

White Paper

FUJITSU Storage ETERNUS AF series and ETERNUS DX series Non-Stop Storage Reference Architecture Configuration Procedures for Storage Cluster

Non-stop storage is a high-availability solution that combines ETERNUS SF products with the ETERNUS AF series or the ETERNUS DX series. It provides an ideal environment for enterprise systems that allows future business growth and data accumulation.



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Preface

Non-stop storage is a solution that ensures continuous system operation while maintaining an optimal, highly-reliable system performance over a long period of time. A combination of FUJITSU Storage ETERNUS SF products and the FUJITSU Storage ETERNUS AF series or the ETERNUS DX series can create non-stop storage environments best suited for enterprise systems.

This document consists of the following chapters, and provides non-stop storage environment configurations and configuration procedures.

1. Overview of Non-Stop Storage Environment

This chapter provides an outline of the non-stop storage environment.

2. Example Configuration and Setup Procedure

This chapter outlines the configuration examples used in this document and the configuration procedures.

3. Non-Stop Storage Configuration Procedure

This chapter explains how to set up the overall non-stop storage environment based on an example configuration. Business servers on the virtual system and the storage systems are duplicated, and vCenter Server, ETERNUS SF Storage Cruiser Manager/Agent, and ETERNUS SF MA are set up on a single management server.

4. WSFC Cluster Configuration Procedure of the Non-Stop Storage Management Server

This chapter explains how to cluster the physical management server in a non-stop storage environment based on an example configuration. Windows Server Failover Clustering (WSFC) is implemented in the management server for clustering ETERNUS SF Storage Cruiser Manager/Agent.

The information after "1. Overview of Non-Stop Storage Environment" for the FUJITSU Storage ETERNUS DX S3 series also applies to the FUJITSU Storage ETERNUS AF series and ETERNUS DX S4 series.

The verification results described in this document are current as of November 2016.

■ Prerequisites

The product lineup and product information stated in this document are current as of November 2018.

■ Target Readers

This document is intended for readers familiar with FUJITSU Storage ETERNUS SF products, the FUJITSU Storage ETERNUS AF series and ETERNUS DX series, VMware vSphere, and Windows Server.

■ Target Models

This document targets the following storage system models.

- FUJITSU Storage ETERNUS AF series

- FUJITSU Storage ETERNUS DX S3 series and later*

*The ETERNUS DX60 S4/S3, ETERNUS DX100 S4/S3, and ETERNUS DX8100 S4 are excluded.

■ Abbreviations

This document uses the following abbreviations.

- FUJITSU Storage ETERNUS DX series	... ETERNUS DX series
- FUJITSU Storage ETERNUS AF series	... ETERNUS AF series
- FUJITSU Storage ETERNUS SF Storage Cruiser	... Storage Cruiser
- FUJITSU Storage ETERNUS SF AdvancedCopy Manager	... ACM
- FUJITSU Storage ETERNUS SF products	... ESF
- ETERNUS SF Manager	... ESF Manager
- ETERNUS SF Storage Cruiser Agent	... ESF Agent
- ETERNUS SF MA	... MA
- Automated Storage Tiering function	... AST
- Automated Quality of Service	... Auto QoS
- Flexible Tier Volume	... FTV
- VMware vSphere	... vSphere
- VMware ESXi	... ESXi
- VMware vCenter Server	... vCenter Server
- VMware vCenter Server Appliance	... vCSA
- VMware vSphere Web Client	... vSphere Web Client
- VMware vSphere Client	... vSphere Client
- Microsoft Windows Server 2012 R2	... Windows Server
- Windows Server Failover Clustering	... WSFC
- Active Directory Server	... AD Server
- Domain Name System Server	... DNS Server
- Network Time Protocol Server	... NTP Server

1. Overview of Non-Stop Storage Environment

This chapter provides an outline of the non-stop storage environment.

1.1. Overview of System Configuration

The system uses VMware vSphere 6 for virtualization.
The Storage Cluster function is used to provide duplicate storage systems and vSphere HA is used to provide duplicate ESXi servers for the business servers.
Two Fibre Channel switches are also provided for redundancy.
A management server is used to manage the virtual environment and storage systems and to collect performance data.
The following figure shows a system configured with ETERNUS DX200 S3 storage systems and a single management server.
Using Storage Cluster with FCs is recommended. iSCSI is also supported, however a switchover with iSCSI can take anywhere between 30 seconds to 1.5 minutes.

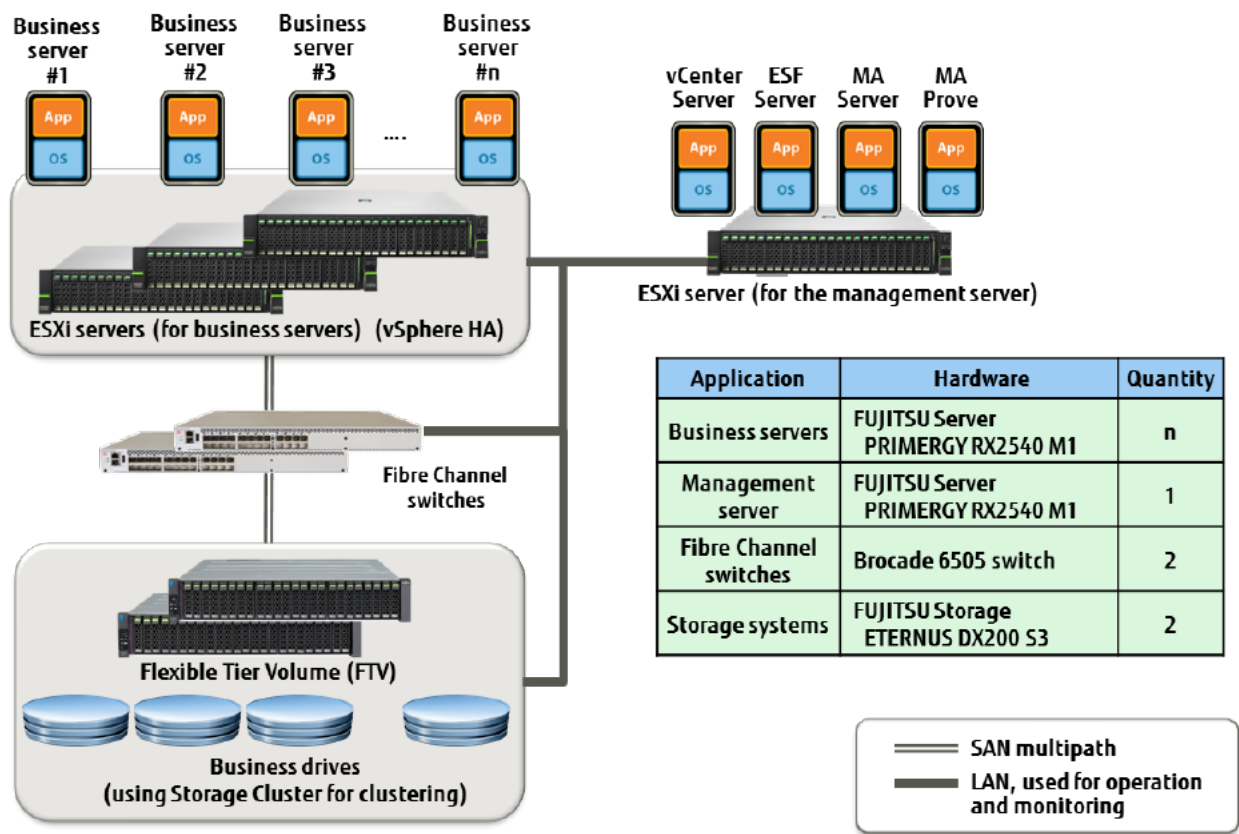


Figure 1 System overview

Note that this document omits the details and configuration procedures of the following servers that are required for non-stop storage environments. Prepare them separately.

