is reset.
Input condition/ Display contents	• Enable • Disable

> **▶ Caution**
>
> This item is displayed when the port mode is "CA" or "CA/RA".

- REC Line No.

Description	Select the REC line number of the target port. The REC line number is used to switch the communication path when a line fails. The REC line number is used to recognize failed lines. Set different REC line numbers for each physical communication path. When lines are in normal status, an REC can be performed regardless of the REC line number (specifying the same REC line numbers is allowed) in the same way as conventional REC operations. Note that no priority applies to REC line numbers. This item is displayed only when the Advanced Copy license has been registered.
Input condition/ Display contents	0 - 127

> **▶ Caution**
>
> - This item is displayed only when the port mode is "CA/RA" or "RA".
> - When a line fails, the communication path is switched according to the REC line number of the copy source storage system. For normal operation, set the same REC line number for the copy source and the copy destination storage systems to recover data.
> - If the port mode has been changed from "CA/RA" or "RA" to the other mode, the REC line number returns to the default setting ("0"). When the port mode has changed from "CA/RA" to "RA" or changed from "RA" to "CA/RA", the current REC line number setting is retained. Refer to <u>"Modify Port Mode" (page 433)</u> for details.

- REC Transfer Mode

Description	Select which REC transfer mode is enabled or disabled for the target port. • Sync (synchronous transfer mode) • Async Stack (asynchronous stack mode) • Async Consistency (asynchronous consistency mode) • Async Through (asynchronous through mode) For example, specify different ports for Consistency and Stack to perform data transfers without any interference. The current setting is retained even when an REC path is changed. When "Enable" is selected for all of the REC transfer modes, a conventional REC is performed. This item is displayed only when the Advanced Copy license has been registered.
Input condition/ Display contents	• Enable An REC is performed in the selected transfer mode for the target port. • Disable An REC is not performed in the selected transfer mode for the target port.

▷ Caution

- This item is displayed only when the port mode is "CA/RA" or "RA".
- The REC transfer mode can be changed without suspending a copy session even when an REC is being performed in the target port. The changed settings are applied immediately to the ETERNUS DX/AF.
- If specific REC transfer modes for all the RA ports and the CA/RA ports are disabled, a copy session with a disabled REC transfer mode fails because the REC paths for all the RA ports and the CA/RA ports are regarded as being blocked. When the REC transfer mode for a copy session that is being performed is disabled, this copy session is halted.
- When "Async Consistency" is disabled for all the RA ports and the CA/RA ports, the REC buffer status changes to "INAC-TIVE".
- For normal operations, set the same REC transfer mode for the copy source and the copy destination storage systems to recover data. When the REC transfer mode is specified for a copy source storage system, the specified REC transfer mode is performed even if one of the following storage systems is used as a copy destination.
  - Older models (ETERNUS DX90 S2, ETERNUS DX410 S2/DX440 S2, ETERNUS DX8100 S2/DX8700 S2, ETERNUS DX90, ETERNUS DX410/DX440, or ETERNUS DX8100/DX8400/DX8700)
  - Storage systems without the "REC Transfer Mode" setting
- If the port mode is changed from "CA/RA" or "RA" to the other mode, the REC transfer mode returns to the default setting ("Enable"). When the port mode has changed from "CA/RA" to "RA" or changed from "RA" to "CA/RA", the current REC line number setting is retained. Refer to <u>"Modify Port Mode" (page 433)</u> for details.

- WWN (Port Name)

Description	When the offline storage migration is performed, the ETERNUS DX/AF (destination device) is regarded as a server connecting to the migration source device. Specify WWPN for the server that was connected to the FC-CA port of the migration source device. The default "WWN (Port Name)" is displayed with parentheses on the right side of the [Default] button. Click the [Default] button to set the default value.
Input condition/ Display contents	WWPN (16-digit hexadecimal)

▷ Caution

- This item is displayed only when the port mode is "Initiator".
- Specifying the WWPN of the server is only required when the host affinity setting is configured between the server and a migration source FC-CA port.
  If LUN mapping is configured for a migration source FC-CA port, the default value does not need to be changed.
- If the FC-Initiator port is used for an online storage migration or the Non-disruptive Storage Migration function, the default value does not need to be changed.

- WWN (Node Name)

Description	When the offline storage migration is performed, the ETERNUS DX/AF (destination device) is regarded as a server connecting to the migration source device. Specify WWNN for the server that was connected to the FC-CA port of the migration source device. The default "WWN (Node Name)" is displayed with parentheses on the right side of the [Default] button. Click the [Default] button to set the default value.
Input condition/ Display contents	WWNN (16-digit hexadecimal)

▶ **Caution**

- This item is displayed only when the port mode is "Initiator".

- Specifying the WWNN of the server is only required when the host affinity setting is configured between the server and a migration source FC-CA port.
  If LUN mapping is configured for a migration source FC-CA port, the default value does not need to be changed.

- If the FC-Initiator port is used for an online storage migration or the Non-disruptive Storage Migration function, the default value does not need to be changed.

● **Destination**

- Checkbox to select copy destination port

Description	Select the checkbox of the copy destination port.
Input condition/ Display contents	Checkbox • Selected • Cleared

Modify iSCSI Port Parameters

For details about this function, refer to <u>"Modify iSCSI Port Parameters" (page 424)</u>.
For the factory default settings for this function, refer to the following sections:
- <u>"B. Modify iSCSI Port Parameters (when the port mode is "CA")" (page 1274)</u>
- <u>"B. Modify iSCSI Port Parameters (when the port mode is "RA")" (page 1275)</u>
- <u>"B. Modify iSCSI Port Parameters (when the port mode is "CA/RA")" (page 1276)</u>
- <u>"B. Modify iSCSI Port Parameters ([Send Ping] screen)" (page 1277)</u>

● **Select Port**

- Port

Description	Select the target port. The selectable port locations (x: CE number, y: CM number, z: CA number, w: Port number) are displayed as options.

Input condition/
Display contents
	• For the ETERNUS DX8700 S3/DX8900 S3
	  CE#x CM#y CA#z Port#w
	• For the other models
	  CM#y CA#z Port#w

● **General Information**

- iSCSI Settings
  - iSCSI Name

Description	Input the iSCSI name of the target port. Click the [Default] button to set the default iSCSI name.
Input condition/ Display contents	• 4 - 223 alphanumeric characters and symbols ('-', '.', ':') • The name starts with "iqn." or "eui."

▶ **Caution**

The same iSCSI name cannot be set to multiple iSCSI ports except the device iSCSI name.

- Alias Name

Description	Input the alias name of the target port (can be omitted). While the iSCSI name is a formal nomenclature that specifies the target iSCSI port, an alias name is used as nickname. An alias name that is the same as another port cannot be specified.
Input condition/ Display contents	Up to 31 alphanumeric characters and symbols ("-" (hyphen), "." (period), ":" (colon), "+" (plus), "@" (at sign), "_" (underscore), "=" (equal), "/" (slash), "[" (left square bracket), "]" (right square bracket), "," (comma), "~" (tilde))

- TCP/IP Settings
    - IP Version

Description	Select the IP address version for the target port.
Input condition/ Display contents	• IPv4 Specify the IPv4 address. When "IPv4" is selected, input "IP Address" (required), "Subnet Mask" (required), and "Gateway". • IPv6 Specify the IPv6 address. When "IPv6" is selected, input "IPv6 Connect IP Address" (required), "IPv6 Global Address", and "IPv6 Gateway". • IPv4/IPv6 Specify both the IPv4 address and the IPv6 address. The input items for IPv4 and IPv6 can be specified.

- IP Address

Description	Input the IPv4 address of the target port (required when "IPv4" is selected). Click the [Test Connection (ping)] button to display the [Send ping] screen. Specify the IP address to check the connection status of the connection remote storage system and the number of transmissions. Click the [Send] button. When the "ping" command is sent, the settings of the IP address and the connection path for the remote storage system can be checked.
Input condition/ Display contents	• Up to 3 numeric characters • First text box: "1" - "255" • Other text boxes: "0" - "255"

- Subnet Mask

Description	Input the subnet mask of the target port (required when "IPv4" is selected).
Input condition/ Display contents	• Up to 3 numeric characters • 255.0.0.0 - 255.255.255.252

- Gateway

Description	Input the gateway IP address of the target port when "IPv4" is selected.
Input condition/ Display contents	• Up to 3 numeric characters • All text boxes: "0" - "255"

- IPv6 Link Local Address

Description	Input the IPv6 link local address of the target port (required when "IPv6" is selected). Refer to "Available IPv6 Address" (page 122) for details. Note that the current setting is displayed by an abbreviation. Click the [Test Connection (ping)] button to display the [Send ping] screen. Specify the IP address to check the connection status of the connection remote storage system and the number of transmissions. Click the [Send] button. When the "ping" command is sent, the settings of the IP address and the connection path for the remote storage system can be checked. Click the [Default] button to set the default IPv6 link local address.

Input condition/
Display contents
	• fe80::xxxx:xxxx:xxxx:xxxx
	  xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
	  Refer to "IPv6 Address Notation" (page 371) for details.

- IPv6 Connect IP Address

Description	Input the IPv6 connect IP address of the target port. "Global address", "unique local address", or "6to4 address" can be input for the IPv6 address. Refer to "Available IPv6 Address" (page 122) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation. "IPv6 Connect IP Address" corresponds to "IP Address" for IPv4. "IPv6 Connect IP Address" can be directly input or created automatically. Click the [Discovery] button to display the [Select IPv6 Prefix] screen. Up to five "IPv6 Prefix" can be obtained. Select "IPv6 Prefix" to create an IPv6 connect IP address automatically from the selected IPv6 prefix and the input IPv6 link local address (interface ID). Click the [OK] button to specify the created IPv6 address in the entry field. Click the [Test Connection (ping)] button to display the [Send ping] screen. Specify the IP address to check the connection status of the connection remote storage system and the number of transmissions. Click the [Send] button. When the "ping" command is sent, the settings of the IP address and the connection path for the remote storage system can be checked.

Input condition/
Display contents
	• xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
	  xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
	  Refer to "IPv6 Address Notation" (page 371) for details.

- IPv6 Gateway

Description	Input the gateway IPv6 address of the target port. The following IPv6 addresses can be used; "link local address", "global address", "unique local address", or "6to4 address". Refer to "Available IPv6 Address" (page 122) for details. Note that the current setting is displayed by an abbreviation. "IPv6 Gateway" can be directly input or created automatically. Click the [Discovery] button to display the [Select IPv6 Gateway] screen. Up to three "IPv6 Gateway" can be obtained. Select "IPv6 Gateway" and click the [OK] button. The selected IPv6 address is specified in the entry field.

Input condition/
Display contents
	• xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
	  xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
	  Refer to "IPv6 Address Notation" (page 371) for details.

- TCP Port No.

Description	Input the TCP port number of the target port. Click the [Default] button to set the default TCP port number.
Input condition/ Display contents	0 - 28671

▶ **Caution**

Do not change the TCP port number from 3260 (default value). REC can only be performed when "TCP Port No." is "3260".

- TCP Window Scale

Description	Input the TCP Window Scale of the target port.
	"TCP Window Scale" is a parameter that is used to specify the TCP window size. When the I/O load is high, the expected performance may not be achieved even if "0" or "1" is specified for TCP Window Scale. Even if "8" or higher is specified, the ETERNUS DX/AF performs as though "7" is specified for TCP Window Scale. Specify the "TCP Window Scale" in powers of two (when the value is n-th to the power of two, "n" indicates the "TCP Window Scale"). The relationship between the setting value and the TCP Window Scale is as follows:

TCP Window Scale	TCP Window size
0	32 KB
1	64 KB
2	128 KB
3	256 KB
4	512 KB
5	1024 KB
6	2048 KB
7	4096 KB
8	8192 KB
9	16384 KB
10	32768 KB
11	65536 KB
12	131072 KB
13	262144 KB
14	524288 KB

Input condition/ Display contents	0 - 14

- iSNS Server

Description	Select whether to enable the use of an iSNS server with IPv4 or IPv6, or disable the use of an iSNS server for the target port. When "IPv4" or "IPv6" is selected, input the IP address of the iSNS server. iSNS is almost equivalent to DNS for the Internet. iSNS server is used to convert the iSCSI name to the IP address on the iSCSI network.
Input condition/ Display contents	• IPv4 • IPv6 • Disable

▶ **Caution**

- This item is displayed when the port mode is "CA" or "CA/RA".
- When "IP Version" is "IPv4" or "IPv4 / IPv6", "IPv4" and "Disable" can be selected.
- When "IP Version" is "IPv6" or "IPv4 / IPv6", "IPv6" and "Disable" can be selected.

- iSNS Server (IPv4 Address)

Description	When "iSNS Server" is "IPv4", input the IPv4 address for the iSNS server.
Input condition/Display contents	• xxx.xxx.xxx.xxx xxx: 1 - 255 for the top field (decimal) xxx: 0 - 255 for other fields (decimal)

▶ **Caution**

This item is displayed when the port mode is "CA" or "CA/RA".

- iSNS Server (IPv6 Address)

Description	When "iSNS Server" is "IPv6", input the IPv6 address for the iSNS server. The following IPv6 addresses can be used; "link local address", "global address", "unique local address", or "6to4 address". Refer to "Available IPv6 Address" (page 122) for details. Note that the current setting is displayed by an abbreviation.
Input condition/Display contents	• xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation" (page 371) for details.

▶ **Caution**

This item is displayed when the port mode is "CA" or "CA/RA".

- iSNS Server Port No.

Description	When "iSNS Server" for the target port is "IPv4" or "IPv6", input the port number of the iSNS server. Click the [Default] button to set the default iSNS server port number.
Input condition/Display contents	0 - 65535

▶ **Caution**

This item is displayed when the port mode is "CA" or "CA/RA".

- VLAN ID

Description	Select whether to "Enable" or "Disable" the VLAN ID for the target port. When "Enable" is selected, input the VLAN ID.
Input condition/Display contents	• Enable Specify the VLAN ID between 0 and 4095 • Disable

▶ **Caution**

When specifying the VLAN ID, confirm the VLAN setting values of the LAN switch and the VLAN tagging configuration of the server LAN card.

- Jumbo Frame

Description	Select whether to "Enable" or "Disable" the Jumbo Frame. Select "Enable" when using the Jumbo Frame to transfer data via the target port. When not using the Jumbo Frame, select "Disable". Enabling Jumbo Frame increases the amount of data to be transferred per Frame, making data transfer more efficient. Confirm that the connected device (*1) supports the Jumbo Frame before enabling the Jumbo Frame. *1: When the ETERNUS DX/AF and server are connected directly, this indicates that the connected device is a server side LAN card (NIC). When the ETERNUS DX/AF and server are connected via a switch, this indicates that the connected device is a switch.
Input condition/ Display contents	• Enable • Disable

▷ **Caution**

- This item is displayed only when the port mode is "CA".
- The same iSCSI name cannot be set to multiple iSCSI ports except the device iSCSI name.

- MTU

Description	Specify the MTU size of the target port. "MTU" is the maximum amount of data that can be transmitted at the one time over the communication network.
Input condition/ Display contents	• When "IP Version" is "IPv4" 576 - 9000 bytes • When "IP Version" is "IPv6" or "IPv4 / IPv6" 1280 - 9000 bytes

▷ **Caution**

This item is not displayed when the port mode is "CA".

- Security Settings
  - CHAP

Description	• When the port mode is "CA" or "CA/RA" (CA) Specify "ON" to use the unidirectional CHAP authentication or bidirectional CHAP authentication for the target port, and specify "OFF" not to use both unidirectional CHAP authentication and bidirectional CHAP authentication. For CHAP authentication, an encrypted password based on a random key that the ETERNUS DX/AF receives from the host is sent, and connection possibility is judged on the server side. • When the port mode is "RA" or "CA/RA" (RA) Select "ON "to enable CHAP Authentication for the target port. Select "OFF" to disable CHAP Authentication. For CHAP authentication, an encrypted password based on a random key that the ETERNUS DX/AF receives from the host is sent, and connection possibility is judged on the server side.
Input condition/ Display contents	• ON • OFF

- CHAP User ID

Description	• When the port mode is "CA" or "CA/RA" (CA) When using the bidirectional CHAP authentication, enter the user ID to access the target port. When using the unidirectional CHAP authentication, it is not necessary to enter a user ID. Make sure to set the user name and password together. • When the port mode is "RA" or "CA/RA" (RA) When "ON" is selected for "CHAP", enter the user name to access the target port. Make sure to set the user name and password together.

Input condition/
Display contents
	• When the port mode is "CA" or "CA/RA" (CA)
	  - Up to 255 alphanumeric characters and symbols
	  - Spaces
	
	• When the port mode is "RA" or "CA/RA" (RA)
	  - Up to 63 alphanumeric characters and symbols
	  - Spaces

- New Password

Description	• When the port mode is "CA" or "CA/RA" (CA) When using the bidirectional CHAP authentication, enter the password to access the target port. When using the unidirectional CHAP authentication, it is not necessary to enter a password. Make sure to set the user name and password together. • When the port mode is "RA" or "CA/RA" (RA) When "ON" is selected for "CHAP", enter the password to access the target port. Make sure to set the user name and password together.

Input condition/
Display contents
	• When the port mode is "CA" or "CA/RA" (CA)
	  - 12 - 100 alphanumeric characters and symbols
	  - Spaces
	
	• When the port mode is "RA" or "CA/RA" (RA)
	  - 12 - 32 alphanumeric characters and symbols
	  - Spaces

- Confirm New Password

Description	Input the same password as that entered in the New Password field.

Input condition/
Display contents
	• When the port mode is "CA" or "CA/RA" (CA)
	  - 12 - 100 alphanumeric characters and symbols
	  - Spaces
	
	• When the port mode is "RA" or "CA/RA" (RA)
	  - 12 - 32 alphanumeric characters and symbols
	  - Spaces

- **Header Digest**

Description	Select "OFF" not to add the Header Digest of the target port. Select "CRC32C" to add the Header Digest. Header Digest is a check code to be added to the header part of the iSCSI port detailed information. Specify "CRC32C" when the host requests to add the check code. "CRC32C" is the algorithm that is used to create a check code.
Input condition/ Display contents	• OFF • CRC32C

> **Caution**

This item is displayed when the port mode is "CA" or "CA/RA".

- **Data Digest**

Description	Select "OFF" not to add the Data Digest of the target port. Select "CRC32C" to add the Data Digest. Data Digest is a check code to be added to the data area of the iSCSI port detailed information. Specify "CRC32C" when the host requests to add the check code. "CRC32C" is the algorithm that is used to create a check code.
Input condition/ Display contents	• OFF • CRC32C

> **Caution**

- This item is displayed when the port mode is "CA" or "CA/RA".
- Data transmission might fail when "Header Digest" or "Data Digest" is enabled. In this case, select "OFF" for "Header Digest" and "Data Digest".

• **General Settings**
  - **Transfer Rate**

Description	Select the transfer speed for the target port. This item is displayed only when "10G Base-T iSCSI" is selected for the port type.
Input condition/ Display contents	• Auto-negotiation The transfer rate is automatically selected from "1 Gbit/s" or "10 Gbit/s". • 1 Gbit/s The transfer speed is 1Gbit/s. • 10 Gbit/s The transfer speed is 10Gbit/s.

  - **Reset Scope**

> ● **N o t e**

Refer to "Reset Scope" (page 1135) in "Modify FC Port Parameters" for details.

- Release Reservation if Chip is Reset

> 🔵 **N o t e**
>
> Refer to "Release Reservation if Chip is Reset" (page 1136) in "Modify FC Port Parameters" for details.

- CmdSN Count

Description	Change the number of commands that can be accepted from the host to the target port at the same time. It is not necessary to change the setting from "Unlimited" for normal use.
Input condition/ Display contents	• Unlimited • 180 • 100 • 80 • 40 • 20

> ▷ **Caution**
>
> This item is displayed when the port mode is "CA" or "CA/RA".

- REC Settings
  - REC Line No.

> 🔵 **N o t e**
>
> Refer to "REC Line No." (page 1136) in "Modify FC Port Parameters" for details.

  - REC Transfer Mode

> 🔵 **N o t e**
>
> Refer to "REC Transfer Mode" (page 1136) in "Modify FC Port Parameters" for details.

⬤ **Additional IP Address Information**

- Additional IP Address Settings
  - Multiple VLAN

Description	Select whether to "Enable" or "Disable" the Multiple VLAN settings for the target port. When the Multiple VLAN setting is enabled, multiple IP addresses can be specified for a single iSCSI-CA port. This enables concurrent connection to multiple hosts that belong to different VLANs via a single iSCSI-CA port.
Input condition/ Display contents	• Enable • Disable

> ▷ **Caution**
>
> • This item is displayed when the port mode is "CA" or "CA/RA".
> • If the Multiple VLAN setting is changed to "Disable", all of the added IP address information is deleted.

> **N o t e**
>
> When the port mode is "CA" or "CA/RA" and Multiple VLAN is enabled, multiple IP address information can be specified.

- VLAN ID

Description	Select whether to "Enable" or "Disable" the VLAN ID for IP#n (n: 1 - 15). When "Enable" is selected, input the VLAN ID.
Input condition/ Display contents	• Enable Specify the VLAN ID between 0 and 4095 • Disable

- IP Version

Description	Select the IP version for IP#n (n: 1 - 15).

Input condition/
Display contents
	• IPv4
	  Specify the IPv4 address. When "IPv4" is selected, input "IP Address" (required), "Subnet Mask" (required), and "Gateway".
	• IPv6
	  Specify the IPv6 address. When "IPv6" is selected, input "IPv6 Connect IP Address" (required), "IPv6 Global Address", and "IPv6 Gateway".
	• IPv4/IPv6
	  Specify both the IPv4 address and the IPv6 address. The input items for IPv4 and IPv6 can be specified.

- IP Address

Description	Input the IPv4 address of IP#n (n: 1 - 15) (required when "IPv4" is selected). For details about parameter settings, refer to "TCP/IP Settings" (page 1139).
Input condition/ Display contents	• Up to 3 numeric characters • First text box: "1" - "255" • Other text boxes: "0" - "255"

- Subnet Mask

Description	Input the subnet mask of IP#n (n: 1 - 15) (required when "IPv4" is selected).
Input condition/ Display contents	• Up to 3 numeric characters • 255.0.0.0 - 255.255.255.252

- Gateway

Description	Input the gateway IPv4 address of IP#n (n: 1 - 15).
Input condition/ Display contents	• Up to 3 numeric characters • All text boxes: "0" - "255"

- IPv6 Link Local Address

Description	Input the IPv6 link local address of IP#n (n: 1 - 15) (required when "IPv6" is selected). For details about parameter settings, refer to "TCP/IP Settings" (page 1139).
Input condition/ Display contents	fe80::xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation" (page 371) for details.

- IPv6 Connect IP Address

Description	Input the IPv6 connect IP address of IP#n (n: 1 - 15). For details about parameter settings, refer to "TCP/IP Settings" (page 1139).
Input condition/ Display contents	xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation" (page 371) for details.

- IPv6 Gateway

Description	Input the gateway IPv6 address of IP#n (n: 1 - 15). For details about parameter settings, refer to "TCP/IP Settings" (page 1139).
Input condition/ Display contents	xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation" (page 371) for details.

- TCP Port No.

Description	Input the TCP port number of IP#n (n: 1 - 15). Click the [Default] button to set the default TCP port number.
Input condition/ Display contents	0 - 28671

- TCP Window Scale

Description	Select the TCP Window Scale of IP#n (n: 1 - 15). For details about parameter settings, refer to "TCP/IP Settings" (page 1139).
Input condition/ Display contents	0 - 14

- iSNS Server

Description	Select whether to enable the use of an iSNS server with IPv4 or IPv6, or disable the use of an iSNS server for IP#n (n: 1 - 15). When "IPv4" or "IPv6" is selected, input the IP address of the iSNS server. For details about parameter settings, refer to "TCP/IP Settings" (page 1139).
Input condition/ Display contents	• IPv4 • IPv6 • Disable

▶ Caution

- When "IP Version" is "IPv4" or "IPv4 / IPv6", "IPv4" and "Disable" can be selected.
- When "IP Version" is "IPv6" or "IPv4 / IPv6", "IPv6" and "Disable" can be selected.

- iSNS Server Port No.

Description	When the iSNS server for the IP#n (n: 1 - 15) is "IPv4" or "IPv6", input the port number of the iSNS server. Click the [Default] button to set the default iSNS server port number.
Input condition/ Display contents	0 - 65535

- Jumbo Frame

Description	Select whether to "Enable" or "Disable" the Jumbo Frame for IP#n (n: 1 - 15). For details about parameter settings, refer to "TCP/IP Settings" (page 1139).
Input condition/ Display contents	• Enable • Disable

> ▶ **Caution**

The same iSCSI name cannot be set to multiple iSCSI ports except the device iSCSI name.

● **Send ping (IP address)**

• IP Address

Description	Input the IPv4 or IPv6 address of the storage system that is used to check the connection status of the target port. The following IPv6 addresses can be used; "link local address", "global address", "unique local address", or "6to4 address". Refer to "Available IPv6 Address" (page 122) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation.

Input condition/
Display contents
	• For IPv4 address
	  - xxx.xxx.xxx.xxx
	    xxx: 1 - 255 for the top field (decimal)
	    xxx: 0 - 255 for other fields (decimal)
	  - Class must be A, B, or C
	• For IPv6 address
	  xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx
	  xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters)
	  Refer to "IPv6 Address Notation" (page 371) for details.

• Send Number

Description	Input the transmission count of the "ping" command.
Input condition/ Display contents	1 (Default) - 10

• Result

Description	Click the [Send] button to display the results of the "ping" commands that are sent.

Input condition/
Display contents
	• success
	  All were sent successfully.
	• failed
	  At least one failure occurred.

Modify SAS Port Parameters

For details about this function, refer to "Modify SAS Port Parameters" (page 429).
For the factory default settings for this function, refer to "B. Modify SAS Port Parameters" (page 1278).

● **Port Settings**

• Port

Description	Select the target port or select the copy source port. The selectable port locations are displayed as options.
Input condition/ Display contents	CM#x CA#y Port#z (x: CM number, y: CA number, z: Port number)

• Transfer Rate

Description	Select the transfer speed for the target port.
Input condition/ Display contents	• When the SAS type is "6G SAS" 　- Auto-negotiation 　- 1.5 Gbit/s 　- 3 Gbit/s 　- 6 Gbit/s • When the SAS type is "12G SAS" 　- Auto-negotiation 　- 3 Gbit/s 　- 6 Gbit/s 　- 12 Gbit/s

• Reset Scope

> ● **N o t e**
>
> Refer to "Reset Scope" (page 1135) in "Modify FC Port Parameters" for details.

• Release Reservation if Chip is Reset

> ● **N o t e**
>
> Refer to "Release Reservation if Chip is Reset" (page 1136) in "Modify FC Port Parameters" for details.

Modify FCoE Port Parameters

For details about this function, refer to .
For the factory default settings for this function, refer to .

● **Port Settings**

- Port

Description	Select the target port or select the copy source port. The selectable port locations (x: CE number, y: CM number, z: CA number, w: Port number) are displayed as options.

Input condition/
Display contents
	• For the ETERNUS DX8700 S3/DX8900 S3
	  CE#x CM#y CA#z Port#w
	• For the other models
	  CM#y CA#z Port#w

- Transfer Rate (Gbit/s)

Description	Set the transfer speed of the target port.
Input condition/ Display contents	10 Gbit/s

- Set VLAN ID

Description	Specify "Automatic" to enable the automatic setting for the VLAN ID of the target port. Specify "Fixed" to enable the fixed setting. When "Automatic" is specified, VLAN ID is automatically obtained and no need to specify the VLAN ID. When "Fixed" is specified, input the VLAN ID.
Input condition/ Display contents	• Automatic • Fixed

- VLAN ID

Description	Input the VLAN ID for the target port. Make sure to set the same value for the VLAN ID as the VLAN ID of the FCoE switch that is to be connected to.
Input condition/ Display contents	0 - 4095

- Set Fabric Name

Description	Specify "Automatic" to enable the automatic setting for the fabric name of the target port. Specify "Fixed" to enable the fixed setting. When "Automatic" is specified, the fabric name of the connected FCoE switch is automatically obtained and does not need to be specified. When "Fixed" is specified, input the fabric name. "Automatic" should be set for normal operation. When "Fixed" is specified, connection to any switch other than the specified FCoE switch cannot be performed.
Input condition/ Display contents	• Automatic • Fixed

• Fabric Name

Description	Input the fabric name (WWN of FCoE) of the target port.
Input condition/Display contents	WWN of FCoE (16-digit hexadecimal)

• FC Frame Size

Description	Select the FC frame size (bytes) of the target port. "FC Frame Size" specifies the length of the communication information.
Input condition/Display contents	• 512 • 1024 • 2048

• Reset Scope

> ◉ **N o t e**
>
> Refer to "Reset Scope" (page 1135) in "Modify FC Port Parameters" for details.

• Release Reservation if Chip is Reset

> ◉ **N o t e**
>
> Refer to "Release Reservation if Chip is Reset" (page 1136) in "Modify FC Port Parameters" for details.

● **Destination**

• Checkbox to select copy destination port

> ◉ **N o t e**
>
> Refer to "Checkbox to select copy destination port" (page 1138) in "Modify FC Port Parameters" for details.

Modify Port Mode

For details about this function, refer to "Modify Port Mode" (page 433).
For the factory default settings for this function, refer to "B. Modify Port Mode" (page 1278).

● **Port List**

• Port Mode(After)

Description	Select the changed port mode. "Initiator" is displayed only for FC ports. The current port mode is displayed by default.
Input condition/Display contents	• CA • RA • CA/RA • Initiator

LUN Group Management

Add LUN Group

For details about this function, refer to "Add LUN Group" (page 437).
For the factory default settings for this function, refer to "B. Add LUN Group" (page 1278).

● LUN Group Setting

• Name

Description	Specify the LUN group name. An existing LUN group name cannot be specified.
Input condition/ Display contents	• Up to 16 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

● Define LUN Group

• Checkbox to select a volume

Description	Select checkboxes for LUNs and volume allocation information that are to be deleted from the LUN group.
Input condition/ Display contents	Checkbox • Selected • Cleared

● LUN Setting

• Start Host LUNs

Description	Specify the LUN from which allocation is to be started. The smallest LUN among the available LUNs. LUNs that are already allocated to the volume cannot be specified.
Input condition/ Display contents	0 - 4095 (decimal)

> ⏵ **Caution**

If the allocation of the host LUN is started from an "External Volume", specify the host LUN that is allocated to the rele-vant volume in the external storage system. The host LUN for the External Volume is displayed in the [External Drives] screen. Refer to "External Drives" (page 668) for details.

• Number of LUNs

Description	The number of LUNs, to which the volumes are allocated, is displayed.
Input condition/ Display contents	1 - 4096 (decimal)

• Select Volume

Description	Select the volume number from which allocation is to be started.
Input condition/ Display contents	Volume number from which allocation is to be started

> **● N o t e**
>
> - If any volumes that cannot be used for allocation exist within the range specified by the LUN number, these volumes are skipped and the next volume is allocated.
> - Volumes that have already been registered in relevant LUN groups are not displayed.

Modify LUN Group

For details about this function, refer to "Modify LUN Group" (page 441).

● LUN Group Setting

- Name

Description	Modify the LUN group name. An existing LUN group name cannot be specified.
Input condition/ Display contents	• Up to 16 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

● Define LUN Group

> **● N o t e**
>
> Refer to "Define LUN Group" (page 1153) in "Add LUN Group" for details.

● LUN Setting

> **● N o t e**
>
> Refer to "LUN Setting" (page 1153) in "Add LUN Group" for details.

Host Response Management

Add Host Response

For details about this function, refer to "Add Host Response" (page 444).
For the factory default settings for this function, refer to "B. Add Host Response" (page 1278).

> **▷ Caution**
>
> For more details on setting the host response parameters, refer to "Configuration Guide -Server Connection-" for each OS type.

● Host Response Name

- Name

Description	Specify the host response name. An existing host response name cannot be used.
Input condition/ Display contents	• Up to 16 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

● LUN Setting

- LUN Addressing

Description	Select the appropriate LUN addressing for each OS.

Input condition/
Display contents
	• Peripheral device addressing (Default)
	  This mode enables mapping to 256 LUNs.
	
	• Flat space addressing
	  his mode enables mapping to 4096 LUNs.

- LUN Expand Mode
  (Peripheral Device Addressing)

Description	Select the LUN expand mode. When expanding the maximum LUNs that can be mapped to 4096, select "Enable". When the maximum LUNs that can be mapped are not expanded, select "Disable (Default)".
Input condition/ Display contents	• Enable • Disable (Default)

> ▶ **Caution**

The number of LUNs that can be referenced from the host is determined by the "LUN Addressing" settings and the "LUN Expand Mode (Peripheral Device Addressing)" settings for the host response. When changing a host response that is already allocated to a host group with the host affinity setting or a host with the host affinity setting, check the LUN setting state. If LUNs that are LUN#256 onward are used, the referable LUN setting cannot be changed to "256 LUN" (*1). Refer to "Host response and referable number of LUNs" (page 1118) for details.

*1:   "Peripheral device addressing (Default)" is specified for LUN addressing and "Disable (Default)" is selected for the LUN Expand Mode (Peripheral Device Addressing).

⬤ **N o t e**

This parameter is available only when the LUN addressing setting is "Peripheral device addressing (Default)".

● ALUA Settings

- Asymmetric / Symmetric Logical Unit Access

Description	Select the access type from the host to a volume.
	
	• ACTIVE-ACTIVE / PREFERRED_PATH
	  There are recommended paths and non-recommended paths for each volume. By using a CA port in the Controlling CM of a RAID group in which the volume belongs for the recommended paths (other ports are regarded as non-recommended paths), data migration between CMs (cross access) can be reduced.
	
	• ACTIVE / ACTIVE
	  All of the paths to the volume are regarded as being recommended paths. The multipath driver decides which paths are used.

Input condition/
Display contents
	• For the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS DX500 S3/DX600 S3, and the ETERNUS DX200F:
	  - ACTIVE-ACTIVE / PREFERRED_PATH (Default)
	  - ACTIVE/ACTIVE
	• For the ETERNUS DX8700 S3/DX8900 S3
	  - ACTIVE-ACTIVE/PREFERRED_PATH
	  - ACTIVE/ACTIVE (Default)

> ▷ **Caution**

- This parameter is only available when the TPGS mode is "Enable (Default)". Note that this parameter is enabled regardless of the TPGS mode setting when the ETERNUS Multipath Driver is used.
- For storage systems other than the ETERNUS DX8700 S3/DX8900 S3, when setting "ACTIVE/ACTIVE", a data migration occurs between CMs and there may be a reduction in performance.

- **TPGS Mode**

Description	Select "Enable (Default)" or "Disable" for the Target Port Group Support (TPGS) mode. TPGS is a standard that is used to achieve ALUA for multipath control. By notifying the path status (recommend or non-recommend) of each volume, the selection conditions of paths for multipath control can be determined. If the TPGS mode is "Disable", the multipath driver that is being used decides which ports are used.
Input condition/ Display contents	- Enable (Default) - Disable

- **TPG Referrals Mode**

Description	Select "Enable" or "Disable (Default)" for the TPGS referrals setting. The TPG Referrals function determines the priority path for each block when accessing volumes via the ETERNUS Multipath Driver in order to prevent cross access.
Input condition/ Display contents	- Enable - Disable (Default)

> ▷ **Caution**

- The TPG Referrals function is performed when "Enable" is selected and all of the following conditions apply:
  - The ETERNUS Multipath Driver supports the TPG Referrals function
  - "Enable (Default)" is selected for "TPGS Mode"
- This parameter is available for Standard type volumes, WSVs, TPVs, FTVs, and Standard (LUN concatenation) type volumes.

● **Inquiry Command Settings**

- Peripheral Device Type (Peripheral Device Addressing)

Description	If the LUN addressing setting is "Peripheral device addressing (Default)", select a Peripheral Device type for unconnected LUNs.
Input condition/ Display contents	- No Device Type (3Fh) (Default) - Not Supported (7Fh) - Not Connected (20h)

> ⬤ **N o t e**

This parameter can only be specified when the LUN addressing setting is "Peripheral device addressing (Default)".

- Peripheral Device Type (Flat Space Addressing)

Description	When the LUN addressing setting is "Flat space addressing", select the Peripheral Device type for LUN0.
Input condition/ Display contents	- No Device Type (3Fh) (Default) - Controller Device (0Ch)

⬤ N o t e

This parameter can only be specified when the LUN addressing setting is "Flat space addressing".

• SCSI Version

Description	Select the version of the SCSI specification that is installed in the ETERNUS DX/AF.
Input condition/ Display contents	• Version6 (Default) • Version5 • Version4 • Version3

• NACA

Description	Select "Enable" or "Disable (Default)" for the Normal Auto Contingent Allegiance (NACA) bit.
Input condition/ Display contents	• Enable • Disable (Default)

• Device ID Type

Description	Select the format of the volume identification information.
Input condition/ Display contents	• Type3 (Default) • Type1 • Type1 + Type3

• Product ID

Description	Select "Default" or "Respond as ETERNUS DX S2" for the product ID that is responded to the host.
Input condition/ Display contents	• Default • Respond as ETERNUS DX S2

⬤ **Test Unit Ready Command Settings**

• Reservation Conflict Response

Description	Select the response status when a command to the volume is received while the relevant volume is reserved by another host.
Input condition/ Display contents	• GOOD (Default) • RESERVATION CONFLICT

⬤ **Sense Settings**

• Notify Change of Volume Mapping

Description	Select whether the host is notified ("Enable (Default)") or not notified ("Disable") when volume mapping is changed.
Input condition/ Display contents	• Enable (Default) • Disable

• Notify Change of Volume Expansion

Description	Select the host is notified ("Enable (Default)") or not notified ("Disable") when the volume capacity is changed.
Input condition/ Display contents	• Enable (Default) • Disable

• Notify Vendor Unique Sense

Description	Select whether asynchronous sense reports module disconnection in the storage system to the host ("Enable") or does not report module disconnection in the storage system to the host ("Disable (Default)").
Input condition/ Display contents	• Enable • Disable (Default)

> ▶ **Caution**

A vendor unique sense code is used for sense data that is to be notified. Do not select "Enable" for this item if status monitoring of the ETERNUS DX/AF is not performed from the host.

• Sense Data Conversion

Description	Select whether or not to send the unconverted sense data to the host.

Input condition/ Display contents	• No Conversion (Default)
	Sense data is sent to the host without any conversion.
	• Customize
	Customized sense data is sent to the host.
	Select "Customize" to display the sense data conversion setting field.
	  - From SK/ASC/ASCQ
	  - To SK/ASC/ASCQ
	    Customize the sense data.

> ● **N o t e**

Click the [Add] button. Enter SK/ASC/ASCQ of the conversion target in the "From" field, and SK/ASC/ASCQ of the conversion destination in the "To" field. Specify "From SK/ASC/ASCQ" and "To SK/ASC/ASCQ" values in pairs.
The sense data that matches the "From SK/ASC/ASCQ" value is changed to the specified "To SK/ASC/ASCQ" value.
"*" indicates a wild-card, and targets all values. The maximum number of sense data conversions is eight patterns.
Click each link to change the setting contents.

SK: SK indicates sense keys included in the sense information.
ASC: ASC indicates sense codes included in the sense information.
ASCQ: ASCQ indicates additional sense code qualifier included in the sense information.
(Example 1) The sense information (4/f1/0) is converted to (4/f1/1) before responding to the host.
   From SK/ASC/ASCQ: 4/f1/0
   To SK/ASC/ASCQ: 4/f1/1
(Example 2) The sense information (4/f1/0 - ff) is converted to (6/f1/0 - ff) before responding to the host.
"*" indicates all patterns from "0" to "ff". The "*" part is not converted.
   From SK/ASC/ASCQ: 4/f1/*
   To SK/ASC/ASCQ: 6/f1/*

● **Mode Sense Command Settings**

• Reservation Conflict Response (Write Exclusive)

Description	Select the response status when the "Mode Sense" command to the volume is received while the relevant volume is reserved with "Write Exclusive" by the host. "Write Exclusive" is a reservation type. Refer to "Reservation" (page 791) for details.

Input condition/ Display contents	• GOOD • RESERVATION CONFLICT (Default)

> ⊳ **Caution**

To use Veritas InfoScale (formerly known as Symantec Storage Foundation), select "GOOD" for this item.

● **Other Settings**

• Command Monitor Time

Description	Select one of the following options for command timeouts.
Input condition/ Display contents	• Default (25sec.) Specify 25 seconds. • Customize Input a value between 10 and 255 seconds.

• Load Balance Response Status

Description	Select the response status for the load balancing function.
Input condition/ Display contents	• CHECK CONDITION / UNIT ATTENTION (Default) • BUSY • TASK SET FULL

> ⊳ **Caution**

This item is only available when "Enable" is selected for "Load Balance" in the subsystem parameter.

• iSCSI Discovery Reply Mode

Description	Select the response mode for iSCSI Discovery requests.
Input condition/ Display contents	• All - Reply All Ports (Default) Replies to the server with the information for all the iSCSI ports (iSCSI names and IP addresses). • Port - Reply Target Port Only Replies to the server with only the information for the specified iSCSI ports (iSCSI names and IP addresses).

• iSCSI Reservation Range

Description	Select the reservation management unit of the iSCSI connection.
Input condition/ Display contents	• Storage System (Default) The reservation status of volumes is managed for each storage system. • CA Port The reservation status of volumes is managed for each CA port.

Default values for recommended patterns of host responses

Host response	Host response name						
	Default	Solaris MPxIO	HP-UX	AIX	AIX VxVM	VS850/SVC	BS2000
LUN Settings							
LUN Addressing (*1)	PRHL (Default)		FLAT			PRHL (Default)	

Host response	Host response name						
	Default	Solaris MPxIO	HP-UX	AIX	AIX VxVM	VS850/SVC	BS2000
LUN Expand Mode (Peripheral Device Addressing)	Disable (Default)						Enable
ALUA Settings							
Asymmetric / Symmetric Logical Unit Access	• For the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS DX500 S3/DX600 S3, and the ETERNUS DX200F ACTIVE-ACTIVE / PREFERRED_PATH (Default) • For the ETERNUS DX8700 S3/DX8900 S3 ACTIVE/ACTIVE (Default)						ACTIVE/ ACTIVE
TPGS Mode	Enable (Default)						
TPG Referrals Mode	Disable (Default)						
Inquiry Command Settings							
Peripheral Device Type (*2) (Peripheral Device Addressing)	No Device Type (3Fh) (Default)					Not Con- nected (20h)	No Device Type (3Fh) (Default)
Peripheral Device Type (*3) (Flat Space Addressing)	No Device Type (3Fh) (Default)		Controller Device (0Ch)	No Device Type (3Fh) (Default)			
SCSI Version	Version 6 (Default)						
NACA	Disable (Default)		Enable			Disable (Default)	
Device ID Type	Type3 (Default)					Type1	Type1 + Type3
Product ID	Default						
Test Unit Ready Command Settings							
Reservation Conflict Response	GOOD (Default)	RESERVA- TION CON- FLICT	GOOD (Default)	RESERVA- TION CON- FLICT	GOOD (Default)	RESERVATION CONFLICT	
Sense Settings							
Notify Change of Volume Mapping	Enable (Default)						
Notify Change of Volume Expansion	Enable (Default)						
Notify Vendor Unique Sense	Disable (Default)						
Sense Data Conversion	No Conver- sion (Default)	Customize SK4->SK6 SKB->SK6	No Conversion (Default)				
Mode Sense Command Settings							
Reservation Conflict Response (Write Exclusive)	RESERVATION CONFLICT (Default)						
Other Settings							
Command Monitor Time	Default (25sec.)						
Load Balance Response Status	CHECK CONDITION / UNIT ATTENTION (Default)						
iSCSI Discovery Reply Mode	All - Reply All Ports (Default)						
iSCSI Reservation Range	Storage System (Default)						

*1: "PRHL (Default)" indicates "Peripheral device addressing (Default)" and "FLAT" indicates "Flat space addressing".

*2: This parameter is ignored when the LUN addressing setting is "FLAT".

*3: This parameter is ignored when the LUN addressing setting is "PRHL (Default)".

Modify Host Response

For details about this function, refer to "Modify Host Response" (page 447).

● **Host Response Name**

- Name

Description	Renames a host response. An existing host response name cannot be used.
Input condition/ Display contents	• Up to 16 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

● **LUN Setting**

⬤ **N o t e**

Refer to "LUN Setting" (page 1155) in "Add Host Response" for details.

● **ALUA Settings**

⬤ **N o t e**

Refer to "ALUA Settings" (page 1155) in "Add Host Response" for details.

● **Inquiry Command Settings**

⬤ **N o t e**

Refer to "Inquiry Command Settings" (page 1156) in "Add Host Response" for details.

● **Test Unit Ready Command Settings**

⬤ **N o t e**

Refer to "Test Unit Ready Command Settings" (page 1157) in "Add Host Response" for details.

● **Sense Settings**

⬤ **N o t e**

Refer to "Sense Settings" (page 1157) in "Add Host Response" for details.

● **Mode Sense Command Settings**

⬤ **N o t e**

Refer to "Mode Sense Command Settings" (page 1158) in "Add Host Response" for details.

● **Other Settings**

> 🔵 **N o t e**
>
> Refer to <u>"Other Settings" (page 1159)</u> in <u>"Add Host Response"</u> for details.

Host-LU QoS Management

Set Host-LU QoS

For details about this function, refer to <u>"Set Host-LU QoS" (page 454)</u>.

● **Select LU QoS Group**

- Select LU QoS Group

Description	This function selects an LU QoS group number to assign to a "Host - CA port - LUN group".
Input condition/ Display contents	LU QoS Group No.

Set FC/FCoE Host QoS

For details about this function, refer to <u>"Set FC/FCoE Host QoS" (page 459)</u>.
For the factory default settings for this function, refer to <u>"B. Set FC/FCoE Host QoS" (page 1279)</u>.

● **FC/FCoE Host QoS Setting**

- Bandwidth Limit

Description	Select the maximum performance in IOPS (throughput value). If the bandwidth limit is not to be configured (the bandwidth is not to be limited), select "Unlimited".
Input condition/ Display contents	• Unlimited • 15000 IOPS (800 MB/s) • 12600 IOPS (700 MB/s) • 10020 IOPS (600 MB/s) • 7500 IOPS (500 MB/s) • 5040 IOPS (400 MB/s) • 3000 IOPS (300 MB/s) • 1020 IOPS (200 MB/s) • 780 IOPS (100 MB/s) • 600 IOPS (70 MB/s) • 420 IOPS (40 MB/s) • 300 IOPS (25 MB/s) • 240 IOPS (20 MB/s) • 180 IOPS (15 MB/s) • 120 IOPS (10 MB/s) • 60 IOPS (5 MB/s)

> **◉ N o t e**
>
> The bandwidth limit can be changed with the "set qos-bandwidth-limit" ETERNUS CLI command. If the bandwidth limit is changed by using ETERNUS CLI, that value is also applied to the bandwidth limit that is specified with ETERNUS Web GUI.

Set iSCSI Host QoS

For details about this function, refer to "Set iSCSI Host QoS" (page 460).
For the factory default settings for this function, refer to "B. Set iSCSI Host QoS" (page 1279).

● iSCSI Host QoS Setting

- Bandwidth Limit

  > **◉ N o t e**
  >
  > Refer to "FC/FCoE Host QoS Setting" (page 1162) in "Set FC/FCoE Host QoS" for details.

Set SAS Host QoS

For details about this function, refer to "Set SAS Host QoS" (page 461).
For the factory default settings for this function, refer to "B. Set SAS Host QoS" (page 1280).

● SAS Host QoS Setting

- Bandwidth Limit

  > **◉ N o t e**
  >
  > Refer to "FC/FCoE Host QoS Setting" (page 1162) in "Set FC/FCoE Host QoS" for details.

Set FC Port QoS

For details about this function, refer to "Set FC Port QoS" (page 462).
For the factory default settings for this function, refer to "B. Set FC Port QoS" (page 1280).

● **FC Port QoS Setting**

• Bandwidth Limit

Description	Select the maximum performance in IOPS (throughput value). If the bandwidth limit is not to be configured (the bandwidth is not to be limited), select "Unlimited".
Input condition/ Display contents	• Unlimited • 27000 IOPS (1000 MB/s) • 21000 IOPS (850 MB/s) • 15000 IOPS (700 MB/s) • 10020 IOPS (600 MB/s) • 8040 IOPS (500 MB/s) • 6000 IOPS (400 MB/s) • 5040 IOPS (300 MB/s) • 4020 IOPS (250 MB/s) • 3000 IOPS (200 MB/s) • 2040 IOPS (160 MB/s) • 1020 IOPS (125 MB/s) • 720 IOPS (90 MB/s) • 480 IOPS (60 MB/s) • 240 IOPS (30 MB/s) • 120 IOPS (15 MB/s)

🔵 **N o t e**

The bandwidth limit can be changed with the "set qos-bandwidth-limit" ETERNUS CLI command. If the bandwidth limit is changed by using ETERNUS CLI, that value is also applied to the bandwidth limit that is specified with ETERNUS Web GUI.

Set iSCSI Port QoS

For details about this function, refer to "Set iSCSI Port QoS" (page 464).
For the factory default settings for this function, refer to "B. Set iSCSI Port QoS" (page 1280).

● **iSCSI Port QoS Setting**

• Bandwidth Limit

🔵 **N o t e**

Refer to "FC Port QoS Setting" (page 1164) in "Set FC Port QoS" for details.

Set SAS Port QoS

For details about this function, refer to "Set SAS Port QoS" (page 465).
For the factory default settings for this function, refer to "B. Set SAS Port QoS" (page 1280).

● **SAS Port QoS Setting**

• Bandwidth Limit

> ◯ **N o t e**
>
> Refer to "FC Port QoS Setting" (page 1164) in "Set FC Port QoS" for details.

Set FCoE Port QoS

For details about this function, refer to "Set FCoE Port QoS" (page 466).
For the factory default settings for this function, refer to "B. Set FCoE Port QoS" (page 1280).

● **FCoE Port QoS Setting**

• Bandwidth Limit

> ◯ **N o t e**
>
> Refer to "FC Port QoS Setting" (page 1164) in "Set FC Port QoS" for details.

Add LU QoS Group

For details about this function, refer to "Add LU QoS Group" (page 467).
For the factory default settings for this function, refer to "B. Add LU QoS Group" (page 1280).

● **LU QoS Group Setting**

• Bandwidth Limit

Description	Select the maximum performance in IOPS (throughput value). If the bandwidth limit is not to be configured (the bandwidth is not to be limited), select "Unlimited".
Input condition/ Display contents	• Unlimited • 15000 IOPS (800 MB/s) • 12600 IOPS (700 MB/s) • 10020 IOPS (600 MB/s) • 7500 IOPS (500 MB/s) • 5040 IOPS (400 MB/s) • 3000 IOPS (300 MB/s) • 1020 IOPS (200 MB/s) • 780 IOPS (100 MB/s) • 600 IOPS (70 MB/s) • 420 IOPS (40 MB/s) • 300 IOPS (25 MB/s) • 240 IOPS (20 MB/s) • 180 IOPS (15 MB/s) • 120 IOPS (10 MB/s) • 60 IOPS (5 MB/s)

> ◯ **N o t e**
>
> The bandwidth limit can be changed with the "set qos-bandwidth-limit" ETERNUS CLI command. If the bandwidth limit is changed by using ETERNUS CLI, that value is also applied to the bandwidth limit that is specified with ETERNUS Web GUI.

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Modify LU QoS Group

For details about this function, refer to "Modify LU QoS Group" (page 469).

● LU QoS Group Setting

- Bandwidth Limit

> **⬤ N o t e**
>
> Refer to "LU QoS Group Setting" (page 1165) in "Add LU QoS Group" for details.

NAS Management

Create Shared Folder

For details about this function, refer to "Create Shared Folder" (page 471).
For the factory default settings for this function, refer to "B. Create Shared Folder" (page 1280).