NTP Server

The ESXi servers, vCenter Server, ESF Server, MA Server, MA Probe, Fibre Channel switches, and the ETERNUS DX200 S3 use the NTP service to synchronize their clocks.

DNS Server or AD Server

Required by vCenter Server, the ESXi servers, and management servers to check FQDNs with each other.
For a single server configuration, a DNS server or an AD server is required.
For an ESF server (installed in the management server) clustered by WSFC, an AD server is required.

1.2. Software Block Diagram

This section describes the software used to provide non-stop storage.

Business servers
VMware vSphere 6.0 is set up on ESXi servers and used for the hypervisor layer.
vSphere HA is used for the cluster layer, with the virtual servers able to run on any of the ESXi servers.
Either Windows or Linux can be used as the OS, depending on the requirements of the respective business servers.
Select the middleware that suits the operation based on the choice of OS.

Management server
As is the case with the business servers, VMware vSphere 6.0 is set up on an ESXi server and used for the hypervisor layer.
Because this example uses a single management server, vSphere HA is not used for the cluster layer.
ESF Server: As this document assumes a Windows OS, the Windows versions of ETERNUS SF are used.
MA Server: An MA server is set up as a directly connected appliance on a virtual server.
MA Probe: An MA probe is set up as a directly connected appliance on a virtual server.
vCenter Server: A vCenter server is set up as a directly connected appliance on a virtual server.

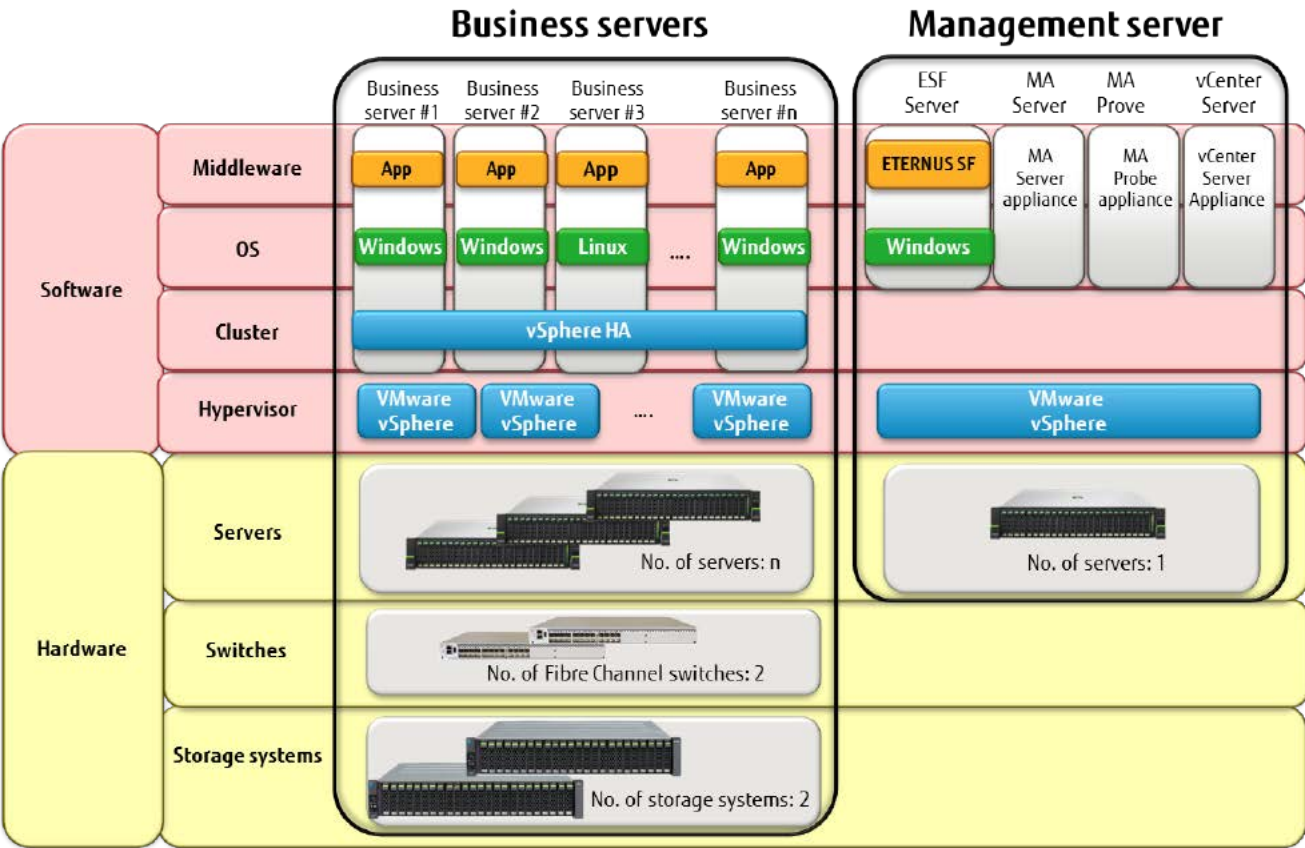


Figure 2 Software block diagram

1.3. Overview of Business Server Operation

This section describes how the business servers work with non-stop storage.

The storage system (ETERNUS DX200 S3) is clustered at the storage system layer. If a failure occurs on the Primary storage, the storage connected to the servers is switched over automatically by making the Secondary storage active.

AST^{*1} is used to allocate data to the storage system in an efficient manner. Storage clustering is performed at the level of the volumes used for AST.

Because the business servers are virtualized, users are not aware of which ESXi server they are running on.

If a failure occurs on an ESXi server, its business servers are automatically shifted to another ESXi server and operation continues.