● Shared Folder Settings

- Usage

Description	Select the usage of the shared folder.
Input condition/ Display contents	• File Sharing Create a regular shared folder. • Home Directory Create a home directory.

- Shared Folder Name

Description	Input the shared folder name. • If "File Sharing" is selected for "Usage" Enter the shared folder name. An existing shared folder name cannot be specified. • If "Home Directory" is selected for "Usage" "homes" is displayed for this item.

Input condition/
Display contents
	• If "File Sharing" is selected for "Usage"
	Up to 76 alphanumeric characters and symbols (in the US-ASCII format)
	Note that the following symbols and characters cannot be used.
	  - Symbols
	    Backslash (0x5C), slash (0x2F), colon (0x3A), asterisk (0x2A), question mark (0x3F), double quotation (0x22), less-than sign (0x3C), greater-than sign (0x3E), vertical line (0x7C), equal (0x3D), comma (0x2C), semicolon (0x3B), left square bracket (0x5B), right square bracket (0x5D), plus (0x2B), and percent (0x25)
	  - Spaces (0x20)
	  - Reserved words
	    ".", "..", ".snap", "global", "homes", "printers", and "IPC$" (Entered letters are not case-sensitive.)
	  - "$bak" and strings ending with "$bak"
	  - "@GMT" and strings starting with "@GMT"
	    (Entered letters are not case-sensitive.)
	• If "Home Directory" is selected for "Usage"
	homes

• Protocol

Description	If "File Sharing" is selected for "Usage", select a protocol that is used by the file system.

Input condition/
Display contents
	• CIFS
	  Use the Windows CIFS protocol.
	• NFS
	  Use the UNIX NFS protocol.
	• CIFS/NFS
	  Use the Windows CIFS or the UNIX NFS protocol.

▷ **Caution**

If "Home Directory" is selected for "Usage", "CIFS" is selected for this item.

• Owner

Description	Input the owner of the shared folder. Enter the user name for the domain to which the ETERNUS DX belongs. If "Home Directory" is selected for "Usage", the "Owner" setting is used when the following functions are executed. • Backup • Restoration The user specified as the owner can access shared folders ("$homes" or "homes$bak") that are available when restoring or mounting backups that include home directories.

Input condition/
Display contents
	Up to 255 alphanumeric characters and symbols (0x20 - 0x7E in the US-ASCII format)
	Note that the following symbols and characters cannot be used.
	• Symbols
	  Slash (0x2F), left square bracket (0x5B), right square bracket (0x5D), colon (0x3A), semi-colon (0x3B), vertical line (0x7C), equal (0x3D), comma (0x2C), plus (0x2B), asterisk (0x2A), question mark (0x3F), less-than sign (0x3C), greater-than sign (0x3E), double quotation (0x22), and at sign (0x40)
	• The following reserved words
	  "shareuser$", "bin", "daemon", "adm", "lp", "sync", "shutdown", "halt", "mail", "uucp", "operator", "games", "gopher", "ftp", "nobody", "vcsa", "rpc", "nscd", "ntp", "saslauth", "mailnull", "smmsp", "rpcuser", "nfsnobody", "sshd", "nslcd", "tcpdump", and "oprofile"

• Group

Description	Input the group of the shared folder. Enter the group name for the domain to which the ETERNUS DX belongs. If "Home Directory" is selected for "Usage", the "Group" setting is used when the following functions are executed. • Backup • Restoration The specified group can access shared folders ("$homes" or "homes$bak") that are available when restoring or mounting backups that include home directories. Note that BUILTIN groups cannot be specified.

Input condition/ Display contents	Up to 255 alphanumeric characters and symbols (0x20 - 0x7E in the US-ASCII format) Note that the following symbols and characters cannot be used. • Symbols Slash (0x2F), left square bracket (0x5B), right square bracket (0x5D), colon (0x3A), semi-colon (0x3B), vertical line (0x7C), equal (0x3D), comma (0x2C), plus (0x2B), asterisk (0x2A), question mark (0x3F), less-than sign (0x3C), greater-than sign (0x3E), double quotation (0x22), and at sign (0x40) • The following reserved words "shareuser$", "bin", "daemon", "sys", "adm", "tty", "disk", "lp", "mem", "kmem", "wheel", "mail", "uucp", "man", "games", "gopher", "video", "dip", "ftp", "lock", "audio", "nobody", "users", "utmp", "utempter", "floppy", "vcsa", "rpc", "nscd", "cdrom", "tape", "dialout", "ntp", "saslauth", "mailnull", "smmsp", "rpcuser", "nfsnobody", "sshd", "ldap", "tcpdump", and "oprofile"

• SMB Encryption of Data Access

Description	When performing SMB encryption for data while accessing the shared folder, select "Enable". When not encrypting, select "Disable".
Input condition/ Display contents	• Enable • Disable

⚠ **Caution**

• This item can be set when "CIFS" or "CIFS/NFS" is selected for "Protocol".

• If a client does not support SMB3.0 or SMB3.1, accessing a shared folder where "Enable" is set for "SMB Encryption of Data Access" is not available.

• Note that the system performance may be reduced when "Enable" is selected for this item.

• Access Based Enumeration

Description	To hide the shared folders and directories that cannot be accessed according to the access control list (ACL function), select "Enable". To display inaccessible shared folders and directories, select "Disable".
Input condition/ Display contents	• Enable • Disable

⚠ **Caution**

• This item can be set when "CIFS" or "CIFS/NFS" is selected for "Protocol".

• If "Home Directory" is selected for "Usage", "Disable" is set for this item.

• CIFS Allowed Hosts

Description	Input all of the hosts that are allowed access to the shared folder by using the CIFS protocol. When this parameter is omitted, access from all hosts are allowed. To specify multiple hosts, separate each input value with a comma (0x2C). Refer to "Method for inputting hosts" (page 1170) for details.
Input condition/ Display contents	• IP address, FQDN, or host name • Alphanumeric characters and symbols (0x20 - 0x7E in the US-ASCII format) (except the question mark (0x3F) and the backslash (0x5C)) • Up to 1023 characters Note that any commas (0x2C) that are used to separate the values are also included in the number of characters.

> **▶ Caution**
>
> - This item can be set when "CIFS" or "CIFS/NFS" is selected for "Protocol".
> - If both "CIFS Allowed Hosts" and "CIFS Denied Hosts" are omitted, access from all hosts is allowed.
> - If the same host is specified for both "CIFS Allowed Hosts" and "CIFS Denied Hosts", access from the relevant host is allowed because the "CIFS Allowed Hosts" setting has priority.
> - Specify all the hosts that have already been allowed access, and hosts that will be allowed access.

- CIFS Denied Hosts

Description	Input all of the hosts that are denied access to the shared folder by using the CIFS protocol. To specify multiple hosts, separate each input value with a comma (0x2C). Refer to "Method for inputting hosts" (page 1170) for details.

Input condition/
Display contents
	• IP address, FQDN, or host name
	• Alphanumeric characters and symbols (0x20 - 0x7E in the US-ASCII format)
	  (except the question mark (0x3F) and the backslash (0x5C))
	• Up to 1023 characters
	  Note that any commas (0x2C) that are used to separate the values are also included in the number of characters.

> **▶ Caution**
>
> - This item can be set when "CIFS" or "CIFS/NFS" is selected for "Protocol".
> - If both "CIFS Allowed Hosts" and "CIFS Denied Hosts" are omitted, access from all hosts is allowed.
> - If the same host is specified for both "CIFS Allowed Hosts" and "CIFS Denied Hosts", access from the relevant host is allowed because the "CIFS Allowed Hosts" setting has priority.
> - Specify all the hosts that have already been denied access, and hosts that will be denied access.

- NFS Allowed Hosts

Description	Input all of the hosts that are allowed access to the shared folder by using the NFS protocol. When this parameter is omitted, access from all hosts are allowed. To specify multiple hosts, separate each input value with a comma (0x2C). Refer to "Method for inputting hosts" (page 1170) for details.

Input condition/
Display contents
	• IP address, FQDN, or host name
	• Alphanumeric characters and symbols (0x20 - 0x7E in the US-ASCII format)
	  (except the question mark (0x3F) and the backslash (0x5C))
	• Up to 1023 characters
	  Note that any commas (0x2C) that are used to separate the values are also included in the number of characters.

> **▶ Caution**
>
> - This item can be set when "NFS" or "CIFS/NFS" is selected for "Protocol" and "File Sharing" is selected for "Usage".
> - Specify all the hosts that have already been allowed access, and hosts that will be allowed access.

● **CIFS Permissions**

• Checkbox to permit CIFS access

Description	Select the checkbox for the CIFS access permissions that are to be deleted (multiple selections can be made).
Input condition/Display contents	Checkbox • Selected • Cleared

● **Select Volume**

• Radio button to select a volume

Description	Select a NAS user volume to assign the shared folder.
Input condition/Display contents	Radio button • Selected • Cleared

Method for inputting hosts

Specify CIFS Allowed Hosts, CIFS Denied Hosts, or NFS Allowed Hosts by using one of the following formats. If a value other than an IP address is specified, the value is regarded as being an FQDN.

• Specifying a single host
  [Example 1] 192.0.2.1

• Specifying multiple hosts
  Separate each input value with a comma (0x2C).
  - Specify the hosts by using IP addresses.
    [Example 2] 192.0.2.1, 192.0.2.2, 192.0.2.3
  - Specify the IP address and the subnet mask.
    [Example 3] 203.0.113.0/255.255.255.0
    [Example 4] 203.0.113.0/24

● **Add CIFS Permission**

• Type

Description	Select the type for setting the CIFS access permissions. To select all authorized users and groups in the ETERNUS DX S4/S3 series, select "Everyone".
Input condition/Display contents	• User • Group • Everyone

🔵 **N o t e**

User and group are user information that is managed in the Active Directory authentication server.

- Name

Description	Enter the CIFS access permission target user name or group name.
Input condition/ Display contents	Up to 2048 alphanumeric characters and symbols (in the US-ASCII format) (Entered letters are not case-sensitive) Note that the following symbols and characters cannot be used. - Backslash (0x5C), slash (0x2F), colon (0x3A), asterisk (0x2A), question mark (0x3F), double quotation (0x22), less-than sign (0x3C), greater-than sign (0x3E), vertical line (0x7C), equal (0x3D), comma (0x2C), semicolon (0x3B), left square bracket (0x5B), right square bracket (0x5D), plus (0x2B), and at sign (0x40)

▷ **Caution**

- This item is available when "User" or "Group" is selected for the CIFS access permission type.
- "Everyone" cannot be entered as the name. (Entered letters are not case-sensitive.)
- The user names and group names which have already been used cannot be entered.

- Authority

Description	Select the CIFS access permissions for shared folders. The setting conditions for each CIFS access permission type are as follows. - If "User" or "Group" is selected for the CIFS access permission type, the CIFS access permission is set only for the specified users or groups. Note that other users and groups cannot access the relevant shared folder. - If "Everyone" is selected for the CIFS access permission type, the CIFS access permission is set for all users and groups.
Input condition/ Display contents	- "Read/Write" Allows reading and writing to. - "Read Only" Allows reading only.

▷ **Caution**

- Both "Read/Write" and "Read Only" cannot be set to a single user at the same time.
- Both "Read/Write" and "Read Only" cannot be set to a single group at the same time.

⬤ **N o t e**

"Read/Write" is given priority over "Read Only" as described below.
- If "Read Only" is specified for UserA and "Read/Write" is specified for GroupA in which UserA is a part of, "Read/Write" is set for all users in GroupA including UserA.
- If "Read/Write" is specified for UserA and "Read Only" is specified for GroupA in which UserA is a part of, "Read/Write" is set for UserA and "Read Only" is set for all other users in GroupA excluding UserA.
- If "Everyone" is selected for the CIFS access permission type, the authority is set with the same conditions as when "Read/Write" or "Read Only" is set to all authorized groups in the ETERNUS DX S4/S3 series.

Modify Shared Folder

For details about this function, refer to "Modify Shared Folder" (page 477).

● **Modify Shared Folder Settings**

- Writable

Description	To set the write permission for the shared folder, select "Yes". To not set a write permission, select "No".
Input condition/ Display contents	• Yes • No

▶ **Caution**

- If "Usage" is "File Sharing", this item can be set.
- If "Usage" is "Home Directory", "Yes" is set for this item.

- Oplocks

Description	To use the Oplocks function to avoid conflicts between files by locking the files in the shared folder, select "Enable". To stop use of this function, select "Disable".
Input condition/ Display contents	• Enable • Disable

▶ **Caution**

This item can be set when "Protocol" is "CIFS" or "CIFS/NFS". However, selecting "Enable" for this item is not recommended when "Protocol" is "CIFS/NFS".

- Owner

🔵 N o t e

Refer to "Owner" (page 1167) in "Create Shared Folder" for details.

- Group

🔵 N o t e

Refer to "Group" (page 1167) in "Create Shared Folder" for details.

- **SMB Encryption of Data Access**

Description	When performing SMB encryption for data while accessing the shared folder, select "Enable". When not encrypting, select "Disable".
Input condition/ Display contents	• Enable • Disable

▷ **Caution**

- This item can be set when "Protocol" is "CIFS" or "CIFS/NFS".
- If a client does not support SMB3.0 or SMB3.1, accessing a shared folder where "Enable" is set for "SMB Encryption of Data Access" is not available.
- Note that the system performance may be reduced when "Enable" is selected for this item.
- If this setting is changed for existing shared folders, sessions that have access to relevant shared folders are temporarily disconnected. However, if sessions that have already been accessing shared folders exist, the ETERNUS DX waits for these sessions to complete.

- **Access Based Enumeration**

Description	To hide the shared folders and directories that cannot be accessed according to the access control list (ACL function), select "Enable". To display inaccessible shared folders and directories, select "Disable". This setting becomes available when the protocol is "CIFS" or "CIFS/NFS".
Input condition/ Display contents	• Enable • Disable

▷ **Caution**

- This item can be set when "Protocol" is "CIFS" or "CIFS/NFS".
- If this setting is changed for existing shared folders, sessions that have access to relevant shared folders are temporarily disconnected.

● **N o t e**

If "Usage" is "Home Directory", "Disable" is set for this item.

- **CIFS Allowed Hosts**

● **N o t e**

Refer to "CIFS Allowed Hosts" (page 1168) in "Create Shared Folder" for details.

- **CIFS Denied Hosts**

● **N o t e**

Refer to "CIFS Denied Hosts" (page 1169) in "Create Shared Folder" for details.

- **NFS Allowed Hosts**

● **N o t e**

Refer to "NFS Allowed Hosts" (page 1169) in "Create Shared Folder" for details.

● **CIFS Permissions**

- Checkbox to permit CIFS access

> **N o t e**
>
> Refer to "Checkbox to permit CIFS access" (page 1170) in "Create Shared Folder" for details.

● **Add CIFS Permission**

- Type

> **N o t e**
>
> Refer to "Type" (page 1170) in "Create Shared Folder" for details.

- Name

> **N o t e**
>
> Refer to "Name" (page 1171) in "Create Shared Folder" for details.

- Authority

> **N o t e**
>
> Refer to "Authority" (page 1171) in "Create Shared Folder" for details.

Create NAS Interface

For details about this function, refer to "Create NAS Interface" (page 481).
For the factory default settings for this function, refer to "B. Create NAS Interface" (page 1281).

● **NAS Interface Settings**

- Port

Description	Select the port in which the NAS interface is to be created. Only the NAS ports that are not configured in a NAS interface are displayed as options in the list box. Note that bonding ports (or member ports for Bonding) are not displayed.
Input condition/ Display contents	The NAS ports that are not configured in a NAS interface (CM#x CA#y Port#z)

- RIP Setting

Description	Select whether to receive the routing information with the target port. To receive the routing information with the target port, select "Enable". To stop receiving the routing information, select "Disable". RIP is used to share the routing information between routers, and to simplify the network settings.
Input condition/ Display contents	• Enable • Disable

• Redundant Port

Description	Select which redundant port is used for the multipath configuration of the target port. If a multipath configuration is not used, select "None". When a multipath configuration is not used for the target port, "single ports with NAS interface settings" and "None" are displayed as options. Ports in a different CM from the target port are displayed as redundant ports. Note that bonding ports (or member ports for Bonding) are not displayed. If a multipath configuration is already used for the target port, a redundant port is displayed. This item is available when a port is specified.

Input condition/
Display contents
	When a multipath configuration is not used for the port:
	  • Single ports with NAS interface settings (CM#x CA#y Port#z)
	  • None
	When a multipath configuration is used for the port:
	  • Redundant ports (CM#x CA#y Port#z)

• IP Address

Description	Input the IPv4 address of the target port.

Input condition/
Display contents
	• xxx.xxx.xxx.xxx
	  xxx: 1 - 255 for the top field (decimal)
	  xxx: 0 - 255 for other fields (decimal)
	• Class must be A, B, or C.

• Subnet Mask

Description	Input the subnet mask of the target port.
Input condition/ Display contents	192.0.0.0 - 255.255.255.252

• Gateway

Description	Input the IPv4 gateway address of the target port.
Input condition/ Display contents	• xxx.xxx.xxx.xxx xxx: 0 - 255 for all the text boxes (decimal) • Class must be A, B, or C.

• IPv6 Link Local Address

Description	Input the IPv6 link local address of the target port.
Input condition/ Display contents	fe80::xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation" (page 371) for details.

• IPv6 Connect IP Address

Description	Input the IPv6 connect IP address of the target port.
Input condition/ Display contents	xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation" (page 371) for details.

• IPv6 Gateway

Description	Input the IPv6 gateway address of the target port.
Input condition/ Display contents	xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation" (page 371) for details.

• IPv6 Prefix length

Description	Input the IPv6 prefix length of the target port.
Input condition/ Display contents	3 - 128

Modify NAS Interface

For details about this function, refer to "Modify NAS Interface" (page 483).
Refer to "Create NAS Interface" (page 1174) for details about the setting items of this function.

Change NAS Server Name

For details about this function, refer to "Change NAS Server Name" (page 485).
For the factory default settings for this function, refer to "B. Change NAS Server Name" (page 1281).

● NAS Server Settings

• Name

Description	Input the NAS server name for the ETERNUS DX S4/S3 series.
Input condition/ Display contents	Up to 15 alphanumeric characters and symbols (in the US-ASCII format) The following list shows the available characters: • 0 (0x30) - 9 (0x39) • A (0x41) - Z (0x5A), a (0x61) - z (0x7A) • A hyphen (0x2D) except as the first and/or the last character

Set DNS Server

For details about this function, refer to "Set DNS Server" (page 486).

● DNS Server Settings

• Primary IP Address

Primary IP Address	Input the primary IP address of the DNS server that is used for operation LAN. Specify the IP address with the IPv4 format. Note that the IPv4 address cannot be the same as the secondary IP address.
Input condition/ Display contents	xxx.xxx.xxx.xxx xxx: 1 - 255 for the top field (decimal) xxx: 0 - 255 for other fields (decimal)

- Secondary IP Address

Description	Input the secondary IP address of the DNS server that is used for operation LAN. Specify the IP address with the IPv4 format. Note that the IPv4 address cannot be the same as the primary IP address. When specifying the secondary IP address, the primary IP address settings cannot be omitted.
Input condition/ Display contents	xxx.xxx.xxx.xxx xxx: 1 - 255 for the top field (decimal) xxx: 0 - 255 for other fields (decimal)

- IPv6 Primary IP Address

Description	Input the primary IP address of the DNS server that is used for operation LAN. Specify the IP address with the IPv6 format. The following IPv6 addresses can be used; "global address" or "unique local address". Refer to "Available IPv6 Address" (page 122) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation. Note that the IPv6 address cannot be the same as the secondary IP address.
Input condition/ Display contents	xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation" (page 371) for details.

- IPv6 Secondary IP Address

Description	Input the secondary IP address of the DNS server that is used for operation LAN. Specify the IP address with the IPv6 format. The following IPv6 addresses can be used; "global address" or "unique local address". Refer to "Available IPv6 Address" (page 122) for details. When the current setting is displayed, the IPv6 address is displayed as an abbreviation. Note that the IPv6 address cannot be the same as the primary IP address. When specifying the IPv6 secondary IP address, the IPv6 primary IP address settings cannot be omitted.
Input condition/ Display contents	xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation" (page 371) for details.

Set Authentication Server

For details about this function, refer to "Set Authentication Server" (page 487).

● **Active Directory Authentication Settings, LDAP Authentication Settings**

- Domain Name

Description	Input the domain name of the authentication server.
Input condition/ Display contents	Up to 255 alphanumeric characters and symbols (0x20 - 0x7E in the US-ASCII format) (except the question mark (0x3F) and the backslash (0x5C))

• Domain Administrator

Description	Input the administrator name for authentication server management.
Input condition/ Display contents	Up to 255 alphanumeric characters and symbols (0x20 - 0x7E in the US-ASCII format) (except the question mark (0x3F) and the backslash (0x5C))

▷ **Caution**

If the domain administrator's name is changed, the password must also be changed.

• Change Password

Description	To change the administrator password for authentication server, select the checkbox.
Input condition/ Display contents	Checkbox • Selected • Cleared

• Domain Administrator's Password

Description	Input the administrator password for the authentication server management. When the domain administrator's password is specified, select the "Change Password" checkbox.
Input condition/ Display contents	• Up to 255 alphanumeric characters and symbols (0x20 - 0x7E in the US-ASCII format) (except the question mark (0x3F) and the backslash (0x5C)) • When the domain administrator's password is specified Select the "Change Password" checkbox.

• Confirm Password

Description	Input the same password as the "Domain Administrator's Password" field for the authentication server.
Input condition/ Display contents	Up to 255 alphanumeric characters and symbols (0x20 - 0x7E in the US-ASCII format) (except the question mark (0x3F) and the backslash (0x5C))

• Authentication Server (1) - (3)

Description	Input the IPv4 address, IPv6 address, or the FQDN of the authentication server.
Input condition/ Display contents	Up to 255 alphanumeric characters and symbols (in the US-ASCII format) The following list shows the available characters: • 0 (0x30) - 9 (0x39) • A (0x41) - Z (0x5A), a (0x61) - z (0x7A) • Hyphen (0x2D), period (0x2E), comma (0x3A)

Add Local User

For details about this function, refer to "Add Local User" (page 489).
For the factory default settings for this function, refer to "B. Add Local User" (page 1281).

● **Local User Settings**

• Name

Description	Enter a local user name.

Input condition/
Display contents
	Up to 32 alphanumeric characters and symbols (in the US-ASCII format)
	• The following list shows the available characters:
	   - A hyphen (0x2D), an underscore (0x5F), and a dollar sign (0x24) can be used.
	   - Alphanumeric characters or an underscore (0x5F) can be used for the first character.
	   - A dollar sign (0x24) can only be used for the last character.
	• Note that the following reserved words cannot be used.
	"adm", "audio", "bin", "cdrom", "cgred", "daemon", "dialout", "dip", "disk", "floppy", "ftp", "games", "gopher", "halt", "kmem", "ldap", "lock", "lp", "mail", "mailnull", "man", "mem", "nfsnobody", "nobody", "nscd", "nslcd", "ntp", "operator", "oprofile", "root", "rpc", "rpcuser", "saslauth", "shutdown", "smmsp", "sshd", "sync", "sys", "tape", "tcpdump", "tty", "users", "utempter", "utmp", "uucp", "vcsa", "video", "wheel", and "everyone"

> ▶ **Caution**

• An existing local user name cannot be used.
• The name that was registered as the NAS Engine login user name (for audit log FTP or for investigation log FTP) cannot be used. The NAS Engine login user name is created with the "create nas-engine-user" ETERNUS CLI command.
• Entered letters are not case-sensitive.

• User ID

Description	Enter a local user ID for the local user. If this item is omitted, an unused number is assigned in ascending order starting from "500".
Input condition/ Display contents	• 450 • 500 - 999

> ▶ **Caution**

• If "shareuser$" is entered for "Name", only "450" can be set for this item.
• An existing user ID cannot be used.

• Password

Description	Enter a password for the local user.
Input condition/ Display contents	8 - 32 alphanumeric characters and symbols (0x20 - 0x7E in the US-ASCII format)

• Confirm Password

Description	Input the same character string as the value entered in the "Password" field for confirmation.
Input condition/ Display contents	8 - 32 alphanumeric characters and symbols (0x20 - 0x7E in the US-ASCII format)

● **Member group selection ([Primary Group] Tab)**

- Radio button to select a primary group

Description	To change the primary group from "sharegroup$" (default), select a radio button for primary group to which the local user will belong.
Input condition/ Display contents	Local groups registered in the ETERNUS DX that can be used as primary groups

▶ **Caution**

The same group as the secondary group cannot be selected.

● **Member group selection ([Secondary Group] Tab)**

- Checkbox to select a secondary group

Description	Select the checkboxes for the secondary groups to which the local user will belong and clear checkboxes for the secondary groups to which the local user will not belong. The local user can belong to a maximum of 16 secondary groups or the local user may not belong to any secondary group.
Input condition/ Display contents	Checkbox • Selected • Cleared

▶ **Caution**

The same group as the primary group cannot be selected.

Special group

Local group ID	Local group name	Description	Available groups	
			Primary group	Secondary group
450	shareuser$	The local user "shareuser$" belongs to this group. This group is automatically created when the controller firmware is updated from controller firmware version V10L51 or earlier while the authentication server is not being used (or all users share the same fixed user account) to V10L53 or later. Regular local users can also belong to this group.	OK	OK
451	sharegroup$	The initial primary group to which the created local users belong. This group is automatically created when local users are created. If all local users that belong to this group are deleted, this group is automatically deleted. If the local user "shareuser$" is deleted and then added again, the recreated "shareuser$" belongs to this group.	OK	OK
1002	BUILTIN_Administrators	One of the BUILTIN groups (*1). Users who belong to this group can execute all operations for all domain controllers within the domain.	N/A	OK
1003	BUILTIN_Users	One of the BUILTIN groups (*1). Users who belong to this group can execute most of the general operations.	N/A	OK
1004	BUILTIN_BackupOperators	One of the BUILTIN groups (*1). Users who belong to this group can perform file backups and file recoveries regardless of the access permissions for all the files of domain controllers within the domain.	N/A	OK

OK: Affiliation possible
N/A: Affiliation not possible

*1: "BUILTIN groups" are groups that are included in the ETERNUS DX as standard. If local users belong to these groups, the backup software "Arcserve Backup" can be used to back up or restore files by using the ETERNUS DX as a backup device.

Modify Local User

For details about this function, refer to "Modify Local User" (page 491).
For the factory default settings for this function, refer to "B. Modify Local User" (page 1281).

● Local User Settings

- Change Password

Description	Only when changing the password, select the "Change Password" checkbox. When the "Change Password" checkbox is selected, enter a new password in "Password" and "Confirm Password".
Input condition/ Display contents	"Change Password" checkbox • Selected • Cleared

- Password

> ◉ N o t e
>
> Refer to "Password" (page 1179) in "Add Local User" for details.

- Confirm Password

> ◉ N o t e
>
> Refer to "Confirm Password" (page 1179) in "Add Local User" for details.

● Member group selection ([Primary Group] Tab)

- Radio button to select a primary group

Description	To change the primary group, select the radio button for the primary group to which the local user will belong. The radio button for the primary group to which the specified local user currently belongs is selected by default.
Input condition/ Display contents	Local groups registered in the ETERNUS DX that can be used as primary groups

> ▶ Caution
>
> The same group as the secondary group cannot be selected.

● **Member group selection ([Secondary Group] Tab)**

• Checkbox to select a secondary group

Description	Select the checkboxes for the secondary groups to which the local user will belong and clear checkboxes for the secondary groups to which the local user will not belong. The checkboxes for the secondary group to which the specified local user currently belongs are selected by default. The local user can belong to a maximum of 16 secondary groups or the local user may not belong to any secondary group.
Input condition/ Display contents	Checkbox • Selected • Cleared

> ⚠ **Caution**

The same group as the primary group cannot be selected.

Add Local Group

For details about this function, refer to .

● **Local Group Settings**

• Name

Description	Enter a local group name.

Input condition/
Display contents
	Up to 32 alphanumeric characters and symbols (in the US-ASCII format)
	• The following list shows the available characters:
	  - A hyphen (0x2D), an underscore (0x5F), and a dollar sign (0x24) can be used.
	  - Alphanumeric characters or an underscore (0x5F) can be used for the first character.
	  - A dollar sign (0x24) can only be used for the last character.
	• Note that the following words cannot be used.
	  - The following reserved words:
	    "adm", "audio", "bin", "cdrom", "cgred", "daemon", "dialout", "dip", "disk", "floppy", "ftp", "games", "gopher", "halt", "kmem", "ldap", "lock", "lp", "mail", "mailnull", "man", "mem", "nfsnobody", "nobody", "nscd", "nslcd", "ntp", "operator", "oprofile", "root", "rpc", "rpcuser", "saslauth", "shutdown", "smmsp", "sshd", "sync", "sys", "tape", "tcpdump", "tty", "users", "utempter", "utmp", "uucp", "vcsa", "video", "wheel", and "everyone"
	  - The following special group names:
	    "sharegroup$", "BUILTIN_Administrators", "BUILTIN_Users", and "BUILTIN_BackupOperators"

> ⚠ **Caution**

• An existing local group name cannot be used.

• The name that was registered as the NAS Engine login user name (for audit log FTP or for investigation log FTP) cannot be used. The NAS Engine login user name is created with the "create nas-engine-user" ETERNUS CLI command.

• Entered letters are not case-sensitive.

• Local group names that consist of only numbers cannot be used.

- Group ID

Description	Enter a local group ID for the local group.
	If this item is omitted, an unused number is assigned in ascending order starting from "500".
Input condition/ Display contents	• 450 • 500 - 999

> ▶ **Caution**

- If "shareuser$" is entered for "Name", only "450" can be set for this item.
- An existing group ID cannot be used.

Add Quota Setting

For details about this function, refer to .
For the factory default settings for this function, refer to .

● Select Volume

- Radio button to select a NAS user volume

Description	Select a quota target NAS user volume.
Input condition/ Display contents	A quota target NAS user volume

> ◉ **N o t e**

When performing a quota setting for the shared folder, if the NAS user volume to which the relevant shared folder belongs is unknown, skip the selection of the NAS user volume.

> ▶ **Caution**

If "Share" is selected for the quota target type in the [Add Quota Target] screen, a radio button becomes available for the NAS user volume to which the relevant shared folder belongs. In this case, other NAS user volumes cannot be selected.

● Quota Target

- Checkbox to select a quota setting information

Description	Select a quota setting information to be deleted.
	Only the quota setting information that was added can be deleted. Multiple quota setting information can be selected at the same time.
Input condition/ Display contents	Checkbox • Selected • Cleared

● Add Quota Target

- Type

Description	Select a type for the quota target.
Input condition/ Display contents	• User • Group • Share

- Name

Description	If "User" or "Group" is selected for the quota target type, enter the user name or the group name of the quota target. If "Share" is selected for the quota target type, select the shared folder name of the quota target. If the quota setting information with the same "Type" and "Name" already exists, that quota cannot be specified.

Input condition/
Display contents
	• If "User" or "Group" is selected for the quota target type
	Up to 255 alphanumeric characters and symbols (0x20 - 0x7E in the US-ASCII format) (except the question mark (0x3F) and the backslash (0x5C))
	• If "Share" is selected for the quota target type
	  - Shared folder name
	  - homes

> 🔵 **N o t e**
>
> If the NAS user volume is selected in the initial screen, only the shared folders that belong to the relevant NAS user volume are displayed as options. If the NAS user volume is not selected, all the shared folders that are registered in the ETERNUS DX are displayed as options.

- Warning (Drive Space)

Description	Enter the warning value for the drive usage in the quota target. If "0" is entered or no values are specified, "Not Specified" (unlimited) is registered in the ETERNUS DX.
Input condition/ Display contents	• 0 - 128TB • MB/GB/TB

- Limit (Drive Space)

Description	Enter the limit value for the drive usage in the quota target. If "0" is entered or no values are specified, "Not Specified" (unlimited) is registered in the ETERNUS DX.
Input condition/ Display contents	• 0 - 128TB • MB/GB/TB

> ▶ **Caution**
>
> If both the warning and limit values are specified, the limit value must be larger than the warning value.

- Warning (File Count)

Description	Enter the warning value for the number of files in the quota target. If "0" is entered, "Not Specified" (unlimited) is registered in the ETERNUS DX.
Input condition/ Display contents	0 - 134217723

• Limit (File Count)

Description	Enter the limit value for the number of files in the quota target.
	If "0" is entered, "Not Specified" (unlimited) is registered in the ETERNUS DX.
Input condition/ Display contents	0 - 134217723

▶ **Caution**

If both the warning and limit values are specified, the limit value must be larger than the warning value.

Modify Quota Setting

For details about this function, refer to .

● **Quota Settings**

• Warning (Drive Space)

Description	Change the warning value for the drive space.
	When this function starts, the current warning value for the drive space is displayed. If "0" is entered or no values are specified, "Not Specified" (unlimited) is registered in the ETERNUS DX.
Input condition/ Display contents	• 0 - 128TB • MB/GB/TB

⬤ **N o t e**

When this function starts, the warning value is displayed with the largest unit (TB/GB/MB) after rounding down to the nearest whole number. For example, if the warning value in the ETERNUS DX is "1572864000 KB", "1500 GB" is displayed.

• Limit (Drive Space)

Description	Change the limit value for the drive space.
	When this function starts, the current limit value for the drive space is displayed. If "0" is entered or no values are specified, "Not Specified" (unlimited) is registered in the ETERNUS DX.
Input condition/ Display contents	• 0 - 128TB • MB/GB/TB

▶ **Caution**

If both the warning and limit values are specified, the limit value must be larger than the warning value.

⬤ **N o t e**

When this function starts, the limit value is displayed with the largest unit (TB/GB/MB) after rounding down to the near-est whole number. Refer to note for for details.

• Warning (File Count)

Description	Change the warning value for the file count. The current warning value for the file count is displayed when this function starts. If "0" is entered, "Not Specified" (unlimited) is registered in the ETERNUS DX.
Input condition/ Display contents	0 - 134217723

• Limit (File Count)

Description	Change the limit value for the file count. The current limit value for the file count is displayed when this function starts. If "0" is entered, "Not Specified" (unlimited) is registered in the ETERNUS DX.
Input condition/ Display contents	0 - 134217723

▷ Caution

If both the warning and limit values are specified, the limit value must be larger than the warning value.

RAID Group Management

This section provides information on the parameters of the following actions for RAID group management.

- Create RAID Group
- Rename RAID Group
- Change Controlling CM
- Expand RAID Group
- Modify RAID Group Parameters
- Assign Eco-mode Schedule (RAID Group)
- Set Key Group (RAID Group)
- External RAID Group Management

Create RAID Group

For details about this function, refer to .
For the factory default settings for this function, refer to .

● New RAID Group

- Name

Description	Input a RAID group name that is to be created. An existing RAID group name cannot be used.
Input condition/ Display contents	• Up to 16 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

● Automatic Setting

- Number of RAID Groups

Description	Input the number of RAID groups that are to be created. When creating multiple RAID groups at a time, the new RAID groups are named automatically. Refer to "Naming Conventions of Volumes" (page 1338) for details.

Input condition/
 Display contents
	• For the ETERNUS DX60 S4/DX60 S3
	   1 - 48
	 • For the ETERNUS DX100 S4/DX100 S3
	   1 - 72
	 • For the ETERNUS DX200 S4/DX200 S3
	   1 - 132
	 • For the ETERNUS DX500 S4/DX500 S3
	   1 - 264
	 • For the ETERNUS DX600 S4/DX600 S3
	   1 - 528
	 • For the ETERNUS DX8100 S3
	   1 - 48
	 • For the ETERNUS DX8700 S3
	   1 - 768
	 • For the ETERNUS DX8900 S3
	   1 - 2304

Input condition/
Display contents
(Cont'd)
	• For the ETERNUS AF250 S2/AF250
	  1 - 24
	• For the ETERNUS AF650 S2/AF650
	  1 - 96
	• For the ETERNUS DX200F
	  1 - 12

• Drive Type

Description	Select the type of drive that configures a RAID group from the list box.
Input condition/ Display contents	• Online • Nearline • SSD • Online SED • Nearline SED • SSD SED

• RAID Level

Description	Select the level of RAID group that is to be created.
Input condition/ Display contents	• High Performance (RAID1+0) • High Capacity (RAID5) • High Reliability (RAID6) • High Reliability (RAID6-FR) • Reliability (RAID5+0) • Mirroring (RAID1) • Striping (RAID0)

> ▶ **Caution**

• Several restrictions apply to RAID groups and volumes in the "RAID6-FR" type RAID group. For details, refer to "Restrictions for RAID6-FR" (page 507)

• Several restrictions apply to RAID groups that are created with "RAID5+0". For the details, refer to "Restrictions for RAID5+0" (page 508).

• Select Drives

Description	Select the requirements that are given priority when creating a Fast Recovery RAID group with automatic drive configuration. This item is available only when the RAID level is "High Reliability (RAID6-FR)".

Input condition/
Display contents
	• Minimize number of using drives
	  Minimize the number of drives in the RAID group to achieve high-speed rebuilding. Refer to "Drive configuration for Fast Recovery RAID groups" (page 1192) for details.
	• Prioritize rebuild rate
	  Use more drives in a RAID group and distribute data to achieve high-speed rebuilding. Refer to "Drive configuration for Fast Recovery RAID groups" (page 1192) for details.

- • RAID Group Capacity

Description	Input the RAID group capacity that is to be created and select the units of capacity. A RAID group is automatically created with a capacity of the entered value or higher.
Input condition/ Display contents	• Numeric characters • TB/GB/MB

● Manual Setting

- • RAID Level

> **○ N o t e**
>
> Refer to "RAID Level" (page 1188) in "Automatic Setting" for details.

- • Controlling CM

Description	Specify the Controlling CM of the RAID group to be created. "Automatic" and the normal CM number ("CE#x CM#y" or "CM#y") that is installed are displayed as options (x: CE number, y: CM number). Select "Automatic" for normal operations. When "Automatic" is selected, the Controlling CM that is to be allocated is determined by the RAID group number. Refer to "Automatic Controlling CM setting" (page 1193) for details.

Input condition/
Display contents
	• For the ETERNUS DX8700 S3/DX8900 S3
	  - Automatic
	  - CE#x CM#y
	• For the other models
	  - Automatic
	  - CM#y

• Fast Recovery Configuration

Description	Select the drive configuration for a Fast Recovery RAID group. Select the drive configuration from "No. of drives in the configuration", "capacity efficiency", and "rebuilding speed" according to your environment. Refer to "Drive configuration for Fast Recovery RAID groups" (page 1192) for details. The more redundant sets there are, the faster the rebuilding becomes. This item is blank when the RAID level is not "High Reliability (RAID6-FR)".

Input condition/
Display contents
	• For the ETERNUS DX200F
	  - (3D+2P)x2+1HS
	  - (4D+2P)x2+1HS
	  - (6D+2P)x2+1HS
	  - (9D+2P)x2+1HS
	  - Blank
	• For the other models
	  - (3D+2P)x2+1HS
	  - (4D+2P)x2+1HS
	  - (6D+2P)x2+1HS
	  - (9D+2P)x2+1HS
	  - (12D+2P)x2+1HS
	  - (5D+2P)x4+1HS
	  - (13D+2P)x2+1HS
	  - (8D+2P)x3+1HS
	  - (4D+2P)x5+1HS
	  - (3D+2P)x6+1HS
	  - Blank
	
	D: Data drives, P: Parity drives, HS: Hot Spares

• RAID Group Capacity

Description	The RAID group capacity is displayed. The "RAID Group Capacity" is automatically calculated from the selected RAID level and drives.
Input condition/ Display contents	Capacity of RAID group that is to be created

● **Drive Selection ([Tabular] Tab)**

• Checkbox to select drives

Description	Select the checkbox for the drive to be selected.
Input condition/ Display contents	Checkbox • Selected • Cleared

● **Drive Selection ([Graphic] Tab)**

• DE selection list box

Description	Select the DE group. Options are displayed in the list box when at least one CE or DE in the DE group is installed in the ETERNUS DX/AF. The options and DE groups for each model are as follows: **Options and DE groups for each model**

Model	Option	DE group
ETERNUS DX60 S4/DX60 S3	DE#0x	CE, DE#01 - DE#03
ETERNUS DX100 S4/DX100 S3	DE#0x	CE, DE#01 - DE#05
ETERNUS DX200 S4/DX200 S3	DE#0x	CE, DE#01 - DE#0A
ETERNUS DX500 S4/DX500 S3	DE#0x	DE#00 - DE#0A
	DE#1x	DE#10 - DE#1A
ETERNUS DX600 S4/DX600 S3	DE#0x	DE#00 - DE#0A
	DE#1x	DE#10 - DE#1A
	DE#2x	DE#20 - DE#2A
	DE#3x	DE#30 - DE#3A
ETERNUS DX8100 S3	DE#0x	DE#00
	DE#1x	DE#10
	DE#2x	DE#20
	DE#3x	DE#30
ETERNUS DX8700 S3	DE#0x	DE#00 - DE#0F
	DE#1x	DE#10 - DE#1F
	DE#2x	DE#20 - DE#2F
	DE#3x	DE#30 - DE#3F
ETERNUS DX8900 S3	DE#0x	DE#00 - DE#0F
	DE#1x	DE#10 - DE#1F
	DE#2x	DE#20 - DE#2F
	DE#3x	DE#30 - DE#3F
	DE#4x	DE#40 - DE#4F
	DE#5x	DE#50 - DE#5F
	DE#6x	DE#60 - DE#6F
	DE#7x	DE#70 - DE#7F
	DE#8x	DE#80 - DE#8F
	DE#9x	DE#90 - DE#9F
	DE#Ax	DE#A0 - DE#AF
	DE#Bx	DE#B0 - DE#BF
ETERNUS AF250 S2/AF250	DE#0x	CE, DE#01
ETERNUS AF650 S2/AF650	DE#0x	DE#00, DE#01
	DE#1x	DE#10, DE#11
	DE#2x	DE#20, DE#21
	DE#3x	DE#30, DE#31

Input condition/ Display contents	DE#Xx (X: 0 - B)

- Checkbox to select drives

Description	Select the checkbox for the drive to be selected.
	Checkboxes are displayed for unused drives. The drive location of each DE is described below.
	Drive location
	For 2.5" DEs, drives are displayed from left to right in ascending order of the slot number. For 3.5" DEs or 3.5" high density DEs, drives are displayed from bottom left to top right in ascending order of the slot number.
	Placing the mouse pointer on the ⓘ icon displays the detailed information of the drive.
Input condition/ Display contents	Checkbox • Selected • Cleared

Drive configuration for Fast Recovery RAID groups

The drive layout in the ETERNUS DX/AF is the same as "RAID6". When using automatic configuration, the drive configuration that satisfies the specified capacity is determined according to the following order.

No. of drives in the configuration (per RAID group)	Redundant sets + HS (*1)	Capacity efficiency (*2) (%)	Rebuilding speed (*3) (Rate)	Number of data drives	Selection order when configuring automatically	
					"Minimize number of using drives" is selected	"Prioritize rebuild rate" is selected
11	(3D+2P)x2+1HS	54.5	2.20	6	1	5
13	(4D+2P)x2+1HS	61.5	2.17	8	2	6
17	(6D+2P)x2+1HS	70.6	2.13	12	3	7
23	(9D+2P)x2+1HS	78.3	2.09	18	4	8
29	(12D+2P)x2+1HS	82.8	2.07	24	5	9
31	(13D+2P)x2+1HS	83.9	2.06	26	6	10
31	(3D+2P)x6+1HS	58.1	6.20	18	Not selected	1
31	(4D+2P)x5+1HS	64.5	5.17	20	Not selected	2
29	(5D+2P)x4+1HS	70.0	4.14	20	Not selected	3
31	(8D+2P)x3+1HS	77.4	3.10	24	Not selected	4

*1:   Fast Recovery RAID groups are described as "Redundant sets + HS".
       RAID6((No. of data drives (D) + No. of parity drives (P)) x No. of redundant sets + No. of Hot spares (HS))
                        ↑
                 Redundant sets
       (Example) "RAID6 ((3D+2P)x2+1HS)" is described as "(3D+2P)x2+1HS".

*2:   The ratio of the user capacity to physical drive capacity.

*3:   Rate when the rebuilding speed for the basic "RAID6 (D+P)" configuration is "1". The rate varies depending on the workload of the ETERNUS DX/AF and system environment.

Automatic Controlling CM setting

The Controlling CM is determined by the value of the remainder when the RAID group number is divided by the number of controllers. If CMs are not installed or if a failed CM exists, the controlling CM is assigned to balance the load in the normal CMs.

- When using the ETERNUS DX/AF storage systems other than the ETERNUS DX8700 S3/DX8900 S3, all CMs are installed, and all CMs are in a normal state

RAID group number	Controlling CM assignment
Even numbers	CM#0
Odd numbers	CM#1

- When using the ETERNUS DX8700 S3/DX8900 S3, all CMs are installed, and all CMs are in a normal state:
  - The number of CMs is 2 (1CE) to 12 (6CEs)

Remainder when dividing the RAID group number by the number of CMs	Number of CMs (Number of CEs)					
	2 (1CE)	4 (2CEs)	6 (3CEs)	8 (4CEs)	10 (5CEs)	12 (6CEs)
0	CE#0 CM#0	CE#0 CM#0	CE#0 CM#0	CE#0 CM#0	CE#0 CM#0	CE#0 CM#0
1	CE#0 CM#1	CE#1 CM#1	CE#2 CM#1	CE#3 CM#1	CE#4 CM#1	CE#5 CM#1
2	–	CE#1 CM#0	CE#1 CM#0	CE#1 CM#0	CE#1 CM#0	CE#1 CM#0
3	–	CE#0 CM#1	CE#1 CM#1	CE#2 CM#1	CE#3 CM#1	CE#4 CM#1
4	–	–	CE#2 CM#0	CE#2 CM#0	CE#2 CM#0	CE#2 CM#0
5	–	–	CE#0 CM#1	CE#1 CM#1	CE#2 CM#1	CE#3 CM#1
6	–	–	–	CE#3 CM#0	CE#3 CM#0	CE#3 CM#0
7	–	–	–	CE#0 CM#1	CE#1 CM#1	CE#2 CM#1
8	–	–	–	–	CE#4 CM#0	CE#4 CM#0
9	–	–	–	–	CE#0 CM#1	CE#1 CM#1
10	–	–	–	–	–	CE#5 CM#0
11	–	–	–	–	–	CE#0 CM#1
12	–	–	–	–	–	–
13	–	–	–	–	–	–
14	–	–	–	–	–	–
15	–	–	–	–	–	–
16	–	–	–	–	–	–
17	–	–	–	–	–	–
18	–	–	–	–	–	–
19	–	–	–	–	–	–
20	–	–	–	–	–	–
21	–	–	–	–	–	–
22	–	–	–	–	–	–
23	–	–	–	–	–	–

- The number of CMs is 14 (7CEs) to 24 (12CEs)

Remainder when dividing the RAID group number by the number of CMs	Number of CMs (Number of CEs)					
	14 (7CEs)	16 (8CEs)	18 (9CEs)	20 (10CEs)	22 (11CEs)	24 (12CEs)
0	CE#0 CM#0	CE#0 CM#0	CE#0 CM#0	CE#0 CM#0	CE#0 CM#0	CE#0 CM#0
1	CE#6 CM#1	CE#7 CM#1	CE#8 CM#1	CE#9 CM#1	CE#A CM#1	CE#B CM#1
2	CE#1 CM#0	CE#1 CM#0	CE#1 CM#0	CE#1 CM#0	CE#1 CM#0	CE#1 CM#0
3	CE#5 CM#1	CE#6 CM#1	CE#7 CM#1	CE#8 CM#1	CE#9 CM#1	CE#A CM#1
4	CE#2 CM#0	CE#2 CM#0	CE#2 CM#0	CE#2 CM#0	CE#2 CM#0	CE#2 CM#0
5	CE#4 CM#1	CE#5 CM#1	CE#6 CM#1	CE#7 CM#1	CE#8 CM#1	CE#9 CM#1
6	CE#3 CM#0	CE#3 CM#0	CE#3 CM#0	CE#3 CM#0	CE#3 CM#0	CE#3 CM#0
7	CE#3 CM#1	CE#4 CM#1	CE#5 CM#1	CE#6 CM#1	CE#7 CM#1	CE#8 CM#1
8	CE#4 CM#0	CE#4 CM#0	CE#4 CM#0	CE#4 CM#0	CE#4 CM#0	CE#4 CM#0
9	CE#2 CM#1	CE#3 CM#1	CE#4 CM#1	CE#5 CM#1	CE#6 CM#1	CE#7 CM#1
10	CE#5 CM#0	CE#5 CM#0	CE#5 CM#0	CE#5 CM#0	CE#5 CM#0	CE#5 CM#0
11	CE#1 CM#1	CE#2 CM#1	CE#3 CM#1	CE#4 CM#1	CE#5 CM#1	CE#6 CM#1
12	CE#6 CM#0	CE#6 CM#0	CE#6 CM#0	CE#6 CM#0	CE#6 CM#0	CE#6 CM#0
13	CE#0 CM#1	CE#1 CM#1	CE#2 CM#1	CE#3 CM#1	CE#4 CM#1	CE#5 CM#1
14	–	CE#7 CM#0	CE#7 CM#0	CE#7 CM#0	CE#7 CM#0	CE#7 CM#0
15	–	CE#0 CM#1	CE#1 CM#1	CE#2 CM#1	CE#3 CM#1	CE#4 CM#1
16	–	–	CE#8 CM#0	CE#8 CM#0	CE#8 CM#0	CE#8 CM#0
17	–	–	CE#0 CM#1	CE#1 CM#1	CE#2 CM#1	CE#3 CM#1
18	–	–	–	CE#9 CM#0	CE#9 CM#0	CE#9 CM#0
19	–	–	–	CE#0 CM#1	CE#1 CM#1	CE#2 CM#1
20	–	–	–	–	CE#A CM#0	CE#A CM#0
21	–	–	–	–	CE#0 CM#1	CE#1 CM#1
22	–	–	–	–	–	CE#B CM#0
23	–	–	–	–	–	CE#0 CM#1

● **Advanced Setting**

Stripe Depth should be set only when advanced tuning needs to be performed for each RAID group. It is not necessary to change the default value for normal use.
Specifying a larger value for the Stripe Depth can reduce the number of drives to access. For "High Performance (RAID1+0)", reducing the number of commands issued to drives improves the performance of access to the specified RAID group. For "High Capacity (RAID5)", however, specifying a larger value for the Stripe Depth might decrease the sequential write performance. In addition, several restrictions apply to a RAID group whose Stripe Depth has been changed and volumes created for such RAID group. Refer to "Restrictions for Stripe Depth modification (for RAID group)" (page 1195) for details.

• Stripe Depth

Description	Select the Stripe Depth of the RAID group that is to be created. Available Stripe Depth value varies depending on the RAID level. Refer to "Available Stripe Depth value (for RAID group)" (page 1195) for details.
Input condition/ Display contents	• 64 KB • 128 KB • 256 KB • 512 KB • 1024 KB

Available Stripe Depth value (for RAID group)

The following table shows the available Stripe Depth value for each RAID level.

RAID level	Drive configuration (*1)	Available Stripe Depth value
Mirroring (RAID1)	1D+1M	–
High Performance (RAID1+0)	Any	64KB, 128KB, 256KB, 512KB, 1024KB
Striping (RAID0)		
High Capacity (RAID5)	2D+1P – 4D+1P	64 KB, 128 KB, 256 KB, 512 KB
	5D+1P – 8D+1P	64 KB, 128 KB, 256 KB
	9D+1P – 15D+1P	64 KB, 128 KB
Reliability (RAID5+0)	Any	64 KB
High Reliability (RAID6)		
High Reliability (RAID6-FR)		

*1: D: Data drives, M: Mirror drives, P: Parity drives

Restrictions for Stripe Depth modification (for RAID group)

The following restrictions are applied for the RAID groups and volumes in the RAID group of which Stripe Depth value is changed.
- Stripe depth for the existing RAID group cannot be changed.
- When selecting drives automatically to create a RAID group, the Stripe Depth cannot be changed.
- Capacity expansion (Logical Device Expansion) for the RAID group of which Stripe Depth was changed is not available.
- Encryption of the RAID group of which Stripe Depth was changed is not available.

Rename RAID Group

For details about this function, refer to .
For the factory default settings for this function, refer to .

● **Rename Setting**

- Name

Description	Specify a new RAID group name. When changing the name of a single RAID group, an existing RAID group name cannot be used.
Input condition/ Display contents	• Up to 16 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

- Start of Suffix

Description	Input the starting number of the suffix that is to be added to the new RAID group name. When changing multiple RAID group names, the suffix number is added to the RAID group names with consecutive numbers in ascending order starting with the entered suffix number. Refer to "Naming Conventions of Volumes" (page 1338) for details. When changing only one RAID Group name, the "Start of Suffix" field is not displayed.
Input condition/ Display contents	• Numeric characters (0 - 99999) • Decimal number • 1 - 5 digits

Change Controlling CM

For details about this function, refer to <u>"Change Controlling CM" (page 516)</u>.
For the factory default settings for this function, refer to <u>"B. Change Controlling CM" (page 1283)</u>.

● Change Controlling CM Setting

• New Controlling CM

Description	Select the new Controlling CM. "Automatic" and the normal CM number ("CE#x CM#y" or "CM#y") that is installed are displayed as options (x: CE number, y: CM number). Select "Automatic" for normal operations. When "Automatic" is selected, the Controlling CM that is to be allocated is determined by the RAID group number. Refer to <u>"Automatic Controlling CM setting" (page 1193)</u> for details.
Input condition/ Display contents	• For the ETERNUS DX8700 S3/DX8900 S3 　- Automatic 　- CE#x CM#y • For the other models 　- Automatic 　- CM#y

Expand RAID Group

For details about this function, refer to <u>"Expand RAID Group" (page 518)</u>.
For the factory default settings for this function, refer to <u>"B. Expand RAID Group" (page 1283)</u>.

● Manual Setting

• RAID Level after expand

Description	Select the RAID level after expansion is performed.
Input condition/ Display contents	• High Performance (RAID1+0) • High Capacity (RAID5) • High Reliability (RAID6) • Striping (RAID0)

● Drive Selection ([Tabular] Tab)

• Checkbox to select drives

Description	Select the checkbox for the drive that is to be used after expansion. The checkbox for the drive being used in the selected RAID group is selected. Clear the checkbox for the drive that is not used after expansion. When selecting drives, refer to <u>"Delete RAID Group" (page 514)</u>.
Input condition/ Display contents	Checkbox • Selected • Cleared

● **Drive Selection ([Graphic] Tab)**

- DE selection list box

Description	Select the DE group. Options are displayed in the list box when at least one CE or DE in the DE group is installed in the ETERNUS DX/AF. Refer to "Options and DE groups for each model" (page 1191) for details.
Input condition/ Display contents	DE#Xx (X: 0 - B)

- Checkbox to select drives

Description	Select the checkbox for the drive that is to be used after expansion. Clear the checkbox for the drive that is not used after expansion. The checkbox for the drive being used in the selected RAID group is selected. Refer to "Drive location" (page 1192) for details about drive location for each DE. Placing the mouse pointer on the ⓘ icon displays the detailed information of the drive. When selecting drives, refer to "Delete RAID Group" (page 514).
Input condition/ Display contents	Checkbox • Selected • Cleared

Modify RAID Group Parameters

For details about this function, refer to "Modify RAID Group Parameters" (page 523).
For the factory default settings for this function, refer to "B. Modify RAID Group Parameters" (page 1284).

● **Parameters Setting**

- Rebuild Priority

Description	Specify the rebuild priority. It is not necessary to change the default setting for normal use. When not changing the setting, select "Do not change". When host access is not performed, rebuild, copyback, and redundant copy to RAID groups that are not registered as REC Disk Buffers are performed with "High" priority regardless of the "Rebuild Priority" setting. The rebuild priority of a RAID group cannot be changed if it is registered as an EXCP. Rebuild, copyback, and redundant copy performance may be improved by specifying a larger "Rebuild Priority" value. Note that specifying larger "Rebuild Priority" may cause the degradation of RAID group performance (throughput) when rebuild, copyback, or redundant copy is being performed in the target RAID group.

Input condition/
Display contents
	• Do not change
	• Low
	  Perform rebuild, copyback, and redundant copy with a normal priority.
	• Middle
	  Give the same priority as the host access to rebuild, copyback, and redundant copy.
	• High
	  Give priority to rebuild, copyback, and redundant copy over host access.

● **Advanced Settings**

• DCMF

Description	Select "Change" and specify the DCMF. It is not necessary to change the default value for normal use. The maximum number of commands issued to a drive is changed to a multiple represented by the specified value. (If "DCMF" is "2", the number of commands is doubled. If "DCMF" is "3", the number of commands is tripled.) When not changing the setting, select "Do not change". The higher the DCMF value is, the more drive throughput is available, improving sequential performance. Note that high DCMF value may result in a high load on the drive, decreasing performance.
Input condition/ Display contents	• Do not change • Change 1 - 10

• Drive Access Priority

Description	Select the drive access priority. It is not necessary to change the default setting for normal use. When not changing the setting, select "Do not change". This item is not displayed when a RAID group that is configured with SSDs or SSD SEDs is selected. For SSDs and SSD SEDs, this item is fixed to "Response". The throughput for all of the drives is improved when "Throughput" is selected because data is collectively written to the same drive. However, the performance of each command response may be reduced because queuing processes for host I/O are not performed by using the FIFO (first in, first out) method.

Input condition/ Display contents	• Do not change
	• Response
	  Commands are issued in order during drive access to speed up a response to the host.
	• Throughput
	  The command issuance order is changed and data is collectively written to the same drive during drive access to improve the throughput for all of the drives.

• Drive Tuning Parameter Setting

Description	Specify whether to "Enable" or "Disable" the following drive tuning parameters. • Throttle • Ordered Cut It is not necessary to change the default setting for normal use. When not changing the "Throttle" and "Ordered Cut" setting values, select "Do not change". Note that "Do not change" is always selected when this function is started.
Input condition/ Display contents	• Do not change • Enable • Disable

▷ **Caution**

When selecting multiple RAID groups as the target of this function and "Enable" is specified for the "Drive Tuning Parameter Setting", the "Throttle" and "Ordered Cut" values set in this screen are applied to the target RAID groups.

• Throttle

Description	Select "Enable" for "Drive Tuning Parameter Setting" and specify "Throttle". "Throttle" is the proportion of the number of commands that are to be issued to a drive at the same time to the maximum number of command issuance. It is not necessary to change the default value for normal use. If a single RAID group is selected to start this function, the value that is currently set in the ETERNUS DX/AF is displayed. If multiple RAID groups are selected to start this function and the same value is specified for all the RAID groups in the ETERNUS DX/AF, that value is displayed. If a RAID group with a different "Throttle" exists in the ETERNUS DX/AF, "100 %" is displayed. Specifying a smaller number can limit the number of commands to be issued to a drive at the same time, resulting in reduction of the load onto the specific RAID group (drive). This setting can be used when the response performance of the specific RAID group (drive) is decreased due to a conflict between host I/Os or batch processes. Specifying a smaller throttle value decreases the number of commands processed by the drive at the same time, which might cause a longer queue time.
Input condition/ Display contents	100 % - 10 %

⊳ **Caution**

If "Enable" is selected for "Drive Tuning Parameter Setting", not only is the "Throttle" value changed but the "Ordered Cut" value is changed as well. To keep the "Ordered Cut" value unchanged, specify the current parameter displayed in the "Current Settings" field.

• Ordered Cut

Description	Select "Enable" for "Drive Tuning Parameter Setting" and specify "Ordered Cut". "Ordered Cut" is the number of commands to optimize drive access processing (priority control). When "Ordered Cut" is "x", the order is changed for every x commands based on the priority settings of the commands. It is not necessary to change the default value for normal use. If a single RAID group is selected to start this function, the value that is currently set in the ETERNUS DX/AF is displayed. If multiple RAID groups are selected to start this function and the same value is specified for all the RAID groups in the ETERNUS DX/AF, that value is displayed. If a RAID group with a different "Ordered Cut" exists in the ETERNUS DX/AF, "0" is displayed. When "Ordered Cut" is "0", the number of commands for controlling the priority cannot be specified. All of the commands issued to the drive are processed according to their priority settings. The "Ordered Cut" value cannot be used for SSDs and SSD SEDs. Specifying a smaller value for "Ordered Cut" reduces the number of commands for priority control. Commands with lower priority are processed without delay. Specifying a smaller value for "Ordered Cut", priority control of commands is performed in increments for the specified number, which might cause a delay in processing commands with a higher priority.
Input condition/ Display contents	0 - 65535

⊳ **Caution**

If "Enable" is selected for "Drive Tuning Parameter Setting", not only is the "Ordered Cut" value changed but the "Throttle" value is changed as well. To keep the "Throttle" value unchanged, specify the current parameter displayed in the "Current Settings" field.

Assign Eco-mode Schedule (RAID Group)

For details about this function, refer to "Assign Eco-mode Schedule (RAID Group)" (page 525).
For the factory default settings for this function, refer to "B. Assign Eco-mode Schedule (RAID Group)" (page 1284).

● Eco-mode Schedule Setting

- Eco-mode Schedule

Description	Select the Eco-mode schedule.
Input condition/ Display contents	• Do not change Do not change the current assignment. • Disable Disable the Eco-mode. • Eco-mode schedule name Assign the selected Eco-mode schedule.

- Eco-mode Action

Description	Select the Eco-mode action.
Input condition/ Display contents	• Do not change Does not change the Eco-mode action (only the Eco-mode schedule can be changed). • Drive power off Enables the Eco-mode action and turns off the drives power during time periods outside the specified schedule. • Drive motor off Enables the Eco-mode action and stops the drives motors during time periods outside the specified schedule. • Drive always on Disables the Eco-mode action and the drive operates continuously regardless of the specified schedule.

Set Key Group (RAID Group)

For details about this function, refer to "Set Key Group (RAID Group)" (page 528).
For the factory default settings for this function, refer to "B. Set Key Group (RAID Group)" (page 1284).

● Key Group Setting

- Key Group

Description	Select whether to add (Enable) or delete (Disable) the RAID groups in the key group. If multiple RAID groups are selected, all the selected RAID groups are added or deleted in a single process.
Input condition/ Display contents	• Enable • Disable

External RAID Group Management

Create External RAID Group

For details about this function, refer to "Create External RAID Group" (page 531).

● New External RAID Group

- Name

Description	Input an External RAID Group name that is to be created. If one External Drive is selected and an External RAID Group is created, existing External RAID Group names cannot be used. If multiple External Drives are selected and multiple External RAID Groups are created, the suffix number starting with "0" is added to the input name. Refer to "Naming Conventions of External RAID Groups" (page 1339) for details.
Input condition/ Display contents	• Up to 16 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

● External Drive List

- Checkbox to select External Drives

Description	Select the checkbox for the External Drive that is to be used to create the External RAID Group. Select the checkbox to the left of "No." to select all External Drives.
Input condition/ Display contents	Checkbox • Selected • Cleared

Thin Provisioning Management

This section provides information on the parameters of the following actions for Thin Provisioning management.

- Set Thin Provisioning
- Create Thin Provisioning Pool
- Rename Thin Provisioning Pool
- Expand Thin Provisioning Pool
- Set Deduplication/Compression
- Modify Threshold Thin Provisioning Pool
- Modify Cache Parameters (Thin Provisioning Pool)
- Assign Eco-mode Schedule (Thin Provisioning Pool)

Set Thin Provisioning

For details about this function, refer to "Set Thin Provisioning" (page 536).
For the factory default settings for this function, refer to "B. Set Thin Provisioning" (page 1285).

● Thin Provisioning Settings

- Thin Provisioning

Description	Select whether to "Enable" or "Disable" the Thin Provisioning function.
Input condition/ Display contents	• Enable • Disable

- Maximum Pool Capacity

Description	Select the maximum pool capacity that is specified for the ETERNUS DX/AF. ETERNUS DX/AF storage systems can expand the maximum pool capacity gradually according to the used pool capacity. Because the maximum pool capacity is not fixed, memory can be more effectively used. Note that if the chunk size is changed depending on the expanded "Maximum Pool Capacity", a calculation different from the existing method is used to obtain the pool capacity that can be created. This item is only available when "Thin Provisioning" is enabled. Note that a capacity that is smaller than the current capacity cannot be selected.

Input condition/
Display contents
	• For the ETERNUS DX60 S4/DX60 S3
	   32 TB
	   64 TB
	   128 TB
	   256 TB
	   512 TB
	   1024 TB
	
	• For the ETERNUS DX100 S4/DX100 S3 and the ETERNUS DX200 S4/DX200 S3
	   32 TB
	   64 TB
	   128 TB
	   256 TB
	   512 TB
	   1024 TB
	   2 PB

Input condition/ Display contents (Cont'd)	• For the ETERNUS DX500 S4/DX500 S3
	  64 TB
	  128 TB
	  256 TB
	  384 TB
	  768 TB
	  1.5 PB
	  3 PB
	
	• For the ETERNUS DX600 S4/DX600 S3
	  128 TB
	  256 TB
	  512 TB
	  768 TB
	  1024 TB
	  2 PB
	  4 PB
	  8 PB
	
	• For the ETERNUS DX8100 S3
	  64 TB
	  128 TB
	  256 TB
	  512 TB
	  1024 TB
	
	• For the ETERNUS DX8700 S3 and the ETERNUS DX8900 S3
	  256 TB
	  512 TB
	  768 TB
	  1024 TB
	  1.5 PB
	  2 PB
	  4 PB
	  8 PB
	  16 PB
	
	• For the ETERNUS AF250 S2/AF250
	  32 TB
	  64 TB
	  128 TB
	  256 TB
	  512 TB
	  1024 TB
	  2 PB
	
	• For the ETERNUS AF650 S2/AF650
	  128 TB
	  256 TB
	  512 TB
	  768 TB
	  1024 TB
	  2 PB
	  4 PB
	  8 PB
	
	• For the ETERNUS DX200F
	  32 TB
	  64 TB
	  128 TB
	  256 TB
	  512 TB
	  1024 TB
	  2 PB

> ▶ **Caution**

- The maximum pool capacity that is set by this function is used as a virtual logical capacity in the ETERNUS DX/AF. When the Thin Provisioning function is enabled, the ETERNUS DX/AF allocates capacity to the physical drives proportionate to the amount of data that is written to the virtual volume. Therefore, the actual available capacity is limited depending on the maximum physical capacity of the drives that can be installed in the storage system or the maximum pool capacity, whichever is smaller. For example, when using an ETERNUS AF250 S2 that is configured only with 400GB SSDs, the actual capacity that can be used is approximately 18TB even if the maximum pool capacity is "32.00TB".
- If the chunk size is changed due to the expansion of the maximum pool capacity and the maximum pool capacity has already been used up before the expansion, new pools cannot be created. For example, if the current maximum pool capacity in the ETERNUS DX8700 S3/DX8900 S3 is "2PB" or "4 PB", the capacity that can be used to create new pools is calculated with the following formula.

Current maximum pool capacity (Chunk size a (*1)) [A]	Used pool capacity (Chunk size b (*2)) [B]	Capacity that can be used to create new pools [C]	Description
2 PB (21 MB)	1 PB (21 MB)	1 PB	The capacity that can be used to create new pools [C] is calculated with the following formula. [C] = [A] - [B] × (Chunk size a / Chunk size b)
2 PB (21 MB)	2 PB (21 MB)	0 PB (New pools cannot be created)	
4 PB (42 MB)	1 PB (21 MB)	2 PB	
4 PB (42 MB)	2 PB (21 MB)	0 PB (New pools cannot be created)	
4 PB (42 MB)	1 PB (42 MB)	3 PB	
4 PB (42 MB)	2 PB (42 MB)	2 PB	

*1: This indicates the chunk size that is determined according to the "Maximum Pool Capacity" that is to be set with this item. Refer to "The maximum number of pools, maximum pool capacity, and determined chunk size for each model" (page 539) for details.

*2: This indicates the chunk size that is determined by the "Maximum Pool Capacity" that had been specified in the ETERNUS DX/AF when TPPs were created. The value can be checked on the [Thin Provisioning Pool] screen. Refer to "Thin Provisioning Pool (Basic Information)" (page 896) for details.

> ⬤ **N o t e**

To reduce the maximum pool capacity, disable "Thin Provisioning". After performing this action, restart this function to enable "Thin Provisioning", and then set a new "Maximum Pool Capacity".

Create Thin Provisioning Pool

For details about this function, refer to "Create Thin Provisioning Pool" (page 539).
For the factory default settings for this function, refer to "B. Create Thin Provisioning Pool" (page 1285).

⬤ New Thin Provisioning Pool

- Name

Description	Input a TPP name. An existing TPP name cannot be specified.
Input condition/ Display contents	• Up to 16 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

- Create Mode

Description	Select a create mode of a TPP.
Input condition/ Display contents	• Automatic • Manual

● **Automatic Setting**

- Drive Type

Description	Select the type of drive that configures the TPP.
Input condition/ Display contents	• Online • Nearline • SSD • Online SED • Nearline SED • SSD SED

- RAID Level

Description	Select the level of RAID group that configures the TPP from the list box.
Input condition/ Display contents	• High Performance (RAID1+0) RAID1+0 (2D+2M, 4D+4M, 8D+8M, 12D+12M) configuration is available. • High Capacity (RAID5) RAID5 (3D+1P, 4D+1P, 6D+1P, 7D+1P, 8D+1P, 12D+1P) configuration is available. • High Reliability (RAID6) RAID6 (4D+2P, 6D+2P, 7D+2P, 8D+2P) configuration is available. • High Reliability (RAID6-FR) RAID6-FR ((4D+2P)x2+1HS, (6D+2P)x2+1HS, (8D+2P)x3+1HS, (4D+2P)x5+1HS) configuration is available (*1). • Mirroring (RAID1) RAID1 (1D+1M) configuration • Striping (RAID0) RAID0 (4D) configuration *1: "High Reliability (RAID6-FR)" groups that configure TPPs are called "Fast Recovery RAID groups".

🔵 **N o t e**

- RAID0 has no data redundancy. Select "High Performance (RAID1+0)", "High Capacity (RAID5)", "High Reliability (RAID6)", "High Reliability (RAID6-FR)", or "Mirroring (RAID1)" for the RAID level.
- The number of RAID groups that configure a TPP is automatically determined by the selected drive type, the RAID level, the selected drives (only for RAID6-FR), the specified total capacity of the Thin Provisioning Pool, and the drives that are installed in the ETERNUS DX/AF.

- Select Drives

Description	Select the requirements that are given priority when creating Fast Recovery RAID groups in the TPP with automatic drive configuration. This item is available only when the RAID level is "High Reliability (RAID6-FR)".

| Input condition/
Display contents | • Minimize number of using drives
Minimize the number of drives in the RAID group to achieve high-speed rebuilding.
Refer to "Drive configuration for Fast Recovery RAID groups (TPP)" (page 1208) for details.
• Prioritize rebuild rate
Use more drives in a RAID group and distribute data to achieve high-speed rebuilding.
Refer to "Drive configuration for Fast Recovery RAID groups (TPP)" (page 1208) for details. |

• Thin Provisioning Pool Total Capacity

Description	Specify the volume capacity and select the unit (PB/TB/GB/MB) of capacity. A TPP is automatically created with a capacity of the input value or higher. For the maximum capacity, refer to "The maximum number of pools, maximum pool capacity, and determined chunk size for each model" (page 539). The maximum capacity that can be used to create new TPPs is displayed to the right of the setting field for this item in the "Max: xx.xx [PB/TB/GB/MB]" format.
Input condition/ Display contents	• Numeric characters • PB/TB/GB/MB

• Encryption by CM

Description	Select the encryption status of TPPs. When the encryption mode is disabled, "On" cannot be selected. When the drive type is "Online SED", "Nearline SED", or "SSD SED", "On" cannot be selected. For the ETERNUS DX60 S4/DX60 S3, this item is not displayed.
Input condition/ Display contents	• On TPPs that are encrypted by a CM are created. • Off TPPs that are not encrypted by a CM are created.

• Alarm

Description	Specify the threshold (%) for monitoring the TPP used capacity. There are two types of threshold: "Warning" and "Attention". Specify the threshold so that "Warning" is larger than "Attention". The "Attention" threshold can be omitted. When omitting the "Attention" threshold, clear the checkbox.
Input condition/ Display contents	• Warning threshold 5 - 99 • Attention threshold 5 - 80 • When omitting the "Attention" threshold Clear the checkbox

• Deduplication

| Description | Select whether to "Enable" or "Disable" Deduplication for the TPP.

This item is only displayed when the Deduplication/Compression for the ETERNUS DX/AF is enabled.
For details about the TPPs that are created depending on the selected items, refer to "TPPs created depending on the selection of "Deduplication" and "Compression"" (page 1207). |

Input condition/ Display contents	• Enable Deduplication target TPPs are created. • Disable Non-Deduplication target TPPs are created.

• Compression

Description	Select whether to "Enable" or "Disable" Compression for the TPP. This item is only displayed when the Deduplication/Compression for the ETERNUS DX/AF is enabled. For details about the TPPs that are created depending on the selected items, refer to "TPPs created depending on the selection of "Deduplication" and "Compression"" (page 1207).
Input condition/ Display contents	• Enable Compression target TPPs are created. • Disable Non-Compression target TPPs are created.

TPPs created depending on the selection of "Deduplication" and "Compression"

Deduplication	Compression	TPPs that are to be created
Enable	Enable	TPPs where both Deduplication and Compression are enabled
Enable	Disable	TPPs where only Deduplication is enabled
Disable	Enable	TPPs where only Compression is enabled
Disable	Disable	TPPs where both Deduplication and Compression are disabled

▷ **Caution**

• If Deduplication or Compression for a TPP is enabled, two RAID groups are created in the TPP. An error occurs if the RAID groups cannot be created.
• To change the Deduplication/Compression setting for the existing TPP, after disabling both the Deduplication and Compression settings for the TPP, reconfigure the parameters. Refer to "Set Deduplication/Compression" (page 557) for details.

⬤ **N o t e**

• When Deduplication or Compression for the TPP is enabled, the DEDUP_SYS Volume and DEDUP_MAP Volume are automatically created in the relevant TPP. Refer to "Set Deduplication/Compression" (page 557) for details.
• The display content for "Chunk Size" varies depending on the "Deduplication" setting or the "Compression" setting. If the chunk size information cannot be obtained, a "-" (hyphen) is displayed.

Deduplication	Compression	Displayed content for "Chunk Size"
Enable	Enable	21 MB
Enable	Disable	
Disable	Enable	
Disable	Disable	Chunk size that is determined according to the maximum pool capacity (*1)
N/A	N/A	

*1:   The maximum pool capacity that is specified by using the procedure in "Set Thin Provisioning" (page 536). The current value can be checked in the [Settings] screen. Refer to "Settings (Thin Provisioning)" (page 922) for details.

Drive configuration for Fast Recovery RAID groups (TPP)

The drive layout in the ETERNUS DX/AF is the same as "RAID6". When using automatic configuration, the drive configuration that satisfies the specified capacity is determined according to the following order.

No. of drives in the configuration (per RAID group)	Redundant sets + HS (*1)	Capacity efficiency (*2) (%)	Rebuild-ing speed (*3) (Rate)	Number of data drives	Selection order when configuring automatically	
					"Minimize number of using drives" is selected	"Prioritize rebuild rate" is selected
13	(4D+2P)x2+1HS	61.5	2.17	8	1	3
17	(6D+2P)x2+1HS	70.6	2.13	12	2	4
31	(8D+2P)x3+1HS	77.4	3.10	24	3	2
31	(4D+2P)x5+1HS	64.5	5.17	20	Not selected	1

*1: Fast Recovery RAID groups are described as "Redundant sets + HS".
RAID6((No. of data drives (D) + No. of parity drives (P)) x No. of redundant sets + No. of Hot spares (HS))
↑
Redundant sets
(Example) "RAID6 ((4D+2P)x2+1HS)" is described as "(4D+2P)x2+1HS".

*2: The ratio of the user capacity to physical drive capacity.

*3: Rate when the rebuilding speed for the basic "RAID6 (D+P)" configuration is "1". The rate varies depending on the workload of the ETERNUS DX/AF and system environment.

● **Manual Setting**

- Drive Type

Description	Select the type of drive that configures the TPP. Only the drives that are installed in the ETERNUS DX/AF are displayed. Refer to "Requirements for selecting drives" (page 543) for details.
Input condition/ Display contents	• Online • Nearline • SSD • Online SED • Nearline SED • SSD SED

- RAID Level

Description	Select the level of RAID group that configures the TPP from the list box. The installed drives determine the selectable RAID levels that are displayed as options.
Input condition/ Display contents	• High Performance (RAID1+0) RAID1+0 (2D+2M, 4D+4M, 8D+8M, 12D+12M) configuration is available. • High Capacity (RAID5) RAID5 (3D+1P, 4D+1P, 6D+1P, 7D+1P, 8D+1P, 12D+1P) configuration is available. • High Reliability (RAID6) RAID6 (4D+2P, 6D+2P, 7D+2P, 8D+2P) configuration is available. • High Reliability (RAID6-FR) RAID6-FR ((4D+2P)x2+1HS, (6D+2P)x2+1HS, (8D+2P)x3+1HS, (4D+2P)x5+1HS) configuration is available (*1). • Mirroring (RAID1) RAID1 (1D+1M) configuration • Striping (RAID0) RAID0 (4D) configuration *1: "High Reliability (RAID6-FR)" groups that configure TPPs are called "Fast Recovery RAID groups".

> ⬤ **N o t e**

- For details on the number of member drives in each RAID level, refer to "The number of member drives in each RAID group" (page 539).
- RAID0 has no data redundancy. Select "High Performance (RAID1+0)", "High Capacity (RAID5)", "High Reliability (RAID6)", "High Reliability (RAID6-FR)", or "Mirroring (RAID1)" for the RAID level.

- Fast Recovery Configuration

Description	Select the drive configuration for Fast Recovery RAID groups in the TPP. Select the drive configuration from "No. of drives in the configuration", "capacity efficiency", and "rebuilding speed" according to your environment. Refer to "Drive configuration for Fast Recovery RAID groups (TPP)" (page 1208) for details. The more redundant sets there are, the faster the rebuilding becomes. This item is blank when the RAID level is not "RAID6-FR".
Input condition/ Display contents	• For the ETERNUS DX200F - (4D+2P)x2+1HS - (6D+2P)x2+1HS - Blank • For the other models - (4D+2P)x2+1HS - (6D+2P)x2+1HS - (8D+2P)x3+1HS - (4D+2P)x5+1HS - Blank D: Data drives, P: Parity drives, HS: Hot Spares

- Encryption by CM

> ⬤ **N o t e**

Refer to "Encryption by CM" (page 1206) in "Automatic Setting" for details.

- Alarm

> **N o t e**
>
> Refer to "Alarm" (page 1206) in "Automatic Setting" for details.

- Chunk Size

Description	Select the "Deduplication/Compression Ready" checkbox to use the TPP for Deduplication/Compression. To enable Deduplication/Compression for a TPP, the chunk size of the relevant TPP must be "21 MB". This item is displayed only when all of the following conditions are satisfied: • The Deduplication/Compression function of the ETERNUS DX/AF is enabled • The chunk size that was determined according to the maximum pool capacity is not "21 MB" A TPP with a chunk size of "21 MB" is created if this checkbox is selected.
Input condition/ Display contents	"Deduplication/Compression Ready" checkbox • Selected • Cleared

> **N o t e**
>
> The display content for this item varies depending on the following conditions.
> - When the "Deduplication/Compression Ready" checkbox is selected
>   21 MB
> - When the "Deduplication/Compression Ready" checkbox is cleared
>   Chunk size that is determined according to the maximum pool capacity (*1)
> - When the chunk size information cannot be obtained
>   "-" (hyphen)
> *1: The maximum pool capacity that is specified by using the procedure in "Set Thin Provisioning" (page 536). The current value can be checked in the [Settings] screen. Refer to "Settings (Thin Provisioning)" (page 922) for details.

● **Advanced Setting**

Stripe Depth should be set only when advanced tuning needs to be performed for each RAID group configuring the TPP. It is not necessary to change the default value for normal use.
Specifying a larger value for the Stripe Depth can reduce the number of drives to access. For "High Performance (RAID1+0)", reducing the number of commands issued to drives improves the performance of access to the specified RAID group. For "High Capacity (RAID5)", however, specifying a larger value for the Stripe Depth might decrease the sequential write performance. In addition, several restrictions apply to a RAID group whose Stripe Depth has been changed. Refer to "Restrictions for Stripe Depth modification (for TPP)" (page 1211) for details.

- Stripe Depth

Description	Select the Stripe Depth of the RAID group that is to be created. Available Stripe Depth value varies depending on the RAID level. Refer to "Available Stripe Depth value (for TPP)" (page 1211) for details.
Input condition/ Display contents	• 64 KB • 128 KB • 256 KB • 512 KB • 1024 KB

Available Stripe Depth value (for TPP)

The following table shows the available Stripe Depth value for each RAID level.

RAID level	Drive configuration (*1)	Available Stripe Depth value
Mirroring (RAID1)	1D+1M	–
High Performance (RAID1+0)	Any	64KB, 128KB, 256KB, 512KB, 1024KB
Striping (RAID0)		
High Capacity (RAID5)	3D+1P	64 KB, 128 KB, 256 KB, 512 KB
	4D+1P, 6D+1P, 7D+1P	64 KB, 128 KB, 256 KB
	8D+1P, 12D+1P	64 KB, 128 KB
High Reliability (RAID6)	Any	64 KB
High Reliability (RAID6-FR)	Any	64 KB

Restrictions for Stripe Depth modification (for TPP)

The following restrictions are applied for RAID groups for which the Stripe Depth value is changed.
- Stripe depth for RAID groups that configure the existing TPPs cannot be changed.
- When selecting drives automatically to create a TPP, the Stripe Depth cannot be changed.

● RAID Group

- Controlling CM

Description	Select the Controlling CM of the RAID group that is to be created. "Automatic" and the normal CM number ("CE#x CM#y" or "CM#y") that is installed are displayed as options (x: CE number, y: CM number). Select "Automatic" for normal operations. When "Automatic" is selected, the Controlling CM that is to be allocated is determined by the RAID group number. Refer to "Automatic Controlling CM setting" (page 1193) for details.

Input condition/
Display contents
	• For the ETERNUS DX8700 S3/DX8900 S3
	  - Automatic
	  - CE#x CM#y
	• For the other models
	  - Automatic
	  - CM#y

● Drive Selection ([Tabular] Tab)

- Checkbox to select drives

Description	Select the checkbox for the drive to be selected. When selecting drives, refer to "Requirements for selecting drives" (page 543).
Input condition/ Display contents	Checkbox • Selected • Cleared

● **Drive Selection ([Graphic] Tab)**

• DE selection list box

Description	Select the DE group. Options are displayed in the list box when at least one CE or DE in the DE group is installed in the ETERNUS DX/AF. Refer to "Options and DE groups for each model" (page 1191) for details.
Input condition/ Display contents	DE#Xx (X: 0 - B)

• Checkbox to select drives

Description	Select the checkbox for the drive to be selected. Checkboxes are displayed for unused drives. Refer to "Drive location" (page 1192) for details about drive location for each DE. Placing the mouse pointer on the ℹ icon displays the detailed information of the drive. When selecting drives, refer to "Requirements for selecting drives" (page 543).
Input condition/ Display contents	Checkbox • Selected • Cleared

Rename Thin Provisioning Pool

For details about this function, refer to "Rename Thin Provisioning Pool" (page 548).
For the factory default settings for this function, refer to "B. Rename Thin Provisioning Pool" (page 1286).

● **Rename Setting**

• Name

Description	Input a new TPP name. When changing the name of a single TPP, an existing TPP name cannot be used.
Input condition/ Display contents	• Up to 16 alphanumeric characters and symbols (except "," (comma) and "?") • Spaces

• Start of Suffix

Description	Input the starting number of the suffix that is to be added to the new TPP name. When changing multiple TPP names, the suffix number is added to the TPP names with consecutive numbers in ascending order starting with the entered suffix number. Refer to "Naming Conventions of Volumes" (page 1338) for details. When changing only one TPP name, the "Start of Suffix" field is not displayed.
Input condition/ Display contents	• Numeric characters (0 - 99999) • Decimal number • 1 - 5 digits

Expand Thin Provisioning Pool

For details about this function, refer to "Expand Thin Provisioning Pool" (page 549).
For the factory default settings for this function, refer to "B. Expand Thin Provisioning Pool" (page 1286).

● Setting Thin Provisioning Pool

- Expand Mode

Description	Select a expand mode of a TPP.

Input condition/
Display contents
	• Automatic
	  Select a drive to expand a TPP automatically.
	• Manual
	  Select a drive to expand a TPP manually.

● Automatic Setting

- Total Capacity after expand

Description	Input the total capacity of the TPP after expansion and select the unit (PB/TB/GB/MB) of capacity. Drives are automatically selected according to the existing RAID group specifications, and the TPP capacity is expanded to the entered value or higher. For the maximum capacity of TPP, refer to "The maximum number of pools, maximum pool capacity, and determined chunk size for each model" (page 539). The maximum capacity that can be used to expand the TPP is displayed to the right of the setting field for this item in the "Max: xx.xx [PB/TB/GB/MB]" format. "Total Capacity after expand" includes the current TPP capacity. The value in this item must be larger than the existing capacity. The current TPP capacity is displayed in "Total Capacity ".
Input condition/ Display contents	• Numeric characters • PB/TB/GB/MB

● RAID Group List

- Controlling CM

Description	Select the Controlling CM of the RAID group that is to be created. "Automatic" and the normal CM number ("CE#x CM#y" or "CM#y") that is installed are displayed as options (x: CE number, y: CM number). Select "Automatic" for normal operations. When "Automatic" is selected, the Controlling CM that is to be allocated is determined by the RAID group number. Refer to "Automatic Controlling CM setting" (page 1193) for details.

Input condition/
Display contents
	• For the ETERNUS DX8700 S3/DX8900 S3
	  - Automatic
	  - CE#x CM#y
	• For the other models
	  - Automatic
	  - CM#y

● **Drive Selection ([Tabular] Tab)**

- Checkbox to select drives

Description	Select the checkbox for the drive to be selected. When selecting drives, refer to "Requirements for selecting drives" (page 543).
Input condition/ Display contents	Checkbox • Selected • Cleared

● **Drive Selection ([Graphic] Tab)**

- DE selection list box

Description	Select the DE group. Options are displayed in the list box when at least one CE or DE in the DE group is installed in the ETERNUS DX/AF. Refer to "Options and DE groups for each model" (page 1191) for details.
Input condition/ Display contents	DE#Xx (X: 0 - B)

- Checkbox to select drives

Description	Select the checkbox for the drive to be selected. Checkboxes are displayed for unused drives. Refer to "Drive location" (page 1192) for details about drive location for each DE. Placing the mouse pointer on the [i] icon displays the detailed information of the drive. When selecting drives, refer to "Requirements for selecting drives" (page 543).
Input condition/ Display contents	Checkbox • Selected • Cleared

Set Deduplication/Compression

For details about this function, refer to "Set Deduplication/Compression" (page 557).
For the factory default settings for this function, refer to "B. Set Deduplication/Compression" (page 1287).

● **Deduplication/Compression Settings**

- Deduplication

Description	Select whether to enable or disable Deduplication for the selected TPP. If multiple TPPs are selected, the same setting is applied as a single process. For the available Deduplication setting, refer to "Available Deduplication/Compression settings" (page 1215).
Input condition/ Display contents	• Enable • Disable

- Compression

Description	Select whether to enable or disable Compression for the selected TPP. If multiple TPPs are selected, the same setting is applied as a single process. For the available Compression setting, refer to "Available Deduplication/Compression settings" (page 1215).
Input condition/ Display contents	- Enable - Disable

Available Deduplication/Compression settings

Current Deduplication	Current Compression	Deduplication		Compression	
		Enable	Disable	Enable	Disable
Enable Error "-" (hyphen)	Enable Error "-" (hyphen)	N/A	Available	N/A	Available
Enable Error "-" (hyphen)	Disable	N/A	Available	N/A	Available
Disable	Enable Error "-" (hyphen)	N/A	Available	N/A	Available
Disable	Disable	Available	Available	Available	Available

Available: Available settings
N/A: Not available

Modify Threshold Thin Provisioning Pool

For details about this function, refer to "Modify Threshold Thin Provisioning Pool" (page 561).
For the factory default settings for this function, refer to "B. Modify Threshold Thin Provisioning Pool" (page 1287).

● Threshold Setting

- Warning

Description	Change the warning threshold (%) for monitoring the TPP used capacity. Specify the warning threshold so that the "Warning" threshold is the same or larger than the "Attention" threshold.
Input condition/ Display contents	5 - 99

- Attention

Description	Specify the attention threshold (%) for monitoring the TPP used capacity. Specify the Attention threshold so that the "Warning" threshold is the same or larger than the "Attention" threshold. The "Attention" threshold can be omitted. When setting the "Attention" threshold, select the checkbox.
Input condition/ Display contents	Checkbox - Selected 5 - 80 - Cleared

Modify Cache Parameters (Thin Provisioning Pool)

For details about this function, refer to "Modify Cache Parameters (Thin Provisioning Pool)" (page 563).
For the factory default settings for this function, refer to "B. Modify Cache Parameters (Thin Provisioning Pool)" (page 1287).

● Parameters Setting

- Multi Writeback Count (MWC)

Description	Specify the value of the Multi Writeback Count. When specifying larger MWC, sequential write access performance is improved. Note that this is not effective when a number of random write accesses occur. Depending on the ratio of read access and write access, read access performance may be reduced.
Input condition/ Display contents	1 - 16

> **N o t e**
>
> The setting values available for Multi Writeback Count vary depending on the RAID level and drive configuration. Refer to "Input Conditions for MWC" (page 1352) for details.

Assign Eco-mode Schedule (Thin Provisioning Pool)

For details about this function, refer to "Assign Eco-mode Schedule (Thin Provisioning Pool)" (page 565).
For the factory default settings for this function, refer to "B. Assign Eco-mode Schedule (Thin Provisioning Pool)" (page 1287).

● Eco-mode Schedule Setting

- Eco-mode Schedule

> **N o t e**
>
> Refer to "Eco-mode Schedule" (page 1200) in "Assign Eco-mode Schedule (RAID Group)" for details.

- Eco-mode Action

> **N o t e**
>
> Refer to "Eco-mode Action" (page 1200) in "Assign Eco-mode Schedule (RAID Group)" for details.

Advanced Copy Management

This section provides information on the parameters of the following actions for Advanced Copy management.

- Register Advanced Copy License
- Modify EC/OPC Priority
- Modify Copy Table Size
- Modify Copy Parameters
- Set Copy Path
- Measure Round Trip Time
- Modify REC Buffer
- Create REC Disk Buffer
- Modify REC Multiplicity
- Set REC Bandwidth Limit
- Create ODX Buffer Volume

Register Advanced Copy License

For details about this function, refer to "Register Advanced Copy License" (page 576).
For the factory default settings for this function, refer to "B. Register Advanced Copy License" (page 1288).

● License Settings

- Registration Method

Description	Select the registration method for the Advanced Copy license. "Use Free License" can only be selected when an Advanced Copy license has not been registered in the ETERNUS DX/AF. This item is only displayed for the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F.

Input condition/
Display contents
	• Use License Key
	  Register a paid license.
	• Use Free License
	  Register a free license.

- License Key

Description	Enter the Advanced Copy license key. For the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F, a license key can only be entered when "Use License Key" is selected for "Registration Method".
Input condition/ Display contents	16 capital letters and numeric characters

Modify EC/OPC Priority

For details about this function, refer to "Modify EC/OPC Priority" (page 579).
For the factory default settings for this function, refer to "B. Modify EC/OPC Priority" (page 1288).

● EC/OPC Priority

• EC/OPC Priority

Description	Set the EC/OPC priority.
Input condition/ Display contents	• Automatic Priority This mode changes the EC/OPC priority automatically in response to the operating load status. • High Priority This mode operates by making maximum use of internal resources. This mode greatly affects host access performance, thus should not be used during normal operation. Use when the operation load is low. • Middle Priority This mode operates slightly slower than the High Priority mode. Select this mode when performance is greatly affected by the High Priority mode, but the copy speed is too slow with the Low Priority mode. • Low Priority This mode reduces the effect on host access. Select this mode when using EC and/or OPC during operation. • Very Low Priority This mode operates slower than the Low Priority mode. Select this mode when performance is affected (such as when the performance of host response is reduced) by the Automatic Priority or Low Priority mode.

● Advanced Setting

• Copy Schedule Mode

Description	Specify the schedule mode for EC, OPC, and Quick OPC. It is not necessary to change the default setting (Session Balancing) for normal use. Setting the schedule mode for SnapOPC and SnapOPC + is not required. Use the procedure in "Modify REC Multiplicity" (page 625) to specify the REC schedule mode.
Input condition/ Display contents	• Session Balancing Copy sessions are scheduled evenly to each Controlling CM for a copy source RAID group (a RAID group to which the copy source volume belongs). • Destination RAID Group Balancing Only one copy session can be performed for each copy destination RAID group. This method prevents unequal loading on a specific RAID group. This may improve the copy performance when a copy destination RAID group is configured by Nearline disks or when "High Priority" is set for EC/OPC.

> ▷ **Caution**

Copy performance is not improved by selecting "Destination RAID Group Balancing" in the following conditions:
- When the type of the copy destination volume is not "Standard"
- When the copy destination volume "Standard" and concatenated

Modify Copy Table Size

For details about this function, refer to .
For the factory default settings for this function, refer to .

● Advanced Copy Table Size Setting

• Resolution

Description	Select the resolution for the copy table.
Input condition/ Display contents	• x 1 • x 2 • x 4 • x 8 • x 16 • x 32 • x 64

• Table Size

Description	Select the copy table size. The copy table size can be set up to the maximum size that is calculated from the installed memory capacity and the usable cache memory capacity in the ETERNUS DX/AF (excluding the currently used capacity such as assigned size to the REC Buffers).
Input condition/ Display contents	• For the ETERNUS DX60 S4/DX60 S3 0 - 128MB (integral multiple of 8) • For the ETERNUS DX100 S4/DX100 S3 and the ETERNUS DX200 S4/DX200 S3 0 - 512MB (integral multiple of 8) • For the ETERNUS DX500 S4/DX500 S3 0 - 1024MB (integral multiple of 8) • For the ETERNUS DX600 S4/DX600 S3 0 - 4096MB (integral multiple of 8) • For the ETERNUS DX8100 S3 0 - 1024MB (integral multiple of 8) • For the ETERNUS DX8700 S3 and the ETERNUS DX8900 S3 0 - 12288MB (integral multiple of 8) • For the ETERNUS AF250 S2/AF250 0 - 512MB (integral multiple of 8) • For the ETERNUS AF650 S2/AF650 0 - 4096MB (integral multiple of 8) • For the ETERNUS DX200F 0 - 512MB (integral multiple of 8)

▷ Caution

In the ETERNUS DX100 S3, a total size of 512MB of memory is reserved for the copy table and REC Buffer. If an REC Buffer is created, 256MB (REC Buffer size, 128MB x 2) of the total memory size is used. Therefore, the maximum table size is 256MB. Note that an REC Buffer cannot be created if the copy table size is larger than 264MB.

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- Table Size Threshold

Description	Specify the threshold for monitoring the used capacity of the copy table (%).
Input condition/ Display contents	1 - 100

> ⬤ **N o t e**
>
> - Refer to "How to calculate the copy table size" (page 1221) for detailed procedure to calculate the copy table size.
> - Refer to "Estimated Advanced Copy Source Capacity" in "Configuration Guide (Web GUI)" for the maximum copy source capacity.

● **Calculation Parameters**

- Total Copy Capacity

Description	- Restore OPC is not used
	Input the total copy capacity (*1) when Restore OPC is not used (unit: GB).
	
	The applicable Advanced Copy types are as follows:
	  - EC
	  - REC
	  - OPC, QuickOPC, SnapOPC, and SnapOPC+ without using Restore OPC
	
	- Restore OPC is used
	Input the total copy capacity (*1) for using Restore OPC (unit: GB).
	
	The applicable Advanced Copy types are as follows:
	OPC, QuickOPC, SnapOPC, and SnapOPC+ using Restore OPC
	
	*1: For details about the total copy capacity, refer to "Respective total values for "Total Copy Capacity" and "Sessions"" (page 1223).

Input condition/ Display contents	Numeric characters (decimal)

- Session Count

Description	- When Restore OPC is not used
	Input the total number of sessions (*1) for not using Restore OPC.
	
	  - The applicable Advanced Copy types are as follows:
	  - EC
	  - REC
	  - OPC, QuickOPC, SnapOPC, and SnapOPC+ without using Restore OPC
	
	- When Restore OPC is used
	Input the total number of sessions (*1) for using Restore OPC.
	
	The applicable Advanced Copy types are as follows:
	OPC, QuickOPC, SnapOPC, and SnapOPC+ using Restore OPC
	
	*1: For details about the total sessions, refer to "Respective total values for "Total Copy Capacity" and "Sessions"" (page 1223).

Input condition/
Display contents
	• For the ETERNUS DX60 S4/DX60 S3
	  0 - 1024
	
	• For the ETERNUS DX100 S4/DX100 S3
	  0 - 1024 (2048) (*1)
	
	• For the ETERNUS DX200 S4/DX200 S3
	  0 - 2048 (4096) (*1)
	
	• For the ETERNUS DX500 S4/DX500 S3 and the ETERNUS DX600 S4/DX600 S3
	  0 - 8192
	
	• For the ETERNUS DX8100 S3
	  0 - 8192
	
	• For the ETERNUS DX8700 S3 and the ETERNUS DX8900 S3
	  0 - 32768
	
	• For the ETERNUS AF250 S2/AF250
	  0 - 2048
	
	• For the ETERNUS AF650 S2/AF650
	  0 - 8192
	
	• For the ETERNUS DX200F
	  0 - 2048
	
	*1: Values in parentheses indicate the number of sessions when "Expand Volume Mode" is "Enable".

How to calculate the copy table size

A dedicated memory area is required for Advanced Copy management and is allocated as a table size. The table size and resolution settings are determined by the copy capacity and the number of sessions (volumes) that will be run simultaneously.

(Table size (S)) [MB] = (S1) + (S2)

S1: Refers to the table size (MB) for EC/REC and for OPC/QuickOPC/SnapOPC/SnapOPC+
without OPC Restoration.
S2: Refers to the table size (MB) for OPC/QuickOPC/SnapOPC/SnapOPC+ with OPC Restoration.

• Round the derived value up to the next multiple of 8 to obtain the correct setting for the copy table size.

• A copy table of the appropriate size (as derived above) is created in each CM.

• If the total table size value (S) exceeds the maximum size allowed, adjust the resolution (M) upward until the maximum table size is no longer exceeded. The resolution (M) should be as small as possible. Maximum allowed table sizes are as follows:

Model	Maximum copy table size (per CM)
ETERNUS DX60 S4/DX60 S3	128 MB
ETERNUS DX100 S4/DX100 S3 ETERNUS DX200 S4/DX200 S3	512 MB
ETERNUS DX500 S4/DX500 S3	1024 MB
ETERNUS DX600 S4/DX600 S3	4096 MB
ETERNUS DX8100 S3	1024 MB
ETERNUS DX8700 S3 ETERNUS DX8900 S3	12288 MB
ETERNUS AF250 S2/AF250	512 MB
ETERNUS AF650 S2/AF650	4096 MB
ETERNUS DX200F	512 MB

▷ **Caution**

The same resolution (M) must be used by both the copy source and copy destination storage systems for REC. If the resolution (M) settings for the copy source and copy destination storage systems are different, REC cannot be performed. Note that the copy table sizes (S) do not need to be the same. If different recommended resolutions (M) are calculated for the copy source and copy destination storage systems, use whichever resolution (M) is greater for both storage systems. If the resolution (M) is changed, recalculate the copy table size (S) setting for the storage system with the new resolution.

● **N o t e**

- The calculated parameters are "Resolution (M)" and "Table Size (S)". It is assumed that almost 100% of the copy table size is used.
- Allowance should be made for possible increases in the copy capacity.
- If the resolution is changed when a copy session exists, calculate the copy table size with the previous resolution for the copy session that is being executed. For copy sessions that are created after the resolution has been changed, calculate the copy table size with the new value.

● **The table size for EC/REC and for OPC/QuickOPC/SnapOPC/SnapOPC+ without OPC Restoration (S1)**

M: Resolution (The same value is used in the ETERNUS DX/AF. Set "x1" if possible.)

C1:   The total copy capacity (GB) for EC/REC, and OPC/QuickOPC/SnapOPC/SnapOPC+ without OPC Restoration (*1)

N1:   The number of sessions EC/REC, and OPC/QuickOPC/SnapOPC/SnapOPC+ without OPC Restoration.

$$S1 \text{ [MB]} = ((2 \times C1 / M) + N1) \times 8 \text{ [KB]} / 1024 \text{ (Round up decimal point)}$$

● **The table size for OPC/QuickOPC/SnapOPC/SnapOPC+ with OPC Restoration (S2)**

M: Resolution (The same value is used in the ETERNUS DX/AF. Set "x1" if possible.)

C2:   The total copy capacity (GB) for OPC/QuickOPC/SnapOPC/SnapOPC+ with OPC Restoration in the volume (*1)

N2:   The number of sessions for OPC/QuickOPC/SnapOPC/SnapOPC+ with OPC Restoration

$$S2 \text{ [MB]} = ((2 \times C2 / M) + N2) \times 2 \times 8 \text{ [KB]} / 1024 \text{ (Round up decimal point)}$$

*1:   For EC, OPC, QuickOPC, SnapOPC, SnapOPC+, and REC copy sources, the copy capacity is the total capacity of all volumes (slices or partitions) in the ETERNUS DX/AF that are defined as copy sources. For REC copy destinations, the copy capacity is the total capacity of all the volumes (slices or partitions) in the ETERNUS DX/AF that are defined as copy destinations.
        If the ETERNUS DX/AF is used for both the " EC, OPC, QuickOPC, SnapOPC, SnapOPC+, or REC copy source" and the " REC copy source", the copy capacity is the total capacity of both.

        For multi-copy sessions, the copy capacity is the total capacity of multi-copy source volumes (slices or partitions), multiplied by the number of multi-copy destinations for each copy source. The copy capacity for generation management by SnapOPC+ sessions is the total capacity of copy source volumes (slices or partitions) multiplied by the number of generations in the copy destination volumes for each copy source.
        Example for multi-copy sessions:
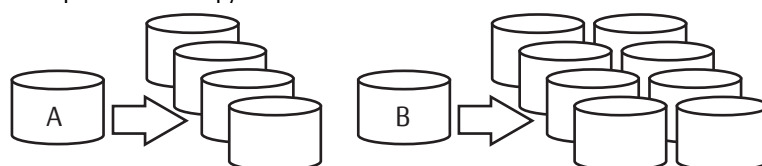
Copy area in the copy source logical volume A: 200 MB, Number of multi-copy destinations: 4
Copy area in the copy source logical volume B: 500 MB, Number of multi-copy destinations: 8
Add 200 x 4 / 500 x 8 = 4800 MB to the copy capacity (C1).
Note that "4" and "8" in this example correspond to the number of generations when calculating the copy table size for SnapOPC+ sessions.

The number of sessions (N1) for multi-copy and SnapOPC+ is 4 + 8 = 12.
When executing OPC Restoration from a copy destination with multi-copy and SnapOPC+ multi-generation enabled, select one copy destination and apply the above formula. Other copy destinations are calculated as being normal multi-copy and SnapOPC+ multi-generation.