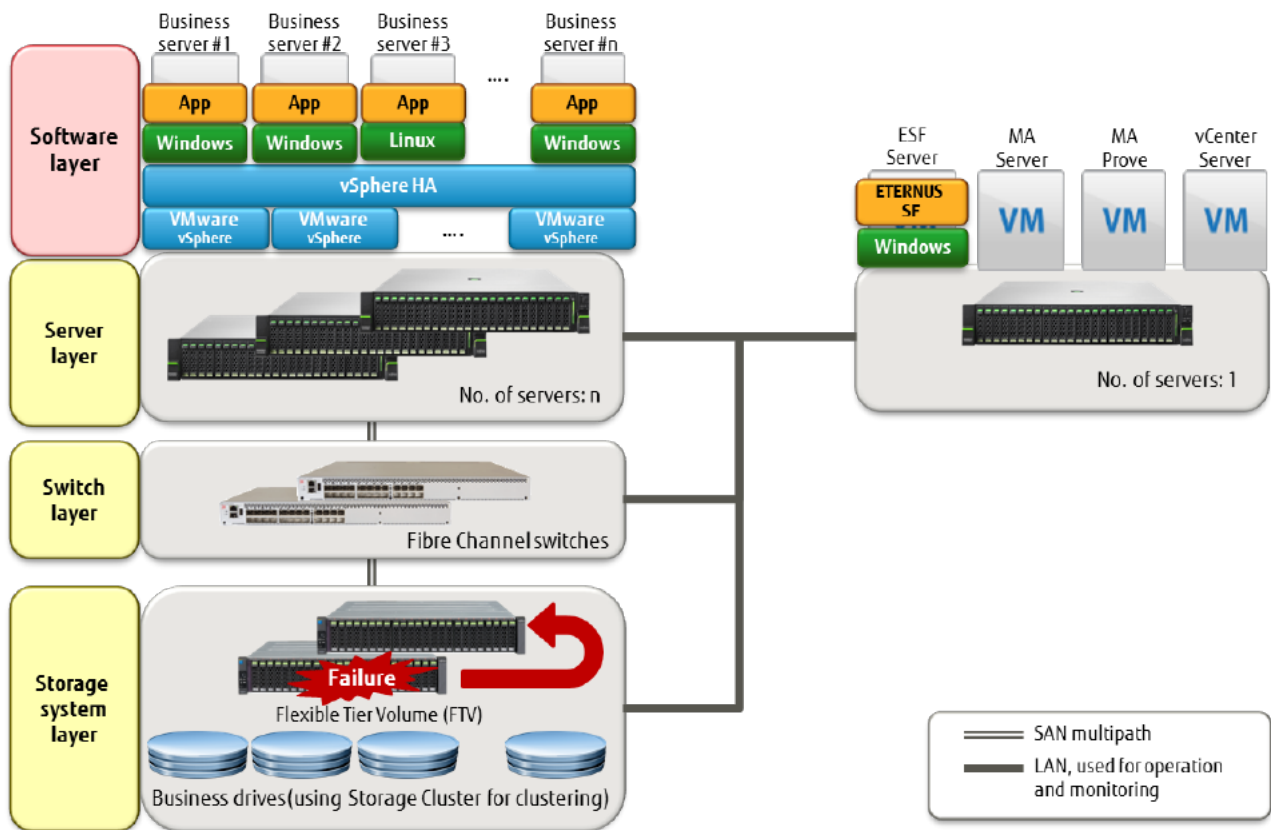


Figure 3 Overview of business operation

*1: If the ETERNUS DX series is used as the storage system, optimal data allocation is automatically performed for the installed high-speed and low-speed drives according to the data access frequency.

AST is not applicable to the ETERNUS AF series because all the drives are SSDs.

If AST is not used, Standard Volumes or Thin Provisioning Volumes (TPV) are used as business volumes.

1.4. Overview of Monitoring Server Operation

The ESF Server is used to manage the storage system (ETERNUS DX200 S3). It handles all aspects of storage operation, including configuration changes, AST settings, and Auto QoS policy settings.

MA Probe collects performance data on the storage systems and servers. It can collect performance data from a variety of sources, including ETERNUS Probe, VMware Probe, Linux Probe, and Windows Probe.

MA Server stores the performance data collected by MA Probe. It provides long-term archiving of the performance data, enabling analysis of performance over a period of years.

vCenter Server is used to configure and manage the virtual environments running on the ESXi servers. If a failure occurs on an ESXi server, its virtual servers are switched over to another ESXi server and automatically restarted.

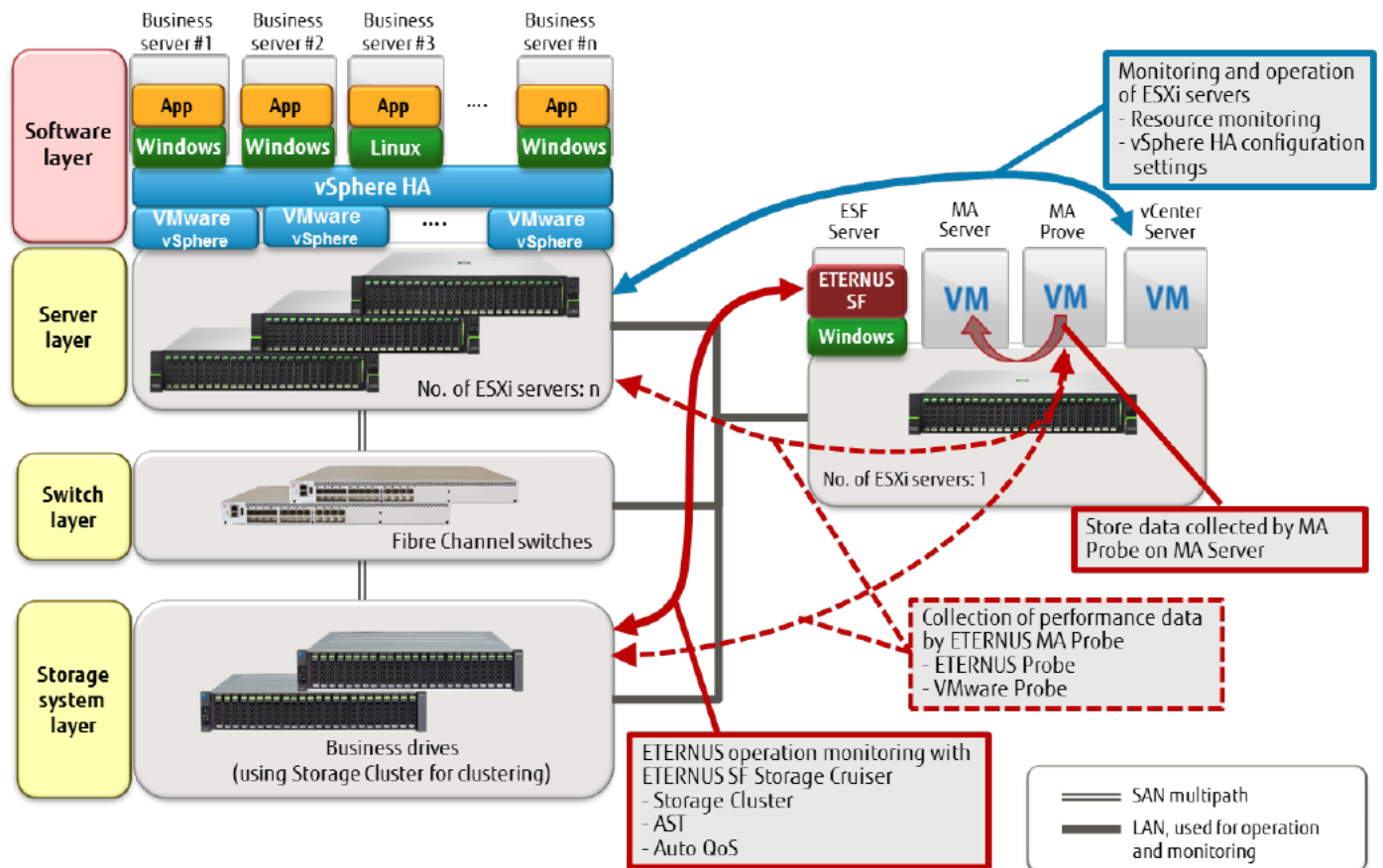


Figure 4 Overview of the monitoring operation

2. Example Configuration and Setup Procedure

This chapter outlines the configuration examples used in this document and the configuration procedures.