Respective total values for "Total Copy Capacity" and "Sessions"

For "Total Copy Capacity" and "Sessions", input the respective total values.
[Example 1]
When executing 10GB OPC (Restore OPC is not used) with 20 sessions and 5GB QuickOPC (Restore OPC is not used) with 10 sessions

Total Copy Capacity (Restore OPC is not used)
= Copy capacity for OPC (10GB x 20 sessions) + Copy capacity for QuickOPC (5GB x 10 sessions)
= 200GB + 50GB = 250GB

Sessions (Restore OPC is not used)
= The number of OPC sessions (20 sessions) + The number of QuickOPC sessions (10 sessions)
= 30 sessions

[Example 2]
When executing 10GB OPC (Restore OPC is not used) with 20 sessions and 5GB QuickOPC (Restore OPC is used) with 10 sessions

Total Copy Capacity (Restore OPC is not used)
= Copy capacity for OPC (10GB x 20 sessions) = 200GB

Sessions (Restore OPC is not used)
= The number of OPC sessions (20 sessions) = 20 sessions

Total Copy Capacity (Restore OPC is not used)
= Copy capacity for QuickOPC (5GB x 10 sessions) = 50GB

Sessions (Restore OPC is not used)
= The number of QuickOPC sessions (10 sessions) = 10 sessions

Modify Copy Parameters

For details about this function, refer to "Modify Copy Parameters" (page 586).
For the factory default settings for this function, refer to "B. Modify Copy Parameters" (page 1290).

● Policy of Snap Data Pool

- Policy Level 1 (Informational) Threshold

Description	If the usage of SDP exceeds the specified threshold, the ETERNUS DX/AF notifies that effect as the Policy Level 1 (Informational).
Input condition/ Display contents	1 - 97

• Policy Level 2 (Warning) Threshold

Description	If the usage of SDP exceeds the specified threshold, the ETERNUS DX/AF notifies that effect as the Policy Level 2 (Warning).
Input condition/ Display contents	2 - 98

• Policy Level 3 (Error) Threshold

Description	If the usage of SDP exceeds the specified threshold, the ETERNUS DX/AF notifies that effect as the Policy Level 3 (Error).
Input condition/ Display contents	3 - 99

● **SDPE Setting**

• SDPE

Description	Select SDPE (GB).
Input condition/ Display contents	• 1 • 2 • 4

Set Copy Path

For details about this function, refer to .
For the factory default settings for this function, refer to .

● **Operation Mode Selection**

• Operation Mode

Description	Select the operation mode.
Input condition/ Display contents	• Create Copy Path Create a copy path and apply to the ETERNUS DX/AF. • Apply Copy Path Apply the existing copy path information file to the ETERNUS DX/AF.

● **Base Information Selection**

• Base Information

Description	Specify the registration method for storage system information.
Input condition/ Display contents	• Backup Path File The copy path information file previously applied is used. • Path File The copy path information file that is saved in the setting PC is used. • Not use Copy path is newly created.

● **Copy Path Information File Selection**

- Copy path information file

Description	Input the location where the copy path information file is stored. Click the [Browse...] button to specify the location, or input the location directly.
Input condition/ Display contents	• Click the [Browse...] button to specify the location • Directly input the location

● **Registered Storage System List**

- Checkboxes for selecting a storage system

Description	Select the ETERNUS storage system to create a copy path. A list of the storage system information specified in the copy path information file previously applied or stored in the ETERNUS DX/AF is displayed.
Input condition/ Display contents	Checkbox • Selected • Cleared

> ▷ **Caution**

- Copy paths cannot be created when the same ETERNUS storage system is set for the local storage system and the remote storage system.
- Copy paths cannot be created between the following ETERNUS storage systems.
  - ETERNUS DX S4/S3 series (*1) and ETERNUS6000
  - ETERNUS DX90 and ETERNUS DX410/DX440/DX8100/DX8400/DX8700
  - ETERNUS DX90 and ETERNUS4000/ETERNUS8000
  - *1: Except the ETERNUS DX60 S4/DX60 S3.

● **Storage System Configuration Settings**

- Port Type

Description	Specify the port type to set the copy path. The displayed contents vary depending on the storage system type. When the target port is not used, select "-" (hyphen).

Input condition/ Display contents	• For the ETERNUS DX100 S4/DX200 S4 and the ETERNUS DX100 S3/DX200 S3
	  - FC 2-Port
	  - iSCSI 2-Port
	  - "-" (hyphen)
	• For the ETERNUS DX500 S4/DX600 S4 and the ETERNUS DX500 S3/DX600 S3
	  - FC 2-Port
	  - FC 4-Port
	  - iSCSI 2-Port
	  - "-" (hyphen)
	• For the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3
	  - FC 2-Port
	  - FC 4-Port
	  - iSCSI 2-Port
	  - "-" (hyphen)

Input condition/
Display contents
(Cont'd)
	• For the ETERNUS AF250 S2 and the ETERNUS AF250
	   - FC 2-Port
	   - iSCSI 2-Port
	   - "-" (hyphen)
	• For the ETERNUS AF650 S2 and the ETERNUS AF650
	   - FC 2-Port
	   - FC 4-Port
	   - iSCSI 2-Port
	   - "-" (hyphen)
	• For the ETERNUS DX200F
	   - FC 2-Port
	   - iSCSI 2-Port
	   - "-" (hyphen)
	• For the ETERNUS DX90 S2
	   - FC 1-Port
	   - FC 2-Port
	   - iSCSI 1-Port
	   - iSCSI 2-Port
	   - "-" (hyphen)
	• For the ETERNUS DX410 S2/DX440 S2 and the ETERNUS DX8100 S2/DX8700 S2
	   - FC 1-Port
	   - FC 2-Port
	   - FC 4-Port
	   - iSCSI 1-Port
	   - iSCSI 2-Port
	   - iSCSI RA (for older storage system connection)
	   - "-" (hyphen)
	• For the ETERNUS DX90
	   - FC 4-Port
	   - "-" (hyphen)
	• For the ETERNUS DX410/DX440/DX8100/DX8400/DX8700 or for the ETERNUS4000/ETER-NUS8000
	   - FC 1-Port
	   - FC 2-Port
	   - FC 4-Port
	   - iSCSI-RA 1-Port
	   - iSCSI-RA 2-Port
	   - "-" (hyphen)
	• For the ETERNUS6000
	   - FC 2-Port
	   - FC 4-Port
	   - "-" (hyphen)

> **▶ Caution**
>
> - Different types of interfaces (FC, iSCSI 1Gbit/s, or iSCSI 10Gbit/s) cannot exist together on the same copy path (the path between the local storage system and the remote storage system).
> - Copy path information files cannot be applied to the ETERNUS storage system when the port mode of the port that is specified in the copy path information does not match the port mode of the adapter installed in the ETERNUS storage system to which the copy path information file is to be applied. Modify the copy path information or switch the port mode on the storage system in advance using the procedure in "Modify Port Mode" (page 433).
> - Copy path information files cannot be applied to the ETERNUS storage system when the port type (FC or iSCSI) that is specified in the copy path information does not match the port type of the adapter installed in the ETERNUS storage system to which the copy path information file is to be applied. Applying copy path information is not available under the following conditions:
>   - If the port type is FC, the WWN in the copy path information differs from that of the adapter in the target ETER- NUS storage system
>   - If the port type is iSCSI, the IP address and the iSCSI Name in the copy path information differ from those of the adapter in the target ETERNUS storage system

- Check to use as RA

Description	Regardless of whether a copy path is applied or not, select all of the RA ports and CA/RA ports. The port number is displayed at right side of the checkbox. When "iSCSI RA (for older storage system connection)", "iSCSI-RA 1-Port", or "iSCSI-RA 2-Port" is selected in the "Port Type" field, all ports are automatically selected. This item is displayed when the model is other than ETERNUS6000.

Input condition/
Display contents
	- #x: Port number (0 - 3)
	- When "FC 1-Port" is selected as the port type (#1, #2 and #3 cannot be selected)
	  #0
	- When "FC 2-Port" is selected as the port type (#2 and #3 cannot be selected)
	  #0, #1
	- When "FC 4-Port" is selected as the port type
	  #0, #1, #2, #3
	- When "iSCSI 1-Port" is selected as the port type (#1 cannot be selected)
	  #0
	- When "iSCSI 2-Port" is selected as the port type
	  #0, #1
	- When "iSCSI-RA" is selected as the port type (All ports are selected)
	  #0, #1
	- When "iSCSI-RA 1-Port" is selected as the port type (#0 is selected)
	  #0
	- When "iSCSI-RA 2-Port" is selected as the port type (All ports are selected)
	  #0, #1

- Initiator / Target Setting

Description	Select the mode for a port which requires the copy path to be set as RA. This item is displayed when the model is ETERNUS6000.
Input condition/ Display contents	- Initiator - Target

● Port Settings

- WWN

Description	Input the WWN for the FC port. A unique WWN in the ETERNUS storage system is required. The following content is displayed as the default setting: ● When the "Storage System Information File" or "Path Information File" has been read, the FC port WWNs that were specified in each file are displayed. ● When the storage system information is manually specified, the FC port WWNs that were created from the WWN of the ETERNUS storage system are displayed.
Input condition/ Display contents	● Hexadecimal numbers (0 - 9, A - F, a - f) ● 16 digits (using "F (f)" or "0" in entire 16 digits is not allowed)

⬤ N o t e

For screens in which FC port WWNs are displayed, refer to "Display screen of the FC port WWNs" (page 1232).

- IP Version

Description	Select the IP version of the iSCSI port. If the copy path is already specified for the port when the copy path information file is being loaded, the IP version that is set for the port is selected as the default setting. For other ports, "IPv4" is set as the default setting. This item is displayed only when the port type is "iSCSI 1-Port" or "iSCSI 2-Port".
Input condition/ Display contents	● IPv4 ● IPv6 (Link Local) ● IPv6 (Connect IP)

▶ Caution

For a single iSCSI port, one of the following IP versions can be used; IPv4, IPv6 (Link Local), or IPv6 (Connect IP). A copy path can be created between iSCSI ports that are the same IP version.

- IP Address

Description	Input the IP address of the iSCSI port. This item is required when "Port Type" is "iSCSI RA" (for older storage system connection), "iSCSI-RA 1-Port", or "iSCSI-RA 2-Port" or when "IP Version" is "IPv4". If not specified, the field is blank.
Input condition/ Display contents	● Numeric characters ● First text box: "1" - "255" ● Other text boxes: "0" - "255"

- IPv6 Link Local Address

Description	Input the IPv6 link local address of the iSCSI port. This item is required when "IP Version" is "IPv6 (Link Local)". Refer to "Available IPv6 Address" (page 122) for details. Note that the current setting is displayed by an abbreviation. This item is displayed only when the port type is "iSCSI 1-Port" or "iSCSI 2-Port". If not specified, the field is blank.
Input condition/ Display contents	● fe80::xxxx:xxxx:xxxx:xxxx xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) Refer to "IPv6 Address Notation" (page 371) for details.

• IPv6 Connect IP Address

Description	Input the IPv6 connect IP address of the iSCSI port. This item is required when "IP Version" is "IPv6 (Connect IP)". "Global address", "unique local address", or "6to4 address" can be input for the IP address. Refer to "Available IPv6 Address" (page 122) for details. Note that the current setting is displayed by an abbreviation. This item is displayed only when the port type is "iSCSI 1-Port" or "iSCSI 2-Port". If not specified, the field is blank.
Input condition/ Display contents	• xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx:xxxx 　xxxx: 0 - ffff (FFFF) (hexadecimal, alphanumeric characters) 　Refer to "IPv6 Address Notation" (page 371) for details.

• iSCSI Name

Description	Input the iSCSI name of the iSCSI port (required). If not specified, the field is blank. Specify a unique iSCSI Name in the same storage system.
Input condition/ Display contents	• 4 - 223 alphanumeric characters and symbols ('-', '.', ':') • The name starts with "iqn." or "eui."

• Alias Name

Description	Input the Alias Name of the iSCSI port (can be omitted). If not specified, the field is blank.
Input condition/ Display contents	Up to 31 alphanumeric characters and symbols

• User Name

Description	Input the user name to access the iSCSI port (can be omitted). Make sure to set the user name and password together. If not specified, the field is blank.
Input condition/ Display contents	Up to 255 alphanumeric characters and symbols

• Password

Description	Input the password to access the iSCSI port (can be omitted). Make sure to set the user name and password together. The entry is displayed with "*" or similar characters. If not specified, the field is blank.
Input condition/ Display contents	12 - 100 alphanumeric characters and symbols

● **Operation Method Selection**

• Operation Method

Description	Select whether to continue the storage system registration.
Input condition/ Display contents	• Finish of registration by file reading • Registration from file When selecting "Registration from file", specify a file in the "Storage System Information File Selection" field. When 128 storage systems are already registered, "Registration from file" cannot be selected.

● **Storage System Information File Selection**

• Storage System Information File

Description	Input the location where the device information file is stored. Click the [Browse...] button to specify the location, or input the location directly.
Input condition/ Display contents	• Click the [Browse...] button to specify the location • Directly input the location

● **Operation Method Selection**

• Operation Method

Description	Select whether to continue the storage system information registration.
Input condition/ Display contents	• Registration by manual operation When selecting "Registration by manual operation", specify parameters in the "Storage System Information Setting" field. When 128 storage systems are already registered, "Registration by manual operation" cannot be selected. • Finish of registration by manual operation

● **Storage System Information Setting**

• Storage System Type

Description	Select the storage system type that is to be registered.
Input condition/ Display contents	• ETERNUS DX500 S4/DX600 S4/AF650 S2 • ETERNUS DX100 S4/DX200 S4/AF250 S2 (*1) • ETERNUS DX8700 S3/DX8900 S3 • ETERNUS DX8100 S3 • ETERNUS DX500 S3/DX600 S3/AF650 • ETERNUS DX100 S3/DX200 S3/DX200F/AF250 (*1) • ETERNUS DX8700 S2 • ETERNUS DX8100 S2 • ETERNUS DX90 S2 • ETERNUS DX410 S2/DX440 S2 • ETERNUS DX90 • ETERNUS DX410/DX440/DX8100/DX8400/DX8700 • ETERNUS4000/ETERNUS8000 MODEL400/600/800/1200/2200 • ETERNUS4000/ETERNUS8000 MODEL300/500/700/900/1100/2100 • ETERNUS6000 *1: ETERNUS DX100 S4/DX100 S3 is displayed only when the local storage system is purchased outside Japan.

- Box ID

Description	Input the Box ID of the storage system that is to be registered. Box ID that is already registered in the ETERNUS storage system cannot be specified.
Input condition/ Display contents	• Capital letters • Numeric characters • Spaces • "#" (hash keys) • 40 characters (fixed)

- WWN

Description	Input the WWN of the ETERNUS storage system that is to be registered. A WWN that is already registered in the ETERNUS storage system cannot be specified.
Input condition/ Display contents	• Hexadecimal numbers (0 - 9, A - F, a - f) • 16 digits (using "F (f)" or "0" in entire 16 digits is not allowed)

⬤ **N o t e**

- For the ETERNUS DX/AF (other than the ETERNUS DX60 S4/DX60 S3), the storage system WWN is displayed in the [System] screen. Refer to "System (Basic Information)" (page 635) for details.
- For older models, the storage system WWN is created from the FC port WWN. Refer to "How to obtain the storage system WWNs" (page 1231) for details.
- For screens in which FC port WWNs are displayed, refer to "Display screen of the FC port WWNs" (page 1232). Note that the same storage system WWN is obtained from any FC port in the ETERNUS storage system.
- If only an iSCSI interface is installed in the ETERNUS storage system, a storage system WWN cannot be created. In this case, use the procedure in "Export Storage Information" (page 588) in older models to create the storage system information file. After this file is created, use the obtained file to register the storage system information with this function.

How to obtain the storage system WWNs

Create the storage system WWN from a FC port WWN.

- For ETERNUS DX8100 S2/ETERNUS DX8700 S2, ETERNUS DX8700 S2/ETERNUS DX8100 S2, ETERNUS DX410 S2/DX440 S2, ETERNUS DX90 S2, or ETERNUS DX90

  (Example 1)
  When the FC port WWN is "500000E0D4445884", the storage system WWN is "500000E0D4445800".
  The underlined value indicates bit7 - 0 in the following example:

Byte position	0	1	2	3	4	5	6	7
bit position	63 – 56	55–48	47–40	39–32	31–24	23–16	15–8	7–0
FC port WWN (bit format)	500000E0D4445884 (0101 0000 0000 0000 0000 0000 1110 0000 1101 0100 0100 0100 0101 1000 <u>1000 0100</u>)							
Storage system WWN (bit format)	500000E0D4445800 (0101 0000 0000 0000 0000 0000 1110 0000 1101 0100 0100 0100 0101 1000 <u>0000 0000</u>)							

- For ETERNUS DX410/DX440/DX8100/DX8400/DX8700,
  ETERNUS4000/ETERNUS8000 model 400/600/800/1200/2200,
  ETERNUS4000/ETERNUS8000 model 300/500/700/900/1100/2100, or ETERNUS6000
  Convert the FC port WWN to bit format and change the bit60 - 48 values to "0".

  (Example 2)
  When the FC port WWN is "2040000B5D6A0000", the storage system WWN is "2000000B5D6A0000".
  The underlined value indicates bit60 - 48 in the following example:

Byte position	0	1	2	3	4	5	6	7
bit position	63 – 56	55–48	47–40	39–32	31–24	23–16	15–8	7–0
FC port WWN (bit format)	2040000B5D6A0000 (0010 0000 0100 0000 0000 0000 0000 1011 0101 1101 0110 1010 0000 0000 0000 0000)							
Storage system WWN (bit format)	2000000B5D6A0000 (0010 0000 0000 0000 0000 0000 0000 1011 0101 1101 0110 1010 0000 0000 0000 0000)							

Display screen of the FC port WWNs

The FC port WWNs are displayed in the following screens:

- For the ETERNUS DX/AF (other than the ETERNUS DX60 S4/DX60 S3)
  → Port information (FC) of the [Channel Adapter Detail] screen

- For the ETERNUS DX90 S2, the ETERNUS DX410 S2/DX440 S2, or the ETERNUS DX8100 S2/DX8700 S2
  → Port information (FC) of the [Channel Adapter Detail] screen

- For the ETERNUS DX90
  → Port status (FC) of the [Storage System Status] screen

- For the ETERNUS DX410/DX440, the ETERNUS DX8100/DX8400/DX8700,
  or the ETERNUS4000/ETERNUS8000
  → CA Detailed Information screen (FC) of the [Storage System Status] screen

- For the ETERNUS6000
  → WWN list (FC) of the [Storage System Status] screen

● Set Copy Path

- Copy Path Information

Description	Select a copy path. Up to eight copy paths can be selected.
	Checkboxes are displayed only for the combinations when all the following conditions are met (combinations to which a copy path can be set):
	• The same port type (FC, iSCSI, or iSCSI-RA) is used for both the local storage system and remote storage system.
	• The same IP version (v4, v6L, or v6C) is specified for the iSCSI ports that are used for both the local and remote storage systems.
	• The port type is RA or CA/RA.
	• For the ETERNUS6000, the local storage system and the remote storage system have different port usages (Initiator/Target).
Input condition/ Display contents	When the copy path is specified Checkbox
	• Selected
	• Cleared

● **Line Setting**

• Connection Type

Description	Select the connection type for the remote storage system.

Input condition/ Display contents	• Remote
	  Connecting the local and remote storage systems via a line.
	• Direct
	  Connecting the local and remote storage systems without a line.
	  Even in connection via a switch, select "Direct" when not using a line.

• Link Speed

Description	Specify the link speed (*1) for connection with the remote storage system. This item can be set when the "Connection Type" is "Remote". *1: For the "Link Speed" field, specify the WAN bandwidth (a total of multiple lines, if used) that can be actually used for REC. For some cases such as using the bandwidth control device, the WAN bandwidth that can be used for REC is designated. In this case, specify the designated value. To control WAN bandwidth, using the bandwidth control device is required. When using a carrier equipment with the compression function, specify the bandwidth (a total of multiple lines, if used) that can be used after compression. In the ETERNUS storage systems, data compression is unavailable. To compress data, using a carrier equipment with the compression function is required. Example 1: When the bandwidth control device is not used Line bandwidth (*2): 200Mbit/s (All available for REC) The number of lines (*3): 4 (200Mbit/s for all) Link speed = 200 (Mbit/s) x 4 = 800 (Mbit/s) Example 2: When the bandwidth control device is used Line bandwidth with bandwidth limit (*2): 100Mbit/s (100Mbit/s out of 200Mbit/s line bandwidth is available for REC) The number of lines (*3): 2 (100Mbit/s for all) Link speed = 100 (Mbit/s) x 2 = 200 (Mbit/s) Example 3: When the line device has no compression function Line bandwidth (*2): 200Mbit/s (All available for REC) The number of lines (*3): 2 (200Mbit/s for all) Compression ratio: 0 (%) (No compression) Link speed = 200 (Mbit/s) x 2 / (1 - 0 (%)) = 400 (Mbit/s) Example 4: When the line device has the compression function Line bandwidth (*2): 200Mbit/s (All available for REC) The number of lines (*3): 2 (200Mbit/s for all) Compression ratio: 20 (%) (20% for all) Link speed = 200 (Mbit/s) x 2 / (1 - 20 (%)) = 500 (Mbit/s) *2: The line bandwidth that the user has signed up to be used for REC *3: The number of lines that the user has signed up to be used for REC
Input condition/ Display contents	• Up to 5-digit decimal number • 1- 65535 (Mbit/s)

▶ **Caution**

To change the link speed, create a copy path with a new link speed by using this function, and apply the created copy path to the related storage systems.

● **Copy Path Information File Selection**

- Copy path information file

Description	Input the location where the copy path information file is stored. Click the [Browse...] button to specify the location, or input the location directly.
Input condition/ Display contents	• Click the [Browse...] button to specify the location • Directly input the location

● **Remote Device Information**

- Checkbox to select a Box ID

Description	Select the checkbox of the path information that is to be applied to the ETERNUS storage system. This checkbox is only displayed when the path information that is created by this function does not match the path information that is already applied. The Box ID in the path information that is created by using this function is selected by default.
Input condition/ Display contents	Checkbox • Selected • Cleared

- Result of applying

Description	The results of comparing the path information that is created by using this function and the path information that is already applied to the ETERNUS storage system are displayed. When the checkbox for selecting a Box ID is selected, the path information after applying the created path information to the ETERNUS storage system is displayed. When the checkbox for selecting a Box ID is cleared, the path information before applying the created path information to the ETERNUS storage system is displayed. • When the path setting is not to be changed, "Do not Change" is displayed • When the path is to be added, "Add" is displayed • When the path is not to be added, "Do not Add" is displayed • When the path setting is to be changed, "Change" is displayed • When the path is to be deleted, "Delete" is displayed Refer to "Specification for applying result" (page 1236) and "Display example of an applying result and an actual applying result" (page 1237) for details. When applying the copy path information file to the ETERNUS storage system, the paths with the "Add", "Change", and "Delete" states are updated.
Input condition/ Display contents	The results of comparing the path information that is created by using this function and the path information that is already applied to the ETERNUS storage system

▶ **Caution**

If the created path information and the path information in the ETERNUS storage system do not match and some of the copy paths to the ETERNUS storage system are not selected to be applied (clear the Box ID checkbox), the actual path information after the application does not correspond to the backed up path information file. Refer to "Specification for applying result" (page 1236) for details.

> ⬤ **N o t e**
>
> - Even when "Result of applying" is "Delete" for the path, the applying result is changed to "Do not Change" when the checkbox for selecting the Box ID is cleared. If the created path information is applied under this condition, the relevant path is not deleted. The path information is merged in the ETERNUS storage system.
> - When "Result of applying" is "Do not Change" for a path, the checkbox for selecting a Box ID is selected. In this case, the checkbox cannot be cleared.

● **Bandwidth Limit Settings**

- Setting Mode

Description	Select a bandwidth setting mode.
Input condition/ Display contents	• Set the same Bandwidth Limit for all paths • Set the Bandwidth Limit for each path

- Bandwidth Limit

Description	When "Set the same Bandwidth Limit for all paths" is selected for the setting mode, enter the bandwidth limit. When "0" is entered, the bandwidth limit is "Unlimited". When "Set the Bandwidth Limit for each path" is selected for the setting mode, the field is blank. Set the bandwidth limit for each path in the "Advanced Copy Path" field.
Input condition/ Display contents	• 0 - 65535 [Mbit/s] • Blank

● **Advanced Copy Path**

- Bandwidth Limit

Description	Enter the bandwidth limit for each path. When "0" is entered, the bandwidth limit is "Unlimited".
Input condition/ Display contents	0 - 65535 [Mbit/s]

● **Remote Device Information**

- Checkbox to select the measuring target

Description	Select the checkbox of the remote storage system to measure the round trip time. This checkbox is only displayed for the remote storage system of which connection type is "Remote".
Input condition/ Display contents	Checkbox • Selected • Cleared

Adding new copy paths

The following example describes how to add new copy paths to the existing copy path configuration.

[Example] Adding a new copy path between "Storage system 1" and "Storage System 3" while a copy path already exists between "Storage system 1" and "Storage system 2".
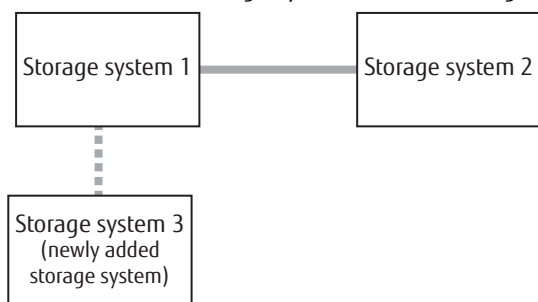
Storage system 1 and Storage system 2: ETERNUS DX S4/S3 series or older storage systems

Storage system 3: ETERNUS DX S4/S3 series

━━━━━━ : Existing copy path

▪▪▪▪▪▪▪▪ : Copy path that is to be added

(1) Perform basic settings such as registering the Advanced Copy license and setting copy table size in order to use REC in "Storage system 3".

(2) Use this function in "Storage system 3" and register the storage system information for "Storage system 1", "Storage system 2", and "Storage system 3".

(3) Create a copy path information file that includes all the following copy path information.
    - Copy path between "Storage system 1" and "Storage system 3"
    - Copy path between "Storage system 1" and "Storage system 2"

(4) Apply the copy path information file that is created in Step (3) to "Storage system 3" and "Storage system 1".

Specification for applying result

Comparison result (*1)		Display item in the "Result of applying" field		
		Status of the checkbox for selecting a Box ID		
		Selected (Apply the information)	Cleared (Do not apply the information)	Default
The Box ID information exists in both storage systems	The path information is the same	Do not Change	Do not Change	Do not Change
	The path information is different	Change	Do not Change (*2)	Change
The Box ID exists only in the created path information		Add	Do not Add	Add
The Box ID information exists only in the path information in the ETERNUS storage system		Delete	Do not Change (*2)	Do not Change

*1:   The comparison result between "created path information" and "path information in the ETERNUS storage system" is displayed.

*2:   If the path information file is applied to the ETERNUS storage system under this condition, the contents of the path information in the ETERNUS storage system and the backup path file do not match.

Display example of an applying result and an actual applying result

[Example 1] When applying the created path information to the ETERNUS storage system (all of the checkboxes for selecting the Box IDs are selected)
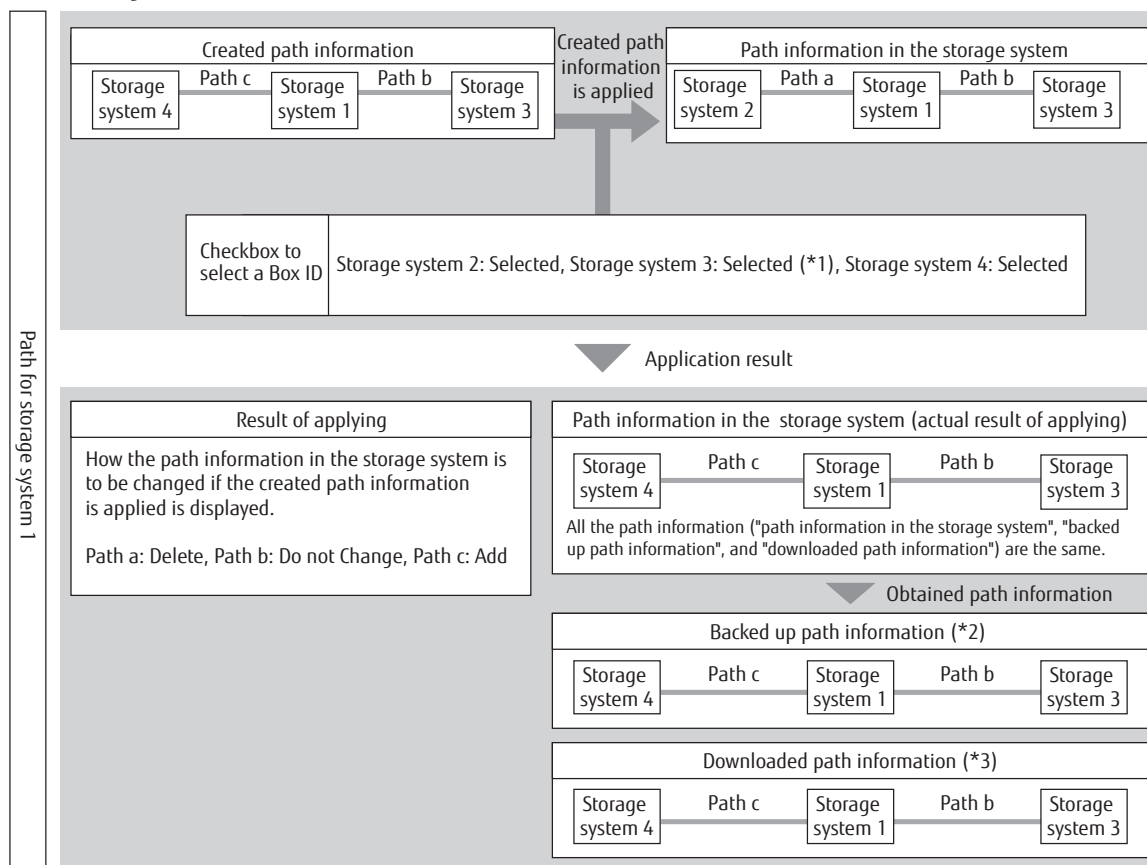
*1: Because there are no differences between "created path information" and "path information in the storage system", the checkbox is selected and cannot be changed.

*2: When the copy path information file is applied to the ETERNUS storage system, a backup path file is created. The backup path file can be downloaded by using the [Export All Copy Path] function.

*3: The copy path information file that is saved in the setting PC by clicking the [Save] button in this function.

[Example 2] When applying the created path information to the ETERNUS storage system (the checkbox for selecting Box ID is cleared)
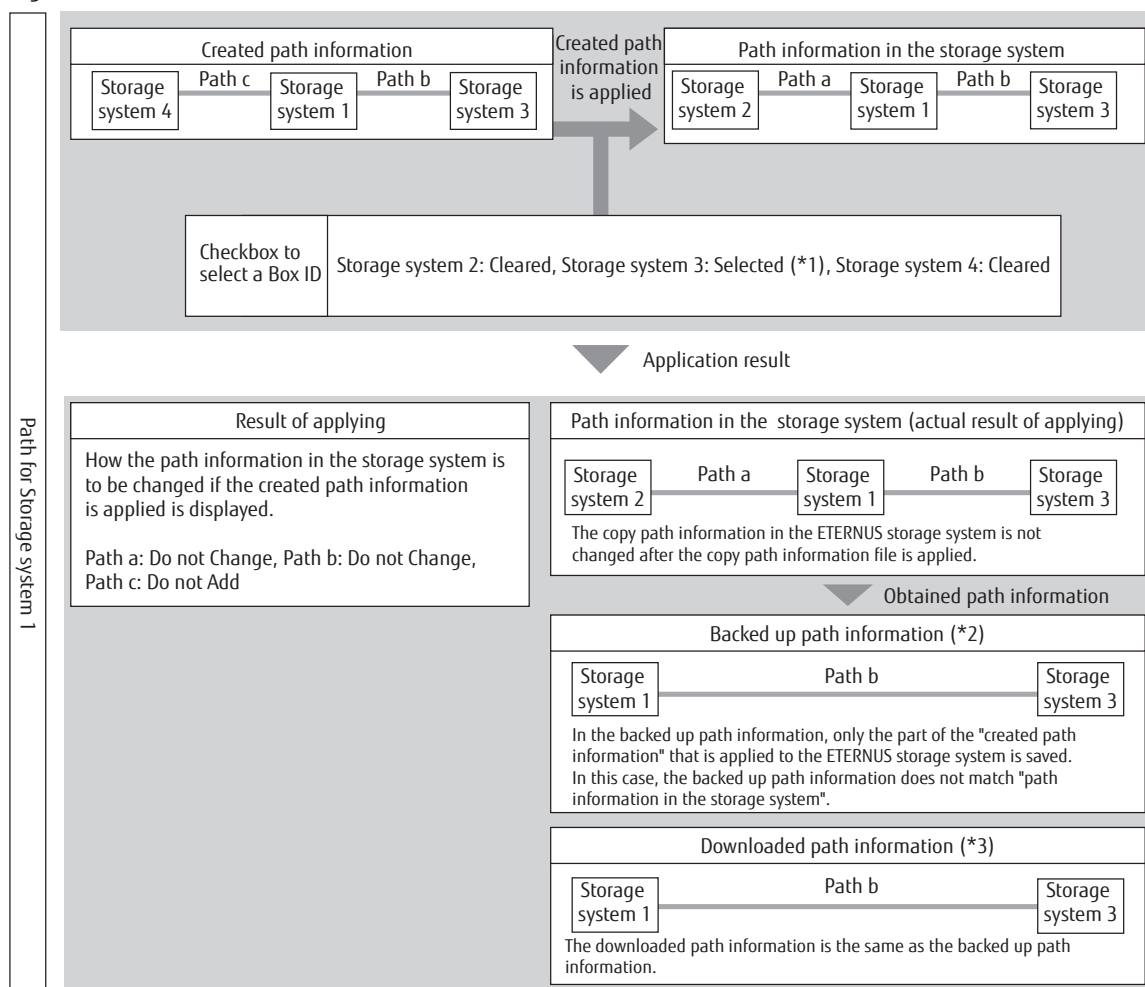
*1: Because there are no differences between "created path information" and "path information in the storage system", the checkbox is selected and cannot be changed.

*2: When the copy path information file is applied to the ETERNUS storage system, a backup path file is created. The backup path file can be downloaded by using the [Export All Copy Path] function.

*3: The copy path information file that is saved in the setting PC by clicking the [Save] button in this function.

[Example 3] When applying the created path information to the ETERNUS storage system (the checkbox for select-ing Box ID is selected or cleared)
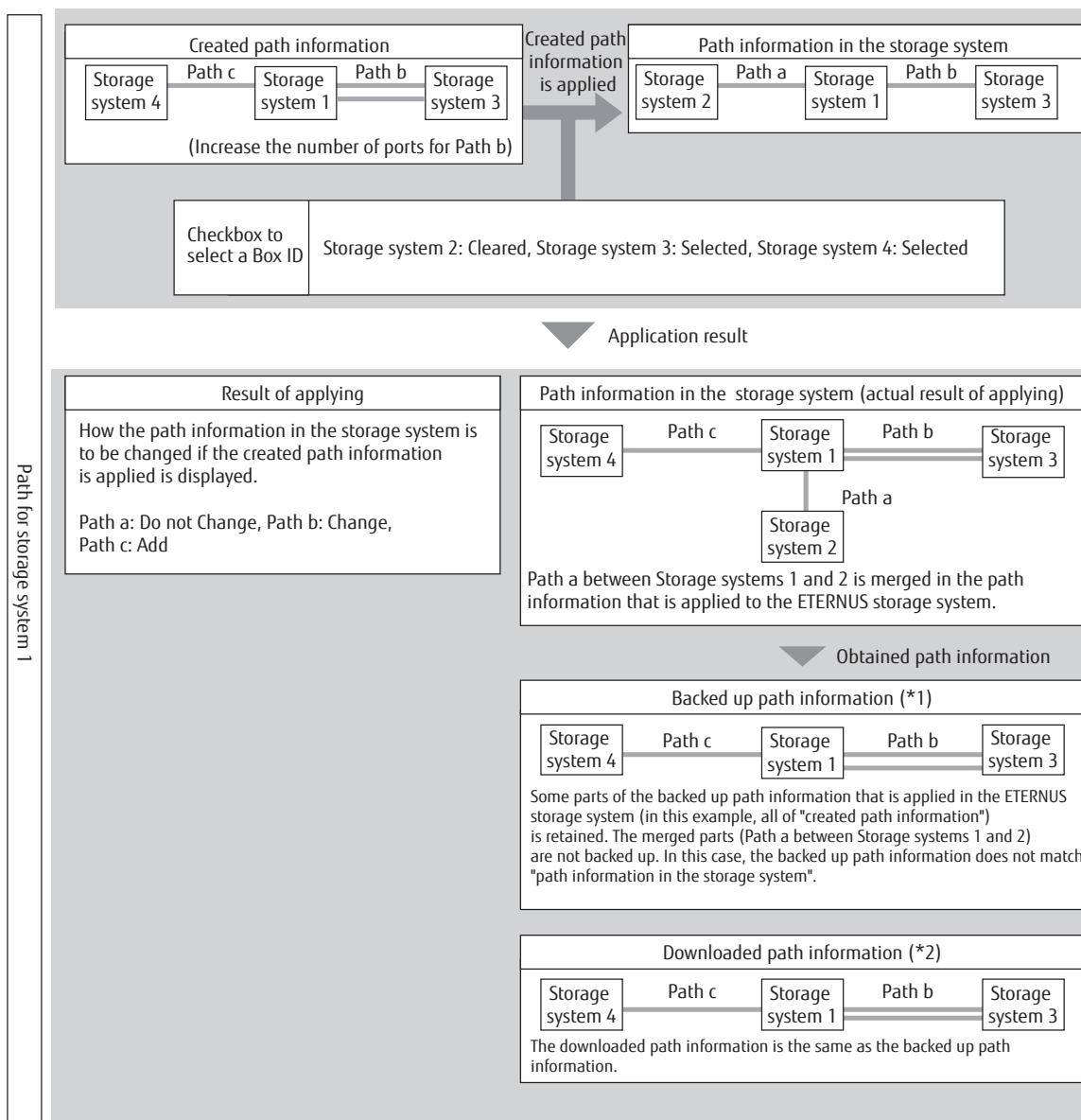
*1: When the copy path information file is applied to the ETERNUS storage system, a backup path file is created. The backup path file can be downloaded by using the [Export All Copy Path] function.

*2: The copy path information file that is saved in the setting PC by clicking the [Save] button in this function.

Measure Round Trip Time

For details about this function, refer to "Measure Round Trip Time" (page 612).

● **Measure Round Trip Time**

- Round Trip Time

Description	The round trip time (msec) measurement result between the source device and the remote storage system is displayed.
	
	If a measurement error has occurred, the field is blank. The value can be changed. The following describes the recommended round trip time.
	• Asynchronous copy
	  within 100 msec.
	• Synchronous copy
	  within 50 msec.

Input condition/ Display contents	Numeric characters between 1 - 65535 (decimal)

Modify REC Buffer

For details about this function, refer to "Modify REC Buffer" (page 613).
For the factory default settings for this function, refer to "B. Modify REC Buffer" (page 1291).

● **REC Buffer Setting List**

- Usage

Description	Specify the usage of the REC Buffer. When setting the REC Buffer for sending, select "Send". When setting the REC Buffer for receiving, select "Receive". To delete the REC Buffer, select "Unused".
Input condition/ Display contents	• Send • Receive • Unused

- Remote Box ID

Description	Select the Box ID for the remote storage system. If the copy path information is deleted after the REC Buffer creation, "???" is displayed. Note that REC Buffers with "???" cannot be used. Delete any REC Buffers with this status. If "Unused" is selected for the usage, "-" (hyphen) is displayed.
Input condition/ Display contents	• Remote storage System Box ID • "-" (hyphen)

- Size

Description	Select the REC Buffer size. If "Unused" is selected for the usage, "-" (hyphen) is displayed. The REC Buffer size can be set up to the maximum size that is calculated from the installed memory capacity and the usable cache memory capacity in the ETERNUS DX/AF (excluding the currently used capacity such as assigned size to the copy tables).

Input condition/
Display contents
	• For the ETERNUS DX100 S4/DX100 S3
	  - 128 MB
	• For the ETERNUS DX200 S4/DX200 S3
	  - 128 MB
	  - 256 MB
	  - 512 MB
	• For the ETERNUS DX500 S4/DX500 S3 and the ETERNUS DX600 S4/DX600 S3
	  - 128 MB
	  - 256 MB
	  - 512 MB
	  - 1024 MB
	  - 2048 MB
	• For the ETERNUS DX8100 S3, the ETERNUS DX8700 S3, and the ETERNUS DX8900 S3
	  - 128 MB
	  - 256 MB
	  - 512 MB
	  - 1024 MB
	  - 2048 MB
	• For the ETERNUS AF250 S2/AF250
	  - 128 MB
	  - 256 MB
	  - 512 MB
	• For the ETERNUS AF650 S2/AF650
	  - 128 MB
	  - 256 MB
	  - 512 MB
	  - 1024 MB
	  - 2048 MB
	• For the ETERNUS DX200F
	  - 128 MB
	  - 256 MB
	  - 512 MB
	• If "Unused" is selected for the usage
	  "-" (hyphen)

> ▷ **Caution**

In the ETERNUS DX100 S3, a total size of 512MB of memory is reserved for the copy table and REC Buffer. If an REC Buffer is created, 256MB (REC Buffer size, 128MB x 2) of the total memory size is used. Therefore, the maximum table size is 256MB. Note that an REC Buffer cannot be created if the copy table size is larger than 264MB.

• Forwarding Interval

Description	Select the data transfer intervals. If "Unused" is selected for the usage, a "-" (hyphen) is displayed.
Input condition/ Display contents	1 sec., 2 sec., 4 sec., 8 sec., 15 sec., 30 sec., 45 sec., 60 sec., 75 sec., 90 sec., 105 sec., 120 sec., "-" (hyphen)

- Monitoring Time

Description	Specify the monitoring time, before transition to the " ⊗ Halt" state for a copy session when an REC Buffer shortage occurs.
	If the REC Buffer is in a high-load state for the specified monitoring time, the copy session is automatically changed to " ⊗ Halt" state. When "0 min." is specified in this field, REC Buffer shortage monitoring is not performed. If "Unused" is selected for the usage, a "-" (hyphen) is displayed.
Input condition/ Display contents	0 min., 1 min., 2 min., 3 min., 4 min., 5 min., 6 min., 7 min., 8 min., 9 min., 10 min., 11 min., 12 min., 13 min., 14 min., 15 min."-" (hyphen)

- HALT Wait Timer

Description	Specify the maximum non-response time. During the non-response time, the host I/O response is stopped to give priority to performing REC transfers in a high-load state.
	If the non-response time exceeds the specified value, response to host I/O is restarted. However, the copy session is changed to the " ⊗ Halt" state. When "0 sec." is specified for this field, the ETERNUS DX/AF gives priority to the host I/O, and the copy session is immediately changed to the " ⊗ Halt" state. If "Unused" is selected for the usage, a "-" (hyphen) is displayed.
Input condition/ Display contents	0 sec., 5 sec., 10 sec., 15 sec."-" (hyphen)

● **Advanced Setting**

"I/O Priority Mode", "Immediate HALT Mode", and "High Bandwidth Mode" can only be set when setting a copy operation or host I/O tuning for each REC Buffer. It is not necessary to change the default setting ("Enable") for normal use.

- I/O Priority Mode

Description	Select either "Enable" or "Disable" for the "I/O Priority Mode" of the REC Buffer.
	If "Unused" is selected for the usage, a "-" (hyphen) is displayed. "I/O Priority Mode" reduces the effect on host I/O when an initial copy for starting, restarting, or recovering the copy function is performed.
Input condition/ Display contents	- Enable - Disable - "-" (hyphen)

▷ **Caution**

- This mode should only be used by users who want to maintain host I/O performance as much as possible during REC.
- If "Enable" is selected and host I/O with a high load continues, it may take an extended period of time for the data to reach an equivalent state. Reduce throughput by as much as possible to avoid exceeding the line bandwidth of REC during initial copying.

- Immediate HALT Mode

Description	Select either "Enable" or "Disable" for the "Immediate HALT Mode" of the REC Buffer.
	If "Unused" is selected for the usage, a "-" (hyphen) is displayed. "Immediate HALT Mode" reduces the effect on host I/O because of the insufficient of REC Buffer when "HALT Wait Timer" is set to "0 sec.". Enable this item when the response to host I/O is reduced even if "0 sec." is selected for the "HALT Wait Timer".

| Input condition/
Display contents | • Enable
• Disable
• "-" (hyphen) |

> ⊳ **Caution**

- This mode should only be used by users who want to maintain host I/O performance as much as possible during REC.
- Items that are set for this mode are only applied when "0 sec." is selected for "HALT Wait Timer".
- When "Enable" is selected, the ETERNUS DX/AF changes the sessions using the target REC Buffers to "❌ Halt" if the capacity of an REC Buffer is insufficient. If this occurs, the initial copy starts every time when recovering from the "❌ Halt" state and the time required for the order of data transfers cannot be guaranteed, resulting in this process taking an extended period of time.

- High Bandwidth Mode

| Description | Select either "Enable" or "Disable" for the "High Bandwidth Mode" of the REC Buffer.

If "Unused" is selected for the usage, "-" (hyphen) is displayed.
"High Bandwidth Mode" reduces the number of communications by transferring control data required for buffer transfers with as little time as possible to improve the transfer speed for long distance communication.
This item is displayed only when using the controller firmware version V10L4x or later. |
| Input condition/
Display contents | • Enable
• Disable
• "-" (hyphen) |

> ⊳ **Caution**

If the controller firmware version is V10L4x or later, this mode is also enabled for the existing REC Buffers. To keep the existing transfer speed specified with a controller firmware version V10L3x or earlier, select "Disable" for this mode.

Create REC Disk Buffer

For details about this function, refer to .
For the factory default settings for this function, refer to .

● **New RAID Group**

- Name

| Description | Input a RAID group name to be created.

An existing RAID group name cannot be used. |
| Input condition/
Display contents | • Up to 16 alphanumeric characters and symbols (except "," (comma) and "?")
• Spaces |

● **Manual Setting**

• Controlling CM

Description	Specify the Controlling CM of the RAID group to be created. "Automatic" and the normal CM number ("CE#x CM#y" or "CM#y") that is installed are displayed as options (x: CE number, y: CM number). Select "Automatic" for normal operations. When "Automatic" is selected, the Controlling CM that is to be allocated is determined by the RAID group number. Refer to "Automatic Controlling CM setting" (page 1193) for details.

Input condition/
 Display contents
	• For the ETERNUS DX8700 S3/DX8900 S3
	   - Automatic
	   - CE#x CM#y
	 • For the other models
	   - Automatic
	   - CM#y

• Encryption by CM

Description	Select the RAID group encryption status with the radio button. When the encryption mode is disabled, "On" cannot be selected. When "On" is specified for "Encryption by CM", select Online, Nearline, or SSD type drives.

Input condition/
 Display contents
	• On
	   Use a CM to perform encryption
	 • Off
	   Perform encryption without using a CM

● **Drive Selection ([Tabular] Tab)**

• Checkbox to select drives

Description	Select the checkbox for the drive that is to be used. When selecting drives, refer to "Requirements for selecting drives" (page 618).
Input condition/ Display contents	Checkbox • Selected • Cleared

● **Drive Selection ([Graphic] Tab)**

• DE selection list box

Description	Select the DE group. Options are displayed in the list box when at least one CE or DE in the DE group is installed in the ETERNUS DX/AF. Refer to "Options and DE groups for each model" (page 1191) for details.
Input condition/ Display contents	DE#Xx (X: 0 - B)

- Checkbox to select drives

Description	Select the checkbox for the drive that is to be used. Checkboxes are displayed for unused drives. Refer to "Drive location" (page 1192) for details about drive location for each DE. Placing the mouse pointer on the ⓘ icon displays the detailed information of the drive. When selecting drives, refer to "Requirements for selecting drives" (page 618).
Input condition/ Display contents	Checkbox - Selected - Cleared

● Advanced Setting

Stripe Depth should be set only when advanced tuning needs to be performed for each RAID group configuring the REC Disk Buffer. It is not necessary to change the default value (64KB) for normal use.

- Stripe Depth

Description	Select the Stripe Depth of the RAID group that is to be created.
Input condition/ Display contents	- 64 KB - 128 KB - 256 KB - 512 KB - 1024 KB

Modify REC Multiplicity

For details about this function, refer to "Modify REC Multiplicity" (page 625).
For the factory default settings for this function, refer to "B. Modify REC Multiplicity" (page 1291).

● Remote Box ID List

- Priority Level

Description	Select the priority level. When the "Connection Type" is "Remote", a "-" (hyphen) is displayed.

Input condition/
Display contents
	- Automatic
	  REC is performed using the priority level (Automatic Priority/High Priority/Middle Priority/
	  Low Priority/Very Low Priority) that is specified in "Modify EC/OPC Priority" (page 579).
	- 1 - 8
	  Specify from "1" to "8" for the REC priority level. "1" corresponds to "Very Low Priority", and
	  "8" corresponds to "High Priority" in "Modify EC/OPC Priority" (page 579).
	- "-" (hyphen)

- Specification Mode

Description	Select the specification mode for multiplicity. When the "Connection Type" is "Direct", a "-" (hyphen) is displayed.
Input condition/ Display contents	- Automatic - Manual - "-" (hyphen)

- Multiplicity

Description	When the specification mode is "Manual", specify multiplicity.
	When the specification mode is "Automatic", or when the connection type is "Direct", a "-" (hyphen) is displayed.
Input condition/ Display contents	• 1 - 1024 • "-" (hyphen)

● **Advanced Setting**

- Copy Schedule Mode

Description	Specify the REC copy schedule mode for each remote storage system.
	It is not necessary to change the default setting (Session Balancing) for normal use.
Input condition/ Display contents	• Session Balancing Copy sessions are scheduled evenly to each Controlling CM for a copy source RAID group (a RAID group to which the copy source volume belongs). • Destination RAID Group Balancing Only one copy session can be performed for each copy destination RAID group. This method prevents unequal loading on a specific RAID group. This may improve the copy performance when the copy source storage system and the copy destination storage system are connected by direct connection and the copy destination RAID group is configured by Nearline disks.

▷ **Caution**

- Copy performance is not improved by selecting "Destination RAID Group Balancing" in the following conditions:
  - When the type of the copy destination volume is not "Standard"
  - When the copy destination volume "Standard" and concatenated
- Specify the same copy schedule mode for copy source and copy destination storage systems. If different modes are specified, the copy performance may not improve as expected.

Set REC Bandwidth Limit

For details about this function, refer to .
For the factory default settings for this function, refer to .

● **Bandwidth Limit Settings**

- Setting Mode

Description	Select a bandwidth setting mode.
Input condition/ Display contents	• Set the same Bandwidth Limit for all paths • Set the Bandwidth Limit for each path

• Bandwidth Limit

Description	When "Set the same Bandwidth Limit for all paths" is selected for the setting mode, enter the bandwidth limit. When "0" is entered, the bandwidth limit is "Unlimited". When "Set the Bandwidth Limit for each path" is selected for the setting mode, the field is blank. Set the bandwidth limit for each path in the "Advanced Copy Path" field.
Input condition/ Display contents	• 0 - 65535 (Mbit/s) • Blank

● **Advanced Copy Path**

• Bandwidth Limit

Description	Enter the bandwidth limit for each path. When "0" is entered, the bandwidth limit is "Unlimited".
Input condition/ Display contents	0 - 65535 (Mbit/s)

Create ODX Buffer Volume

For details about this function, refer to .
For the factory default settings for this function, refer to .

● **ODX Buffer Volume**

• Name

Description	Input the ODX Buffer volume name. An existing volume name cannot be specified. Volume names starting with "$SYSVOL", "$VVOL_META", or "$DEDUP" cannot be used.
Input condition/ Display contents	Up to 32 alphanumeric characters and symbols (except "," (comma) and "?")

• Capacity

Description	Specify the ODX Buffer volume capacity and select the unit of capacity. Up to a 15-digit number including the "." (decimal point) can be input. Note that when "MB" is selected, the specified value is rounded down to the nearest whole number. When "GB" or "TB" is selected, the specified value is converted to "MB" and rounded down to the nearest whole number.
Input condition/ Display contents	• 1 GB - 1 TB • TB/GB/MB

▶ **Caution**

If "Use all Largest Free Space" is selected, inputting the capacity is not required. The specified value and unit are not used.

● **N o t e**

Up to 15 numbers can be used. If a decimal point is included in the input value, up to 14 numbers can be used.
[Example] 0.1234567890123 (14 numbers and a decimal point)

• Type

Description	Select the ODX Buffer volume type. If the Thin Provisioning function is disabled, "Standard" is displayed in this field.

Input condition/
Display contents
	• Standard
	  Volumes that are created in RAID groups.
	• Thin Provisioning Volume
	  Volumes that are created in TPPs.

• Use all Largest Free Space

Description	Select the "Enable" checkbox to create an ODX Buffer volume with the largest available free space in the RAID group. This checkbox can be selected or cleared only when "Type" is "Standard". If the "Enable" checkbox is selected, an ODX Buffer volume with the maximum capacity is created with the available space displayed in the "Largest Free Space" field for the selected RAID group.
Input condition/ Display contents	"Enable" checkbox • Selected • Cleared

▷ **Caution**

• When the "Enable" checkbox is selected, the capacity and the unit are not available.

• An ODX Buffer volume cannot be created if the "Largest Free Space" is less than 1 GB or larger than 1 TB.

• The capacity for the created ODX Buffer volume is not displayed. Use the [Volume] screen to check the volume capacity after volume creation is complete.

⬤ **N o t e**

• ODX Buffer volumes are used as buffers for saving old data and cannot be used as a copy source or a copy destination. Therefore, even if "Use all Largest Free Space" is enabled, a similar restriction is not applied when creating Standard type volumes, SDPVs, and WSVs.

• Up to 15 numbers can be used. If a decimal point is included in the input value, up to 14 numbers can be used. [Example] 0.1234567890123 (14 numbers and a decimal point)

• Encryption by CM

Description	Select the encryption status of the ODX Buffer volume. This item is not displayed in the following conditions. • Encryption mode is disabled • The ETERNUS DX60 S4/DX60 S3 is being used

Input condition/
Display contents
	• On
	  Volumes that are encrypted by CM are created.
	• Off
	  Volumes that are not encrypted are created.

▷ **Caution**

• When "Thin Provisioning" is selected for "Type", selecting on or off for "Encryption by CM" is not available.

• When "Encryption by CM" is "On", a RAID group that is configured with SEDs cannot be selected. When creating an ODX Buffer volume in a RAID group that is configured by SEDs, select "Off".

• Allocation

Description	Select the allocation mode for the ODX Buffer volume. This item is available only when the "Type" is "Thin Provisioning Volume".

Input condition/
Display contents
	• Thin
	  Physical area is allocated to the target area of the volume when a write I/O is received.
	• Thick
	  Physical area is allocated to the whole area of the volume when volumes are created.

● **Target RAID Group/Thin Provisioning Pool**

• Target RAID Group/Thin Provisioning Pool

Description	• When "Type" is "Standard" (select RAID group)
	  Select RAID groups to which the ODX Buffer volume is created.
	
	• When "Type" is "Thin Provisioning Volume" (select TPP)
	  Select TPPs to which the ODX Buffer volume is created.

Input condition/ Display contents	RAID group or TPP

⊳ **Caution**

• When "Type" is "Standard" (select RAID group)
  – When "Encryption by CM" is "On", a RAID group that is configured with SEDs cannot be selected.
  – RAID groups in the following conditions are not displayed in the target RAID group list:
    • RAID groups that are registered in TPPs
    • RAID groups that are registered in FTRPs
    • RAID groups that are registered as REC Disk Buffers
    • RAID groups that are registered as EXCPs
    • RAID groups in which 128 volumes are already created
    • RAID groups for which "Usage" is "Temporary"
    • RAID groups with free space that is less than 1GB
    • External RAID Groups

• When "Type" is "Thin Provisioning Volume" (select TPP)
  FTRPs and FTSPs are not displayed in the target Thin Provisioning Pool list.

B. Factory Default List

This appendix describes the default settings for the following management functions.

- System Management
- Volume Management
- Connectivity Management
- RAID Group Management
- Thin Provisioning Management
- Advanced Copy Management

The following sections describe the factory default values. Note that functions and setting items that do not have default settings are not listed.

System Management

This section provides information on the default parameters of the following actions for system management.

- Set Deduplication/Compression Mode
- Modify Date and Time
- Change Box ID
- Setup Subsystem Parameters
- Setup Encryption Mode
- Setup SMI-S Environment
- Setup Power Management
- Setup Extreme Cache
- Setup Exclusive Read Cache
- Setup Disk Drive Patrol
- Setup Debug Mode
- Backup Configuration
- Start/Stop Performance Monitoring
- Clear Cache
- Modify Eco-mode General Setting
- Create Eco-mode Schedule
- Setup User Account
- Modify User Policy
- Modify RADIUS
- Add Role
- Setup Network Environment
- Setup Firewall
- Setup SNMP Agent Basic Interface
- Setup SNMP Manager
- Setup SNMP Agent MIB Access View
- Setup SNMP Agent User
- Setup SNMP Agent Community
- Setup SNMP Agent Trap
- Download MIB File
- Setup E-Mail Notification
- Setup Syslog
- Setup SSH Server Key

- Create Self-signed SSL Certificate
- Create Key/CSR
- Setup SSL Version
- Setup Event Notification
- Export/Delete Log
- Export/Delete Panic Dump
- Audit Log
- Setup Audit Log
- Add Key Server
- Create Key Group
- Update SED Authentication Key
- Create External Drive
- Setup Remote Support
- Setup Log Sending Parameters
- Setup AIS Connect Environment
- Setup Remote Session Permission
- Apply Controller Firmware

■ Set Deduplication/Compression Mode

Screen	Setting item	Default value

Deduplication Mode Settings	Deduplication/Compression	• For the ETERNUS AF250 S2/AF650 S2 and the ETERNUS AF250/AF650
		Enable
		• For the ETERNUS DX500 S4/DX600 S4
		  - Factory default setting
		    • When "Memory Extension" is installed Enable
		    • When "Memory Extension" is not installed Disable
		• For the ETERNUS DX200 S3 and the ETERNUS DX500 S3/DX600 S3
		  - Factory default setting
		    • When "Memory Extension" is installed Enable
		    • When "Memory Extension" is not installed Disable
		  - When the existing controller firmware is upgraded to V10L60 or later Disable
		• For the ETERNUS DX200 S4 Disable

■ **Modify Date and Time**

Screen	Setting item	Default value
Date/Time Settings	Date	The current date and time that is specified in the ETERNUS DX/AF. (When the ETERNUS DX/AF is installed in Japan, the local time for Japan is displayed)
Time Zone Settings	Time Zone	• When the ETERNUS DX/AF is shipped from Japan and shipped to Japan (GMT+09:00) Tokyo, Osaka, Kyoto, Fukuoka, Sapporo • When the ETERNUS DX/AF is shipped from Japan to regions other than Japan (GMT+00:00) Dublin, London, Manchester, Lisbon The default value depends on the shipment information. • When selecting "Manually" in the "Time Zone" field +00:00
Daylight Saving Time Settings	Daylight Saving Time	Disable
	Range	By day of the week
	Start	• When "Range" is "By day of the week" January 1st Sunday 00 : 00 • When "Range" is "By Date" January 01 00 : 00
	End	• When "Range" is "By day of the week" January 1st Sunday 00 : 00 • When "Range" is "By Date" January 01 00 : 00
NTP Settings	Synchronize with NTP Server	Disable
	Primary NTP Server	
	LAN Port used for NTP	MNT
	Secondary NTP Server	
	LAN Port used for NTP	MNT

■ **Change Box ID**

Screen	Setting item	Default value
Set Box ID	Box ID	Device ID

■ **Setup Subsystem Parameters**

Screen	Setting item	Default value
Setup Subsystem Parameters	Thin Provisioning Allocation Mode	TPP balancing

	Flexible Write Through	• For the ETERNUS AF250 S2/AF650 S2, the ETERNUS AF250/AF650, and the ETERNUS DX200F
		  - When the ETERNUS DX/AF is shipped from the factory
		    Enable
		  - When the existing controller firmware is upgraded to V10L30 or later
		    Disable
		• For the other models
		  Disable

	Turbo Mode	• For the ETERNUS DX500 S4/DX600 S4 and the ETERNUS AF250 S2/AF650 S2
		  Enable
		• For the other models
		  Disable

	Writeback Limit Count	512
	Expand Volume Mode	Disable
Setup Host	Load Balance	Enable
	Reject INQUIRY from Unauthorized Host	Disable

	Optimize for Advanced Format SSD	• When the ETERNUS DX/AF is shipped from the factory
		  Enable
		• When the existing controller firmware is upgraded to V10L30 or later
		  Disable

	Expand Host Mode	Disable
Setup Disk Drive	Checkcode Enforcement	Enable
	Copybackless	Enable
Web GUI Settings	Function to Add Host	
	Use "Add Host Group"	Selected
	Use "Add Host"	Cleared
Deduplication/Compression Settings	Data Compare when hash collision occurs	Disable

■ **Setup Encryption Mode**

Screen	Setting item	Default value
Encryption Mode Setting	Encryption Mode	Disable

■ **Setup SMI-S Environment**

Screen	Setting item	Default value
SMI-S Settings	SMI-S	• When the ETERNUS DX/AF is shipped to EMEA and North America Enable • When the ETERNUS DX/AF is shipped to regions other than above Disable
	SSL Certificate	SMI-S Self-signed SSL Certificate
	Performance Information	Disable

■ **Setup Power Management**

Screen	Setting item	Default value
Power Control by External Device	RCIL	Disable
	Auto Power	Disable
	Power Resume	Disable
Connection Module Settings (*1)	PWC	Cleared
PWC Connection Settings	Connection CM	Cleared
	Delay until Shutdown	0 min.
	Set management unit interface	• For the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3 Manual • For the other models PMAN
	Power Failure Signal	Positive
	Low Battery Signal	Positive
	UPS Shutdown Signal	• Cleared • When the "Enable" checkbox is selected "Positive"

*1:   This item is displayed for the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3.

■ **Setup Extreme Cache**

Screen	Setting item	Default value
Extreme Cache Setting	Cache Used	Not Used
Extreme Cache Memory Size Setting	New Memory Size	0 (GB)
Extreme Cache Pool Memory Size Settings	Select Drives	All cleared
	Encryption by CM	Off
Tuning Parameters Settings	Initial Caching Threshold	1
	Caching Threshold	• 5 • "Not replace Cache Data" checkbox Cleared (relocate)
	Caching Priority	10 (Fastest)
	Monitoring I/O	Read

■ **Setup Exclusive Read Cache**

Screen	Setting item	Default value
Cache Size Settings	Exclusive Read Cache	0%

■ **Setup Disk Drive Patrol**

Screen	Setting item	Default value
Setup Disk Drive Patrol	Disk Drive Patrol	Enable

■ **Setup Debug Mode**

Screen	Setting item	Default value
Master Trace Level Settings	Master Trace Level	Standard
	Level	0x06
Trace Level by Group	Level	0x06
Panic	Collection Mode	Nose and Tail Mode

■ **Backup Configuration**

Screen	Setting item	Default value
Select Configuration Definition	Configuration Definition Data	Configuration (Latest)
Select Backup Slot	Configuration Definition Data	Backup #1

■ **Start/Stop Performance Monitoring**

Screen	Setting item	Default value
Performance Monitoring (when starting performance monitoring)	Interval	30 sec.

■ **Clear Cache**

Screen	Setting item	Default value

Target Cache Settings	Target Cache	• CM
		  Selected
		• Extreme Cache (*1)
		  Selected
		• Extreme Cache Pool (*2)
		  Selected

*1:   This item is only displayed when EXC is enabled.
*2:   This item is only displayed when EXCP is enabled.

■ **Modify Eco-mode General Setting**

Screen	Setting item	Default value
Eco-mode General Settings	Eco-mode	Disable

■ Create Eco-mode Schedule

Screen	Setting item	Default value
Set Event	Event Type	everyday • When the event type is "everyday" - From Time 00:00 - To Time 00:00 • When the event type is "Every week" - Period (start day) Monday - Period (end day) Monday - From Time 00:00 - To Time 00:00 • When the event type is "Specific days" - Month Every Month - Period (start date) 01 - Period (term) One day only - From Time 00:00 - To Time 00:00 • When the event type is "Specific week" - Month Every Month - Period (nth week) 1st - Period (start day) Monday - Period (end day) Monday - From Time 00:00 - To Time 00:00

■ Setup User Account

Screen	Setting item	Default value
Add New User Account	Role	Monitor
	Account	Enable
	Password Policy	Disable
	Lockout Policy	Disable

■ **Modify User Policy**

Screen	Setting item	Default value
Password Policy	Minimum Password Length	4
	Password Complexity	Disable
	Password History	0 (A history of the passwords used is not managed)
	Minimum Password Age	0 (The password can be changed at anytime)
	Maximum Password Age	0 (The password can be used indefinitely)
Lockout Policy	Lockout Threshold	0 (The lockout function for the user account is disabled)
	Lockout Duration	30 min.

■ **Modify RADIUS**

Screen	Setting item	Default value
RADIUS Setting	RADIUS Authentication	Disable
	Recovery Mode	Yes (Communication error / Authentication error)
Primary Server, Secondary Server	Port No.	1812
	LAN Port	MNT
	Authentication Mode	CHAP
	Retry Out Time	30 sec.

■ **Add Role**

Screen	Setting item	Default value
Target Role	Status Display	All cleared
	RAID Group Management	
	Volume - Create / Modify	
	Volume - Delete / Format	
	Host Interface Management	
	NAS Management	
	Advanced Copy Management	
	Copy Session Management	
	Storage Migration Management	
	Storage Management	
	User Management	
	Authentication / Role	
	Security Setting	
	Maintenance Information	
	Firmware Management	
	Maintenance Operation	

■ **Setup Network Environment**

Screen	Setting item	Default value
LAN	Speed and Duplex	Auto-negotiation
	Wake on LAN	Disable

Screen	Setting item	Default value
IPv4 Settings		

Interface	Master IP Address	• For the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F
		   – MNT port
		     IP address that is assigned by the DHCP server
		   – RMT port
		     192.168.1.1
		 • For the other models
		   – MNT port
		     IP address that is assigned by the DHCP server
		   – FST port
		     192.168.1.1

	Slave IP Address	Not specified

	Subnet Mask	• For the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETERNUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F
		   – MNT port
		     Subnet mask that is assigned by the DHCP server
		   – RMT port
		     255.255.255.0
		 • For the other models
		   – MNT port
		     Subnet mask that is assigned by the DHCP server
		   – FST port
		     255.255.255.0

	Gateway	Not specified
IPv6 Settings		
Interface	Master IP Link Local Address	The link local address that is based on the storage system WWN
	Master Connect IP Address	Not specified
	Slave IP Link Local Address	Not specified
	Slave Connect IP Address	Not specified
	Length of Subnet Prefix	Not specified
	Gateway	Not specified

■ **Setup Firewall**

Screen	Setting item		Default value
Firewall Settings			
Acceptable Protocol	HTTP		• MNT Selected • RMT Selected • FST (*1) Selected
	HTTPS		• MNT Selected • RMT Selected • FST (*1) Selected
	Telnet		• MNT Selected • RMT Selected • FST (*1) Selected
	SSH		• MNT Selected • RMT Selected • FST (*1) Selected
	ICMP		• MNT Selected • RMT Selected • FST (*1) Selected
	Maintenance-Secure		• MNT Selected • RMT Selected • FST (*1) Selected
	SNMP		• MNT Selected • RMT Selected • FST (*1) Selected
	RCIL		• MNT Cleared
	ETERNUS DX Discovery		• MNT Selected

*1:   FST is displayed when using the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS DX8100 S3/ DX8700 S3/DX8900 S3, the ETERNUS AF650 S2, and the ETERNUS AF650.

■ **Setup SNMP Agent Basic Interface**

Screen	Setting item	Default value
Basic Interface	SNMP Function	Disable
	LAN Port used for SNMP	MNT
	Authentication Failure	Send SNMP Trap
	Engine ID	Default
	MIB-II RFC Version	RFC1213

■ **Setup SNMP Manager**

Screen	Setting item	Default value
Manager	IP Version	IPv4

■ **Setup SNMP Agent MIB Access View**

Screen	Setting item	Default value
MIB Access View	View Name	ViewALL
	Subtree#1 - Subtree#10	Inclusion

■ **Setup SNMP Agent User**

Screen	Setting item	Default value
Setup SNMP Agent User	MIB View Setting	ViewALL
	Authentication	Disable
	Authentication Method	MD5
	Encryption	Disable
	Encryption Method	DES

■ **Setup SNMP Agent Community**

Screen	Setting item	Default value
Setup SNMP Agent Community	View Name	ViewALL
	Allowed SNMP Manager List	Cleared

■ **Setup SNMP Agent Trap**

Screen	Setting item	Default value
Setup SNMP Agent Trap	Manager No.	Manager01
	SNMP Version	v1
	Community Name	The first community name in the list box
	User Name	The first user name in the list box
	Port No.	162

■ **Download MIB File**

Screen	Setting item	Default value
Download MIB File	Option	"The ServerView control code is added to the comment line of the MIB definition file" checkbox Cleared
	Version	v1

■ **Setup E-Mail Notification**

Screen	Setting item	Default value
Notification E-Mail	Notification E-Mail	Disable
E-Mail Server Settings	LAN Port used for SMTP Connection	MNT
	SNMP Port No.	25
	SMTP over SSL	None
	SMTP requires authentication	None
	Authentication Method	Automatic
Advanced Settings	"Change following Timing Parameter items" checkbox	Cleared
	Connection Timeout	5 (sec.)
	Response Timeout	5 (sec.)
	Maximum Retries	0 (count)
	Retry Interval	1 (sec.)

■ **Setup Syslog**

Screen	Setting item	Default value
Syslog Server1, Syslog Server2	Send Log	off
	Port No.	514
	LAN Port	MNT

■ **Setup SSH Server Key**

Screen	Setting item	Default value
SSH Server Key Setting	Key Length	2048 bit

■ **Create Self-signed SSL Certificate**

Screen	Setting item	Default value
Create Self-signed SSL Certificate Setting	Key Length	2048 bit

■ **Create Key/CSR**

Screen	Setting item	Default value
Create Key/CSR Setting	Key Length	2048 bit

■ **Setup SSL Version**

Screen	Setting item		Default value
SSL Version Settings	Protocol		
	HTTPS (GUI)		• TLS1.0 Selected • TLS1.1 Selected • TLS1.2 Selected
	HTTPS (SMI-S)		• TLS1.0 Selected • TLS1.1 Selected • TLS1.2 Selected
	Maintenance-Secure		• TLS1.0 Selected • TLS1.1 Selected • TLS1.2 Selected

■ **Setup Event Notification**

Screen	Setting item	Default value
Setting based on Severity	Checkbox to select the notification method	Refer to "Initial setting list" (page 1039) for details.
Error Severity Level		
Warning Severity Level		
Informational Level		

■ **Export/Delete Log**

Screen	Setting item	Default value
Option	Export Mode	All
	Specify Time Range	No
	Include I/O Module log	Yes
	Include NAS Engine log	Yes
	Log File Size	Non-segmentation
	Delete of Customer Information	No

■ **Export/Delete Panic Dump**

Screen	Setting item	Default value
Panic Dumps	Panic Dumps	Cleared
Option	Dump File Segment Size	Non-segmentation

■ **Audit Log**

Screen	Setting item	Default value
Enable Audit Log	Operation mode	Disable (*1)
Disable Audit Log		

*1: The Audit log function is disabled by default and only the [Enable Audit log] function is available.

■ **Setup Audit Log**

Screen	Setting item	Default value
Syslog Server1, Syslog Server2	Send Audit Log	off
	Port No.	514
	LAN Port	MNT

■ **Add Key Server**

Screen	Setting item	Default value
Key Server Setting	Port No.	5696
	LAN Port	MNT

■ **Create Key Group**

Screen	Setting item	Default value
Key Group Setting	Security Level	High
	Recovery Mode	Automatic
	Key Valid Period	Unlimited
	Key Server	
	Master	None
	Slave	None

■ **Update SED Authentication Key**

Screen	Setting item	Default value
Current SED Authentication Key Setting	Current Key	Enabled Key

■ **Create External Drive**

Screen	Setting item	Default value
External Drive Setting	External LU Information	"Inherit" checkbox Selected

■ **Setup Remote Support**

Screen	Setting item	Default value
Customer Information		
Customer Information	"Delete any Customer Identity information from the storage system after the information is sent to the 'REMCS Center'." checkbox	Cleared
Detailed Settings	Country of Installation (ISO3166 A2)	• When logged with "Japanese" as the selected language JP • When logged with "English" as the selected language Blank
Information filled by Field Engineers	Installation Date	2001-01
Communication Environment Information		
Connection	Connection Type	Internet Connection
	LAN Port used for Remote Support	MNT
Service	Scheduled Connection Time	Undefined (10:00 - 15:00) (*1)
	Scheduled Connection Period	Every Day
	Specify the Day of the Week	Sunday
Proxy Server	Port No.	0
SMTP Server	Port No.	25
	SMTP over SSL	None
SMTP Authentication Information	Authentication Type	No SMTP Authentication
	Authentication Method	Automatic
	Port No.	110
REMCS Center	REMCS Center	Blank
Detailed Configuration Information	Data Transmission Method	Split (*2)
	Specify Storage System Name for HELO/EHLO Announcement when Sending E-Mail	Do not specify
	Use S/MIME	Use
Result notification information		
Detailed Settings	Administrator	Notification
	Connection check operator	Not Notification
Time Information		
Detailed Settings	SMTP Connection Timeout	60 sec.
	SMTP Response Timeout	60 sec.
	SMTP Retry Count	5 count
	SMTP Retry Interval	30 sec.
	HTTP Timeout	30 sec.
	HTTP Retry Count	5 count
	HTTP Retry Interval	5 sec.
	Queue Time before Sending E-Mails (only when POP Before SMTP authentication is enabled)	1000 msec.

*1:   Different times are specified in the factory settings in order to disperse the load on the REMCS center.
*2:   The default value when "Split" is selected is "Split large data into multiple E-Mails" and "512KB".

■ **Setup Log Sending Parameters**

Screen	Setting item	Default value
Configure Automatic Log Transmission		
Send Log based on Events	Send Log when Errors Occur	• When the [Setup Remote Support] setting has not been completed in advance Cleared • When the [Setup Remote Support] setting has been completed in advance Selected
Send Log Periodically	Periodical Transmission of Log	• When the [Setup Remote Support] setting has not been completed in advance Cleared • When the [Setup Remote Support] setting has been completed in advance Selected
	Time	Undefined (10:00 - 15:00) (*1)
	Period	Once per Week
	Day of the Week	Undefined (Monday - Friday) (*2)
Immediately Send Log Manually		
Manual Transmission	Include I/O Module log	Yes
	Time Range Specified	"Specify" checkbox Cleared

*1:   Different times are specified in the factory settings.
*2:   Different days are specified in the factory settings.

■ **Setup AIS Connect Environment**

Screen	Setting item	Default value
AIS Connect Environment Setting	AIS Connect	Disable
	Use LAN Port	MNT
	SSL Server Certification	Use
	Automatic Log Transmission	Enable
	Connection Type	HTTP
	Change Password	Cleared

■ **Setup Remote Session Permission**

Screen	Setting item	Default value
Remote Session Permission Setting	Remote Session	Forbid
	Remote Session Timeout	1 h

■ **Apply Controller Firmware**

Screen	Setting item	Default value
Controller Firmware Archive Settings	Controller Firmware Archive	Latest Version
Schedule Settings	Apply Date	• Apply Now • When "Set Date" is selected The current time, which is rounded up to the nearest hour or half-hour, is displayed.
Apply Mode Check	Apply Mode (Permit firmware downgrade)	Cleared

Volume Management

This section provides information on the default parameters of the following actions for volume management.
- Create Volume
- Rename Volume
- Modify Thin Provisioning Volume Threshold
- Set Allocation
- Start RAID Migration
- Modify Cache Parameters
- Set ALUA
- Set Volume QoS
- Set Snapshot

■ Create Volume

Screen	Setting item	Default value
New Volume	Use External Drive	"Enable" checkbox 　Cleared
	Deduplication	Disable
	Compression	Disable
	Allocation	Thin
	NAS FS Block Size	256 KB
	RAID Group / TPP Selection	Automatic
	Data Integrity	Default
Automatic Setting	Drive Type	Online (*1)
	RAID Level	High Performance (RAID1+0) (*1)
	Key Group	Enable
	Number of Volumes	1
	Start of Suffix	0
	Digits of Suffix	1
	Encryption by CM	Off
Manual Setting (When creating Standard type volumes, SDVs, or SDPVs)	Use all Largest Free Space	"Enable" checkbox 　Cleared
	Start of Suffix	0
	Digits of Suffix	1
	Volume No.	"Set Value" checkbox 　Cleared
	Encryption by CM	Off
	Number of Volumes	0
	Checkbox to select an External RAID Group	Cleared
Manual Setting (When creating TPVs or NAS Volumes)	Start of Suffix	0
	Digits of Suffix	1
	Volume No.	"Set Value" checkbox 　Cleared
	Number of Volumes	0

Screen	Setting item		Default value
Manual Setting (When creating WSVs)	Volume Information		
		Use all Largest Free Space	"Enable" checkbox Cleared
		Number of Volumes	0
		Start of Suffix	0
		Digits of Suffix	1
		Volume No.	"Set Value" checkbox Cleared
		Wide Stripe Size	Normal
		Concatenation Order	Automatic
		Encryption by CM	Off
Manual Setting (When creating WSVs)	Select RAID Group Information		
		Drive Type	Online (*1)
		RAID Level	High Performance (RAID1+0) (*1)
		Number of Member Drives	4 (*1)
		Stripe Depth	64KB

*1: The default value varies depending on the RAID groups registered in the ETERNUS DX/AF.

■ Rename Volume

Screen	Setting item	Default value
Rename Setting	Start of Suffix	0
	Digits of Suffix	1

■ Modify Thin Provisioning Volume Threshold

Screen	Setting item	Default value
Threshold Settings	New Threshold	80 (%)

■ Set Allocation

Screen	Setting item	Default value
Allocation Settings	Allocation	Thin

■ **Start RAID Migration**

Screen	Setting item	Default value
Setting Volume	Migration Destination	RAID Group / Thin Provisioning Pool / Flexible Tier Pool
	Volume Capacity	Migration source volume size
	FTSP Priority	Automatic
	Encryption	Encryption status of the migration source volume
	Deduplication	Deduplication status of the migration source volume
	Compression	Compression status of the migration source volume
	Allocation	Thin
	Data Sync after Migration	Automatic Stop
	Start Optimizing TPV/FTV Capacity after migration	Disable
	Data Integrity	Data protection method of the migration source volume
Select Migration Destination	Select Migration Destination	Cleared
Wide Striping Volume Setting	Volume Information	
	Wide Stripe Size	Normal
	Concatenation Order	Automatic
	Select RAID Group Information	
	Drive Type	Online (*1)
	RAID Level	High Performance (RAID1+0) (*1)
	Number of Member Drives	4 (*1)
	Stripe Depth	64KB
Select RAID Groups	Checkbox to select a RAID group	Cleared

*1:   The default value varies depending on the RAID groups registered in the ETERNUS DX/AF.

■ **Modify Cache Parameters**

Screen	Setting item	Default value
Parameters Setting	Cache Page Capacity	Unlimited ("-" (hyphen))
	Prefetch Limit (PL)	8
	Force Prefetch Mode (FP)	OFF
	Multi Writeback Count (MWC)	Refer to "Allowed input for MWC when using the default Stripe Depth value (Volume)" (page 1352) in "Allowed Input for MWC When Using the Default Stripe Depth Value" and "Allowed input for MWC when the Stripe Depth value is tuned (Volume)" (page 1354) in "Allowed Input for MWC When the Stripe Depth Value is Tuned" for details.
	Prefetch Sequential Detect Count (PSDC)	5
	Sequential Dirty Detect Count (SDDC)	5
	Sequential Slope (SS)	128
	Sequential Dirty Slope (SDS)	128

Screen	Setting item	Default value
Parameters Setting	Sequential Parallel Multi I/O Count (SPMC)	• For the ETERNUS DX60 S4/DX60 S3 　1 • For the ETERNUS DX100 S4/DX100 S3 　2 • For the ETERNUS DX200 S4/DX200 S3 　6 • For the ETERNUS DX500 S4/DX500 S3 　6 • For the ETERNUS DX600 S4/DX600 S3 　10 • For the ETERNUS DX8100 S3 　6 • For the ETERNUS DX8700 S3 　6 • For the ETERNUS DX8900 S3 　10 • For the ETERNUS AF250 S2/AF250 　6 • For the ETERNUS AF650 S2/AF650 　10 • For the ETERNUS DX200F 　6
	Extreme Cache Pool	Enable

■ Set ALUA

Screen	Setting item	Default value
ALUA Settings	New ALUA	Follow Host Response

■ Set Volume QoS

Screen	Setting item	Default value
Volume QoS Setting	New Bandwidth Limit	Unlimited

■ **Set Snapshot**

Screen	Setting item		Default value
Snapshot Setting	Name		• "Use the volume name to setup snapshot" checkbox Selected • Name Blank (*1)
	Number of Generations		7
	Mode		Automatic
	Schedule		
		Day of the Week	All selected
		Time	• When "Time Interval" is selected for "Time" 24 • When "Advanced Setting" is selected for "Time" All cleared

*1:   For the snapshot destination SDVs, "Selected NAS user volume name" + "$snap_N" (N: Number of generations between 1 - 128) is automatically specified.

■ **Set Snapshot**

Connectivity Management

This section provides information on the default parameters of the following actions for connectivity management.

- Create Host Affinity
- Add FC/FCoE Host Group
- Add iSCSI Host Group
- Add SAS Host Group
- Add FC/FCoE Host
- Add iSCSI Host
- Add SAS Host
- Modify FC Port Parameters (when the port mode is "CA")
- Modify FC Port Parameters (when the port mode is "RA" or "CA/RA")
- Modify FC Port Parameters (when the port mode is "Initiator")
- Modify iSCSI Port Parameters (when the port mode is "CA")
- Modify iSCSI Port Parameters (when the port mode is "RA")
- Modify iSCSI Port Parameters (when the port mode is "CA/RA")
- Modify iSCSI Port Parameters ([Send Ping] screen)
- Modify SAS Port Parameters
- Modify FCoE Port Parameters
- Modify Port Mode
- Add LUN Group
- Add Host Response
- Modify CA Reset Group
- QoS
- Set FC/FCoE Host QoS
- Set iSCSI Host QoS
- Set SAS Host QoS
- Set FC Port QoS
- Set iSCSI Port QoS
- Set SAS Port QoS
- Set FCoE Port QoS
- Add LU QoS Group
- Create Shared Folder
- Create NAS Interface
- Change NAS Server Name
- Add Local User
- Modify Local User
- Add Quota Setting
- Automatic Meta Cache Distribution

■ Create Host Affinity

Screen	Setting item	Default value
Target Connection Setting	Target Connection	Host Group - CA Port Group
Select Host Group	Host Response	Default

■ **Add FC/FCoE Host Group**

Screen	Setting item	Default value
Host Group Setting	Host Response	Default

■ **Add iSCSI Host Group**

Screen	Setting item	Default value
Host Group Setting	Host Response	Default
	IP Version	IPv4

■ **Add SAS Host Group**

Screen	Setting item	Default value
Host Group Setting	Host Response	Default

■ **Add FC/FCoE Host**

Screen	Setting item	Default value
Host Setting	Host Response	Default

■ **Add iSCSI Host**

Screen	Setting item	Default value
Host Setting	Host Response	Default
	IP Version	IPv4

■ **Add SAS Host**

Screen	Setting item	Default value
Host Setting	Host Response	Default

■ **Modify FC Port Parameters (when the port mode is "CA")**

Screen	Setting item	Default value
Port Settings	Connection	FC-AL
	Set Loop ID	Manual
	Loop ID	• When "Set Loop ID" is "Manual" 0x0 • When "Set Loop ID" is "Automatic" Ascending
	Transfer Rate	Auto-negotiation
	Frame Size	2048 (bytes)
	Reset Scope	I_T_L
	Release Reservation if Chip is Reset	Disable

■ **Modify FC Port Parameters (when the port mode is "RA" or "CA/RA")**

Screen	Setting item	Default value
Port Settings	Connection	FC-AL
	Set Loop ID	Manual
	Loop ID	• When "Set Loop ID" is "Manual" 0x0 • When "Set Loop ID" is "Automatic" Ascending
	Transfer Rate	Auto-negotiation
	Frame Size	2048 (bytes)
	REC Line No.	0
	REC Transfer Mode	
	Sync (synchronous transfer mode)	Enable
	Async Stack (asynchronous stack mode)	
	Async Consistency (asynchronous consistency mode)	
	Async Through (asynchronous through mode)	

■ **Modify FC Port Parameters (when the port mode is "Initiator")**

Screen	Setting item	Default value
Port Settings	Connection	FC-AL
	Set Loop ID	Manual
	Loop ID	• When "Set Loop ID" is "Manual" 0x0 • When "Set Loop ID" is "Automatic" Ascending
	Transfer Rate	Auto-negotiation
	Frame Size	2048 (bytes)
	WWN (Port Name)	WWPN of the ETERNUS DX/AF
	WWN (Node Name)	WWNN of the ETERNUS DX/AF

■ **Modify iSCSI Port Parameters (when the port mode is "CA")**

Screen	Setting item	Default value
iSCSI Settings	iSCSI Name	iqn.2000-09.com.fujitsu:storage-system.eternus-xxxx:00yyyyyy (*1)

Screen	Setting item	Default value
TCP/IP Settings	IP Version	IPv4
	IP Address	192.168.xxx.xxx
	Subnet Mask	255.255.255.0
	Gateway	Not specified
	IPv6 Link Local Address	Address that is obtained from the WWN of the ETERNUS DX/AF
	IPv6 Connect IP Address	Not specified
	IPv6 Gateway	Not specified
	TCP Port No.	3260
	TCP Window Scale	2
	iSNS Server	Disable
	iSNS Server Port No.	3205
	VLAN ID	• Disable • When the "Enable" checkbox is selected 0
	Jumbo Frame	Disable
Security Settings	CHAP	OFF
	Header Digest	OFF
	Data Digest	OFF
General Settings	Transfer Rate	Auto-negotiation
	Reset Scope	I_T_L
	Release Reservation if Chip is Reset	Disable
	CmdSN Count	Unlimited
Additional IP Address Settings	Multiple VLAN	Disable
	IP Address	Not specified
	Subnet Mask	Not specified
	Gateway	Not specified
	IPv6 Link Local Address	Not specified
	IPv6 Connect IP Address	Not specified
	IPv6 Gateway	Not specified

*1:   The default value varies depending on the factory setting. Refer to <u>"The default value for "iSCSI Name"" (page 1282)</u> for details.

■ Modify iSCSI Port Parameters (when the port mode is "RA")

Screen	Setting item	Default value
iSCSI Settings	iSCSI Name	iqn.2000-09.com.fujitsu:storage-system.eternus-xxxx:00yyyyyy (*1)

Screen	Setting item	Default value
TCP/IP Settings	IP Version	IPv4
	IP Address	192.168.xxx.xxx
	Subnet Mask	255.255.255.0
	Gateway	Not specified
	IPv6 Link Local Address	Address that is obtained from the WWN of the ETERNUS DX/AF
	IPv6 Connect IP Address	Not specified
	IPv6 Gateway	Not specified
	TCP Port No.	3260
	TCP Window Scale	2
	VLAN ID	• Disable • When the "Enable" checkbox is selected 0
	MTU	1300 bytes
Security Settings	CHAP	OFF
General Settings	Transfer Rate	Auto-negotiation
REC Settings	REC Line No.	0
	REC Transfer Mode	
	Sync (synchronous transfer mode)	Enable
	Async Stack (asynchronous stack mode)	
	Async Consistency (asynchronous consistency mode)	
	Async Through (asynchronous through mode)	

*1:   The default value varies depending on the factory setting. Refer to "The default value for "iSCSI Name"" (page 1282) for details.

■ Modify iSCSI Port Parameters (when the port mode is "CA/RA")

Screen	Setting item	Default value
iSCSI Settings	iSCSI Name	iqn.2000-09.com.fujitsu:storage-system.eternus-xxxx:00yyyyyy (*1)

Screen	Setting item	Default value
TCP/IP Settings	IP Version	IPv4
	IP Address	192.168.xxx.xxx
	Subnet Mask	255.255.255.0
	Gateway	Not specified
	IPv6 Link Local Address	Address that is obtained from the WWN of the ETERNUS DX/AF
	IPv6 Connect IP Address	Not specified
	IPv6 Gateway	Not specified
	TCP Port No.	3260
	TCP Window Scale	2
	iSNS Server	Disable
	iSNS Server Port No.	3205
	VLAN ID	• Disable • When the "Enable" checkbox is selected 0

	MTU	• When changing the port mode from "CA" to "CA/RA"
		  1500 bytes
		• When changing the port mode from "RA" to "CA/RA"
		  1300 bytes

Security Settings	CHAP (CA)	OFF
	CHAP (RA)	OFF
	Header Digest	OFF
	Data Digest	OFF
General Settings	Transfer Rate	Auto-negotiation
	Reset Scope	I_T_L
	Release Reservation if Chip is Reset	Disable
	CmdSN Count	Unlimited
REC Settings	REC Line No.	0
	REC Transfer Mode	
	Sync (synchronous transfer mode)	Enable
	Async Stack (asynchronous stack mode)	
	Async Consistency (asynchronous consistency mode)	
	Async Through (asynchronous through mode)	

*1:   The default value varies depending on the factory setting. Refer to <u>"The default value for "iSCSI Name"" (page 1282)</u> for details.

■ **Modify iSCSI Port Parameters ([Send Ping] screen)**

Screen	Setting item	Default value
CM#x CA#y Port#z	Send Number	1

■ **Modify SAS Port Parameters**

Screen	Setting item	Default value
Port Settings	Transfer Rate	Auto-negotiation
	Reset Scope	I_T_L
	Release Reservation if Chip is Reset	Disable

■ **Modify FCoE Port Parameters**

Screen	Setting item	Default value
Port Settings	Transfer Rate	10 Gbit/s
	Set VLAN ID	Automatic
	VLAN ID	0
	Set Fabric Name	Automatic
	Fabric Name	0
	Frame Size	2048 (bytes)
	Reset Scope	I_T_L
	Release Reservation if Chip is Reset	Disable

■ **Modify Port Mode**

Screen	Setting item	Default value
Port List	Port Mode(After)	CA

■ **Add LUN Group**

Screen	Setting item	Default value
LUN Setting	Start Host LUNs	0
	Number of LUNs	1

■ **Add Host Response**

Screen	Setting item	Default value
LUN Settings	LUN Addressing	Peripheral device addressing (Default)
	LUN Expand Mode (Peripheral Device Addressing)	Disable (Default)
ALUA Settings	Asymmetric / Symmetric Logical Unit Access	• For the ETERNUS DX8700 S3/DX8900 S3 ACTIVE/ACTIVE (Default) • For the other models ACTIVE-ACTIVE / PREFERRED_PATH (Default)
	TPGS Mode	Enable (Default)
	TPG Referrals Mode	Disable (Default)

Screen	Setting item	Default value
Inquiry Command Settings	Peripheral Device Type (Peripheral Device Addressing)	No Device Type (3Fh) (Default)
	Peripheral Device Type (Flat Space Addressing)	No Device Type (3Fh) (Default)
	SCSI Version	Version6 (Default)
	NACA	Disable (Default)
	Device ID Type	Type3 (Default)
	Product ID	Default
Test Unit Ready Command Settings	Reservation Conflict Response	GOOD (Default)
Sense Settings	Notify Change Volume Mapping	Enable (Default)
	Notify Volume Capacity Expansion	Enable (Default)
	Notify Vendor Unique Sense	Disable (Default)
	Sense Data Conversion	No Conversion (Default)
Mode Sense Command Settings	Reservation Conflict Response (Write Exclusive)	RESERVATION CONFLICT (Default)
Other Settings	Command Monitor Time	Default (25 sec.)
	Load Balance Response Status	CHECK CONDITION / UNIT ATTENTION (Default)
	iSCSI Discovery Reply Mode	All - Reply All Ports (Default)
	iSCSI Reservation Range	Storage System (Default)

■ **Modify CA Reset Group**

Screen	Setting item	Default value
Select Ports	"Port" checkbox	All checkboxes are selected

■ **QoS**

Screen	Setting item	Default value
Enable/Disable QoS	Operation mode	Disable (*1)

*1:   The QoS function is disabled by default and only [Enable QoS] in [Action] is available.

■ **Set FC/FCoE Host QoS**

Screen	Setting item	Default value
FC/FCoE Host QoS Setting	Bandwidth Limit	Unlimited

■ **Set iSCSI Host QoS**

Screen	Setting item	Default value
iSCSI Host QoS Setting	Bandwidth Limit	Unlimited

■ **Set SAS Host QoS**

Screen	Setting item	Default value
SAS Host QoS Setting	Bandwidth Limit	Unlimited

■ **Set FC Port QoS**

Screen	Setting item	Default value
FC Port QoS Setting	Bandwidth Limit	Unlimited

■ **Set iSCSI Port QoS**

Screen	Setting item	Default value
iSCSI Port QoS Setting	Bandwidth Limit	Unlimited

■ **Set SAS Port QoS**

Screen	Setting item	Default value
SAS Port QoS Setting	Bandwidth Limit	Unlimited

■ **Set FCoE Port QoS**

Screen	Setting item	Default value
FCoE Port QoS Setting	Bandwidth Limit	Unlimited

■ **Add LU QoS Group**

Screen	Setting item	Default value
LU QoS Group Setting	Bandwidth Limit	Unlimited

■ **Create Shared Folder**

Screen	Setting item	Default value
Shared Folder Settings	Usage	File Sharing
	Protocol	CIFS
	Writable	Yes
	Oplocks	Disable
	Owner	root
	Group	root
	SMB Encryption of Data Access	Disable
	Access Based Enumeration	Disable
Select Volume	Radio button to select a volume	• When only one NAS user volume exists: The checkbox for the relevant volume is selected • When multiple NAS user volumes exist: All the checkboxes are cleared
Add CIFS Permission	Type	User
	Authority	Read/Write

■ **Create NAS Interface**

Screen	Setting item	Default value
NAS Interface Settings	RIP Setting	Enable
	Redundant Port	None
	IP Address	Not specified
	Subnet Mask	Not specified
	Gateway	Not specified
	IPv6 Link Local Address	Not specified
	IPv6 Connect IP Address	Not specified
	IPv6 Gateway	Not specified
	IPv6 Prefix length	Not specified

■ **Change NAS Server Name**

Screen	Setting item	Default value
NAS Server Settings	Name	DXyyyyyyyyyy (*1)

*1:   "DX" is fixed and "yyyyyyyyyy" indicates the serial number of the ETERNUS DX S4/S3 series.

■ **Add Local User**

Screen	Setting item	Default value
Primary Group	Radio button to select a primary group	sharegroup$
Secondary Group	Checkbox to select a secondary group	All cleared

■ **Modify Local User**

Screen	Setting item	Default value
Local User Settings	Change Password	Cleared
	Radio button to select a primary group	A radio button for the current primary group to which the selected local user belongs is selected
	Checkbox to select a secondary group	Checkboxes for the current secondary groups to which the selected local user belongs are selected

■ **Add Quota Setting**

Screen	Setting item	Default value

Select Volume	Radio button to select a NAS user volume	• If only one NAS user volume exists
		  The relevant volume is selected
		• If two or more NAS user volumes exist
		  No volumes are selected

Screen	Setting item		Default value
Add Quota Target	Type		User
	Drive Space		
		Warning	• Blank (unlimited) • GB
		Limit	• Blank (unlimited) • GB
	File Count		
		Warning	0 (unlimited)
		Limit	0 (unlimited)

■ Automatic Meta Cache Distribution

Screen	Setting item	Default value
Enable Automatic Meta Cache Distribution	Operation mode	Disabled (*1)
Disable Automatic Meta Cache Distribution		

*1: The "Automatic Meta Cache Distribution" setting is disabled by default and only [Enable Automatic Distribution] is available in [Action].

The default value for "iSCSI Name"

The default "iSCSI Name" varies depending on the factory setting. The setting for "iSCSI Name" is as follows:

iqn.2000-09.com.fujitsu:storage-system.eternus-xxxx:00yyyyyy

- xxxx
  The following character strings are specified for each model.
  - For the ETERNUS DX60 S4/DX100 S4/DX200 S4
    "dxl"
  - For the ETERNUS DX500 S4/DX600 S4
    "dxm"
  - For the ETERNUS DX60 S3/DX100 S3/DX200 S3
    "dxl"
  - For the ETERNUS DX500 S3/DX600 S3
    "dxm"
  - For the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3
    "dxh"
  - For the ETERNUS AF250 S2
    "dxl"
  - For the ETERNUS AF650 S2
    "dxm"
  - For the ETERNUS AF250
    "dxl"
  - For the ETERNUS AF650
    "dxm"
  - For the ETERNUS DX200F
    "dxl"

- yyyyyy
  "Model ID + unique number" for WWN is specified.

RAID Group Management

This section provides information on the default parameters of the following actions for RAID group management.
- Create RAID Group
- Rename RAID Group
- Change Controlling CM
- Expand RAID Group
- Modify RAID Group Parameters
- Assign Eco-mode Schedule (RAID Group)
- Set Key Group (RAID Group)

■ Create RAID Group

Screen	Setting item	Default value
New RAID Group	Create Mode	Automatic
Automatic Setting	Drive Type	Online (*1)
	RAID Level	High Performance (RAID1+0)
	Select Drives	Minimize number of using drives
Manual Setting	RAID Level	High Performance (RAID1+0)
	Controlling CM	Automatic
	Fast Recovery Configuration	• When the RAID level is "RAID6-FR" (3D+2P)x2+1HS • When the RAID level is not "RAID6-FR" Blank
	Checkbox to select a drive	All cleared
Advanced Settings	Stripe Depth	64 KB

*1:   The default value varies depending on the type of drives that are installed in the ETERNUS DX/AF and that can be used to create new RAID groups.

■ Rename RAID Group

Screen	Setting item	Default value
Rename Setting	Start of Suffix	0

■ Change Controlling CM

Screen	Setting item	Default value
Change Controlling CM Setting	New Controlling CM	Automatic

■ Expand RAID Group

Screen	Setting item	Default value
Manual Setting	RAID Level after expand	High Performance (RAID1+0)

■ **Modify RAID Group Parameters**

Screen	Setting item	Default value
Parameters Setting	Rebuild Priority	• When the RAID level is not "High Reliability (RAID6-FR)" Low • When the RAID level is "High Reliability (RAID6-FR)" High
Advanced Settings	DCMF	1
	Drive Access Priority	Response
	Drive Tuning Parameter Setting	Enable
	Throttle	100%
	Ordered Cut	400

■ **Assign Eco-mode Schedule (RAID Group)**

Screen	Setting item	Default value
Eco-mode Schedule Settings	Eco-mode Action	• When no Eco-mode schedules are registered Drive always on • When Eco-mode schedules are registered Do not change

■ **Set Key Group (RAID Group)**

Screen	Setting item	Default value
Key Group Setting	Key Group	Enable

Thin Provisioning Management

This section provides information on the default parameters of the following actions for Thin Provisioning management.

- Set Thin Provisioning
- Create Thin Provisioning Pool
- Rename Thin Provisioning Pool
- Expand Thin Provisioning Pool
- Set Deduplication/Compression
- Modify Threshold Thin Provisioning Pool
- Modify Cache Parameters (Thin Provisioning Pool)
- Assign Eco-mode Schedule (Thin Provisioning Pool)

■ Set Thin Provisioning

Screen	Setting item	Default value
Thin Provisioning Settings	Thin Provisioning	Disable

	Maximum Pool Capacity	• For the ETERNUS DX60 S4/DX60 S3
		  32 TB
		• For the ETERNUS DX100 S4/DX100 S3
		  32 TB
		• For the ETERNUS DX200 S4/DX200 S3
		  32 TB
		• For the ETERNUS DX500 S4/DX500 S3
		  64 TB
		• For the ETERNUS DX600 S4/DX600 S3
		  128 TB
		• For the ETERNUS DX8100 S3
		  64 TB
		• For the ETERNUS DX8700 S3
		  256 TB
		• For the ETERNUS DX8900 S3
		  256 TB
		• For the ETERNUS AF250 S2/AF250
		  32 TB
		• For the ETERNUS AF650 S2/AF650
		  128 TB
		• For the ETERNUS DX200F
		  32 TB

■ Create Thin Provisioning Pool

Screen	Setting item	Default value
New Thin Provisioning Pool	Create Mode	Automatic

Screen	Setting item	Default value
Automatic Setting	Drive Type	Online (*1)
	RAID Level	Striping (RAID0)
	Select Drives	Minimize number of using drives
	Encryption by CM	Off

	Alarm	• Warning
		  90 (%)
		• Attention
		  70 (%)

	Deduplication	Disable
	Compression	Disable
Manual Setting	Drive Type	Online (*1)
	RAID Level	Striping (RAID0)

	Fast Recovery Configuration	• When the RAID level is "High Reliability (RAID6-FR)"
		  (4D+2P)x2+1HS
		• When the RAID level is not "High Reliability (RAID6-FR)"
		  Blank

	Encryption by CM	Off

	Alarm	• Warning
		  90 (%)
		• Attention
		  70 (%)

	Chunk Size (*2)	"Deduplication/Compression Ready" checkbox Cleared
Add RAID Group	Controlling CM	Automatic
	Checkbox to select a drive	All cleared
Advanced Setting	Stripe Depth	64 KB

*1: The default value varies depending on the type of drives that are installed in the ETERNUS DX/AF and that can be used to create new TPPs.

*2: This item is displayed only when the chunk size that was determined according to the maximum pool capacity is not "21 MB".

■ Rename Thin Provisioning Pool

Screen	Setting item	Default value
Rename Setting	Start of Suffix	0

■ Expand Thin Provisioning Pool

Screen	Setting item	Default value
Setting Thin Provisioning Pool	Expand Mode	Automatic
Manual Setting (Add RAID Group)	Controlling CM	Automatic

■ Set Deduplication/Compression

Screen	Setting item	Default value
Deduplication/Compression Settings	Deduplication	• If "Current Deduplication" is "Enable", "Error", or "-" (hyphen) Disable • If "Current Deduplication" and "Current Compression" are "Disable" Enable
	Compression	• If "Current Compression" is "Enable", "Error", or "-" (hyphen) Disable • If "Current Deduplication" and "Current Compression" are "Disable" Enable

■ Modify Threshold Thin Provisioning Pool

Screen	Setting item	Default value
Threshold Setting	Warning	90 (%)
	Attention	75 (%)

■ Modify Cache Parameters (Thin Provisioning Pool)

Screen	Setting item	Default value
Parameters Setting	Multi Writeback Count (MWC)	Refer to "Allowed input for MWC when using the default Stripe Depth value (TPP)" (page 1353) in "Allowed Input for MWC When Using the Default Stripe Depth Value" and "Allowed Input for MWC when the Stripe Depth value is tuned (TPP)" (page 1355) in "Allowed Input for MWC When the Stripe Depth Value is Tuned" for details.

■ Assign Eco-mode Schedule (Thin Provisioning Pool)

Screen	Setting item	Default value
Eco-mode Schedule Settings	Eco-mode Action	• When no Eco-mode schedules are registered Drive always on • When Eco-mode schedules are registered Do not change

Advanced Copy Management

This section provides information on the default parameters of the following actions for Advanced Copy management.