"3. Non-Stop Storage Configuration Procedure" explains how to set up the overall non-stop storage environment shown in "1. Overview of Non-Stop Storage Environment" based on an example configuration. The following figure shows the example configuration, and a range of configurations.

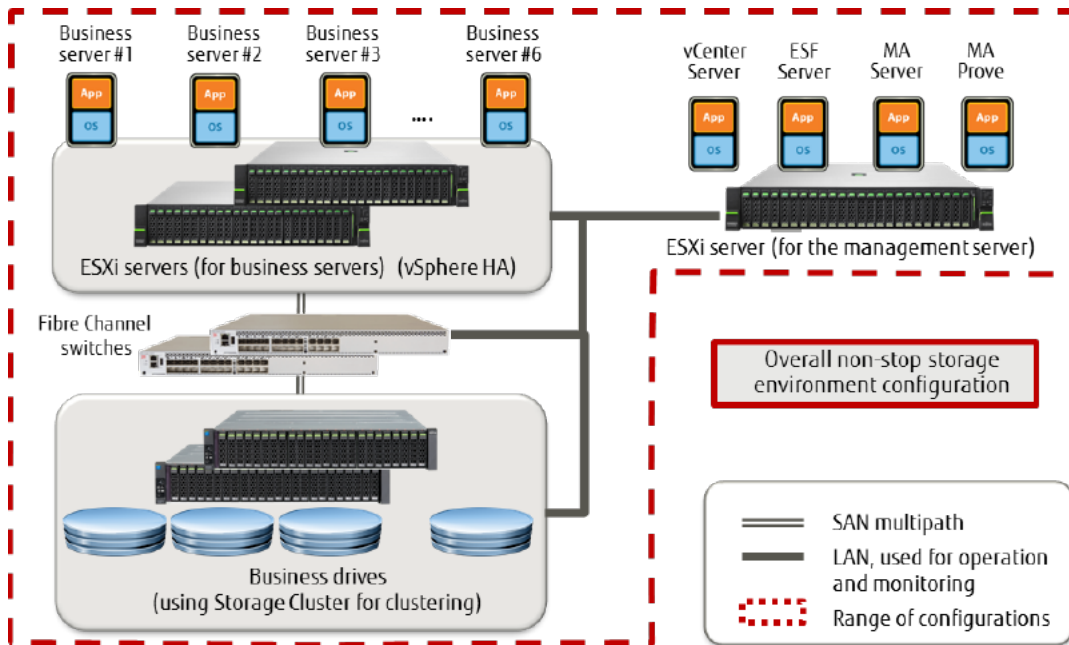


Figure 5 Example of a non-stop storage environment, and a range of configurations

"4. WSFC Cluster Configuration Procedure of the Non-Stop Storage Management Server" explains how to cluster an ESF server (installed in the management server) with WSFC in a non-stop storage environment based on an example configuration. Assuming that the ESF server is set up on a single physical server, Chapter 4 shows the procedures to create WSFC shared drives and to cluster ESF servers. The following figure shows the example configuration, and a range of configurations.

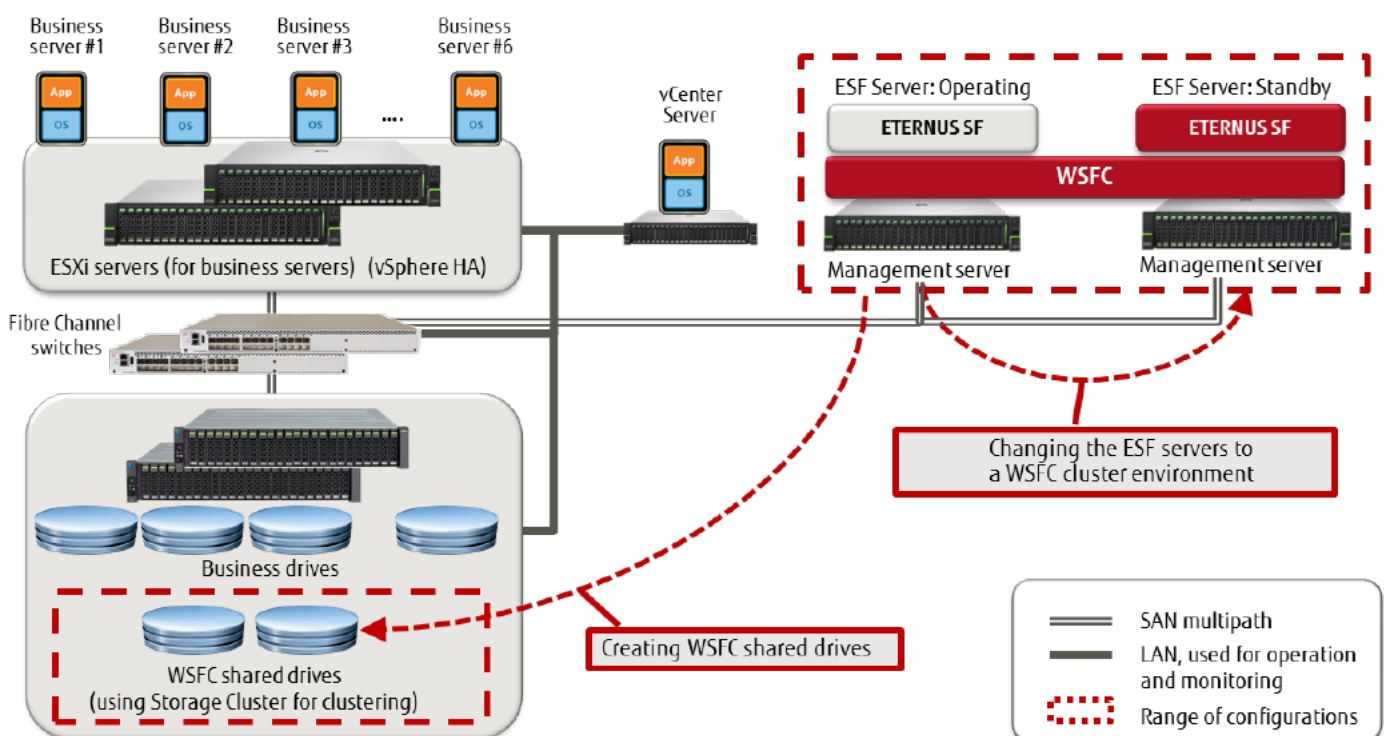


Figure 6 Example of non-stop storage management servers clustered with WSF, and a range of configurations

3. Non-Stop Storage Configuration Procedure

This chapter provides a configuration example of a non-stop storage environment and its configuration procedure.