- Register Advanced Copy License
- Modify EC/OPC Priority
- Modify Copy Table Size
- Modify Copy Parameters
- Set Copy Path
- Modify REC Buffer
- Create REC Disk Buffer
- Modify REC Multiplicity
- Set REC Bandwidth Limit
- ODX
- Create ODX Buffer Volume

■ Register Advanced Copy License

Screen	Setting item	Default value
License Settings	Registration Method (*1)	Use License Key

*1:   This item is displayed for the ETERNUS DX60 S4/DX100 S4/DX200 S4, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETER-NUS AF250 S2, the ETERNUS AF250, and the ETERNUS DX200F.

■ Modify EC/OPC Priority

Screen	Setting item	Default value
EC/OPC Priority	EC/OPC Priority	Automatic Priority
Advanced Setting	Copy Schedule Mode	Session Balancing

■ **Modify Copy Table Size**

Screen	Setting item	Default value

Advanced Copy Table Size Setting	Resolution	• For the ETERNUS DX60 S4/DX60 S3
		  x 16
		• For the ETERNUS DX100 S4/DX100 S3
		  x 16
		• For the ETERNUS DX200 S4/DX200 S3
		  x 16
		• For the ETERNUS DX500 S4/DX500 S3
		  x 1
		• For the ETERNUS DX600 S4/DX600 S3
		  x 1
		• For the ETERNUS DX8100 S3
		  x 1
		• For the ETERNUS DX8700 S3
		  x 1
		• For the ETERNUS DX8900 S3
		  x 1
		• For the ETERNUS AF250 S2/AF250
		  x 16
		• For the ETERNUS AF650 S2/AF650
		  x 1
		• For the ETERNUS DX200F
		  x 16

	Table Size	• For the ETERNUS DX60 S4/DX60 S3
		  128 (MB)
		• For the ETERNUS DX100 S4/DX100 S3
		  128 (MB)
		• For the ETERNUS DX200 S4/DX200 S3
		  128 (MB)
		• For the ETERNUS DX500 S4/DX500 S3
		  0
		• For the ETERNUS DX600 S4/DX600 S3
		  0
		• For the ETERNUS DX8100 S3
		  0
		• For the ETERNUS DX8700 S3
		  0
		• For the ETERNUS DX8900 S3
		  0
		• For the ETERNUS AF250 S2/AF250
		  128 (MB)
		• For the ETERNUS AF650 S2/AF650
		  0
		• For the ETERNUS DX200F
		  128 (MB)

	Table Size Threshold	80 (%)

■ **Modify Copy Parameters**

Screen	Setting item	Default value
Policy of Snap Data Pool	Policy Level 1 (Informational) Threshold	50 (%)
	Policy Level 2 (Warning) Threshold	70 (%)
	Policy Level 3 (Error) Threshold	99 (%)
SDPE Setting	SDPE	1 (GB)

■ **Set Copy Path**

Screen	Setting item	Default value
Operation Mode Selection	Operation Mode	Create Copy Path
Base Information Selection	Base Information	Backup Path File
Storage System Configuration Settings	Initiator/Target Setting (for ETERNUS6000)	Initiator
Port Settings	WWN	FC port WWN
	IP Version	IPv4
	IP Address	Not specified
	IPv6 Link Local Address	Not specified
	IPv6 Connect IP Address	Not specified
Storage System Information Setting	Storage System Type	• When the controller firmware version is "V10L80" or later ETERNUS DX500 S4/DX600 S4/AF650 S2 • When the controller firmware version is "V10L70" or "V10L71" ETERNUS DX100 S4/DX200 S4 (*1) • When the controller firmware version is "V10L40" to "V10L6x" ETERNUS DX8700 S3/DX8900 S3 • When the controller firmware version is "V10L3x" or earlier ETERNUS DX500 S3/DX600 S3 *1: ETERNUS DX100 S4 is displayed only when the local storage system is purchased outside Japan.
Line Setting	Connection Type	Direct
	Link Speed	1 (Mbit/s)
Path Settings	Line Setting	Cleared
Bandwidth Limit Settings	Setting Mode	Set the same Bandwidth Limit for all paths
	Bandwidth Limit	0 (Mbit/s)

■ **Modify REC Buffer**

Screen	Setting item	Default value
REC Buffer Setting List	Usage	Unused
	Remote Storage Box ID	Remote storage system Box ID (*1)
	Size	128 MB (*1)
	Forwarding Interval	1 sec. (*1)
	Monitoring Time	5 min. (*1)
	HALT Wait Timer	15 sec. (*1)
Advanced Setting	I/O Priority Mode	Enable (*1)
	Immediate HALT Mode	Enable (*1)
	High Bandwidth Mode	Enable (*1)

*1:   The default value when the usage is "Send" or "Receive".

■ **Create REC Disk Buffer**

Screen	Setting item	Default value
Manual Setting	Controlling CM	Automatic
	Encryption by CM	Off
Advanced Setting	Stripe Depth	64 KB

■ **Modify REC Multiplicity**

Screen	Setting item	Default value
Remote Box ID List	Priority Level	• When the local storage system and the remote storage system are connected by direct connection Automatic • When the local storage system and the remote storage system are connected by remote connection "-" (hyphen)
	Specification Mode	• When the local storage system and the remote storage system are connected by remote connection Automatic • When the local storage system and the remote storage system are connected by direct connection "-" (hyphen)
Remote Box ID List	Multiplicity	• When the local storage system and the remote storage system are connected by remote connection and "Manual" is selected for the specification mode 1 • When the local storage system and the remote storage system are connected by remote connection and "Automatic" is selected for the specification mode "-" (hyphen) • When the local storage system and the remote storage system are connected by direct connection "-" (hyphen)
Advanced Setting	Copy Schedule Mode	Session Balancing

■ **Set REC Bandwidth Limit**

Screen	Setting item	Default value
Bandwidth Limit Settings	Setting Mode	Set the same Bandwidth Limit for all paths
	Bandwidth Limit	0 (Mbit/s): Unlimited

■ **ODX**

Screen	Setting item	Default value
Enable ODX	Operation mode	Disable (*1)
Disable ODX		

*1:   The ODX function is disabled by default and only the [Enable ODX] function is available.

■ **Create ODX Buffer Volume**

Screen	Setting item	Default value
ODX Buffer Volume	Type	Standard
	Use all Largest Free Space	Cleared
	Encryption by CM	• When the encryption mode is enabled Off • When the encryption mode is disabled Not displayed
	Allocation	Thin
Target RAID Group/Thin Provisioning Pool	Radio button to select a RAID group (when "Type" is "Standard")	Not selected
	Radio button to select a TPP (when "Type" is "Thin Provisioning")	Not selected

C.   User Roles and Policies

This appendix describes user roles and policies.

Roles

When creating a user account, at least one role must be applied.
There are two types of roles: a default role and a custom role. The default role is already prepared in the ETERNUS DX/AF and the custom role can be managed by the user.

■ Default Role

Use the default roles for normal operation. Default roles cannot be deleted. The default role settings cannot be changed.
The following table shows the default roles and policies that are applied to each default role.

Policies	Default Roles						
	Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer	Software (*1)
Status Display	OK	OK	OK	NG	OK	OK	NG
RAID Group Management	NG	OK	OK	NG	NG	OK	NG
Volume - Create / Modify	NG	OK	OK	NG	NG	OK	NG
Volume - Delete / Format	NG	OK	OK	NG	NG	OK	NG
Host Interface Management	NG	OK	OK	NG	NG	OK	NG
NAS Management	NG	OK	OK	NG	NG	OK	NG
Advanced Copy Management	NG	OK	OK	NG	NG	OK	NG
Copy Session Management	NG	OK	OK	NG	NG	OK	NG
Storage Migration Management	NG	OK	OK	NG	NG	OK	NG
Storage Management	NG	OK	NG	NG	NG	OK	NG
User Management	NG	OK	NG	OK	NG	NG	NG
Authentication / Role	NG	OK	NG	OK	NG	NG	NG
Security Setting	NG	OK	NG	NG	OK	NG	NG
Maintenance Information	NG	OK	NG	NG	OK	OK	NG
Firmware Management	NG	OK	NG	NG	NG	OK	NG
Maintenance Operation	NG	NG	NG	NG	NG	OK	NG

OK: Available
NG: Not available

*1:   "Software" is the role that is used for external software. A user account with the "Software" role cannot log in to ETERNUS Web GUI.

■ Custom Roles

Create custom roles when the operating environment cannot be configured by default roles.
Custom roles have unique names that do not match the existing roles. Policies are applied for custom roles.
Multiple policies can be applied to one custom role.
Refer to the following sections for the procedure on how to set custom roles.

- Add Role
  This function creates custom roles.
- Delete Role
  This function deletes custom roles.

- Modify Role
  This function changes custom role settings.

Availability of Functions for each Policy

Functions that can be used vary depending on the policy.
The following tables show the availability of functions for each policy.
"Software" is the default role that is used for external software. A user account with the "Software" role cannot log in to ETERNUS Web GUI. "Software" is omitted in the following tables.

■ Overview (Display)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Overview	Any policy	OK	OK	OK	OK	OK	OK

■ Initial Setup (Action)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Initial Setup (*1)	Any of the following policies: • Storage Management • Security Setting	NG	OK	OK	NG	OK	OK

*1: The setting items varies depending on the login user role.

■ System Management (Display)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
System (Basic Information)	Any of the following policies: • Status Display • Storage Management • User Management • Authentication / Role • Security Setting • Maintenance Information • Firmware Management • Maintenance Operation	OK	OK	OK	OK	OK	OK

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Network	Any of the following policies: • Status Display • Storage Management	OK	OK	OK	NG	OK	OK
Remote Support (REMCS)	Any of the following policies:	OK	OK	OK	NG	OK	OK
Remote Support (AIS Connect)	• Status Display • Storage Management • Maintenance Operation	OK	OK	OK	NG	OK	OK
Root Certificate	Status Display	OK	OK	OK	NG	OK	OK
Key Management		OK	OK	OK	NG	OK	OK
Key Group		OK	OK	OK	NG	OK	OK
Define Role	Any of the following policies: • User Management • Authentication / Role	NG	OK	NG	OK	NG	NG
Eco-mode	Any of the following policies: • Status Display • RAID Group Management • Maintenance Operation	OK	OK	OK	NG	OK	OK
Event/Dump	Any of the following policies: • Status Display • Storage Management • Maintenance Information • Maintenance Operation	OK	OK	OK	NG	OK	OK
Audit Log	Security Setting	NG	OK	NG	NG	OK	NG
Firmware Maintenance	Any of the following policies: • Firmware Management • Maintenance Operation	NG	OK	NG	NG	NG	OK
Storage Migration	Any of the following policies: • Status Display • Storage Migration Management	OK	OK	OK	NG	OK	OK

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
External Drives	Any of the following policies: • Status Display • RAID Group Management	OK	OK	OK	NG	OK	OK
Utility	Any of the following policies: • Storage Management • Maintenance Information • Maintenance Operation	NG	OK	NG	NG	OK	OK
System Settings	Any of the following policies: • Status Display • Advanced Copy Management • Storage Management • Security Setting • Maintenance Operation	OK	OK	OK	NG	OK	OK

■ **System Management (Action)**

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Change User Password	Any policy	OK	OK	OK	OK	OK	OK
Set SSH Public Key		OK	OK	OK	OK	OK	OK
Set Deduplication/ Compression Mode	Any of the following policies: • Storage Management • Maintenance Operation	NG	OK	NG	NG	NG	OK
Register Non-disruptive Storage Migration License		NG	OK	NG	NG	NG	OK
Delete Non-disruptive Storage Migration License		NG	OK	NG	NG	NG	OK

System Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Modify Storage System Name	Storage Management	NG	OK	NG	NG	NG	OK
Modify Date and Time		NG	OK	NG	NG	NG	OK

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Change Box ID	Advanced Copy Management	NG	OK	OK	NG	NG	OK
Setup Subsystem Parameters	Any of the following policies: • Storage Management • Maintenance Operation	NG	OK	NG	NG	NG	OK
Setup Encryption Mode	Security Setting	NG	OK	NG	NG	OK	NG
Setup SMI-S Environment	Storage Management	NG	OK	NG	NG	NG	OK
Register SED Authentication Key	Security Setting	NG	OK	NG	NG	OK	NG
Setup Power Management	Storage Management	NG	OK	NG	NG	NG	OK
Setup Extreme Cache		NG	OK	NG	NG	NG	OK
Setup Exclusive Read Cache	Any of the following policies: • Storage Management • Maintenance Operation	NG	OK	NG	NG	NG	OK
Setup Disk Drive Patrol		NG	OK	NG	NG	NG	OK
Setup Debug Mode		NG	OK	NG	NG	NG	OK

Utility Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Shutdown/Restart Storage System	Storage Management	NG	OK	NG	NG	NG	OK
Backup Configuration	Maintenance Information	NG	OK	NG	NG	OK	OK
Export Configuration		NG	OK	NG	NG	OK	OK
Start/Stop Performance Monitoring	Storage Management	NG	OK	NG	NG	NG	OK
Clear Cache		NG	OK	NG	NG	NG	OK

Eco-mode Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Modify Eco-mode General Setting	Any of the following policies: • RAID Group Management • Maintenance Operation	NG	OK	OK	NG	NG	OK

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Create Eco-mode Schedule	RAID Group Management	NG	OK	OK	NG	NG	OK
Delete Eco-mode Schedule		NG	OK	OK	NG	NG	OK
Modify Eco-mode Schedule		NG	OK	OK	NG	NG	OK

User Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Setup User Account	User Management	NG	OK	NG	OK	NG	NG
Initialize User Account		NG	OK	NG	OK	NG	NG
Modify User Policy		NG	OK	NG	OK	NG	NG
Modify RADIUS	Authentication / Role	NG	OK	NG	OK	NG	NG
Add Role		NG	OK	NG	OK	NG	NG
Delete Role		NG	OK	NG	OK	NG	NG
Modify Role		NG	OK	NG	OK	NG	NG

Network Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Setup Network Environment	Storage Management	NG	OK	NG	NG	NG	OK
Setup Firewall		NG	OK	NG	NG	NG	OK
Setup SNMP Agent Basic Interface		NG	OK	NG	NG	NG	OK
Setup SNMP Manager		NG	OK	NG	NG	NG	OK
Setup SNMP Agent MIB View		NG	OK	NG	NG	NG	OK
Setup SNMP Agent User		NG	OK	NG	NG	NG	OK
Setup SNMP Agent Community		NG	OK	NG	NG	NG	OK
Setup SNMP Agent Trap		NG	OK	NG	NG	NG	OK
Download MIB File		NG	OK	NG	NG	NG	OK
Send SNMP Trap Test		NG	OK	NG	NG	NG	OK
Display SMTP Log		NG	OK	NG	NG	NG	OK
Setup E-Mail Notification		NG	OK	NG	NG	NG	OK
Setup Syslog		NG	OK	NG	NG	NG	OK
Setup SSH Server Key		NG	OK	NG	NG	NG	OK

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Create Self-signed SSL Certificate	Storage Management	NG	OK	NG	NG	NG	OK
Create Key/CSR		NG	OK	NG	NG	NG	OK
Register SSL Certificate		NG	OK	NG	NG	NG	OK
Setup SSL Version		NG	OK	NG	NG	NG	OK

Event/Dump Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Setup Event Notification	Storage Management	NG	OK	NG	NG	NG	OK
Display/Delete Event Log	Maintenance Information	NG	OK	NG	NG	OK	OK
Export/Delete Log (*1)		NG	OK	NG	NG	OK	OK
Export/Delete Panic Dump (*2)		NG	OK	NG	NG	OK	OK

*1: The "Maintenance Operation" policy is also required for deleting logs.
*2: The "Maintenance Operation" policy is also required for deleting panic dumps.

Audit Log Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Enable Audit Log	Security Setting	NG	OK	NG	NG	OK	NG
Disable Audit Log		NG	OK	NG	NG	OK	NG
Setup Audit Log		NG	OK	NG	NG	OK	NG

Key Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Setup Key Management Machine Name	Security Setting	NG	OK	NG	NG	OK	NG
Add Key Server		NG	OK	NG	NG	OK	NG
Delete Key Server		NG	OK	NG	NG	OK	NG
Modify Key Server		NG	OK	NG	NG	OK	NG
Create Key Group		NG	OK	NG	NG	OK	NG
Delete Key Group		NG	OK	NG	NG	OK	NG
Modify Key Group		NG	OK	NG	NG	OK	NG
Update SED Authentication Key		NG	OK	NG	NG	OK	NG
Import SSL/KMIP Certificate		NG	OK	NG	NG	OK	NG

Storage Migration Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Start Storage Migration	Storage Migration Management	NG	OK	OK	NG	NG	OK
Download Template File for Storage Migration Settings		NG	OK	OK	NG	NG	OK
Delete Storage Migration Path		NG	OK	OK	NG	NG	OK
Download Storage Migration Result		NG	OK	OK	NG	NG	OK
Restart Storage Migration		NG	OK	OK	NG	NG	OK
Suspend Storage Migration		NG	OK	OK	NG	NG	OK
Stop Storage Migration		NG	OK	OK	NG	NG	OK

External Drive Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Create External Drive	RAID Group Management	NG	OK	OK	NG	NG	OK
Delete External Drive		NG	OK	OK	NG	NG	OK

Remote Support Management (REMCS)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Display Communication Log	Storage Management	NG	OK	NG	NG	NG	OK
Setup Remote Support		NG	OK	NG	NG	NG	OK
Update Customer Information		NG	OK	NG	NG	NG	OK
Update Communication Environment Information		NG	OK	NG	NG	NG	OK
Setup Log Sending Parameters		NG	OK	NG	NG	NG	OK
Stop/Restart Remote Support		NG	OK	NG	NG	NG	OK

Remote Support Management (AIS Connect)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Setup AIS Connect Environment	Any of the following policies: • Storage Management • Maintenance Operation	NG	OK	NG	NG	NG	OK
Setup Remote Session Permission		NG	OK	NG	NG	NG	OK
Send Log		NG	OK	NG	NG	NG	OK
Test Server Connectivity		NG	OK	NG	NG	NG	OK
Send AIS Connect Test Event		NG	OK	NG	NG	NG	OK
Import Root Certificate	Storage Management	NG	OK	NG	NG	NG	OK

Firmware Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Apply Controller Firmware	Any of the following policies: • Firmware Management • Maintenance Operation	NG	OK	NG	NG	NG	OK
Delete Controller Firmware Schedule		NG	OK	NG	NG	NG	OK

■ **Component Management (Display)**

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Storage (Basic Information)	Any of the following policies: • Status Display • Maintenance Operation	OK	OK	OK	NG	OK	OK
Controller Enclosure		OK	OK	OK	NG	OK	OK
Controller Module		OK	OK	OK	NG	OK	OK
Performance (CM)		OK	OK	OK	NG	OK	OK
Port Error Statistics (for the ETERNUS AF250 and the ETERNUS DX200F)	Maintenance Information	NG	OK	NG	NG	OK	OK
Channel Adapter	Any of the following policies: • Status Display • Maintenance Operation	OK	OK	OK	NG	OK	OK
Battery (BBU) (*1)		OK	OK	OK	NG	OK	OK
PCIe Flash Module	Status Display	OK	OK	OK	NG	OK	OK
Performance (PCIe Flash Module)		OK	OK	OK	NG	OK	OK
Performance (CA)	Any of the following policies: • Status Display • Maintenance Operation	OK	OK	OK	NG	OK	OK
Bootup and Utility Device		OK	OK	OK	NG	OK	OK
Power Supply Unit (CE)		OK	OK	OK	NG	OK	OK
Battery (BTU/ BCU) (*2)		OK	OK	OK	NG	OK	OK
Frontend Enclosure		OK	OK	OK	NG	OK	OK
Frontend Router		OK	OK	OK	NG	OK	OK
Service Controller		OK	OK	OK	NG	OK	OK
Power Supply Unit (FE)		OK	OK	OK	NG	OK	OK
FAN Unit		OK	OK	OK	NG	OK	OK
Operation Panel		OK	OK	OK	NG	OK	OK
Drive Enclosure		OK	OK	OK	NG	OK	OK
I/O Module		OK	OK	OK	NG	OK	OK
Port Error Statistics	Maintenance Information	NG	OK	NG	NG	OK	OK
Power Supply Unit (DE)	Any of the following policies: • Status Display • Maintenance Operation	OK	OK	OK	NG	OK	OK
Fan Expander Module		OK	OK	OK	NG	OK	OK

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Drives	Any of the following policies: • Status Display • RAID Group Management • Maintenance Information • Maintenance Operation	OK	OK	OK	NG	OK	OK
Performance (Drive)	Any of the following policies: • Status Display • Maintenance Information	OK	OK	OK	NG	OK	OK
Drive Error Statistics	Maintenance Information	NG	OK	NG	NG	OK	OK

*1:   This function is available for the ETERNUS DX60 S4/DX100 S4/DX200 S4 and the ETERNUS AF250 S2.

*2:   This function is available for the ETERNUS DX500 S4/DX600 S4, the ETERNUS DX500 S3/DX600 S3, the ETERNUS DX8100 S3/DX8700 S3/DX8900 S3, the ETERNUS AF650 S2, and the ETERNUS AF650.

■ Component Management (Action)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Add Drive Enclosure	Any of the following policies: • Storage Management (*1) • Maintenance Operation	NG	OK	NG	NG	NG	OK
Turn on Locator Beacon/Turn off Locator Beacon	Status Display	OK	OK	OK	NG	OK	OK
Add Channel Adapter Port (*2)	Any of the following policies: • Storage Management • Maintenance Operation	NG	OK	NG	NG	NG	OK
Assign Global Hot Spare	RAID Group Management	NG	OK	OK	NG	NG	OK
Release Global Hot Spare		NG	OK	OK	NG	NG	OK
Assign Dedicated Hot Spare		NG	OK	OK	NG	NG	OK
Release Dedicated Hot Spare		NG	OK	OK	NG	NG	OK

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Force Enable Module	Any of the following policies: • Storage Management (*3) • Maintenance Operation	NG	OK	NG	NG	NG	OK
Recover NAS System Volume	Any of the following policies: • Storage Management • Maintenance Operation	NG	OK	NG	NG	NG	OK
Export Performance Information	Status Display	OK	OK	OK	NG	OK	OK
Clear Drive Error Statistics (All Drives)	Maintenance Information	NG	OK	NG	NG	OK	OK
Clear Drive Error Statistics (Selected Drives)		NG	OK	NG	NG	OK	OK

*1:   This function is available for the ETERNUS DX60 S4/DX100 S4/DX200, the ETERNUS DX60 S3/DX100 S3/DX200 S3, the ETER-
       NUS AF250 S2, and the ETERNUS AF250.

*2:   This function is available for the ETERNUS DX60 S4/DX100 S4 and the ETERNUS DX60 S3/DX100 S3.

*3:   For users with the "Storage Management" policy, the NAS Engine can only be forcibly enabled.

■ Volume Management (Display)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Volume (Basic Information)	Any of the following policies: • Status Display • Volume - Create / Modify • Volume - Delete / Format • Host Interface Management • Maintenance Operation	OK	OK	OK	NG	OK	OK
Performance (Host I/O)	Volume - Create / Modify	NG	OK	OK	NG	NG	OK
Performance (QoS)	Any of the following policies: • Status Display • Volume - Create / Modify	OK	OK	OK	NG	OK	OK
Performance (Advanced Copy)	Status Display	OK	OK	OK	NG	OK	OK

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
LUN Group	Any of the following policies: • Status Display • Host Interface Management	OK	OK	OK	NG	OK	OK
Reservation		OK	OK	OK	NG	OK	OK
Pinned Data	Any of the following policies: • Status Display • Maintenance Operation	OK	OK	OK	NG	OK	OK
Bad Sector		OK	OK	OK	NG	OK	OK
Balancing Thin Provisioning Volume	Any of the following policies: • Status Display • Volume - Create / Modify	OK	OK	OK	NG	OK	OK
Snapshot	Any of the following policies: • Status Display • NAS Management	OK	OK	OK	NG	OK	OK

■ **Volume Management (Action)**

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Create Volume	Volume - Create / Modify	NG	OK	OK	NG	NG	OK
Delete Volume	Volume - Delete / Format	NG	OK	OK	NG	NG	OK
Rename Volume	Volume - Create / Modify	NG	OK	OK	NG	NG	OK
Format Volume	Volume - Delete / Format	NG	OK	OK	NG	NG	OK
Expand Volume	Volume - Create / Modify	NG	OK	OK	NG	NG	OK
Encrypt Volume		NG	OK	OK	NG	NG	OK
Expand Thin Provisioning Volume		NG	OK	OK	NG	NG	OK
Modify Thin Provisioning Volume Threshold		NG	OK	OK	NG	NG	OK
Optimize TPV/FTV Capacity	RAID Group Management	NG	OK	OK	NG	NG	OK
Cancel Optimizing TPV/FTV Capacity		NG	OK	OK	NG	NG	OK
Start Balancing of Thin Provisioning Volume	Volume - Create / Modify	NG	OK	OK	NG	NG	OK
Stop Balancing of Thin Provisioning Volume		NG	OK	OK	NG	NG	OK
Reconfigure NAS Volume		NG	OK	OK	NG	NG	OK
Set Allocation		NG	OK	OK	NG	NG	OK

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Delete Snap Data Pool Volume	Volume - Delete / Format	NG	OK	OK	NG	NG	OK
Force Delete Snap Data Pool Volume		NG	OK	OK	NG	NG	OK
Initialize Snap Data Volume		NG	OK	OK	NG	NG	OK
Start RAID Migration (*1)	Volume - Create / Modify	NG	OK	OK	NG	NG	OK
Stop RAID Migration		NG	OK	OK	NG	NG	OK
Stop External Volume Data Synchronization		NG	OK	OK	NG	NG	OK
Forbid Advanced Copy		NG	OK	OK	NG	NG	OK
Permit Advanced Copy		NG	OK	OK	NG	NG	OK
Release Reservation	Host Interface Management	NG	OK	OK	NG	NG	OK
Modify Cache Parameters	Volume - Create / Modify	NG	OK	OK	NG	NG	OK
Export Cache Parameters		NG	OK	OK	NG	NG	OK
Export Performance Information	Status Display	OK	OK	OK	NG	OK	OK
Set ALUA	Host Interface Management	NG	OK	OK	NG	NG	OK
Set Volume QoS	Volume - Create / Modify	NG	OK	OK	NG	NG	OK
Set Snapshot	NAS Management	NG	OK	OK	NG	NG	OK
Delete Snapshot		NG	OK	OK	NG	NG	OK
Start Snapshot		NG	OK	OK	NG	NG	OK
Stop Snapshot		NG	OK	OK	NG	NG	OK
Delete External LU Information	Volume - Create / Modify	NG	OK	OK	NG	NG	OK

*1: When performing migration from an encrypted volume to a non-encrypted volume, the "Security Setting" policy is also required.

■ **Connectivity Management (Display)**

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Connectivity (Basic Information)	Any of the following policies: • Status Display • Host Interface Management	OK	OK	OK	NG	OK	OK
Host Group		OK	OK	OK	NG	OK	OK
FC/FCoE Host		OK	OK	OK	NG	OK	OK
iSCSI Host		OK	OK	OK	NG	OK	OK
SAS Host		OK	OK	OK	NG	OK	OK
CA Port Group		OK	OK	OK	NG	OK	OK
FC Port		OK	OK	OK	NG	OK	OK
iSCSI Port		OK	OK	OK	NG	OK	OK
SAS Port		OK	OK	OK	NG	OK	OK
FCoE Port		OK	OK	OK	NG	OK	OK
LUN Group		OK	OK	OK	NG	OK	OK
Host Response		OK	OK	OK	NG	OK	OK
CA Reset Group		OK	OK	OK	NG	OK	OK
Host-LU QoS	Host Interface Management	NG	OK	OK	NG	NG	OK
Host QoS (Basic)		NG	OK	OK	NG	NG	OK
FC/FCoE Host QoS		NG	OK	OK	NG	NG	OK
iSCSI Host QoS		NG	OK	OK	NG	NG	OK
SAS Host QoS		NG	OK	OK	NG	NG	OK
Port QoS (Basic)		NG	OK	OK	NG	NG	OK
FC Port QoS		NG	OK	OK	NG	NG	OK
iSCSI Port QoS		NG	OK	OK	NG	NG	OK
SAS Port QoS		NG	OK	OK	NG	NG	OK
FCoE Port QoS		NG	OK	OK	NG	NG	OK
LU QoS Group		NG	OK	OK	NG	NG	OK
NAS	Status Display	OK	OK	OK	NG	OK	OK
NAS Interface		OK	OK	OK	NG	OK	OK
Environment Settings	Any of the following policies: • Status Display • NAS Management	OK	OK	OK	NG	OK	OK
Quota Management		OK	OK	OK	NG	OK	OK
Meta Cache Distribution		OK	OK	OK	NG	OK	OK

■ Connectivity Management (Action)

Host Affinity Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Create Host Affinity	Host Interface Management	NG	OK	OK	NG	NG	OK
Delete Host Affinity		NG	OK	OK	NG	NG	OK
Modify Host Affinity		NG	OK	OK	NG	NG	OK

Host Group Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Add FC/FCoE Host Group	Host Interface Management	NG	OK	OK	NG	NG	OK
Add iSCSI Host Group		NG	OK	OK	NG	NG	OK
Add SAS Host Group		NG	OK	OK	NG	NG	OK
Delete Host Group		NG	OK	OK	NG	NG	OK
Modify Host Group		NG	OK	OK	NG	NG	OK
Add FC/FCoE Host		NG	OK	OK	NG	NG	OK
Add iSCSI Host		NG	OK	OK	NG	NG	OK
Add SAS Host		NG	OK	OK	NG	NG	OK
Delete FC/FCoE Host		NG	OK	OK	NG	NG	OK
Delete iSCSI Host		NG	OK	OK	NG	NG	OK
Delete SAS Host		NG	OK	OK	NG	NG	OK
Modify FC/FCoE Host		NG	OK	OK	NG	NG	OK
Modify iSCSI Host		NG	OK	OK	NG	NG	OK
Modify SAS Host		NG	OK	OK	NG	NG	OK

CA Port Group Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Create FC Port Group	Host Interface Management	NG	OK	OK	NG	NG	OK
Create iSCSI Port Group		NG	OK	OK	NG	NG	OK
Create SAS Port Group		NG	OK	OK	NG	NG	OK
Create FCoE Port Group		NG	OK	OK	NG	NG	OK
Delete CA Port Group		NG	OK	OK	NG	NG	OK
Modify CA Port Group		NG	OK	OK	NG	NG	OK
Modify FC Port Parameters		NG	OK	OK	NG	NG	OK
Modify iSCSI Port Parameters		NG	OK	OK	NG	NG	OK
Modify SAS Port Parameters		NG	OK	OK	NG	NG	OK
Modify FCoE Port Parameters		NG	OK	OK	NG	NG	OK
Modify Port Mode		NG	OK	OK	NG	NG	OK

LUN Group Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Add LUN Group	Host Interface Management	NG	OK	OK	NG	NG	OK
Delete LUN Group		NG	OK	OK	NG	NG	OK
Modify LUN Group		NG	OK	OK	NG	NG	OK

Host Response Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Add Host Response	Host Interface Management	NG	OK	OK	NG	NG	OK
Delete Host Response		NG	OK	OK	NG	NG	OK
Modify Host Response		NG	OK	OK	NG	NG	OK

Modify CA Reset Group

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Modify CA Reset Group	Host Interface Management	NG	OK	OK	NG	NG	OK

Host-LU QoS Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Enable/Disable QoS	Host Interface Management	NG	OK	OK	NG	NG	OK
Initialize QoS	Any of the following policies: • Volume - Create / Modify • Host Interface Management	NG	OK	OK	NG	NG	OK
Set Host-LU QoS	Host Interface Management	NG	OK	OK	NG	NG	OK
Release Host-LU QoS		NG	OK	OK	NG	NG	OK
Start Host-LU QoS Performance Monitoring		NG	OK	OK	NG	NG	OK
Stop Host-LU QoS Performance Monitoring		NG	OK	OK	NG	NG	OK
Set FC/FCoE Host QoS		NG	OK	OK	NG	NG	OK
Set iSCSI Host QoS		NG	OK	OK	NG	NG	OK
Set SAS Host QoS		NG	OK	OK	NG	NG	OK
Set FC Port QoS		NG	OK	OK	NG	NG	OK
Set iSCSI Port QoS		NG	OK	OK	NG	NG	OK
Set SAS Port QoS		NG	OK	OK	NG	NG	OK
Set FCoE Port QoS		NG	OK	OK	NG	NG	OK
Add LU QoS Group		NG	OK	OK	NG	NG	OK
Delete LU QoS Group		NG	OK	OK	NG	NG	OK
Modify LU QoS Group		NG	OK	OK	NG	NG	OK

NAS Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Create Shared Folder	NAS Management	NG	OK	OK	NG	NG	OK
Delete Shared Folder		NG	OK	OK	NG	NG	OK
Modify Shared Folder		NG	OK	OK	NG	NG	OK
Clear NAS Data		NG	OK	OK	NG	NG	OK
Create NAS Interface		NG	OK	OK	NG	NG	OK
Delete NAS Interface		NG	OK	OK	NG	NG	OK
Modify NAS Interface		NG	OK	OK	NG	NG	OK
Change NAS Server Name		NG	OK	OK	NG	NG	OK
Set DNS Server		NG	OK	OK	NG	NG	OK
Set Authentication Server		NG	OK	OK	NG	NG	OK

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Add Local User	NAS Management	NG	OK	OK	NG	NG	OK
Delete Local User		NG	OK	OK	NG	NG	OK
Modify Local User		NG	OK	OK	NG	NG	OK
Add Local Group		NG	OK	OK	NG	NG	OK
Delete Local Group		NG	OK	OK	NG	NG	OK
Add Quota Setting		NG	OK	OK	NG	NG	OK
Delete Quota Setting		NG	OK	OK	NG	NG	OK
Modify Quota Setting		NG	OK	OK	NG	NG	OK
Initialize Meta Cache Distribution		NG	OK	OK	NG	NG	OK
Enable Automatic Meta Cache Distribution		NG	OK	OK	NG	NG	OK
Disable Automatic Meta Cache Distribution		NG	OK	OK	NG	NG	OK

■ RAID Group Management (Display)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
RAID Group (Basic Information)	Any of the following policies: • Status Display • RAID Group Management • Volume - Create / Modify • Maintenance Operation	OK	OK	OK	NG	OK	OK
Tuning	Any of the following policies: • Status Display • RAID Group Management	OK	OK	OK	NG	OK	OK
Eco-mode Schedule (RAID Group)		OK	OK	OK	NG	OK	OK
SED Key Group		OK	OK	OK	NG	OK	OK
External RAID Group	Any of the following policies: • Status Display • RAID Group Management • Maintenance Operation	OK	OK	OK	NG	OK	OK

■ **RAID Group Management (Action)**

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Create RAID Group	RAID Group Management	NG	OK	OK	NG	NG	OK
Delete RAID Group		NG	OK	OK	NG	NG	OK
Rename RAID Group		NG	OK	OK	NG	NG	OK
Change Controlling CM		NG	OK	OK	NG	NG	OK
Expand RAID Group		NG	OK	OK	NG	NG	OK
Modify RAID Group Parameters		NG	OK	OK	NG	NG	OK
Assign Eco-mode Schedule (RAID Group)		NG	OK	OK	NG	NG	OK
Set Key Group (RAID Group)	All of the following policies: • RAID Group Management • Security Setting	NG	OK	NG	NG	NG	NG
Recovery SED		NG	OK	NG	NG	NG	NG

External RAID Group Management

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Create External RAID Group	RAID Group Management	NG	OK	OK	NG	NG	OK
Delete External RAID Group		NG	OK	OK	NG	NG	OK
Recover External RAID Group		NG	OK	OK	NG	NG	OK

■ **Thin Provisioning Management (Display)**

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Thin Provisioning Pool (Basic Information)	Any of the following policies: • Status Display • RAID Group Management • Volume - Create / Modify • Volume - Delete / Format	OK	OK	OK	NG	OK	OK

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Threshold (Thin Provisioning Pool)	Any of the following policies: • Status Display • RAID Group Management	OK	OK	OK	NG	OK	OK
Eco-mode Schedule (Thin Provisioning Pool)		OK	OK	OK	NG	OK	OK
Flexible Tier Pool (Basic Information)	Any of the following policies: • Status Display • RAID Group Management • Volume - Delete / Format	OK	OK	OK	NG	OK	OK
Settings (Thin Provisioning)	Status Display	OK	OK	OK	NG	OK	OK

■ Thin Provisioning Management (Action)

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Set Thin Provisioning	Storage Management	NG	OK	NG	NG	NG	OK
Create Thin Provisioning Pool	RAID Group Management	NG	OK	OK	NG	NG	OK
Delete Thin Provisioning Pool		NG	OK	OK	NG	NG	OK
Rename Thin Provisioning Pool		NG	OK	OK	NG	NG	OK
Expand Thin Provisioning Pool		NG	OK	OK	NG	NG	OK
Format Thin Provisioning Pool (All Area)		NG	OK	OK	NG	NG	OK
Format Thin Provisioning Pool (Unformatted Area)		NG	OK	OK	NG	NG	OK
Set Deduplication/ Compression	Storage Management	NG	OK	NG	NG	NG	OK
Modify Threshold Thin Provisioning Pool	RAID Group Management	NG	OK	OK	NG	NG	OK
Modify Cache Parameters (Thin Provisioning Pool)		NG	OK	OK	NG	NG	OK
Assign Eco-mode Schedule (Thin Provisioning Pool)		NG	OK	OK	NG	NG	OK
Start Balancing Flexible Tier Pool	Volume - Create / Modify	NG	OK	OK	NG	NG	OK
Stop Balancing Flexible Tier Pool		NG	OK	OK	NG	NG	OK

■ **Advanced Copy Management (Display)**

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Advanced Copy (Basic Information)	Any of the following policies: • Status Display • Advanced Copy Management • Copy Session Management • Storage Management	OK	OK	OK	NG	OK	OK
Advanced Copy (All Local Sessions)	Any of the following policies: • Status Display • Copy Session Management	OK	OK	OK	NG	OK	OK
EC		OK	OK	OK	NG	OK	OK
OPC		OK	OK	OK	NG	OK	OK
QuickOPC		OK	OK	OK	NG	OK	OK
SnapOPC		OK	OK	OK	NG	OK	OK
SnapOPC+		OK	OK	OK	NG	OK	OK
Monitor		OK	OK	OK	NG	OK	OK
Advanced Copy (All Remote Sessions)		OK	OK	OK	NG	OK	OK
REC		OK	OK	OK	NG	OK	OK
ODX Sessions		OK	OK	OK	NG	OK	OK
XCOPY Sessions		OK	OK	OK	NG	OK	OK
Virtual Volume Sessions	Any of the following policies: • Status Display • Copy Session Management	OK	OK	OK	NG	OK	OK
Settings (Advanced Copy)	Any of the following policies: • Status Display • Advanced Copy Management • Copy Session Management • Storage Management (*1)	OK	OK	OK	NG	OK	OK
Snap Data Pool	Any of the following policies: • Status Display • Advanced Copy Management	OK	OK	OK	NG	OK	OK
Copy Path		OK	OK	OK	NG	OK	OK
REC Buffer		OK	OK	OK	NG	OK	OK
REC Disk Buffer		OK	OK	OK	NG	OK	OK

*1:   When displaying the set state for the Advanced Copy license, the "Storage Management" policy is also required.

■ **Advanced Copy Management (Action)**

Function	Required Policy for this Function	Availability of Executions in the Default Role					
		Monitor	Admin	Storage Admin	Account Admin	Security Admin	Main-tainer
Start SnapOPC+	Copy Session Management	NG	OK	OK	NG	NG	OK
Stop Copy Session		NG	OK	OK	NG	NG	OK
Register Advanced Copy License	Storage Management	NG	OK	NG	NG	NG	OK
Delete Advanced Copy License		NG	OK	NG	NG	NG	OK
Modify EC/OPC Priority	Advanced Copy Management	NG	OK	OK	NG	NG	OK
Modify Copy Table Size		NG	OK	OK	NG	NG	OK
Modify Copy Parameters		NG	OK	OK	NG	NG	OK
Export Storage Information		NG	OK	OK	NG	NG	OK
Set Copy Path		NG	OK	OK	NG	NG	OK
Delete All Copy Path		NG	OK	OK	NG	NG	OK
Export All Copy Path		NG	OK	OK	NG	NG	OK
Measure Round Trip Time	Advanced Copy Management	NG	OK	OK	NG	NG	OK
Modify REC Buffer		NG	OK	OK	NG	NG	OK
Create REC Disk Buffer		NG	OK	OK	NG	NG	OK
Assign REC Disk Buffer		NG	OK	OK	NG	NG	OK
Delete REC Disk Buffer		NG	OK	OK	NG	NG	OK
Format REC Disk Buffer		NG	OK	OK	NG	NG	OK
Modify REC Multiplicity		NG	OK	OK	NG	NG	OK
Set REC Bandwidth Limit		NG	OK	OK	NG	NG	OK
Enable ODX	Any of the following policies: • Volume - Create / Modify • Volume - Delete / Format • Advanced Copy Management	NG	OK	OK	NG	NG	OK
Disable ODX		NG	OK	OK	NG	NG	OK
Create ODX Buffer Volume		NG	OK	OK	NG	NG	OK

OK: Available function
NG: Unavailable function

D. Supported Functions for Each Controller Firmware Version

This appendix shows the functions that are supported for each controller firmware version. A "✓" symbol indicates that the function is supported for the specified firmware versions.

Function	Controller firmware version														
	V10L10	V10L14	V10L16	V10L20	V10L21	V10L30	V10L32	V10L33	V10L40	V10L51	V10L53	V10L60	V10L70	V10L80	V10L82
Overview															
Overview	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
System															
System (Basic Information)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Network	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Remote Support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
REMCS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
AIS Connect	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Root Certificate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Key Management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Key Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Define Role	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Eco-mode	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Event/Dump	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Audit Log	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Firmware Maintenance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Storage Migration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
External Drives	–	–	–	–	–	–	–	–	–	–	–	–	–	✓	✓
Utility	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
System Settings	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Initial Setup	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Change User Password	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set SSH Public Key	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set Deduplication/Compression Mode	–	–	–	–	–	–	–	–	–	–	–	✓	✓	✓	✓
Register Non-disruptive Storage Migration License	–	–	–	–	–	–	–	–	–	–	–	–	–	✓	✓
Delete Non-disruptive Storage Migration License	–	–	–	–	–	–	–	–	–	–	–	–	–	✓	✓
System Management															
Modify Storage System Name	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Date and Time	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Change Box ID	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Subsystem Parameters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Encryption Mode	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup SMI-S Environment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Register SED Authentication Key	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Power Management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Extreme Cache	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Exclusive Read Cache	–	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Function	Controller firmware version														
	V10L10	V10L14	V10L16	V10L20	V10L21	V10L30	V10L32	V10L33	V10L40	V10L51	V10L53	V10L60	V10L70	V10L80	V10L82
Setup Disk Drive Patrol	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Debug Mode	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Utility Management															
Shutdown/Restart Storage System	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Backup Configuration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Export Configuration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Start/Stop Performance Monitoring	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Clear Cache	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Eco-mode Management															
Modify Eco-mode General Setting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create Eco-mode Schedule	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Eco-mode Schedule	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Eco-mode Schedule	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
User Management															
Setup User Account	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Initialize User Account	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify User Policy	–	–	–	–	–	–	–	–	–	–	–	–	✓	✓	✓
Modify RADIUS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Add Role	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Role	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Role	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Network Management															
Setup Network Environment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Firewall	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup SNMP Agent Basic Interface	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup SNMP Manager	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup SNMP Agent MIB Access View	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup SNMP Agent User	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup SNMP Agent Community	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup SNMP Agent Trap	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Download MIB File	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Send SNMP Trap Test	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Display SMTP Log	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup E-Mail Notification	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Syslog	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup SSH Server Key	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create Self-signed SSL Certificate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create Key/CSR	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Register SSL Certificate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup SSL Version	–	–	–	–	–	–	–	–	–	–	–	–	✓	✓	✓
Event/Dump Management															
Setup Event Notification	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Display/Delete Event Log	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Function	Controller firmware version														
	V10L10	V10L14	V10L16	V10L20	V10L21	V10L30	V10L32	V10L33	V10L40	V10L51	V10L53	V10L60	V10L70	V10L80	V10L82
Export/Delete Log	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Export/Delete Panic Dump	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Audit Log Management															
Enable Audit Log	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Disable Audit Log	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Audit Log	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Key Management															
Setup Key Management Machine Name	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Add Key Server	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Key Server	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Key Server	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create Key Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Key Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Key Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Update SED Authentication Key	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Import SSL/KMIP Certificate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Storage Migration Management															
Start Storage Migration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Download Template File for Storage Migration Settings	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Storage Migration Path	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Download Storage Migration Result	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Restart Storage Migration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Suspend Storage Migration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stop Storage Migration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
External Drive Management															
Create External Drive	–	–	–	–	–	–	–	–	–	–	–	–	–	✓	✓
Delete External Drive	–	–	–	–	–	–	–	–	–	–	–	–	–	✓	✓
Remote Support Management (REMCS)															
Display Communication Log	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Remote Support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Update Customer Information	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Update Communication Environment Information	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Log Sending Parameters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stop/Restart Remote Support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Remote Support Management (AIS Connect)															
Setup AIS Connect Environment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Remote Session Permission	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Send Log	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Test Server Connectivity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Send AIS Connect Test Event	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Import Root Certificate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Function	Controller firmware version														
	V10L10	V10L14	V10L16	V10L20	V10L21	V10L30	V10L32	V10L33	V10L40	V10L51	V10L53	V10L60	V10L70	V10L80	V10L82
Firmware Management															
Apply Controller Firmware	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Controller Firmware Schedule	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Component															
Storage (Basic Information)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Controller Enclosure	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Controller Module	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Performance (CM)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Channel Adapter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Performance (CA)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Battery (BBU)	–	–	–	–	–	–	–	–	–	–	–	–	✓	✓	✓
PCIe Flash Module	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Performance (PCIe Flash Module)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bootup and Utility Device	–	–	–	–	–	–	–	–	–	–	–	✓	✓	✓	✓
Power Supply Unit (CE)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Battery (BTU/BCU)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Frontend Enclosure	–	–	–	–	–	–	–	–	✓	✓	✓	✓	✓	✓	✓
Frontend Router	–	–	–	–	–	–	–	–	✓	✓	✓	✓	✓	✓	✓
Service Controller	–	–	–	–	–	–	–	–	✓	✓	✓	✓	✓	✓	✓
Power Supply Unit (FE)	–	–	–	–	–	–	–	–	✓	✓	✓	✓	✓	✓	✓
FAN Unit	–	–	–	–	–	–	–	–	✓	✓	✓	✓	✓	✓	✓
Operation Panel	–	–	–	–	–	–	–	–	✓	✓	✓	✓	✓	✓	✓
Drive Enclosure	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
I/O Module	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Port Error Statistics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Power Supply Unit (DE)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Fan Expander Module	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Drives	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Performance (Drive)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Drive Error Statistics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Assign Global Hot Spare	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Release Global Hot Spare	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Assign Dedicated Hot Spare	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Release Dedicated Hot Spare	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Turn on Locator Beacon/Turn off Locator Beacon	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Add Drive Enclosure	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Add Channel Adapter Port	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NAS Recovery Management															
Force Enable Module	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Recover NAS System Volume	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Export Performance Information	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Clear Drive Error Statistics (All Drives)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Clear Drive Error Statistics (Selected Drives)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Function	Controller firmware version														
	V10L10	V10L14	V10L16	V10L20	V10L21	V10L30	V10L32	V10L33	V10L40	V10L51	V10L53	V10L60	V10L70	V10L80	V10L82
Volume															
Volume (Basic Information)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Performance (Host I/O)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Performance (QoS)	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Performance (Advanced Copy)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
LUN Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Reservation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pinned Data	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bad Sector	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Balancing Thin Provisioning Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Snapshot	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rename Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Format Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Expand Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Encrypt Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
TPV Management															
Expand Thin Provisioning Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Thin Provisioning Volume Threshold	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Optimize TPV/FTV Capacity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cancel Optimizing TPV/FTV Capacity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Start Balancing Thin Provisioning Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stop Balancing Thin Provisioning Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Reconfigure NAS Volume	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set Allocation	–	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SDV/SDPV Management															
Delete Snap Data Pool Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Force Delete Snap Data Pool Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Initialize Snap Data Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Start RAID Migration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stop RAID Migration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stop External Volume Data Synchronization	–	–	–	–	–	–	–	–	–	–	–	–	–	–	✓
Forbid Advanced Copy	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Permit Advanced Copy	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Release Reservation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Cache Parameters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Export Cache Parameters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Export Performance Information	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set ALUA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set Volume QoS	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Function	V10L10	V10L14	V10L16	V10L20	V10L21	V10L30	V10L32	V10L33	V10L40	V10L51	V10L53	V10L60	V10L70	V10L80	V10L82
Controller firmware version															
Snapshot Management for NAS Volumes															
Set Snapshot	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Snapshot	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Start Snapshot	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stop Snapshot	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete External LU Information	–	–	–	–	–	–	–	–	–	–	–	–	–	✓	✓
Connectivity															
Connectivity (Basic Information)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Host Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FC/FCoE Host	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
iSCSI Host	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SAS Host	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CA Port Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FC Port	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
iSCSI Port	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SAS Port	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FCoE Port	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
LUN Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Host Response	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CA Reset Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Host-LU QoS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Host QoS (Basic)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FC/FCoE Host QoS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
iSCSI Host QoS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SAS Host QoS	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Port QoS (Basic)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FC Port QoS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
iSCSI Port QoS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SAS Port QoS	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FCoE Port QoS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
LU QoS Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NAS	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NAS Interface	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Environment Settings	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Quota Management	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Meta Cache Distribution	–	–	–	–	–	–	–	–	–	–	✓	✓	✓	✓	✓
Host Affinity Management															
Create Host Affinity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Host Affinity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Host Affinity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Host Group Management															
Add FC/FCoE Host Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Add iSCSI Host Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Function	Controller firmware version														
	V10L10	V10L14	V10L16	V10L20	V10L21	V10L30	V10L32	V10L33	V10L40	V10L51	V10L53	V10L60	V10L70	V10L80	V10L82
Add SAS Host Group	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Host Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Host Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Host Group (FC/FCoE)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Host Group (iSCSI)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Host Group (SAS)	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Add FC/FCoE Host	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Add iSCSI Host	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Add SAS Host	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete FC/FCoE Host	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete iSCSI Host	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete SAS Host	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify FC/FCoE Host	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify iSCSI Host	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify SAS Host	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CA Port Group Management															
Create FC Port Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create iSCSI Port Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create SAS Port Group	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create FCoE Port Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete CA Port Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify CA Port Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify FC Port Parameters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify iSCSI Port Parameters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify SAS Port Parameters	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify FCoE Port Parameters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Port Mode	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
LUN Group Management															
Add LUN Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete LUN Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify LUN Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Host Response Management															
Add Host Response	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Host Response	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Host Response	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify CA Reset Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Host-LU QoS Management															
Enable/Disable QoS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Initialize QoS	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set Host-LU QoS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Release Host-LU QoS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Start Host-LU QoS Performance Monitoring	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stop Host-LU QoS Performance Monitoring	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Function	Controller firmware version														
	V10L10	V10L14	V10L16	V10L20	V10L21	V10L30	V10L32	V10L33	V10L40	V10L51	V10L53	V10L60	V10L70	V10L80	V10L82
Set FC/FCoE Host QoS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set iSCSI Host QoS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set SAS Host QoS	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set FC Port QoS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set iSCSI Port QoS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set SAS Port QoS	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set FCoE Port QoS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Add LU QoS Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete LU QoS Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify LU QoS Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NAS Management															
Create Shared Folder	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Shared Folder	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Shared Folder	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Clear NAS Data	–	–	–	–	–	–	–	–	–	✓	✓	✓	✓	✓	✓
Create NAS Interface	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete NAS Interface	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify NAS Interface	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Change NAS Server Name	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set DNS Server	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set Authentication Server	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Add Local User	–	–	–	–	–	–	–	–	–	–	✓	✓	✓	✓	✓
Delete Local User	–	–	–	–	–	–	–	–	–	–	✓	✓	✓	✓	✓
Modify Local User	–	–	–	–	–	–	–	–	–	–	✓	✓	✓	✓	✓
Add Local Group	–	–	–	–	–	–	–	–	–	–	✓	✓	✓	✓	✓
Delete Local Group	–	–	–	–	–	–	–	–	–	–	✓	✓	✓	✓	✓
Add Quota Setting	–	–	–	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓
Delete Quota Setting	–	–	–	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓
Modify Quota Setting	–	–	–	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓
Initialize Meta Cache Distribution	–	–	–	–	–	–	–	–	–	–	✓	✓	✓	✓	✓
Enable Automatic Meta Cache Distribution	–	–	–	–	–	–	–	–	–	–	✓	✓	✓	✓	✓
Disable Automatic Meta Cache Distribution	–	–	–	–	–	–	–	–	–	–	✓	✓	✓	✓	✓
RAID Group															
RAID Group (Basic Information)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tuning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Eco-mode Schedule (RAID Group)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SED Key Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create RAID Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
External RAID Group	–	–	–	–	–	–	–	–	–	–	–	–	–	✓	✓
Delete RAID Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rename RAID Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Change Controlling CM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Expand RAID Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

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Function	Controller firmware version														
	V10L10	V10L14	V10L16	V10L20	V10L21	V10L30	V10L32	V10L33	V10L40	V10L51	V10L53	V10L60	V10L70	V10L80	V10L82
Modify RAID Group Parameters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Assign Eco-mode Schedule (RAID Group)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set Key Group (RAID Group)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Recovery SED	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
External RAID Group Management															
Create External RAID Group	–	–	–	–	–	–	–	–	–	–	–	–	–	✓	✓
Delete External RAID Group	–	–	–	–	–	–	–	–	–	–	–	–	–	✓	✓
Recover External RAID Group	–	–	–	–	–	–	–	–	–	–	–	–	–	✓	✓
Thin Provisioning															
Thin Provisioning Pools															
Thin Provisioning Pool (Basic Information)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Threshold (Thin Provisioning Pool)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Eco-mode Schedule (Thin Provisioning Pool)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Flexible Tier Pools															
Flexible Tier Pool (Basic Information)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Settings (Thin Provisioning)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set Thin Provisioning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create Thin Provisioning Pool	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Thin Provisioning Pool	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rename Thin Provisioning Pool	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Expand Thin Provisioning Pool	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Format Thin Provisioning Pool (All Area)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Format Thin Provisioning Pool (Unformatted Area)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set Deduplication/Compression	–	–	–	–	–	–	–	–	–	–	–	✓	✓	✓	✓
Modify Threshold Thin Provisioning Pool	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Cache Parameters (Thin Provisioning Pool)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Assign Eco-mode Schedule (Thin Provisioning Pool)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Start Balancing Flexible Tier Pool	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stop Balancing Flexible Tier Pool	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Advanced Copy															
Advanced Copy (Basic Information)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Advanced Copy (All Local Sessions)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
EC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
OPC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
QuickOPC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SnapOPC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SnapOPC+	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Monitor	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Advanced Copy (All Remote Sessions)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
REC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ODX Sessions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
XCOPY Sessions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Virtual Volume Sessions	–	–	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓

Function	Controller firmware version														
	V10L10	V10L14	V10L16	V10L20	V10L21	V10L30	V10L32	V10L33	V10L40	V10L51	V10L53	V10L60	V10L70	V10L80	V10L82
Settings (Advanced Copy)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Snap Data Pool	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Copy Path	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
REC Buffer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
REC Disk Buffer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Start SnapOPC+	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stop Copy Session	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Register Advanced Copy License	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Advanced Copy License	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify EC/OPC Priority	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Copy Table Size	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Copy Parameters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
REC Management															
Export Storage Information	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set Copy Path	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete All Copy Path	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Export All Copy Path	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Measure Round Trip Time	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify REC Buffer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create REC Disk Buffer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Assign REC Disk Buffer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete REC Disk Buffer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Format REC Disk Buffer	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify REC Multiplicity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set REC Bandwidth Limit	–	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ODX Management															
Enable ODX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Disable ODX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create ODX Buffer Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

✓: Supported
–: Not supported

E. Supported Functions for Each Model

This appendix shows the functions that are supported for each model. A "✓" symbol indicates that the function is supported for the specified models.

Function	ETERNUS DX60 S3	ETERNUS DX100 S3	ETERNUS DX200 S3	ETERNUS DX500 S3	ETERNUS DX600 S3	ETERNUS DX8100 S3	ETERNUS DX8700 S3	ETERNUS DX8900 S3	ETERNUS DX60 S4	ETERNUS DX100 S4	ETERNUS DX200 S4	ETERNUS DX500 S4	ETERNUS DX600 S4	ETERNUS AF250 S2	ETERNUS AF650 S2	ETERNUS AF250	ETERNUS AF650	ETERNUS DX200F
Overview																		
Overview	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
System																		
System (Basic Information)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Network	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Remote Support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
REMCS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
AIS Connect	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Root Certificate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Key Management (*1)	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Key Group	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Define Role	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Eco-mode (*1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–
Event/Dump	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Audit Log	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Firmware Maintenance	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Storage Migration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
External Drives	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Utility	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
System Settings	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Initial Setup	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Change User Password	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set SSH Public Key	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set Deduplication/Compression Mode (*1)	–	–	✓	✓	✓	–	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	–
Register Non-disruptive Storage Migration License	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Non-disruptive Storage Migration License	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
System Management																		
Modify Storage System Name	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Date and Time	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Change Box ID	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Subsystem Parameters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Encryption Mode (*1)	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup SMI-S Environment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Function	Model																	
	ETERNUS DX60 S3	ETERNUS DX100 S3	ETERNUS DX200 S3	ETERNUS DX500 S3	ETERNUS DX600 S3	ETERNUS DX8100 S3	ETERNUS DX8700 S3	ETERNUS DX8900 S3	ETERNUS DX60 S4	ETERNUS DX100 S4	ETERNUS DX200 S4	ETERNUS DX500 S4	ETERNUS DX600 S4	ETERNUS AF250 S2	ETERNUS AF650 S2	ETERNUS AF250	ETERNUS AF650	ETERNUS DX200F
Register SED Authentication Key (*1)	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Power Management	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Extreme Cache	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Exclusive Read Cache	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Disk Drive Patrol	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Debug Mode	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Utility Management																		
Shutdown/Restart Storage System	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Backup Configuration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Export Configuration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Start/Stop Performance Monitoring	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Clear Cache	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Eco–mode Management (*1)																		
Modify Eco–mode General Setting	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–
Create Eco–mode Schedule	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–
Delete Eco–mode Schedule	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–
Modify Eco–mode Schedule	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–
User Management																		
Setup User Account	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Initialize User Account	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify User Policy	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify RADIUS	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Add Role	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Role	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Role	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Network Management																		
Setup Network Environment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Firewall	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup SNMP Agent Basic Interface	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup SNMP Manager	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup SNMP Agent MIB Access View	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup SNMP Agent User	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup SNMP Agent Community	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup SNMP Agent Trap	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Download MIB File	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Function	Model																	
	ETERNUS DX60 S3	ETERNUS DX100 S3	ETERNUS DX200 S3	ETERNUS DX500 S3	ETERNUS DX600 S3	ETERNUS DX8100 S3	ETERNUS DX8700 S3	ETERNUS DX8900 S3	ETERNUS DX60 S4	ETERNUS DX100 S4	ETERNUS DX200 S4	ETERNUS DX500 S4	ETERNUS DX600 S4	ETERNUS AF250 S2	ETERNUS AF650 S2	ETERNUS AF250	ETERNUS AF650	ETERNUS DX200F
Send SNMP Trap Test	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Display SMTP Log	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup E-Mail Notification	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Syslog	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup SSH Server Key	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create Self-signed SSL Certificate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create Key/CSR	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Register SSL Certificate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup SSL Version	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Event/Dump Management																		
Setup Event Notification	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Display/Delete Event Log	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Export/Delete Log	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Export/Delete Panic Dump	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Audit Log Management																		
Enable Audit Log	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Disable Audit Log	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Audit Log	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Key Management (*1)																		
Setup Key Management Machine Name	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Add Key Server	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Key Server	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Key Server	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create Key Group	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Key Group	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Key Group	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Update SED Authentication Key	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Import SSL/KMIP Certificate	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Storage Migration Management																		
Start Storage Migration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Download Template File for Storage Migration Settings	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Storage Migration Path	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Download Storage Migration Result	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Restart Storage Migration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Suspend Storage Migration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stop Storage Migration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Function	ETERNUS DX60 S3	ETERNUS DX100 S3	ETERNUS DX200 S3	ETERNUS DX500 S3	ETERNUS DX600 S3	ETERNUS DX8100 S3	ETERNUS DX8700 S3	ETERNUS DX8900 S3	ETERNUS DX60 S4	ETERNUS DX100 S4	ETERNUS DX200 S4	ETERNUS DX500 S4	ETERNUS DX600 S4	ETERNUS AF250 S2	ETERNUS AF650 S2	ETERNUS AF250	ETERNUS AF650	ETERNUS DX200F
External Drive Management																		
Create External Drive	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete External Drive	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Remote Support Management (REMCS)																		
Display Communication Log	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Remote Support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Update Customer Information	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Update Communication Environment Information	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Log Sending Parameters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stop/Restart Remote Support	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Remote Support Management (AIS Connect)																		
Setup AIS Connect Environment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Setup Remote Session Permission	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Send Log	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Test Server Connectivity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Send AIS Connect Test Event	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Import Root Certificate	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Firmware Management																		
Apply Controller Firmware	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Controller Firmware Schedule	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Component																		
Storage (Basic Information)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Controller Enclosure	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Controller Module	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Performance (CM)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Channel Adapter	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Performance (CA)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Battery (BBU) (*1)	–	–	–	–	–	–	–	–	✓	✓	✓	–	–	✓	–	–	–	–
PCIe Flash Module (*1)	–	–	–	✓	✓	–	✓	✓	–	–	–	✓	✓	–	–	–	–	–
Performance (PCIe Flash Module) (*1)	–	–	–	✓	✓	–	✓	✓	–	–	–	✓	✓	–	–	–	–	–
Bootup and Utility Device (*1)	–	–	–	–	–	✓	✓	✓	–	–	–	–	–	–	–	–	–	–
Power Supply Unit (CE)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Battery (BTU/BCU) (*1)	–	–	–	✓	✓	✓	✓	✓	–	–	–	✓	✓	–	✓	–	✓	–
Frontend Enclosure (*1)	–	–	–	–	–	–	✓	✓	–	–	–	–	–	–	–	–	–	–
Frontend Router	–	–	–	–	–	–	✓	✓	–	–	–	–	–	–	–	–	–	–
Service Controller	–	–	–	–	–	–	✓	✓	–	–	–	–	–	–	–	–	–	–
Power Supply Unit (FE)	–	–	–	–	–	–	✓	✓	–	–	–	–	–	–	–	–	–	–

Function	ETERNUS DX60 S3	ETERNUS DX100 S3	ETERNUS DX200 S3	ETERNUS DX500 S3	ETERNUS DX600 S3	ETERNUS DX8100 S3	ETERNUS DX8700 S3	ETERNUS DX8900 S3	ETERNUS DX60 S4	ETERNUS DX100 S4	ETERNUS DX200 S4	ETERNUS DX500 S4	ETERNUS DX600 S4	ETERNUS AF250 S2	ETERNUS AF650 S2	ETERNUS AF250	ETERNUS AF650	ETERNUS DX200F
FAN Unit	–	–	–	–	–	–	✓	✓	–	–	–	–	–	–	–	–	–	–
Operation Panel	–	–	–	–	–	–	✓	✓	–	–	–	–	–	–	–	–	–	–
Drive Enclosure (*1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–
I/O Module	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–
Port Error Statistics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–
Power Supply Unit (DE)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–
Fan Expander Module	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–
Drives	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Performance (Drive)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Drive Error Statistics	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Assign Global Hot Spare	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Release Global Hot Spare	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Assign Dedicated Hot Spare	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Release Dedicated Hot Spare	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Turn on Locator Beacon/Turn off Locator Beacon	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Add Drive Enclosure (*1)	✓	✓	✓	–	–	–	–	–	✓	✓	✓	–	–	✓	–	✓	–	–
Add Channel Adapter Port (*1)	✓	✓	–	–	–	–	–	–	✓	✓	–	–	–	–	–	–	–	–
NAS Recovery Management (*1)																		
Force Enable Module	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Recover NAS System Volume	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Export Performance Information	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Clear Drive Error Statistics (All Drives)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Clear Drive Error Statistics (Selected Drives)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Volume																		
Volume (Basic Information)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Performance (Host I/O)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Performance (QoS) (*1)	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Performance (Advanced Copy)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
LUN Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Reservation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Pinned Data	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Bad Sector	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Balancing Thin Provisioning Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Snapshot (*1)	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Create Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rename Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Function	ETERNUS DX60 S3	ETERNUS DX100 S3	ETERNUS DX200 S3	ETERNUS DX500 S3	ETERNUS DX600 S3	ETERNUS DX8100 S3	ETERNUS DX8700 S3	ETERNUS DX8900 S3	ETERNUS DX60 S4	ETERNUS DX100 S4	ETERNUS DX200 S4	ETERNUS DX500 S4	ETERNUS DX600 S4	ETERNUS AF250 S2	ETERNUS AF650 S2	ETERNUS AF250	ETERNUS AF650	ETERNUS DX200F
Format Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Expand Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Encrypt Volume (*1)	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
TPV Management																		
Expand Thin Provisioning Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Thin Provisioning Volume Threshold	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Optimize TPV/FTV Capacity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cancel Optimizing TPV/FTV Capacity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Start Balancing Thin Provisioning Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stop Balancing Thin Provisioning Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Reconfigure NAS Volume (*1)	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Set Allocation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SDV/SDPV Management																		
Delete Snap Data Pool Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Force Delete Snap Data Pool Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Initialize Snap Data Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Start RAID Migration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stop RAID Migration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stop External Volume Data Synchronization	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Forbid Advanced Copy	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Permit Advanced Copy	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Release Reservation	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Cache Parameters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Export Cache Parameters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Export Performance Information	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set ALUA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set Volume QoS (*1)	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Snapshot Management for NAS Volumes (*1)																		
Set Snapshot	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Delete Snapshot	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Start Snapshot	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Stop Snapshot	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Delete External LU Information	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Function	ETERNUS DX60 S3	ETERNUS DX100 S3	ETERNUS DX200 S3	ETERNUS DX500 S3	ETERNUS DX600 S3	ETERNUS DX8100 S3	ETERNUS DX8700 S3	ETERNUS DX8900 S3	ETERNUS DX60 S4	ETERNUS DX100 S4	ETERNUS DX200 S4	ETERNUS DX500 S4	ETERNUS DX600 S4	ETERNUS AF250 S2	ETERNUS AF650 S2	ETERNUS AF250	ETERNUS AF650	ETERNUS DX200F
Connectivity																		
Connectivity (Basic Information)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Host Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FC/FCoE Host	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
iSCSI Host	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SAS Host (*1)	✓	✓	✓	–	–	–	–	–	✓	✓	✓	–	–	–	–	–	–	–
CA Port Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FC Port	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
iSCSI Port	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SAS Port (*1)	✓	✓	✓	–	–	–	–	–	✓	✓	✓	–	–	–	–	–	–	–
FCoE Port (*1)	–	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–	–	–	–	–	–
LUN Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Host Response	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
CA Reset Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Host–LU QoS (*1)	–	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Host QoS (Basic)	–	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FC/FCoE Host QoS	–	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
iSCSI Host QoS	–	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SAS Host QoS	–	✓	✓	–	–	–	–	–	✓	✓	✓	–	–	–	–	–	–	–
Port QoS (Basic)	–	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
FC Port QoS	–	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
iSCSI Port QoS	–	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SAS Port QoS	–	✓	✓	–	–	–	–	–	✓	✓	✓	–	–	–	–	–	–	–
FCoE Port QoS	–	✓	✓	✓	✓	✓	✓	–	–	–	–	–	–	–	–	–	–	–
LU QoS Group	–	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
NAS (*1)	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
NAS Interface	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Environment Settings	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Quota Management	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Meta Cache Distribution	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Host Affinity Management																		
Create Host Affinity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Host Affinity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Host Affinity	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Host Group Management																		
Add FC/FCoE Host Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Add iSCSI Host Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Add SAS Host Group (*1)	✓	✓	✓	–	–	–	–	–	✓	✓	✓	–	–	–	–	–	–	–
Delete Host Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Host Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Function		ETERNUS DX60 S3	ETERNUS DX100 S3	ETERNUS DX200 S3	ETERNUS DX500 S3	ETERNUS DX600 S3	ETERNUS DX8100 S3	ETERNUS DX8700 S3	ETERNUS DX8900 S3	ETERNUS DX60 S4	ETERNUS DX100 S4	ETERNUS DX200 S4	ETERNUS DX500 S4	ETERNUS DX600 S4	ETERNUS AF250 S2	ETERNUS AF650 S2	ETERNUS AF250	ETERNUS AF650	ETERNUS DX200F
	Modify Host Group (FC/FCoE)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Modify Host Group (iSCSI)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Modify Host Group (SAS) (*1)	✓	✓	✓	–	–	–	–	–	✓	✓	✓	–	–	–	–	–	–	–
	Add FC/FCoE Host	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Add iSCSI Host	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Add SAS Host (*1)	✓	✓	✓	–	–	–	–	–	✓	✓	✓	–	–	–	–	–	–	–
	Delete FC/FCoE Host	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Delete iSCSI Host	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Delete SAS Host (*1)	✓	✓	✓	–	–	–	–	–	✓	✓	✓	–	–	–	–	–	–	–
	Modify FC/FCoE Host	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Modify iSCSI Host	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Modify SAS Host (*1)	✓	✓	✓	–	–	–	–	–	✓	✓	✓	–	–	–	–	–	–	–
CA Port Group Management																			
	Create FC Port Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Create iSCSI Port Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Create SAS Port Group (*1)	✓	✓	✓	–	–	–	–	–	✓	✓	✓	–	–	–	–	–	–	–
	Create FCoE Port Group (*1)	–	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–	–	–	–	–	–
	Delete CA Port Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Modify CA Port Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Modify FC Port Parameters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Modify iSCSI Port Parameters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Modify SAS Port Parameters (*1)	✓	✓	✓	–	–	–	–	–	✓	✓	✓	–	–	–	–	–	–	–
	Modify FCoE Port Parameters (*1)	–	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–	–	–	–	–	–
	Modify Port Mode	✓*2	✓	✓	✓	✓	✓	✓	✓	✓*2	✓	✓	✓	✓	✓	✓	✓	✓	✓
LUN Group Management																			
	Add LUN Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Delete LUN Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Modify LUN Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Host Response Management																			
	Add Host Response	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Delete Host Response	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Modify Host Response	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify CA Reset Group		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Host–LU QoS Management (*1)																			
	Enable/Disable QoS	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Initialize QoS	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
	Set Host–LU QoS	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓

Function	Model																	
	ETERNUS DX60 S3	ETERNUS DX100 S3	ETERNUS DX200 S3	ETERNUS DX500 S3	ETERNUS DX600 S3	ETERNUS DX8100 S3	ETERNUS DX8700 S3	ETERNUS DX8900 S3	ETERNUS DX60 S4	ETERNUS DX100 S4	ETERNUS DX200 S4	ETERNUS DX500 S4	ETERNUS DX600 S4	ETERNUS AF250 S2	ETERNUS AF650 S2	ETERNUS AF250	ETERNUS AF650	ETERNUS DX200F
Release Host–LU QoS	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Start Host–LU QoS Performance Monitoring	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stop Host–LU QoS Performance Monitoring	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set FC/FCoE Host QoS	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set iSCSI Host QoS	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set SAS Host QoS	–	✓	✓	–	–	–	–	–	–	✓	✓	–	–	–	–	–	–	–
Set FC Port QoS	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set iSCSI Port QoS	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set SAS Port QoS	–	✓	✓	–	–	–	–	–	–	✓	✓	–	–	–	–	–	–	–
Set FCoE Port QoS	–	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–	–	–	–	–	–
Add LU QoS Group	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete LU QoS Group	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify LU QoS Group	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
NAS Management (*1)																		
Create Shared Folder	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Delete Shared Folder	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Modify Shared Folder	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Clear NAS Data	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Create NAS Interface	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Delete NAS Interface	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Modify NAS Interface	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Change NAS Server Name	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Set DNS Server	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Set Authentication Server	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Add Local User	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Delete Local User	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Modify Local User	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Add Local Group	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Delete Local Group	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Add Quota Setting	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Delete Quota Setting	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Modify Quota Setting	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Initialize Meta Cache Distribution	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Enable Automatic Meta Cache Distribution	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–
Disable Automatic Meta Cache Distribution	–	✓	✓	✓	✓	–	–	–	–	✓	✓	✓	✓	–	–	–	–	–

Function	ETERNUS DX60 S3	ETERNUS DX100 S3	ETERNUS DX200 S3	ETERNUS DX500 S3	ETERNUS DX600 S3	ETERNUS DX8100 S3	ETERNUS DX8700 S3	ETERNUS DX8900 S3	ETERNUS DX60 S4	ETERNUS DX100 S4	ETERNUS DX200 S4	ETERNUS DX500 S4	ETERNUS DX600 S4	ETERNUS AF250 S2	ETERNUS AF650 S2	ETERNUS AF250	ETERNUS AF650	ETERNUS DX200F
RAID Group																		
RAID Group (Basic Information)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Tuning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Eco-mode Schedule (RAID Group) (*1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–
SED Key Group (*1)	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
External RAID Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create RAID Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete RAID Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rename RAID Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Change Controlling CM	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Expand RAID Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify RAID Group Parameters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Assign Eco-mode Schedule (RAID Group) (*1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–
Set Key Group (RAID Group) (*1)	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Recovery SED (*1)	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
External RAID Group Management																		
Create External RAID Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete External RAID Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Recover External RAID Group	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Thin Provisioning (*3)																		
Thin Provisioning Pools																		
Thin Provisioning Pool (Basic Information)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Threshold (Thin Provisioning Pool)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Eco-mode Schedule (Thin Provisioning Pool) (*1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–
Flexible Tier Pools (*1)																		
Flexible Tier Pool (Basic Information)	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Settings (Thin Provisioning)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set Thin Provisioning	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create Thin Provisioning Pool	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Thin Provisioning Pool	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rename Thin Provisioning Pool	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Expand Thin Provisioning Pool	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Format Thin Provisioning Pool (All Area)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Format Thin Provisioning Pool (Unformatted Area)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Function	ETERNUS DX60 S3	ETERNUS DX100 S3	ETERNUS DX200 S3	ETERNUS DX500 S3	ETERNUS DX600 S3	ETERNUS DX8100 S3	ETERNUS DX8700 S3	ETERNUS DX8900 S3	ETERNUS DX60 S4	ETERNUS DX100 S4	ETERNUS DX200 S4	ETERNUS DX500 S4	ETERNUS DX600 S4	ETERNUS AF250 S2	ETERNUS AF650 S2	ETERNUS AF250	ETERNUS AF650	ETERNUS DX200F
Set Deduplication/Compression (*1)	–	–	✓	✓	✓	–	–	–	–	–	✓	✓	✓	✓	✓	✓	✓	–
Modify Threshold Thin Provisioning Pool	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Cache Parameters (Thin Provisioning Pool)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Assign Eco–mode Schedule (Thin Provisioning Pool) (*1)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	–	–	–	–	–
Start Balancing Flexible Tier Pool (*1)	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stop Balancing Flexible Tier Pool (*1)	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Advanced Copy																		
Advanced Copy (Basic Information)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Advanced Copy (All Local Sessions)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
EC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
OPC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
QuickOPC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SnapOPC	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
SnapOPC+	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Monitor	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Advanced Copy (All Remote Sessions) (*1)	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
REC	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
ODX Sessions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
XCOPY Sessions	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Virtual Volume Sessions (*1)	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Settings (Advanced Copy)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Snap Data Pool	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Copy Path (*1)	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
REC Buffer (*1)	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
REC Disk Buffer (*1)	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Start SnapOPC+	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Stop Copy Session	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Register Advanced Copy License	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete Advanced Copy License	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify EC/OPC Priority	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Copy Table Size	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify Copy Parameters	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
REC Management (*1)																		
Export Storage Information	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set Copy Path	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓

Function	ETERNUS DX60 S3	ETERNUS DX100 S3	ETERNUS DX200 S3	ETERNUS DX500 S3	ETERNUS DX600 S3	ETERNUS DX8100 S3	ETERNUS DX8700 S3	ETERNUS DX8900 S3	ETERNUS DX60 S4	ETERNUS DX100 S4	ETERNUS DX200 S4	ETERNUS DX500 S4	ETERNUS DX600 S4	ETERNUS AF250 S2	ETERNUS AF650 S2	ETERNUS AF250	ETERNUS AF650	ETERNUS DX200F
Delete All Copy Path	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Export All Copy Path	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Measure Round Trip Time	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify REC Buffer	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create REC Disk Buffer	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Assign REC Disk Buffer	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Delete REC Disk Buffer	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Format REC Disk Buffer	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Modify REC Multiplicity	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
Set REC Bandwidth Limit	–	✓	✓	✓	✓	✓	✓	✓	–	✓	✓	✓	✓	✓	✓	✓	✓	✓
ODX Management																		
Enable ODX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Disable ODX	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Create ODX Buffer Volume	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

✓: Supported, –: Not supported

*1: Some models do not support this function.

*2: If the ETERNUS DX60 S4/DX60 S3 is used with iSCSI or SAS host interfaces, this function is not displayed in [Action].

*3: If the ETERNUS DX60 S4/DX100 S4/DX200 S4 1CM model or the ETERNUS DX60 S/DX100 S3/DX200 S3 1CM model is used, the [Thin Provisioning] navigation is not displayed.

F. Naming Conventions of Volumes, Hosts, and External RAID Groups

This appendix describes the naming conventions for volumes and hosts.

Naming Conventions of Volumes

The following naming conventions apply when creating and renaming volumes. Note that the same conventions apply when creating and renaming RAID groups and when renaming TPPs.

- When creating or renaming multiple volumes at the same time, the volume name is automatically applied to the volumes according to the specified "Name", selected "Start of Suffix", and selected "Digits of Suffix".
  [Example]
    When the specified volume name is "Volume" (six characters), "Start of Suffix" is "90", "Digits of Suffix" is "2", and the number of volumes is "11": The volume names "Volume90" to "Volume100" are applied to the volumes.
- If the automatically applied volume name exceeds the maximum length due to the "Start of Suffix" and "Digits of Suffix" settings, the excess characters are deleted from the specified "Name", and replaced with a "~". The maximum length of the name is as follows:
  - Volume name
    32 characters
  - RAID group name and TPP name
    16 characters
  [Example]
    When the specified volume name is "ETERNUS_DXAF_Standard-XX_VolumeX" (32 characters), "Start of Suffix" is "90", "Digits of Suffix" is "2", and the number of volumes is "11": the volume names "ETERNUS_DXAF_Standard-XX_Volu~90" to "ETERNUS_DXAF_Standard-XX_Vol~100" are applied to the volumes.
- When a volume name including the suffix number already exists, the suffix number is increased by one (+1). The suffix number is increased by one (+1) until no volume names overlap.

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>
> If "Start of Suffix" starts with "0" and it exceeds "Digits of Suffix", the zeros are deleted from "Start of Suffix" and then applied to the volume name.
> [Example 1]
>   When the specified volume name is "Volume", "Start of Suffix" is "000", and "Digits of Suffix" is "1": the volume name "Volume0" is applied to the volume.
> [Example 2]
>   When the specified volume name is "Volume", "Start of Suffix" is "00005", and "Digits of Suffix" is "2": the volume name "Volume05" is applied to the volume.

Naming Conventions When Adding Hosts

The following naming conventions apply when adding hosts:

- A name is automatically applied to a host with the "host group name" and a suffix number "_x" (serial numbers starting with "0").
  [Example]
      When specifying "HOST_Group_001" (14 characters) as the host group name
          Names such as "HOST_Group_001_0" and "HOST_Group_001_1" are applied to the host groups.
- When the host name including the suffix number "_x" has more than 16 characters, the excess number of characters is deleted from the "host group name", starting with the last character and a suffix number "~x" will be added. Then, the name will contain only 16 characters.
  [Example]
      When specifying "HOST_Group_ABCDE" (16 characters) as the host group name
          Names such as "HOST_Group_ABC~0" and "HOST_Group_ABC~1" are applied to the host groups.
- When a host name including the suffix number already exists, the suffix number is increased by one (+1). The suffix number is increased by one (+1) until no host names overlap.
- The hosts, which were selected on the [Now Connected] screen, are named, and then the hosts, which were specified on the [Manual Input] screen, are named next.
- The name of the existing member host will not be changed.

Naming Conventions of External RAID Groups

The following naming conventions apply when creating External RAID Groups:

- When creating multiple External RAID Groups at a time, a name is automatically added to an External RAID Group with the specified "Name" and a suffix number "x" (serial numbers starting with "0").
  [Example]
      When specifying "ExRAIDGroup_aa" (14 characters) as the External RIAD Group name
          Names such as "ExRAIDGroup_aa0" and "ExRAIDGroup_aa1" are applied to the External RAID Groups.
- When an External RAID Group name including the suffix number "x" has more than 16 characters, the excess number of characters is deleted from the "Name", starting with the last character and a suffix number "~x" will be added.
  [Example]
      When specifying "ExRAIDGroup_abab" (16 characters) as the External RIAD Group name
          Names such as "ExRAIDGroup_ab~0" and "ExRAIDGroup_ab~1" are applied to the External RAID Groups.
- When an External RAID Group name including the suffix number already exists, the suffix number is increased by one (+1). The suffix number is increased by one (+1) until no External RAID Group names overlap.

G. Basic Size and MWC Input Condition for RAID Groups

This appendix describes the basic size for each RAID level and the input conditions for the Multi Writeback Count (MWC) of each RAID group.

Basic Size for each RAID Group

This section describes the basic size for each RAID level.
The allowed input for the basic size varies depending on the RAID level, the drive configuration, and the Stripe Depth value.

Basic Size When Using the Default Stripe Depth Value (For Standard Type Volumes, TPVs, or SDPVs)

When using the default Stripe Depth value, refer to the following table for basic size:

■ **Basic size of each RAID group when using the default Stripe Depth value**

RAID level	Drive configuration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)
		(Stripe Depth = 64KB (default))
Mirroring (RAID1)	1D+1M	1
High Performance (RAID1+0)	2D+2M	1
	3D+3M	3
	4D+4M	1
	5D+5M	5
	6D+6M	3
	7D+7M	7
	8D+8M	1
	9D+9M	9
	10D+10M	5
	11D+11M	11
	12D+12M	3
	13D+13M	13
	14D+14M	7
	15D+15M	15
	16D+16M	1

RAID level	Drive configuration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)
		(Stripe Depth = 64KB (default))
High Capacity (RAID5)	2D+1P	1
	3D+1P	3
	4D+1P	1
	5D+1P	5
	6D+1P	3
	7D+1P	7
	8D+1P	1
	9D+1P	9
	10D+1P	5
	11D+1P	11
	12D+1P	3
	13D+1P	13
	14D+1P	7
	15D+1P	15
Reliability (RAID5+0)	(2D+1P)x2	1
	(3D+1P)x2	3
	(4D+1P)x2	1
	(5D+1P)x2	5
	(6D+1P)x2	3
	(7D+1P)x2	7
	(8D+1P)x2	1
	(9D+1P)x2	9
	(10D+1P)x2	5
	(11D+1P)x2	11
	(12D+1P)x2	3
	(13D+1P)x2	13
	(14D+1P)x2	7
	(15D+1P)x2	15
High Reliability (RAID6)	3D+2P	3
	4D+2P	1
	5D+2P	5
	6D+2P	3
	7D+2P	7
	8D+2P	1
	9D+2P	9
	10D+2P	5
	11D+2P	11
	12D+2P	3
	13D+2P	13
	14D+2P	7

RAID level	Drive configuration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)
		(Stripe Depth = 64KB (default))
High Reliability (RAID6-FR)	(3D+2P)x2+1HS	3
	(4D+2P)x2+1HS	1
	(6D+2P)x2+1HS	3
	(9D+2P)x2+1HS	9
	(12D+2P)x2+1HS	3
	(5D+2P)x4+1HS	5
	(13D+2P)x2+1HS	13
	(8D+2P)x3+1HS	1
	(4D+2P)x5+1HS	1
	(3D+2P)x6+1HS	3

*1:   D: Data drives, M: Mirror drives, P: Parity drives, HS: Hot Spares

*2:   Basic size when creating volumes.
The ETERNUS DX/AF manages volumes in units of stripe size. If the volume size is not an exact multiple of the basic size (stripe size), then when a RAID group is created the remainder at the end of the last stripe used will be lost. Stripe size is independent of the disk drive capacity. Figure 1 shows what happens when the volume size is an integral multiple of the basic size and what happens when it is not.

Figure 1   Basic size when creating volumes

■Volume size is the exact multiple of basic size   ■Volume size is not the exact multiple of basic size

Next volume is created from the next boundary   Next volume is created from the next boundary
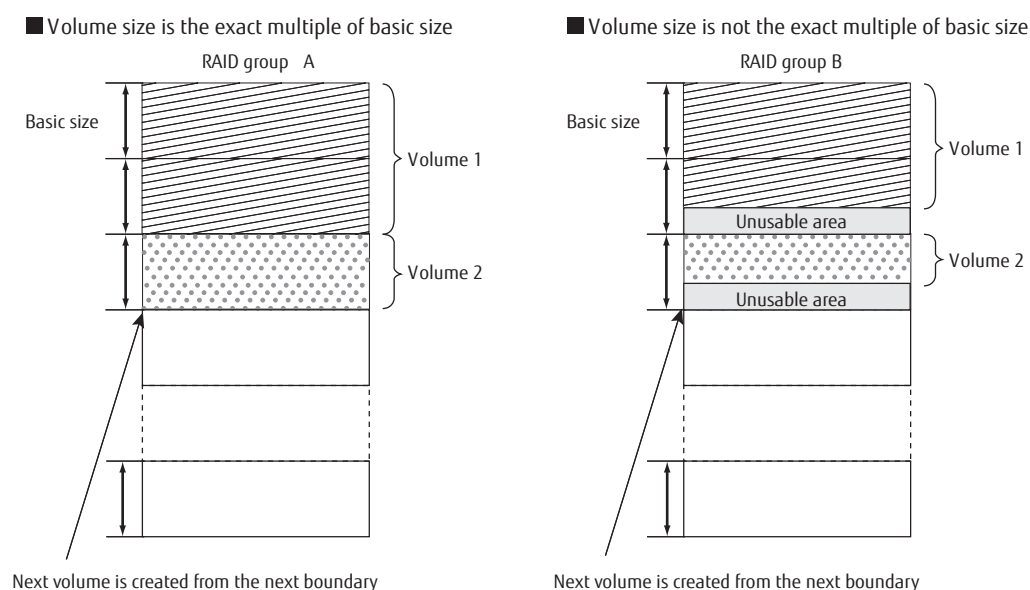
🔵 **N o t e**

The basic size is not changed even if the chunk size of the TPP to which the TPV belongs is changed. This also applies even when the Stripe Depth is 128KB or larger. Refer to "Basic Size When Stripe Depth is Tuned (For Standard Type Volumes, TPVs, or SDPVs)" (page 1347) for details.

Basic Size When Using the Default Stripe Depth Value (For WSVs)

When using the default Stripe Depth value, refer to the following table for basic size:

■ Basic size of each RAID group when using the default Stripe Depth value

For WSVs, the basic size is a multiple of the number of concatenations (the number of RAID groups that are to be concatenated).

When the Wide Stripe Size is "Normal"

RAID level	Drive configuration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)
		(Stripe Depth = 64KB (default))
Mirroring (RAID1)	1D+1M	16 x Number of concatenations
High Performance (RAID1+0)	2D+2M	16 x Number of concatenations
	3D+3M	255 x Number of concatenations
	4D+4M	16 x Number of concatenations
	5D+5M	255 x Number of concatenations
	6D+6M	63 x Number of concatenations
	7D+7M	63 x Number of concatenations
	8D+8M	16 x Number of concatenations
	9D+9M	63 x Number of concatenations
	10D+10M	125 x Number of concatenations
	11D+11M	253 x Number of concatenations
	12D+12M	63 x Number of concatenations
	13D+13M	247 x Number of concatenations
	14D+14M	63 x Number of concatenations
	15D+15M	255 x Number of concatenations
	16D+16M	16 x Number of concatenations
High Capacity (RAID5)	2D+1P	16 x Number of concatenations
	3D+1P	255 x Number of concatenations
	4D+1P	16 x Number of concatenations
	5D+1P	255 x Number of concatenations
	6D+1P	63 x Number of concatenations
	7D+1P	63 x Number of concatenations
	8D+1P	16 x Number of concatenations
	9D+1P	63 x Number of concatenations
	10D+1P	125 x Number of concatenations
	11D+1P	253 x Number of concatenations
	12D+1P	63 x Number of concatenations
	13D+1P	247 x Number of concatenations
	14D+1P	63 x Number of concatenations
	15D+1P	255 x Number of concatenations

RAID level	Drive configuration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)
		(Stripe Depth = 64KB (default))
Reliability (RAID5+0)	(2D+1P)x2	16 x Number of concatenations
	(3D+1P)x2	63 x Number of concatenations
	(4D+1P)x2	16 x Number of concatenations
	(5D+1P)x2	125 x Number of concatenations
	(6D+1P)x2	63 x Number of concatenations
	(7D+1P)x2	63 x Number of concatenations
	(8D+1P)x2	16 x Number of concatenations
	(9D+1P)x2	63 x Number of concatenations
	(10D+1P)x2	15 x Number of concatenations
	(11D+1P)x2	121 x Number of concatenations
	(12D+1P)x2	15 x Number of concatenations
	(13D+1P)x2	117 x Number of concatenations
	(14D+1P)x2	63 x Number of concatenations
	(15D+1P)x2	15 x Number of concatenations
High Reliability (RAID6)	3D+2P	255 x Number of concatenations
	4D+2P	16 x Number of concatenations
	5D+2P	255 x Number of concatenations
	6D+2P	63 x Number of concatenations
	7D+2P	63 x Number of concatenations
	8D+2P	16 x Number of concatenations
	9D+2P	63 x Number of concatenations
	10D+2P	125 x Number of concatenations
	11D+2P	253 x Number of concatenations
	12D+2P	63 x Number of concatenations
	13D+2P	247 x Number of concatenations
	14D+2P	63 x Number of concatenations

*1:   D: Data drives, M: Mirror drives, P: Parity drives

*2:   Basic size when creating volumes.
       The ETERNUS DX/AF manages volumes in units of stripe size. If the volume size is not an exact multiple of the basic size
       (stripe size), then when a RAID group is created the remainder at the end of the last stripe used will be lost. Stripe size is
       independent of the disk drive capacity. Figure 1 shows what happens when the volume size is an integral multiple of the
       basic size and what happens when it is not.

When the Wide Stripe Size is "Small"

RAID level	Drive configuration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)
		(Stripe Depth = 64KB (default))
Mirroring (RAID1)	1D+1M	2 x Number of concatenations
High Performance (RAID1+0)	2D+2M	2 x Number of concatenations
	3D+3M	15 x Number of concatenations
	4D+4M	2 x Number of concatenations
	5D+5M	15 x Number of concatenations
	6D+6M	15 x Number of concatenations
	7D+7M	7 x Number of concatenations
	8D+8M	2 x Number of concatenations
	9D+9M	27 x Number of concatenations
	10D+10M	15 x Number of concatenations
	11D+11M	11 x Number of concatenations
	12D+12M	3 x Number of concatenations
	13D+13M	13 x Number of concatenations
	14D+14M	7 x Number of concatenations
	15D+15M	15 x Number of concatenations
	16D+16M	2 x Number of concatenations
High Capacity (RAID5)	2D+1P	2 x Number of concatenations
	3D+1P	15 x Number of concatenations
	4D+1P	2 x Number of concatenations
	5D+1P	15 x Number of concatenations
	6D+1P	15 x Number of concatenations
	7D+1P	7 x Number of concatenations
	8D+1P	2 x Number of concatenations
	9D+1P	27 x Number of concatenations
	10D+1P	15 x Number of concatenations
	11D+1P	11 x Number of concatenations
	12D+1P	3 x Number of concatenations
	13D+1P	13 x Number of concatenations
	14D+1P	7 x Number of concatenations
	15D+1P	15 x Number of concatenations

RAID level	Drive configuration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)
		(Stripe Depth = 64KB (default))
Reliability (RAID5+0)	(2D+1P)x2	2 x Number of concatenations
	(3D+1P)x2	15 x Number of concatenations
	(4D+1P)x2	2 x Number of concatenations
	(5D+1P)x2	15 x Number of concatenations
	(6D+1P)x2	3 x Number of concatenations
	(7D+1P)x2	7 x Number of concatenations
	(8D+1P)x2	2 x Number of concatenations
	(9D+1P)x2	9 x Number of concatenations
	(10D+1P)x2	5 x Number of concatenations
	(11D+1P)x2	11 x Number of concatenations
	(12D+1P)x2	3 x Number of concatenations
	(13D+1P)x2	13 x Number of concatenations
	(14D+1P)x2	7 x Number of concatenations
	(15D+1P)x2	15 x Number of concatenations
High Reliability (RAID6)	3D+2P	15 x Number of concatenations
	4D+2P	2 x Number of concatenations
	5D+2P	15 x Number of concatenations
	6D+2P	15 x Number of concatenations
	7D+2P	7 x Number of concatenations
	8D+2P	2 x Number of concatenations
	9D+2P	27 x Number of concatenations
	10D+2P	15 x Number of concatenations
	11D+2P	11 x Number of concatenations
	12D+2P	3 x Number of concatenations
	13D+2P	13 x Number of concatenations
	14D+2P	7 x Number of concatenations

*1:   D: Data drives, M: Mirror drives, P: Parity drives

*2:   Basic size when creating volumes.
      The ETERNUS DX/AF manages volumes in units of stripe size. If the volume size is not an exact multiple of the basic size (stripe size), then when a RAID group is created the remainder at the end of the last stripe used will be lost. Stripe size is independent of the disk drive capacity. Figure 1 shows what happens when the volume size is an integral multiple of the basic size and what happens when it is not.

Basic Size When Stripe Depth is Tuned (For Standard Type Volumes, TPVs, or SDPVs)

Refer to the following table for the basic size of RAID groups when the Stripe Depth value is changed:

■ Basic size of each RAID group when the Stripe Depth value is tuned

RAID level	Drive configuration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)			
		When the Stripe Depth is ...			
		128KB	256KB	512KB	1024KB
High Performance (RAID1+0)	2D+2M	1	1	1	2
	3D+3M	3	3	3	3
	4D+4M	1	1	2	4
	5D+5M	5	5	5	5
	6D+6M	3	3	3	6
	7D+7M	7	7	7	7
	8D+8M	1	2	4	8
	9D+9M	9	9	9	9
	10D+10M	5	5	5	10
High Performance (RAID1+0)	11D+11M	11	11	11	11
	12D+12M	3	3	6	12
	13D+13M	13	13	13	13
	14D+14M	7	7	7	14
	15D+15M	15	15	15	15
	16D+16M	2	4	8	16
High Capacity (RAID5)	2D+1P	1	1	1	–
	3D+1P	3	3	3	–
	4D+1P	1	1	2	–
	5D+1P	5	5	–	–
	6D+1P	3	3	–	–
	7D+1P	7	7	–	–
	8D+1P	1	2	–	–
	9D+1P	9	–	–	–
	10D+1P	5	–	–	–
	11D+1P	11	–	–	–
	12D+1P	3	–	–	–
	13D+1P	13	–	–	–
	14D+1P	7	–	–	–
	15D+1P	15	–	–	–

*1:   D: Data drives, M: Mirror drives, P: Parity drives

*2:   Basic size when creating volumes.
The ETERNUS DX/AF manages volumes in units of stripe size. If the volume size is not an exact multiple of the basic size (stripe size), then when a RAID group is created the remainder at the end of the last stripe used will be lost. Stripe size is independent of the disk drive capacity. Figure 1 shows what happens when the volume size is an integral multiple of the basic size and what happens when it is not.

Basic Size When Stripe Depth is Tuned (For WSVs)

Refer to the following table for the basic size of RAID groups when the Stripe Depth value is changed:

■ Basic size of each RAID group when the Stripe Depth value is tuned

For WSVs, the basic size is a multiple of the number of concatenations (the number of RAID groups that are to be concatenated).

When the Wide Stripe Size is "Normal"

RAID level	Drive configu-ration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)			
		When the Stripe Depth is ...			
		128KB	256KB	512KB	1024KB
High Performance (RAID1+0)	2D+2M	16 x Number of concatenations	16 x Number of concatenations	16 x Number of concatenations	16 x Number of concatenations
	3D+3M	63 x Number of concatenations	63 x Number of concatenations	15 x Number of concatenations	15 x Number of concatenations
	4D+4M	16 x Number of concatenations	16 x Number of concatenations	16 x Number of concatenations	16 x Number of concatenations
	5D+5M	125 x Number of concatenations	15 x Number of concatenations	15 x Number of concatenations	15 x Number of concatenations
	6D+6M	63 x Number of concatenations	15 x Number of concatenations	15 x Number of concatenations	12 x Number of concatenations
	7D+7M	63 x Number of concatenations	63 x Number of concatenations	14 x Number of concatenations	14 x Number of concatenations
	8D+8M	16 x Number of concatenations	16 x Number of concatenations	16 x Number of concatenations	16 x Number of concatenations
	9D+9M	63 x Number of concatenations	63 x Number of concatenations	27 x Number of concatenations	9 x Number of concatenations
	10D+10M	15 x Number of concatenations	15 x Number of concatenations	15 x Number of concatenations	10 x Number of concatenations
	11D+11M	121 x Number of concatenations	55 x Number of concatenations	11 x Number of concatenations	11 x Number of concatenations
	12D+12M	15 x Number of concatenations	15 x Number of concatenations	12 x Number of concatenations	12 x Number of concatenations
	13D+13M	117 x Number of concatenations	13 x Number of concatenations	13 x Number of concatenations	13 x Number of concatenations
	14D+14M	63 x Number of concatenations	14 x Number of concatenations	14 x Number of concatenations	14 x Number of concatenations
High Performance (RAID1+0)	15D+15M	15 x Number of concatenations	15 x Number of concatenations	15 x Number of concatenations	15 x Number of concatenations
	16D+16M	16 x Number of concatenations	16 x Number of concatenations	16 x Number of concatenations	16 x Number of concatenations

RAID level	Drive configu-ration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)			
		When the Stripe Depth is ...			
		128KB	256KB	512KB	1024KB
High Capacity (RAID5)	2D+1P	16 x Number of concatenations	16 x Number of concatenations	16 x Number of concatenations	–
	3D+1P	63 x Number of concatenations	63 x Number of concatenations	15 x Number of concatenations	–
	4D+1P	16 x Number of concatenations	16 x Number of concatenations	16 x Number of concatenations	–
	5D+1P	125 x Number of concatenations	15 x Number of concatenations	–	–
	6D+1P	63 x Number of concatenations	15 x Number of concatenations	–	–
	7D+1P	63 x Number of concatenations	63 x Number of concatenations	–	–
	8D+1P	16 x Number of concatenations	16 x Number of concatenations	–	–
	9D+1P	63 x Number of concatenations	–	–	–
	10D+1P	15 x Number of concatenations	–	–	–
	11D+1P	121 x Number of concatenations	–	–	–
	12D+1P	15 x Number of concatenations	–	–	–
	13D+1P	117 x Number of concatenations	–	–	–
	14D+1P	63 x Number of concatenations	–	–	–
	15D+1P	15 x Number of concatenations	–	–	–

*1: D: Data drives, M: Mirror drives, P: Parity drives

*2: Basic size when creating volumes.
The ETERNUS DX/AF manages volumes in units of stripe size. If the volume size is not an exact multiple of the basic size (stripe size), then when a RAID group is created the remainder at the end of the last stripe used will be lost. Stripe size is independent of the disk drive capacity. Figure 1 shows what happens when the volume size is an integral multiple of the basic size and what happens when it is not.

When the Wide Stripe Size is "Small"

RAID level	Drive configu-ration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)			
		When the Stripe Depth is ...			
		128KB	256KB	512KB	1024KB
High Performance (RAID1+0)	2D+2M	2 x Number of concatenations	2 x Number of concatenations	2 x Number of concatenations	2 x Number of concatenations
	3D+3M	15 x Number of concatenations	3 x Number of concatenations	3 x Number of concatenations	3 x Number of concatenations
	4D+4M	2 x Number of concatenations	2 x Number of concatenations	2 x Number of concatenations	4 x Number of concatenations
	5D+5M	15 x Number of concatenations	5 x Number of concatenations	5 x Number of concatenations	5 x Number of concatenations
	6D+6M	3 x Number of concatenations	3 x Number of concatenations	3 x Number of concatenations	6 x Number of concatenations
	7D+7M	7 x Number of concatenations	7 x Number of concatenations	7 x Number of concatenations	7 x Number of concatenations
	8D+8M	2 x Number of concatenations	2 x Number of concatenations	4 x Number of concatenations	8 x Number of concatenations
	9D+9M	9 x Number of concatenations	9 x Number of concatenations	9 x Number of concatenations	9 x Number of concatenations
	10D+10M	5 x Number of concatenations	5 x Number of concatenations	5 x Number of concatenations	10 x Number of concatenations
	11D+11M	11 x Number of concatenations	11 x Number of concatenations	11 x Number of concatenations	11 x Number of concatenations
	12D+12M	3 x Number of concatenations	3 x Number of concatenations	6 x Number of concatenations	12 x Number of concatenations
	13D+13M	13 x Number of concatenations	13 x Number of concatenations	13 x Number of concatenations	13 x Number of concatenations
	14D+14M	7 x Number of concatenations	7 x Number of concatenations	7 x Number of concatenations	14 x Number of concatenations
	15D+15M	15 x Number of concatenations	15 x Number of concatenations	15 x Number of concatenations	15 x Number of concatenations
	16D+16M	2 x Number of concatenations	4 x Number of concatenations	8 x Number of concatenations	16 x Number of concatenations
High Capacity (RAID5)	2D+1P	2 x Number of concatenations	2 x Number of concatenations	2 x Number of concatenations	–
	3D+1P	15 x Number of concatenations	3 x Number of concatenations	3 x Number of concatenations	–
	4D+1P	2 x Number of concatenations	2 x Number of concatenations	2 x Number of concatenations	–
	5D+1P	15 x Number of concatenations	5 x Number of concatenations	–	–
	6D+1P	3 x Number of concatenations	3 x Number of concatenations	–	–
	7D+1P	7 x Number of concatenations	7 x Number of concatenations	–	–

RAID level	Drive configu-ration (*1)	Basic size (MB) (Lowest exact MB multiple) (*2)			
		When the Stripe Depth is ...			
		128KB	256KB	512KB	1024KB
High Capacity (RAID5)	8D+1P	2 x Number of concatenations	2 x Number of concatenations	–	–
	9D+1P	9 x Number of concatenations	–	–	–
	10D+1P	5 x Number of concatenations	–	–	–
	11D+1P	11 x Number of concatenations	–	–	–
	12D+1P	3 x Number of concatenations	–	–	–
	13D+1P	13 x Number of concatenations	–	–	–
	14D+1P	7 x Number of concatenations	–	–	–
	15D+1P	15 x Number of concatenations	–	–	–

*1:   D: Data drives, M: Mirror drives, P: Parity drives

*2:   Basic size when creating volumes.
       The ETERNUS DX/AF manages volumes in units of stripe size. If the volume size is not an exact multiple of the basic size (stripe size), then when a RAID group is created the remainder at the end of the last stripe used will be lost. Stripe size is independent of the disk drive capacity. Figure 1 shows what happens when the volume size is an integral multiple of the basic size and what happens when it is not.