3.1. Configuration

The configuration of the non-stop storage environment and its major settings are explained.

3.1.1. Outline of the Business Volume Configuration

As business servers, VMware vSphere ESXi is installed in two PRIMERGY servers and VMware vSphere HA is configured in the virtual machines on the ESXi server.

Virtual machines use the virtual logical volumes (FTV) on the storage system as disk resources.

Two ETERNUS DX200 S3s are used for the storage system, and the virtual logical volumes (FTV) are synchronized between storage systems by the Storage Cluster function.

The Storage Cluster function determines the Primary storage and the Secondary storage from the TFO group.

In this example, a bidirectional FTV synchronization is performed using two different TFO groups of the Primary storage.

FTVs are created in automated storage tiering pools (Tier pool).

Data within the Tier pool is relocated between high-speed disks and low-speed disks based on access frequency.

Disks can be a combination of SSDs, Online SAS disks, and Nearline SAS disks.

In this example, a 2-tier configuration using Online SAS disks as the fast disks and Nearline SAS disks as the slow disks is used.

For a 3-tier configuration example, refer to "4.1.1. Outline of the Overall Configuration".

The business volume configuration in this example is shown below.

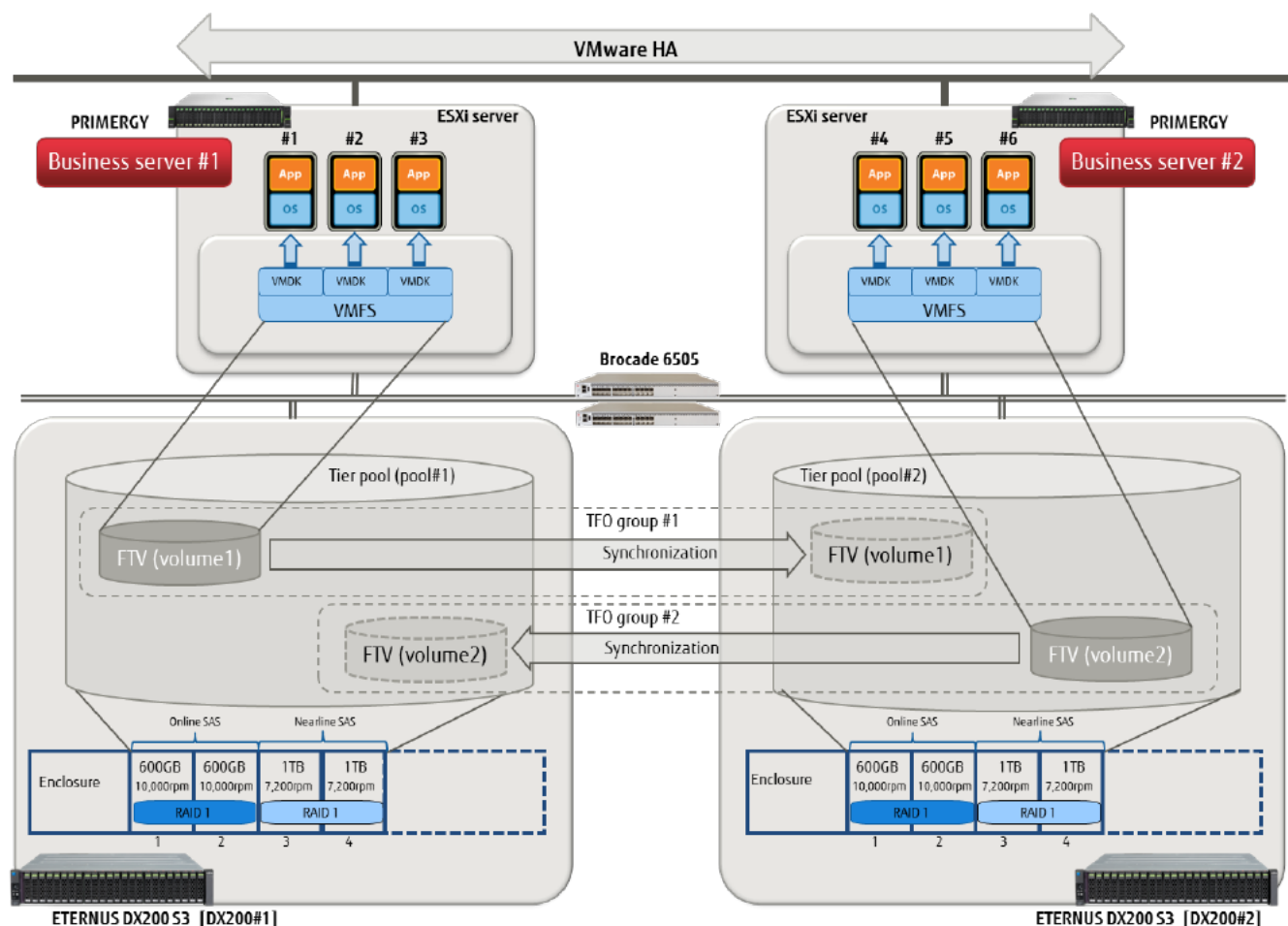


Figure 7 Business volume configuration overview

3.1.2. SAN Connection Configuration Overview

Use of the Storage Cluster function requires a connection between the business server and the storage system, and a connection between storage systems.

- (1) Connection configuration between the business server and the storage system
 With the Storage Cluster function, the FC ports of two storage systems are configured as a CA port pair.
 With CA port pairs, storage systems accessed by a business server is switched according to Linkup/Linkdown of the FC port.
 During normal operation, the FC port of the Primary storage is in the Linkup state and the FC port of the Secondary storage is in the Linkdown state.
 To configure a CA port pair, a dedicated port is required for each TFO group.
 In addition, for redundant communication paths between the server and storage system, two CA port pairs per TFO group are configured.

- CA port pair configuration of TFO group #1

A CA port pair is configured with the FC port of DX200#1 and the FC port of DX200#2.

The FC ports that make up the CA port pair should be connected to the same Fibre Channel switch.

For redundant communication paths, two CA port pairs are created and connected to different Fibre Channel switches.

A business server is connected to two Fibre Channel switches so the server can access both CA port pairs.

The CA port pair configuration of TFO group #1 in this environment is shown below.