Basic Size When Stripe Depth is Tuned (For TPP Capacity)

When Stripe Depth is tuned for RAID groups that are used as TPPs, the basic size that can be used for the TPPs may increase. The following table shows RAID group configurations in which the basic size is different from the normal size.

Basic size	Stripe Depth	RAID group configuration
42 MB	256 KB	RAID1+0 (8+8)
	512 KB	RAID0 (4D), RAID1+0 (4+4), RAID1+0 (12+12)
84 MB	512 KB	RAID1+0 (8+8), RAID1+0 (12+12)
	1024 KB	RAID0 (4D), RAID1+0 (4+4), RAID1+0 (12+12)
168 MB	1024 KB	RAID1+0 (8+8)

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If the TPP capacity is not an exact multiple of the basic size, areas that cannot be used as TPPs are created in the RAID group.

Input Conditions for MWC

This section describes the allowed input values for the Multi Writeback Count (MWC).
The allowed input for MWC varies depending on the RAID level, the drive configuration, and the Stripe Depth value.

Allowed Input for MWC When Using the Default Stripe Depth Value

When using the default Stripe Depth value, refer to the following table for the allowed MWC value:

■ Allowed input for MWC when using the default Stripe Depth value (Volume)

RAID level	Drive configuration (*1)	Allowed input for MWC (initial state)
		Stripe Depth = 64KB (default)
Striping (RAID0)	2D	1 – 16 (4)
	3D	1 – 10 (3)
	4D	1 – 8 (2)
	5D	1 – 6 (2)
	6D	1 – 5 (2)
	7D	1 – 4 (2)
	8D	1 – 4 (1)
	9D	1 – 3 (1)
	10D	1 – 3 (1)
	11D – 16D	1 – 2 (1)
Mirroring (RAID1)	1D+1M	1 – 16 (8)
High Performance (RAID1+0)	2D+2M	1 – 16 (4)
	3D+3M	1 – 10 (3)
	4D+4M	1 – 8 (2)
	5D+5M	1 – 6 (2)
	6D+6M	1 – 5 (2)
	7D+7M	1 – 4 (2)
	8D+8M	1 – 4 (1)
	9D+9M	1 – 3 (1)
	10D+10M	1 – 3 (1)
	11D+11M – 16D+16M	1 – 2 (1)
High Capacity (RAID5)	2D+1P	1 – 8 (4)
	3D+1P	1 – 8 (3)
	4D+1P	1 – 8 (2)
	5D+1P	1 – 6 (2)
	6D+1P	1 – 5 (2)
	7D+1P	1 – 4 (2)
	8D+1P	1 – 4 (1)
	9D+1P	1 – 3 (1)
	10D+1P	1 – 3 (1)
	11D+1P – 15D+1P	1 – 2 (1)

RAID level	Drive configuration (*1)	Allowed input for MWC (initial state)
		Stripe Depth = 64KB (default)
Reliability (RAID5+0)	(2D+1P)x2	4 (fixed)
	(3D+1P)x2	2 (fixed)
	(4D+1P)x2	2 (fixed)
	(5D+1P)x2 – (15D+1P)x2	1 (fixed)
High Reliability (RAID6)	3D+2P	1 – 8 (3)
	4D+2P	1 – 8 (2)
	5D+2P	1 – 6 (2)
	6D+2P	1 – 5 (2)
	7D+2P	1 – 4 (2)
	8D+2P	1 – 4 (1)
	9D+2P	1 – 3 (1)
	10D+2P	1 – 3 (1)
	11D+2P – 14D+2P	1 – 2 (1)
High Reliability (RAID6-FR)	(3D+2P)x2+1HS (3D+2P)x6+1HS	1 - 8 (3)
	(4D+2P)x2+1HS (4D+2P)x5+1HS	1 - 8 (2)
	(5D+2P)x4+1HS	1 - 6 (2)
	(6D+2P)x2+1HS	1 - 5 (2)
	(8D+2P)x3+1HS	1 - 4 (1)
	(9D+2P)x2+1HS	1 - 3 (1)
	(12D+2P)x2+1HS (13D+2P)x2+1HS	1 - 2 (1)

*1: D: Data drives, M: Mirror drives, P: Parity drives, HS: Hot Spares

■ Allowed input for MWC when using the default Stripe Depth value (TPP)

RAID level	Drive configuration (*1)	Allowed input for MWC (initial state)
		Stripe Depth = 64KB (default)
Striping (RAID0)	4D	1 – 8 (2)
Mirroring (RAID1)	1D+1M	1 – 16 (8)
High Performance (RAID1+0)	2D+2M	1 – 16 (4)
	4D+4M	1 – 8 (2)
	8D+8M	1 – 4 (1)
	12D+12M	1 – 2 (1)
High Capacity (RAID5)	3D+1P	1 – 8 (3)
	4D+1P	1 – 8 (2)
	6D+1P	1 – 5 (2)
	7D+1P	1 – 4 (2)
	8D+1P	1 – 4 (1)
	12D+1P	1 – 2 (1)
High Reliability (RAID6)	4D+2P	1 – 8 (2)
	6D+2P	1 – 5 (2)
	7D+2P	1 – 4 (2)
	8D+2P	1 – 4 (1)

RAID level	Drive configuration (*1)	Allowed input for MWC (initial state)
		Stripe Depth = 64KB (default)
High Reliability (RAID6-FR)	(4D+2P)x2+1HS (4D+2P)x5+1HS	1 – 8 (2)
	(6D+2P)x2+1HS	1 – 5 (2)
	(8D+2P)x3+1HS	1 – 4 (1)

*1:　D: Data drives, M: Mirror drives, P: Parity drives

Allowed Input for MWC When the Stripe Depth Value is Tuned

Refer to the following table for the allowed MWC value when the Stripe Depth value is changed:

■ Allowed input for MWC when the Stripe Depth value is tuned (Volume)

RAID level	Drive configuration (*1)	Allowed input for MWC (initial state)			
		When the Stripe Depth is ...			
		128KB	256KB	512KB	1024KB
Striping (RAID0)	2D	1 – 8 (4)	1 – 4 (4)	1 – 2 (2)	1 (fixed)
	3D	1 – 5 (3)	1 – 2 (2)	1 (fixed)	1 (fixed)
	4D	1 – 4 (2)	1 – 2 (2)	1 (fixed)	1 (fixed)
	5D	1 – 3 (2)	1 (fixed)	1 (fixed)	1 (fixed)
	6D	1 – 2 (2)	1 (fixed)	1 (fixed)	1 (fixed)
	7D	1 – 2 (2)	1 (fixed)	1 (fixed)	1 (fixed)
	8D	1 – 2 (1)	1 (fixed)	1 (fixed)	1 (fixed)
	9D – 16D	1 (fixed)	1 (fixed)	1 (fixed)	1 (fixed)
High Performance (RAID1+0)	2D+2M	1 – 8 (4)	1 – 4 (4)	1 – 2 (2)	1 (fixed)
	3D+3M	1 – 5 (3)	1 – 2 (2)	1 (fixed)	1 (fixed)
	4D+4M	1 – 4 (2)	1 – 2 (2)	1 (fixed)	1 (fixed)
	5D+5M	1 – 3 (2)	1 (fixed)	1 (fixed)	1 (fixed)
	6D+6M	1 – 2 (2)	1 (fixed)	1 (fixed)	1 (fixed)
	7D+7M	1 – 2 (2)	1 (fixed)	1 (fixed)	1 (fixed)
	8D+8M	1 – 2 (1)	1 (fixed)	1 (fixed)	1 (fixed)
	9D+9M – 16D+16M	1 (fixed)	1 (fixed)	1 (fixed)	1 (fixed)
High Capacity (RAID5)	2D+1P	1 – 4 (4)	1 – 2 (2)	1 (fixed)	–
	3D+1P	1 – 4 (3)	1 – 2 (2)	1 (fixed)	–
	4D+1P	1 – 4 (2)	1 – 2 (2)	1 (fixed)	–
	5D+1P	1 – 3 (2)	1 (fixed)	–	–
	6D+1P	1 – 2 (2)	1 (fixed)	–	–
	7D+1P	1 – 2 (2)	1 (fixed)	–	–
	8D+1P	1 – 2 (1)	1 (fixed)	–	–
	9D+1P – 15D+1P	1 (fixed)	–	–	–

*1:　D: Data drives, M: Mirror drives, P: Parity drives, –: Stripe Depth cannot be changed

■ Allowed Input for MWC when the Stripe Depth value is tuned (TPP)

RAID level	Drive configuration (*1)	Allowed input for MWC (initial state)			
		When the Stripe Depth is ...			
		128KB	256KB	512KB	1024KB
Striping (RAID0)	4D	1 – 4 (2)	1 – 2 (2)	1 (fixed)	1 (fixed)
High Performance (RAID1+0)	2D+2M	1 – 8 (4)	1 – 4 (4)	1 – 2 (2)	1 (fixed)
	4D+4M	1 – 4 (2)	1 – 2 (2)	1 (fixed)	1 (fixed)
	8D+8M	1 – 2 (1)	1 (fixed)	1 (fixed)	1 (fixed)
	12D+12M	1 (fixed)	1 (fixed)	1 (fixed)	1 (fixed)
High Capacity (RAID5)	3D+1P	1 – 4 (3)	1 – 2 (2)	1 (fixed)	–
	4D+1P	1 – 4 (2)	1 – 2 (2)	1 (fixed)	–
	6D+1P	1 – 2 (2)	1 (fixed)	–	–
	7D+1P	1 – 2 (2)	1 (fixed)	–	–
	8D+1P	1 – 2 (1)	1 (fixed)	–	–
	12D+1P	1 (fixed)	–	–	–

*1:   D: Data drives, M: Mirror drives, P: Parity drives, –: Stripe Depth cannot be changed

H.   Using RADIUS Authentication

This appendix describes supplementary notes when using RADIUS Authentication.

Using RADIUS Authentication to Access the ETERNUS DX/AF

- RADIUS Authentication is used to authenticate logging in to the ETERNUS DX/AF with ETERNUS Web GUI or ETERNUS CLI.
- Up to two RADIUS servers can be connected to an ETERNUS DX/AF.
- To use RADIUS Authentication, the user account information (user ID, password, and role) that is allowed to access ETERNUS DX/AF in the RADIUS server must be pre-registered.
- There are two types of authentication methods: CHAP and PAP.
- User roles are specified in the Vendor Specific Attribute (VSA) of the Access-Accept response from the server. The following table shows the syntax of the VSA based account role on the RADIUS server.

Syntax of the Vendor Specific Attribute (VSA) based account role

Item	Size (octets)	Value	Description
Type	1	26	Attribute number for the Vendor Specific Attribute
Length	1	7 or more	Attribute size (calculated by server)
Vendor-Id	4	211	Fujitsu Limited (SMI Private Enterprise Code)
Vendor type	1	1	Eternus-Auth-Role
Vendor length	1	2 or more	Attribute size described after the Vendor type (calculated by server)
Attribute-Specific	1 or more	ASCII characters	List of one or more role names assignable to successfully authenticated users (*1)

*1:   The server-side role names are case sensitive and must be set correctly.
       [Example] RoleName0

Notes when Using RADIUS Authentication for ETERNUS Web GUI

- A primary server and secondary server can be set for ETERNUS Web GUI authentication. If the primary RADIUS server times out, the secondary server is tried.
- If RADIUS Authentication fails and "Do not use Internal Authentication" has been selected for "Authentication Error Recovery", it will not be possible to login to ETERNUS Web GUI or ETERNUS CLI.
- When "Use Internal Authentication (Network Error Case)" has been selected for "Authentication Error Recovery", Internal Authentication is only performed if RADIUS Authentication fails on both primary and secondary RADIUS servers, and at least one of these failures is due to network error.
- So long as there is no RADIUS Authentication response the ETERNUS DX/AF will keep retrying to authenticate the user for the entire "Timeout" period set on the "Set RADIUS Authentication (Initial)" menu. Authentication not succeeding before the timeout occurs is considered a RADIUS Authentication failure.
- When using RADIUS Authentication, if the role that is received from the server is unknown (not set) for the storage system, RADIUS Authentication fails.

Setting Up the RADIUS Server

Windows Server 2008 R2 example

The RADIUS setup procedure described below uses a Windows Server 2008 R2 as an example. It must be noted that this setup procedure is not necessarily guaranteed to work for all network environments. Make sure to obtain your system administrator's help in setting up the system.

The procedure for setting up the RADIUS service on Windows Server 2008 R2 is as follows.

(1) Install the Network Policy and Access Services
For details on installing "Network Policy and Access Services", refer to the Microsoft web-site.

(2) Enable CHAP
If CHAP Authentication is required, set Windows to store passwords using reversible encryption, rather than relying on the default setting.

> ▷ **Caution**
>
> If the current password is already stored by using irreversible encryption, the current password setting is not changed even when enabling the password to be stored by using reversible encryption. To use reversible encryption to store the current password, set the user password again or specify that the password for each user is changed for the next login.

(3) Configure the users
Network Policy Server (NPS) is the Microsoft implementation of a RADIUS server and proxy. When using NPS to check the User login certificate, a list of user groups is displayed instead of a list of specific users. Each user group must be associated with a role that logs into a specific ETERNUS DX/AF. For example, after setting the "root", "Admin", and "user" user groups, those users that are to be allowed to login must be added to the proper group.

   ● **Create Users and User Groups**

   (1) Select [Start] → [Administrative Tools] → [Computer Management].

   (2) Select [System Tools] → [Local Users and Groups] → [Users].
   Right-click [Users] and select [New User].
   Create an ETERNUS DX/AF login user as the [New User].

   (3) Select [System Tools] → [Local Users and Groups] → [Groups].
   Right-click [Groups] and select [New Group].
   Create an ETERNUS DX/AF group as the [New Group] and add the user created in Step (2).

(4) Set the Network Policy and Access Services
The following three steps must be performed:
   - Register the ETERNUS DX/AF as a RADIUS client
   - Set the accessible user group and the authentication method
   - Set the role with Vendor Specific Attribute (VSA)

● **Register the ETERNUS DX/AF as a RADIUS client**

(1) Select [Start] → [Administrative Tools] → [Server Manager].

(2) Select [Roles] → [Network Policy and Access Services] → [NPS] → [RADIUS Clients and Servers] →
[RADIUS Clients].
Right-click [RADIUS Clients] and select [New RADIUS Client], and set the various items.
- For the "Address (IP or DNS)", set the IP address of the client ETERNUS DX/AF.
- For the "Vendor name", set "RADIUS Standard".
- For the "Shared secret", set the shared key that is registered on the client ETERNUS DX/AF.

● **Set the Accessible User Group and the Authentication Method**

(1) Select [Start] → [Administrative Tools] → [Server Manager].

(2) Select [Roles] → [Network Policy and Access Services] → [NPS] → [Policies] → [Network Policies].
Right-click [Network Policies], select [New], and set the various items.
- Click "Add" in the "Conditions" tab and add "Windows Groups". For "Windows Groups", add the
group that was created for the ETERNUS DX/AF.
- For the "secure authentication methods", check "Encryption authentication (CHAP(C))" or "Unen-
crypted authentication (PAP,SPAP)(S)". Select the same setting as is set on the ETERNUS DX/AF.

● **Set the role with Vendor Specific Attribute (VSA)**

(1) Select [Start] → [Administrative Tools] → [Server Manager].

(2) Select [Roles] → [Network Policy and Access Services] → [NPS] → [Policies] → [Network Policies].
Select and double-click the newly added policy.

(3) Set the following items using the [Add] button under [Vendor Specific] on the [Settings] tab.
- For the "Attributes", add "Vendor-Specific/RADIUS Standard".
- For the "Enter Vendor Code", enter "211".
- For the "RADIUS RFC", click "Yes, it conforms".
- For the "Vendor-assigned attribute number", enter "1".
- For the "Attribute format", select "String".
- For the "Attribute Value", enter the role name for the user who belongs to the added "Groups". The
role name must be registered in the ETERNUS DX/AF in advance. The server-side role names are
case sensitive and must be input correctly.
[Example] RoleName0

I. Storage Migration Setting Files

This appendix describes Storage Migration setting files.

Template File for Storage Migration Settings

The following table shows the details of a template file for storage migration settings.

Keyword			Number of settings	Allowed input
Type		Specify the type of Storage Migration. (Example) Type = Open	1	Open
GROUP		Specify a path group for each source storage system. Up to 16 path groups can be specified. Specify "0x" (2-digit) + 0 - F (1-digit) with hexadecimal numbers. [Example] GROUP=0x0	1	0x0 - 0xF ("0x" + 1-digit hexadeci-mal)
	OPE-MODE	Specify one of the operation modes (M/M+QC/M+FC/QC/FC/M & IO) for the Storage Migration. The following symbols are used for the operation modes: 　　M: Migration 　　M+QC: Migration + Quick Compare 　　M+FC: Migration + Full Compare 　　QC: Quick Compare 　　FC: Full Compare 　　M & IO: Migration & Host IO OPEMODE can be omitted. When this parameter is not specified, "Migration" is used. Refer to "Operation mode" (page 1360) for details. [Example] OPEMODE=M+QC	1	M M+QC M+FC QC FC M & IO
	PATH	Specify the path information of the destination and source storage systems. Up to 8 paths per path group can be specified. [Example] • For the ETERNUS DX8700 S3/DX8900 S3 　PATH=CEx,CMy,CAz,Pw,vvvvvvvvvvvvvvvv • For the other models 　PATH=CMy,CAz,Pw,vvvvvvvvvvvvvvvv x: CE number, y: CM number, z: CA number, w: Port number vvvvvvvvvvvvvvvv: WWN	4 or 5	–
		CE / CM / CA / P → Specify the location infor-mation (CEx, CMy, CAz, Pw) of the destination FC-Initiator port to which the path is configured.		• For the ETERNUS DX8700 S3/DX8900 S3 CEx, CMy, CAz, Pw • For the other models CMy, CAz, Pw x: CE number y: CM number z: CA number w: Port number
		WWN → Specify the WWN of the source FC-Initiator port to which the path is config-ured.		16-digit hexadecimal (using "0" as the first digit or using an "F (f)" for all 16 digits is not allowed)

Keyword			Number of settings	Allowed input
GROUP	VOL	Specify the source LUN (Y) and the destination volume (Z). The maximum number of source LUNs for each migration path (PATH) is 512. [Example] VOL=Y, Z Example of specifying source LUNs and destination volumes 	Source LUN	Destination volume
---	---
Input a decimal number Specification method: "0x" is not added on top of the value. Decimal numbers can be used only when the source LUN is from "0" to "255".	Input a decimal number Specification method: "0x" is not added on top of the value.
Input a hexadecimal number (4-digit) Specification method: Add "0x" on top of the value. Input in the "0xYYYY" format.	Input a hexadecimal number (4-digit) Specification method: Add "0x" on top of the value. Input in the "0xZZZZ" format.
Input a hexadecimal number (16-digit) Specification method: Add "0x" on top of the value. Input in the "0xYYYYYYYYYYYYYYYY" format.				Source LUN: 0 - 255 (decimal) 0xYYYY (4-digit hexadecimal) 0xYYYYYYYYYYYYYYYY (16-digit hexadecimal) Destination volume: Z (decimal) 0xZZZZ (4-digit hexadecimal)

Operation mode

The following table explains the details of the operation mode.

OPEMODE		Description
Specification code	Meaning	
M	Migration	Data migration from the source storage system to the destination system is performed (offline Storage Migration).
M+QC	Migration + Quick Compare	Data migration from the source storage system to the destination system and a data comparison of source LUNs and destination volumes are performed. "Quick Compare" compares data in a part of the volume area. "Migration + Quick Compare" consecutively executes "data migration" and "data comparison" for each volume (offline Storage Migration).
M+FC	Migration + Full Compare	Data migration from the source storage system to the destination system and a data comparison of source LUNs and destination volumes are performed. "Full Compare" compares data in entire volume area. "Migration + Full Compare" consecutively executes "data migration" and "data comparison" for each volume (offline Storage Migration). ▷ **Caution** • Host access to the destination storage system must be stopped when "Migration + Full Compare" is specified. • When "Migration + Full Compare" is specified for the operation mode, the time to complete the operation after data migration is increased significantly.
QC	Quick Compare	A data comparison of source LUNs and destination volumes is performed. "Quick Compare" compares data in a part of the volume area (offline Storage Migration).

OPEMODE		Description
Specification code	Meaning	
FC	Full Compare	A data comparison of source LUNs and destination volumes is performed. "Full Compare" compares data in entire volume area (offline Storage Migration). ▶ **Caution** • Host access to the destination storage system must be stopped when "Full Compare" is specified. • When "Full Compare" is specified for the operation mode, the time to complete the operation after data migration is increased significantly.
M & IO	Migration & Host IO	Data migration from the source storage system to the destination storage system is performed. Stop the operation only when switching the host connection to the migration destination storage system. This enables continued host access to the migration destination volume during the data migration (online Storage Migration).

Coding Conventions for the Storage Migration Setting File

The following table shows the coding conventions for a Storage Migration setting file.

Keyword	Coding conventions
Common	- The Storage Migration setting file must be saved in the text format. - Contents of the file must be described in alphanumeric characters. - A keyword (Type, GROUP, OPEMODE, PATH, VOL) and its setting value must be connected with "=" (equal). - Only a tab or space can be placed before a keyword (Type, GROUP, OPEMODE, PATH, VOL). - The number of setting values assigned to a keyword (Type, GROUP, OPEMODE, PATH, VOL) with "=" must coincide with the number specified for each keyword. For more information on the number of setting values for each keyword, refer to "Template File for Storage Migration Settings" (page 1359). - Add the following information for each GROUP. - For the ETERNUS DX8700 S3/DX8900 S3 PATH (CEx, CMy, CAz, Pw, WWN), VOL - For the other models PATH (CMy, CAz, Pw, WWN), VOL - There must not be an overlap with the content of the Storage Migration setting file or the migration information (GROUP, destination CA port, source WWN, source LUN, or destination volume) of the path already configured.
GROUP	- Up to 16 GROUPs can be specified. - For the setting range for each GROUP, refer to "Template File for Storage Migration Settings" (page 1359).
OPEMODE	- Specify "M", "M+QC", "M+FC", "QC", "FC", or "M & IO" for each GROUP (when OPEMODE is omitted, it is regarded as though "M" is specified and only migration is performed). - OPEMODE in the Storage Migration setting file must be only "M & IO" or options other than "M & IO". - For the setting range for each OPEMODE, refer to "Template File for Storage Migration Settings" (page 1359).
PATH	- Enclose the PATH and VOL for each GROUP with "{ }" (bracket symbols). - Describe all "PATHs" and then all "VOLs" for each GROUP. - Up to 8 PATHs per GROUP can be specified. - Separate the PATH setting values with "," (comma). - For the setting range of PATH, refer to "Template File for Storage Migration Settings" (page 1359). - Describe the PATH in the following order. PATH=CEx, CMy, CAz, Pw, vvvvvvvvvvvvvvvv WWN for the source FC-CA port CE#, CM#, CA#, and Port# for the destination FC-Initiator port - If the migration destination is the ETERNUS DX8700 S3/DX8900 S3, "CEx" must be specified when specifying a CE other than "CE0". If "CEx" is omitted, "CE0" is assumed. - If the migration destination is not the ETERNUS DX8700 S3/DX8900 S3, omit the "CEx" setting or specify "CE0". - Start a new line for each PATH. Multiple PATHs cannot be described without breaking.

Keyword	Coding conventions

VOL	• Keep the number of VOLs to 512 or less, so they can be accessed from the source FC-CA port.
	• Separate the VOL setting values with "," (comma).
	• For the setting range of VOL, refer to "Template File for Storage Migration Settings" (page 1359).
	• Describe the VOL in the following order.
	
	  VOL=xxxx, yyyy
	         ↑ ↑
	             Destination volume number
	       Source LUN
	
	• Start a new line for each VOL. Multiple VOLs cannot be described without breaking.
	• There must be no overlaps within the same GROUP for the source LUN.

Other information	• Entered letters are not case-sensitive. • A line that starts with "#" is a comment. • A file can be any text string.

Setting Example of the Storage Migration Setting File

A setting example of the Storage Migration setting file is shown below:

```
# Setting Example (for the ETERNUS DX/AF except the ETERNUS DX8700 S3/DX8900 S3)
eternus-storage-migration-0101
Type=Open

GROUP=0
OPEMODE=M+QC

{

  PATH=CM0,CA0,P0,0000000011111111
  PATH=CM1,CA0,P1,2222222233333333
  VOL=0x0000,0x0040
  VOL=0x0001,0x0041
  VOL=0x00FF,0x013F

}

GROUP=1
OPEMODE=M+QC

{

  PATH=CM0,CA1,P0,8888888888888888
  VOL=4,10

}

GROUP=2
OPEMODE=M

{

  PATH=CM0,CA1,P1,9999999999999999
  VOL=0x0000011000000000,0x0141

}
```

The above example describes the case where the following paths and migration volumes are configured for three source storage systems (GROUP#0, 1, 2).

Path group (OPEMODE)	Migration information		
GROUP=0 (M+QC)	Path	Location information of the destination FC-Initiator port	WWN for the source FC-CA port
		CM0,CA0,P0	0000000011111111
		CM1,CA0,P1	2222222233333333
	Migration volume	Source LUN	Destination volume number
		0x0000	0x0040
		0x0001	0x0041
		0x00FF	0x013F
GROUP=1 (M+QC)	Path	Location information of the destination FC-Initiator port	WWN for the source FC-CA port
		CM0,CA1,P0	8888888888888888
	Migration volume	Source LUN	Destination volume number
		4	10
GROUP=2 (M)	Path	Location information of the destination FC-Initiator port	WWN for the source FC-CA port
		CM0,CA1,P1	9999999999999999
	Migration volume	Source LUN	Destination volume number
		0x0000011000000000	0x0141

J. Setting Procedures for Replacing HBAs

This appendix describes how to replace an HBA in the ETERNUS DX.

When management software such as ETERNUS SF Storage Cruiser is used, use the management software for migrating the current access path settings instead of the procedure that is provided in this manual.

One of the following connection statuses is used between a host and an ETERNUS DX. Note that the required procedures depend on the connection status.

- When the host affinity settings are used
- When the host affinity settings are not used (when conventional LUN mapping is used)

Advance Preparation

Before starting the operation, check the following information.

- The WWN of the current HBA
- The host name corresponds to the WWN of the current HBA
- The WWN of the new HBA

Overview of the Procedure

The workflow for replacing an HBA is as follows. Perform the following procedure.

(1) Check the connection status between the host and the ETERNUS DX/AF.
   Refer to "Checking the Connection Status Between the Host and the ETERNUS DX/AF" (page 1367) for details.

(2) Replaces the HBA in the host and connects the host and the ETERNUS DX/AF.
   This operation must be performed by a maintenance engineer.

(3) Perform the system settings according to the connection status that was checked in Step (1).
   - When the host affinity settings are used
     Settings for the ETERNUS DX/AF are required. Refer to "Required Storage System Settings After HBA Replacement (When Host Affinity Settings are Used)" (page 1368) for details.

   - When the host affinity settings are not used (conventional LUN mapping is used)
     Settings for the ETERNUS DX/AF are not required. This ends the replacement procedure for an HBA.

The following procedure is an example when a FC interface is used between the host and the ETERNUS DX/AF.
The same procedure can basically be used even when the interface type is iSCSI or FCoE.

Checking the Connection Status Between the Host and the ETERNUS DX/AF

Perform the following procedure to check the connection status between the host and the ETERNUS DX/AF.

Procedure

1 Click [Connectivity] in the navigation.

2 Click [FC/FCoE] in the category.
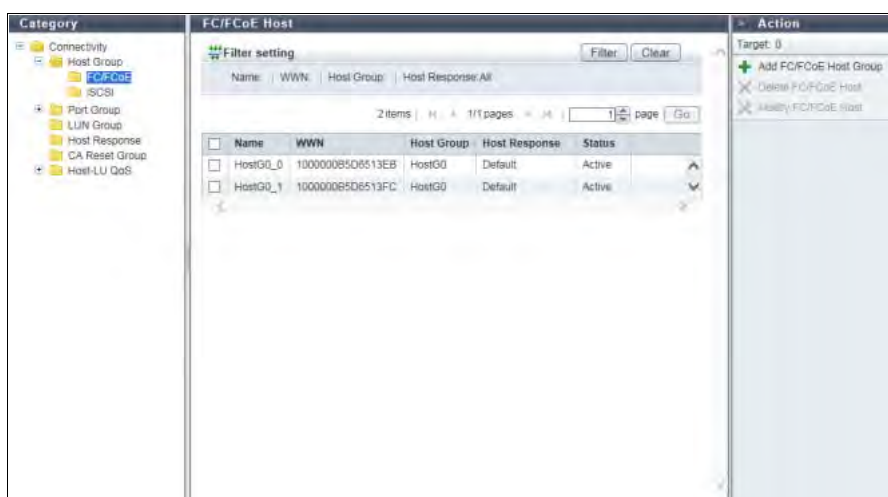
→ The [FC/FCoE Host] screen appears.

3 Check the connection status between the relevant host and the ETERNUS DX/AF in the "Status" field.

■ When the host affinity settings are used

→ "Active" is displayed as the status. Proceed to "Required Storage System Settings After HBA Replacement (When Host Affinity Settings are Used)" (page 1368)

■ When the host affinity settings are not used (conventional LUN mapping is used)

→ "Inactive" is displayed as the status. In this case, settings after replacing the HBA are not required. The replacement of the HBA is complete.

End of procedure

J.   Setting Procedures for Replacing HBAs
      Required Storage System Settings After HBA Replacement (When Host Affinity Settings are Used)

P2X0-1260-23ENZ0

Required Storage System Settings After HBA Replacement (When Host Affinity Settings are Used)

In this section, the setting procedure for an ETERNUS DX/AF that uses host affinity settings is provided.

▷ **Caution**

- When management software such as ETERNUS SF Storage Cruiser is used, use the management software for migrating the current access path settings instead of the procedure that is provided in this manual (manual setting).
- To set WWN zoning by using the switch, make sure to change the zoning settings in advance.

The procedure for storage system settings when the host affinity is used is as follows.
Change the WWN of the HBA that is to be replaced to the WWN of the new HBA.

Procedure

1   Input "User ID" and "Password" in the browser and log in to ETERNUS Web GUI.
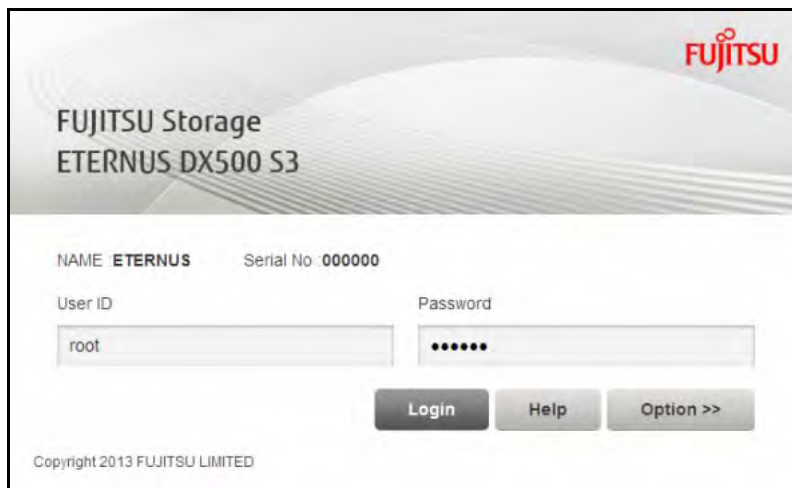
2   Change the WWN of the HBA that is to be replaced to the WWN of the new HBA.

2-1   Click [Connectivity] in the navigation.
→ The [Connectivity] screen appears.

2-2   Click [FC/FCoE] in the category.
→ The [FC/FCoE Host] screen appears.

2-3   Select the checkbox of the WWN for the HBA that is to be replaced (in this example, "1000000B5D6513FC" is selected).

J. Setting Procedures for Replacing HBAs
   Required Storage System Settings After HBA Replacement (When Host Affinity Settings are Used)

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2-4 Click [Modify FC/FCoE Host] in [Action].
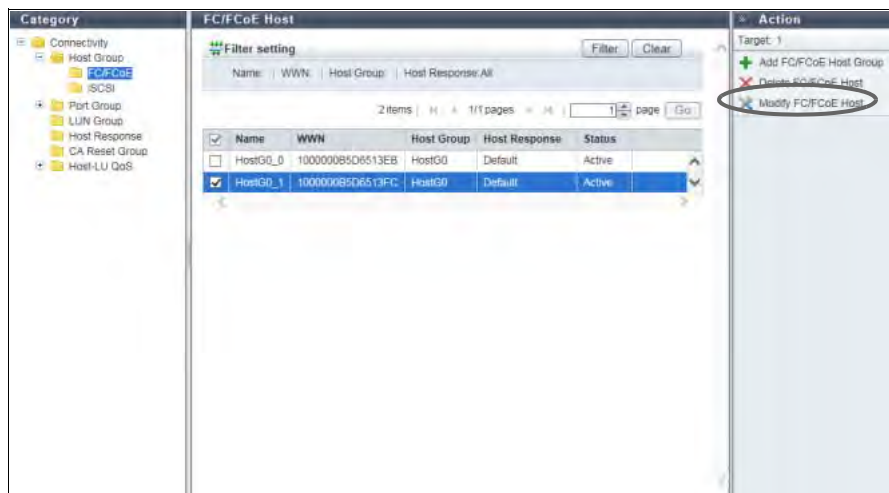
→ The [Modify FC/FCoE Host] screen appears.

2-5 Change the WWN of the HBA that is to be replaced to the WWN of the new HBA, and click the [Modify] button.

> ▶ **Caution**
>
> Do not change the "Name".
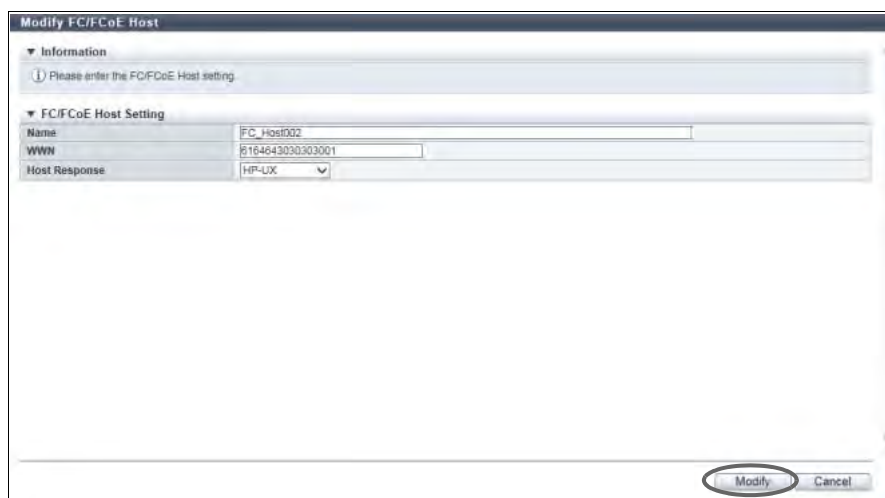
2-6 A confirmation screen appears. Click the [OK] button.
→ Changing of the FC host starts.

2-7 Click the [Done] button to return to the [FC/FCoE Host] screen.

J.   Setting Procedures for Replacing HBAs
     Required Storage System Settings After HBA Replacement (When Host Affinity Settings are not Used)

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2-8   Confirm that the WWN is successfully changed.
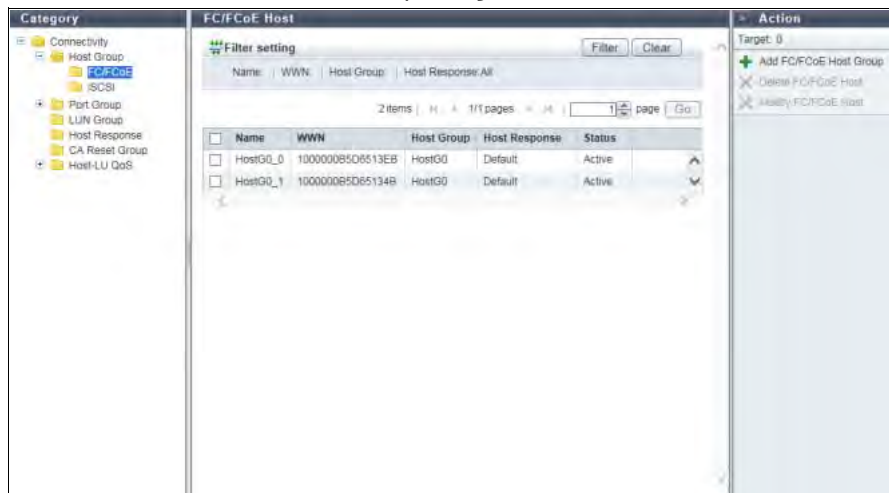
End of procedure

This ends the host affinity setting for replacing an HBA.
Recover the multipath configuration from the host.
After recovering the multipath configuration, confirm that the ETERNUS DX/AF can be accessed from the host.

> **Caution**

If the WWN is changed by the [Modify FC/FCoE Host] function, changing the host affinity setting is not required.

Required Storage System Settings After HBA Replacement (When Host Affinity Settings are not Used)

When the host affinity function is not used (conventional LUN mapping is used), changing the storage system settings after replacing an HBA is not required.

K.   Error Code

The error codes for copy sessions are described below.

Error code	Description
0x10 – 0x1F	An error that is caused by a copy source volume occurs. Some copy source volumes cannot be accessed because a failure has occurred in a component (e.g. drives and drive enclosures).
0x20 – 0x2F	An error that is caused by a copy destination volume occurs. Some copy destination volumes cannot be accessed because a failure has occurred in a component (e.g. drives and drive enclosures).
0x30 – 0x3F	An error that is caused by a copy path occurs or an REC Buffer Halt occurs. The error location (Suspected Spot) is displayed in the "Detail Information" field on the [Copy Path] screen. Refer to "Copy Path" (page 947) for details.
0xB1	This copy session stopped due to an error that has occurred in the cascade source session while the cascade copy was being specified.
0xBA	A bad sector is detected.
0xBB	SDV/SDP capacity is insufficient.
0xBD	Overload status is detected in a copy destination volume or a copy destination storage system.
0xBE	A copy path error occurs. Data is stored in the REC Buffer. This error is displayed only when the "Type" is "REC".
0xBF	A copy path error occurs. Data is stored in the REC Disk Buffer. This error is displayed only when the "Type" is "REC".
Other than above	An error other than the ones listed above occurs.

L. Status List

The status of the ETERNUS DX/AF, volumes, RAID groups, Thin Provisioning Pools, components, an SED authentication key (hereinafter, referred to as "key"), and key servers that are displayed in the operation screens is described below.

Storage System General Status

The general status of the ETERNUS DX/AF is displayed as an icon with character strings.
A "Normal (green)" general status icon indicates normal status, while other color images indicate a failure.
The meaning of each general status icon is described below.

Device general status	Description
Normal (Green)	The ETERNUS DX/AF is in the normal state.
Maintenance (Orange)	The ETERNUS DX/AF is under maintenance.
Warning (Yellow)	The ETERNUS DX/AF is in the warning state.
Error (Red)	The ETERNUS DX/AF is in the failed state.
Not Ready (Red)	"Not Ready" is a status where an abnormality is detected at a power-off, and I/O access from the host cannot be received.

Storage System General Status (Detail)

The general status of the ETERNUS DX/AF (detail) is displayed with an icon and character string, or only character string.
The meaning of ETERNUS DX/AF general status (detail) is described below.

Device general status (detail)	Device general status	Description
✓ Normal	**Normal** (Green)	The ETERNUS DX/AF is in the normal state.
⊘ Maintenance	**Maintenance** (Orange)	Components that are undergoing maintenance exist in the ETERNUS DX/AF. Rebuild or copyback is being performed.
⊘ Change Controlling CM	**Maintenance** (Orange)	Changing of the Controlling CM is required.
⚠ Pinned Data	**Warning** (Yellow)	Pinned data is detected.
⚠ Warning	**Warning** (Yellow)	A component requires preventive maintenance. A bad sector is detected.
✗ Error	**Error** (Red)	A component has an error.
✗ Not Ready (*)	**Not Ready** (Red)	A failure is detected when starting or turning off the ETERNUS DX/AF. I/O from the host cannot be received normally. *: The number, which indicates the factor of being "Not Ready", is displayed.

Device general status (detail)	Device general status	Description
❌ Subsystem Down	**Not Ready** (Red)	The ETERNUS DX/AF is in the failed state. I/O from the host cannot be received normally.
❌ Unknown	**Error** (Red)	A status other than the ones listed above.

Volume Status

Volume status is displayed with an icon and the status name. The volume status is described below.

Status	Description
✅ Available	The volume is operating normally.
✅ Spare in Use	The RAID group to which the volume belongs manages redundancy by using the hot spare.
🚫 Readying	The volume is not formatted.
🚫 Rebuild	Rebuilding from a failed data drive to the hot spare or to the replaced drive is being performed in the RAID group to which the volume belongs.
🚫 Copyback	Copyback from the hot spare to the new data drive is being performed in the RAID group to which the volume belongs.
🚫 Redundant Copy	Redundant copy to the hot spare is being performed in the RAID group to which the volume belongs.
🚫 Partially Exposed Rebuild	Rebuilding from the first failed data drive to the hot spare or to the replaced drive is being performed in the RAID group to which the volume belongs. This status is displayed only when the RAID level of the RAID group to which the volume belongs is "High Reliability (RAID6)" or "High Reliability (RAID6-FR)".
🚫 Exposed Rebuild	Two of the data drives for the RAID group to which the volume belongs have failed. Rebuilding from the first failed data drive to the hot spare or to the replaced drive is being performed. In addition, all the hot spares have already been used. As a result, the second failed data drive is waiting for the hot spare to become available. This status is displayed only when the RAID level of the RAID group to which the volume belongs is "High Reliability (RAID6)" or "High Reliability (RAID6-FR)".
⚠️ Exposed	The RAID group to which the volume belongs lost redundancy due to drive failure.
⚠️ Partially Exposed	One of the drives that configures the RAID group to which the volume belongs has failed. This status is displayed only when the RAID level of the RAID group to which the volume belongs is "High Reliability (RAID6)" or "High Reliability (RAID6-FR)".
❌ Not Available	The volume cannot be used.
❌ Not Ready	The RAID group to which the volume belongs is blocked.
❌ Broken	The volume is broken.
❌ Data Lost	Data in the volume is lost. Reading or writing of data cannot be performed.
❓ Unknown	A status other than the ones listed above.

RAID Group Status

RAID group status is displayed with an icon and the status name. The RAID group status is described below.

Status	Description
✅ Available	The RAID group is operating normally.
✅ Spare in Use	Rebuilding to the hot spare is complete. The RAID group manages redundancy by using the hot spare.
✅ Spare in Use (Fast)	Rebuilding to the Fast Recovery hot spare is complete. The RAID group manages redundancy by using the Fast Recovery hot spare. This status is displayed only when the RAID level is "High Reliability (RAID6-FR)".
✅ Readying	The RAID group that is registered as an REC Disk Buffer is not formatted. This status is displayed only for a RAID group that is registered as an REC Disk Buffer.
🟠 Rebuild	Rebuilding from a failed data drive to the hot spare or to the replaced drive is being performed in the RAID group.
🟠 Copyback	Copyback from the hot spare to the new data drive is being performed in the RAID group.
🟠 Copyback (Fast)	Copyback from the Fast Recovery hot spare (*1) to the new data drive for the RAID group is being performed. This status is displayed only when the RAID level is "High Reliability (RAID6-FR)". *1: Hot spare area that is distributed in the Fast Recovery RAID group.
🟠 Redundant Copy	Redundant copy to the hot spare is being performed in the RAID group.
🟠 Partially Exposed Rebuild	Rebuilding from the first failed data drive to the hot spare or to the replaced drive is being performed in the RAID group. This status is displayed only when the RAID level is "High Reliability (RAID6)".
🟠 Partially Exposed Rebuild (Fast)	Rebuilding from the first failed data drive to the Fast Recovery hot spare is being performed in the RAID group. This status is displayed only when the RAID level is "High Reliability (RAID6-FR)".
🟠 Exposed Rebuild	Two of the data drives for the RAID group have failed. Rebuilding from the first failed data drive to the hot spare or to the replaced drive is being performed. In addition, all the hot spares have already been used. As a result, the second failed data drive is waiting for the hot spare to become available. This status is displayed only when the RAID level is "High Reliability (RAID6)".
🟠 Exposed Rebuild (Fast)	Two of the data drives for the RAID group have failed. Rebuilding from the first failed data drive to the Fast Recovery hot spare is being performed. In addition, all the hot spares have already been used. As a result, the second failed data drive is waiting for the hot spare to become available. This status is displayed only when the RAID level is "High Reliability (RAID6-FR)".
⚠️ Exposed	The RAID group lost redundancy due to drive failure.
⚠️ Exposed (Fast)	The RAID group lost redundancy due to drive failure. The RAID group uses the Fast Recovery hot spare. This status is displayed only when the RAID level is "High Reliability (RAID6-FR)".
⚠️ Partially Exposed	One of the drives that configures the RAID group has failed. This status is displayed only when the RAID level is "High Reliability (RAID6)".
⚠️ Partially Exposed (Fast)	One of the drives that configures the RAID group has failed. The RAID group uses the Fast Recovery hot spare. This status is displayed only when the RAID level is "High Reliability (RAID6-FR)".
❌ No Disk Path	The RAID group is blocked.
❌ SED Locked	The RAID group is blocked. If an SED authentication key cannot be obtained from the key server, "SED Locked" is displayed.
❌ Broken	The RAID group is broken.

Status	Description
❌ Broken (Fast)	The RAID group is broken. The RAID group uses the Fast Recovery hot spare. This status is displayed only when the RAID level is "High Reliability (RAID6-FR)".
❓ Unknown	A status other than the ones listed above.

External RAID Group Status

External RAID Group status is displayed with an icon and the status name. The External RAID Group status is described below.

Status	Description
✅ Available	The External RAID Group is operating normally.
❌ Broken	The External RAID Group is broken.
❌ Not Accessible	The External RAID Group cannot be accessed.
❓ Unknown	A status other than the ones listed above.

Thin Provisioning Pool Status

TPP status is displayed with an icon and the status name. The TPP status is described below.

Status	Description
✅ Available	The TPP is operating normally.
🚫 Maintenance	Forcible recovery of the TPP is being performed.
🚫 Readying	All the physical allocation area in the TPP is not formatted.
🚫 Partially Readying	Some parts of the physical allocation area in the TPP is not formatted.
⚠️ Exposed	The TPP is available. The "Exposed" state of the TPP is displayed not only when the RAID group that configures the TPP has lost redundancy and is in the "Exposed" state, but also when the RAID group maintains redundancy in the "Spare in Use" state. The "Exposed" state of TPP indicates that the RAID group in the TPP is not in the normal state because of any causes such as the drive failure.
❌ Blockade	The TPP is blocked.
❌ Broken	The TPP is broken.
❌ Data Lost	Data in the TPP is lost. Reading or writing of data cannot be performed.
❓ Unknown	A status other than the ones listed above.

Component Status

This section explains the component status.
The status of the components is displayed with an icon for each storage system image in the view screen.

Status	Description
(green check icon)	The component is operating normally.
(blue box icon)	The component is installed, but not used.
(orange slash icon)	The component is under maintenance.
(yellow warning icon)	The component requires preventive maintenance.
(red x icon)	An error has occurred in the component.
(gray question icon)	A status other than the ones listed above.

In the list screen and the detailed information screen, the status of the components is displayed with an icon and the status name.

| Status	Description
(green check) Normal	The component is operating normally.
(blue box) Unconnected	A faulty component exists in the ETERNUS DX/AF.
(blue box) Undefined	The component is installed, but not used.
(blue box) Undefined (Error)	The component, which is not being used, is in the error state.
(blue box) Normal (Unused parts inside)	There is an unused component that is installed in the ETERNUS DX/AF.
(orange slash) Check1	The component is being rebooted.
(orange slash) Maintenance	The component is under maintenance.
(yellow warning) Warning	The component requires preventive maintenance.
(red x) Error	An error has occurred in the component.
(gray question) Unknown	A status other than the ones listed above.

Drive Status

Drive status is displayed with an icon and the status name. The drive status is described below.

Status	Description
Available	The drive is in the normal state. The drive is used in the RAID group. Volumes are created in the RAID group.
Spare	The drive is an unused hot spare.
Available	The drive is in the normal state. The drive is used in the RAID group. No volumes are created in the RAID group.
Present	The drive is not used (not registered as a RAID group or hot spare), or is waiting for rebuild/copy back.
Readying	The drive is starting up.
Rebuild/Copyback	Rebuild or copy back is being performed in the drive.
Redundant Copy	A Redundant copy is being performed in the drive.
Not Supported	The drive is not supported. [Example] Drive capacity is insufficient.
Not Exist	The drive cannot be recognized.
Failed Usable	An error involving RAID group failure has occurred in the drive.
Broken	An error has occurred in the drive.
Unknown	A status other than the ones listed above.

External Drive Status

External Drive status is displayed with an icon and the status name. The External Drive status is described below.

Status	Description
Available	The External Drive is in the normal state. The External Drive is used in the External RAID Group. External Volumes are created in the External RAID Group.
Available	The External Drive is in the normal state. The External Drive is used in the External RAID Group. No External Volumes are created in the External RAID Group.
Present	The External Drive is unused (or not registered in the External RAID Group).
Rebuild	A mirror configuration is being established in the External Drive.
Not Exist	The External Drive cannot be recognized.
Failed Usable	An error involving External RAID Group failure has occurred in the External Drive.
Unknown	A status other than the ones listed above.

Key Status

Key status is displayed with the status name. The key status is described below.

Status	Description
Normal	A valid key is registered for the SEDs. The key is in the normal state.
Unregistered Server Certificate	The "SSL / KMIP Certificate" (key server certification) is not registered in the ETERNUS DX/AF. Communication between the ETERNUS DX/AF and the key server cannot be performed.
Expired Server Certificate	The "SSL / KMIP Certificate" (key server certification) has expired. Communication between the ETERNUS DX/AF and the key server cannot be performed.
No SSL Certificate	An SSL certificate (*1) for the ETERNUS DX/AF has not been created. Communication between the ETERNUS DX/AF and the key server cannot be performed.
Network Error	The key cannot be obtained due to a network error between the ETERNUS DX/AF and the key server.
Not Acquired	The required key for starting key server management is not obtained. The allocation of the Master server and the Slave server to the key group has been deleted.
Expiration	An expired key is registered in the SED. The key has expired, but a new key can be obtained from the server.
Key Server Error	The network between the ETERNUS DX/AF and the key server is in the normal state, but no SED key is stored in the key server.
Modifying	A RAID group in which the key is being modified exists in the key group. "RAID group of which key is modifying" indicates the following conditions: • The key is being updated manually from ETERNUS Web GUI or ETERNUS CLI • The key is automatically being updated because it expired • Updating of the key stopped due to an error • SEDs are maintained while a network error occurs when the security level is "Low"

*1:   "Self-signed SSL certificate" or "SSL server certificate"

Key Server Status

Key server status is displayed with the status name. The key server status is described below.

Status	Description
Normal	The communication between the ETERNUS DX/AF and the key server is normal. The key can be obtained successfully. The key server is in the normal state.
Setting	"Setting" indicates the following conditions: • The "SSL / KMIP Certificate" (key server certification) or SSL certificate (*1) is not registered. • The network between the ETERNUS DX/AF and the key server is normal, but connection to the key server is forbidden.
Network Error	The network between the ETERNUS DX/AF and the key server is not connected normally.
Key Acquisition Failure	The key that is requested from the ETERNUS DX/AF does not exist in the key server.
Key Server Error	An error due to a failure other than key acquisition failure is detected.
Internal Error	Communication to the key server could not be performed due to an internal failure of the ETERNUS DX/AF.

*1:   "Self-signed SSL certificate" or "SSL server certificate"

FUJITSU Storage
ETERNUS DX S4/S3 series Hybrid Storage Systems,
ETERNUS AF series, ETERNUS DX200F All-Flash Arrays

ETERNUS Web GUI User's Guide

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