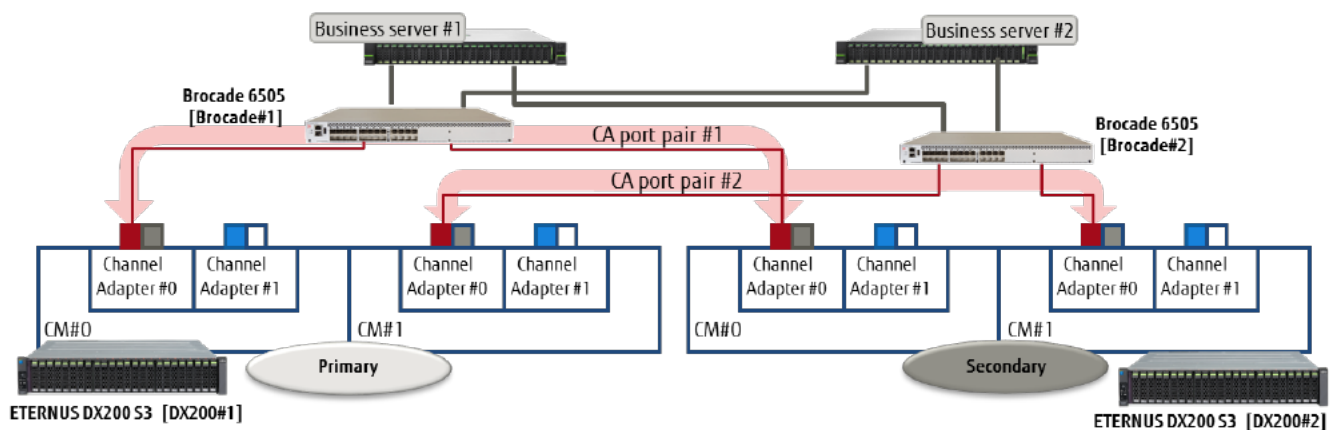


Figure 8 CA port pair configuration of TFO group #1

- CA port pair configuration of TFO group #2

TFO group #2 uses FC ports different from those in TFO group #1 to configure a CA port pair.

The FC port and Fibre Channel connection configuration, and the business server and Fibre Channel switch connection configuration are the same as TFO group #1.

The CA port pair configuration of TFO group #2 in this environment is shown below.

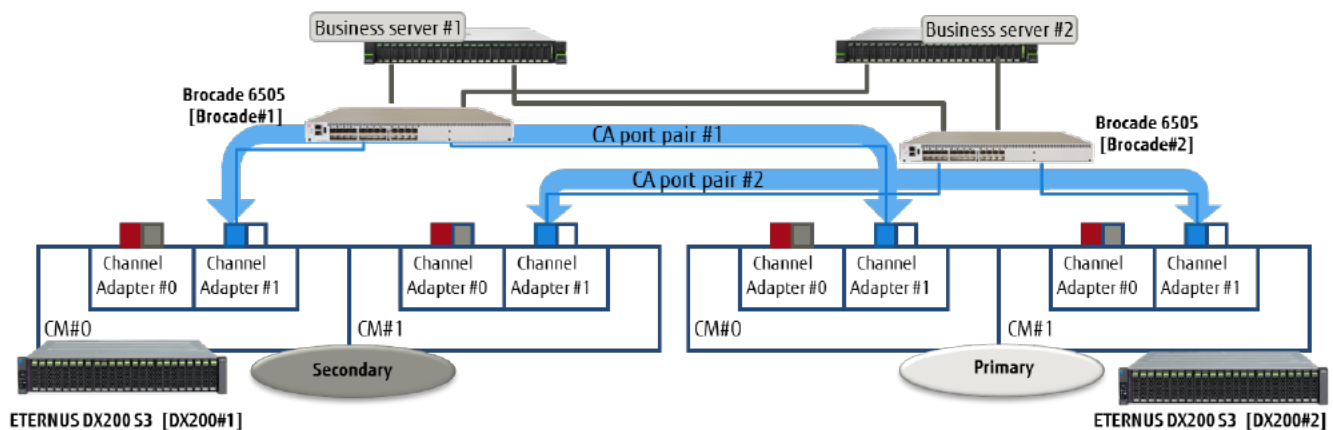


Figure 9 CA port pair configuration of TFO group #2

(2) Connection configuration between storage systems

The Storage Cluster function uses REC paths to synchronize data between storage systems.

REC paths use a dedicated FC port (RA mode) to connect storage systems.

For redundant communication paths, two REC paths are configured by connecting to different Fibre Channel switches or by directly connecting between storage systems.

In this example, the connection configuration between storage systems via Fibre Channel switches is shown.

For the configuration using a direct connection between storage systems, refer to "4.1.2. SAN Connection Configuration Overview".

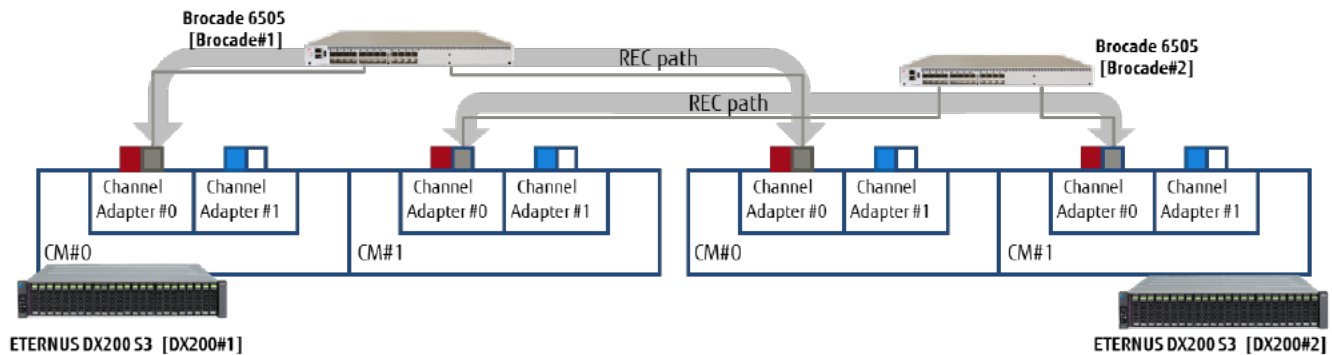


Figure 10 Inter-storage connection configuration

3.1.3. Outline of the Operation Management Configuration

A monitoring server is installed to monitor business servers and storage systems, and to collect performance information.

VMware vSphere ESXi is installed in one PRIMERGY server to configure the following virtual machines on the ESXi server.

- Operation management server (ESF Manager, Storage Cluster controller, and ESF agent)

- MA Server

- MA Probe

- vCenter Server

For redundant storage operation/monitoring environments by WSFC, an operation management server must be installed as a physical server.

Use the local disk of the PRIMERGY server as the disk resource of the virtual machines on the monitoring server,

For an overview of the monitoring server, refer to "1.4. Overview of Monitoring Server Operation".

3.1.4. Hardware/Software

The hardware and software licenses used in this example are listed below.

Hardware

- ETERNUS DX200 S3 x 2
- 600 GB/10 krpm 2.5-inch SAS disk drive x 2 x 2
- 1 TB/7.2 krpm 2.5-inch Nearline SAS disk drive x 2 x 2
- PRIMERGY RX2540 M1 x 3
- Brocade 6505 x 2

Firmware of the ETERNUS DX200 S3 should be V10L32 or later.

In addition to the above, provide network devices such as L2SW, DNS server, NTP server, and work PC.

Software, licenses

- VMware vSphere 6.0 (ESXi)
- VMware vCenter Server Appliance 6.0
- Windows Server 2012 R2 (for business server x 2, for ESF Server x 1)
- ETERNUS SF Storage Cruiser/ACM/Express 16 media pack (Windows 64-bit version)
- ETERNUS SF Storage Cruiser V16 Standard License for Tier1 x 2 licenses
- ETERNUS SF Storage Cruiser Storage Cluster Option for Tier1 x 2 licenses
- ETERNUS SF Storage Cruiser Optimization Option for Tier1 x 2 licenses
- ETERNUS SF Storage Cruiser QoS Management Option for Tier1 x 2 licenses
- ETERNUS SF AdvancedCopy Manager V16 Standard License for Tier1 x 2 licenses
- ETERNUS SF MA 8 media pack
- ETERNUS SF MA 8 Tier1 x 2 licenses
- ETERNUS SF MA 8 for VMware x 2 licenses

The ETERNUS SF products of the following versions are used in this example.

- ETERNUS SF Storage Cruiser 16.3
- ETERNUS SF MA 8.4

When using the ETERNUS AF series as the storage system, use the following versions of ETERNUS SF products.

- ETERNUS SF Storage Cruiser 16.4
 - ETERNUS SF MA 8.5
- Apply patch number MAP201609001 to ETERNUS SF MA 8.5.

If using ETERNUS SF products of versions different from those listed in this document, refer to the product manuals for the appropriate procedure.

3.1.5. Connection Diagram

The configuration of LAN and SAN used in this example are shown below.

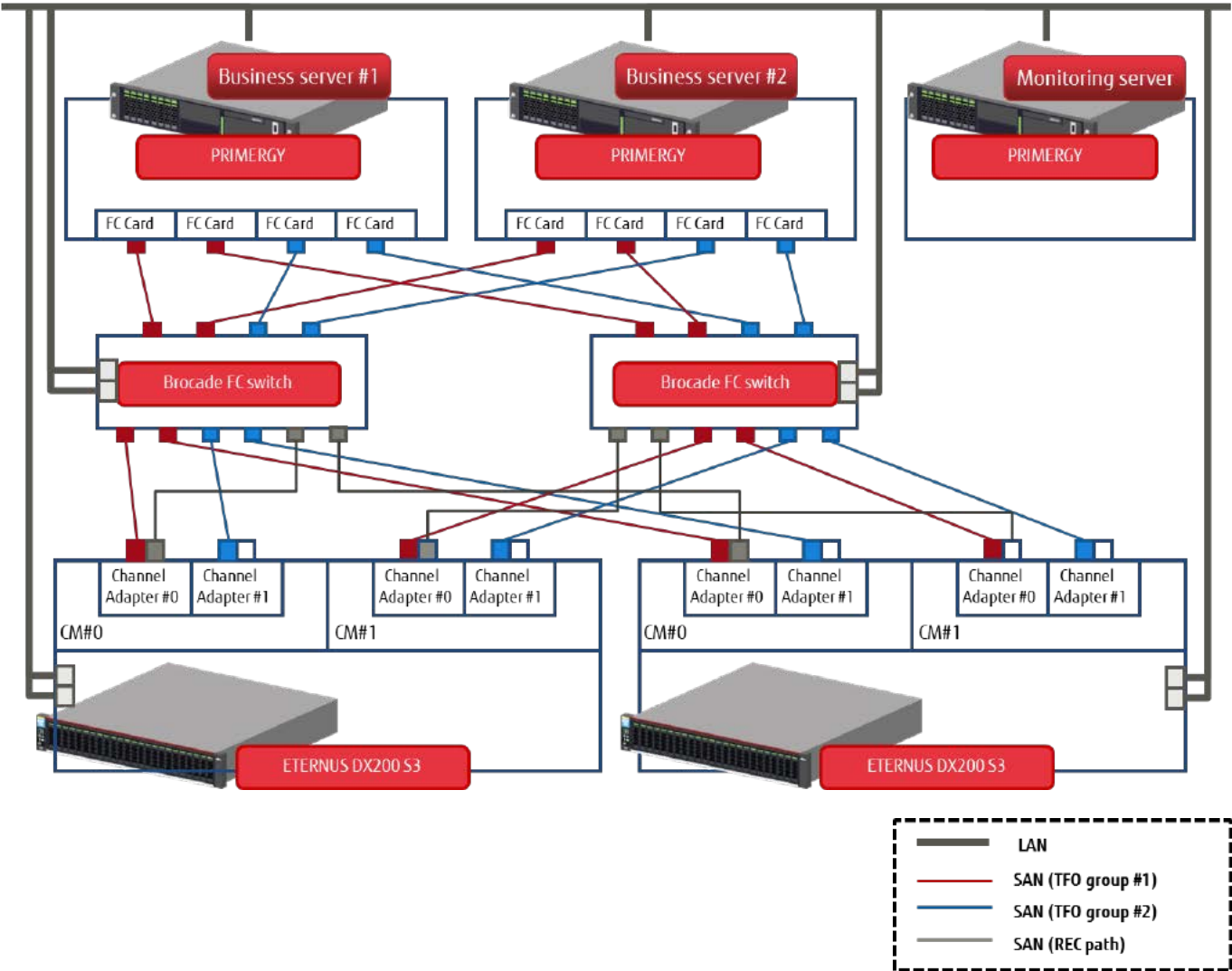


Figure 11 Connection diagram

3.1.6. List of Parameter Settings

The main settings of the network and storage system for this example are described below.

Network

Device/Virtual machine	Hostname	IP address
Business server #1	esxi01	192.168.30.31
Business server #2	esxi02	192.168.30.32
Monitoring server	esxi03	192.168.30.33
Brocade#1	fcs01	192.168.30.10
Brocade#2	fcs02	192.168.30.11
DX200#1	dx200-1	192.168.30.12
DX200#2	dx200-2	192.168.30.13
Business server VM#1	sv-1a	192.168.30.51
Business server VM#2	sv-1b	192.168.30.52
Business server VM#3	sv-1c	192.168.30.53
Business server VM#4	sv-2a	192.168.30.54
Business server VM#5	sv-2b	192.168.30.55
Business server VM#6	sv-2c	192.168.30.56
Operation management server (ESF Manager)	esf-m	192.168.30.21
MA Server	ma-sv	192.168.30.22
MA Probe	ma-pr	192.168.30.23
vCenter Server	vc-sv	192.168.30.24

Table 1 Hostnames and IP addresses

Storage system

DX200#1			DX200#2			Usage
Port	Port type	Mode	Port	Port type	Mode	
CM#0 CA#0 port#0	FC	CA	CM#0 CA#0 port#0	FC	CA	TFO group #1
CM#0 CA#0 port#1	FC	RA	CM#0 CA#0 port#1	FC	RA	REC path
CM#0 CA#1 port#0	FC	CA	CM#0 CA#1 port#0	FC	CA	TFO group #2
CM#1 CA#0 port#1	FC	CA	CM#1 CA#0 port#1	FC	CA	TFO group #1
CM#1 CA#0 port#1	FC	RA	CM#1 CA#0 port#1	FC	RA	REC path
CM#1 CA#1 port#0	FC	CA	CM#1 CA#1 port#0	FC	CA	TFO group #2

Table 2 Port settings

Tier pool name	Policy name	Tier	Low sub-pool			High sub-pool			FTV		
			Disk	# of disks	RAID	Disk	# of disks	RAID	FTV name	Size	Allocation method
pool_1	gold	2	Nearline SAS	2	RAID 1	Online SAS	2	RAID 1	volume1	800GB	Thin
									volume2	800GB	Thin

Table 3 DX200#1 Tier pool settings

Tier pool name	Policy name	Tier	Low sub-pool			High sub-pool			FTV		
			Disk	# of disks	RAID	Disk	# of disks	RAID	FTV name	Size	Allocation method
pool_2	gold	2	Nearline SAS	2	RAID 1	Online SAS	2	RAID 1	volume1	800GB	Thin
									volume2	800GB	Thin

Table 4 DX200#2 Tier pool settings

Name	TFO group name	Primary/Secondary		CA port pair
		DX200#1	DX200#2	
TFO group #1	TFOG_1	Primary	Secondary	Reference the port settings
TFO group #2	TFOG_2	Secondary	Primary	Reference the port settings

Table-5 TFO group settings

Server information	HBA	Port	LUN No.	Affinity/ LUN group name	FTV
esxi01	vmhba3	CM#0 CA#0 port#0	0	AG_1	volume1
	vmhba4	CM#1 CA#0 port#0			
	vmhba5	CM#0 CA#1 port#0	1	AG_2	volume2
	vmhba6	CM#1 CA#1 port#0			
esxi02	vmhba3	CM#0 CA#0 port#0	0	AG_1	volume1
	vmhba4	CM#1 CA#0 port#0			
	vmhba5	CM#0 CA#1 port#0	1	AG_2	volume2
	vmhba6	CM#1 CA#1 port#0			

Table 6 DX200#1 access path settings

Server information	HBA	Port	LUN No.	Affinity/ LUN group name	FTV
esxi01	vmhba3	CM#0 CA#0 port#0	0	AG_1	volume1
	vmhba4	CM#1 CA#0 port#0			
	vmhba5	CM#0 CA#1 port#0	1	AG_2	volume2
	vmhba6	CM#1 CA#1 port#0			
esxi02	vmhba3	CM#0 CA#0 port#0	0	AG_1	volume1
	vmhba4	CM#1 CA#0 port#0			
	vmhba5	CM#0 CA#1 port#0	1	AG_2	volume2
	vmhba6	CM#1 CA#1 port#0			

Table 7 DX200#2 access path settings

Target volume	Priority
volume1	High
volume2	Low

Table 8 DX200#1 Auto QoS settings

Target volume	Priority
volume1	High
volume2	Low

Table 9 DX200#2 Auto QoS settings

3.2. System Configuration Workflow

The workflow of the environment configuration is shown below.

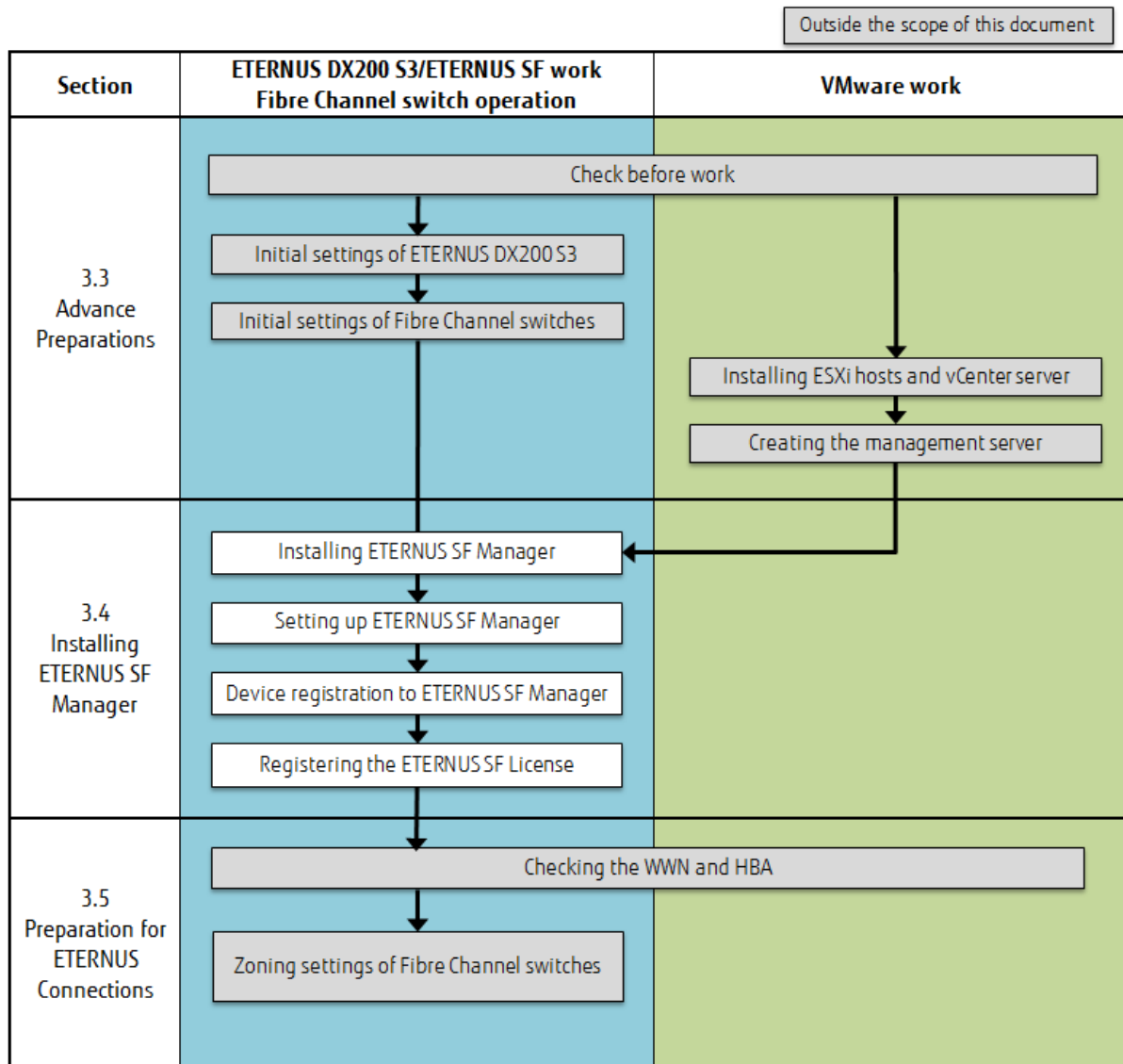


Figure 12 Workflow 1 of the environment configuration

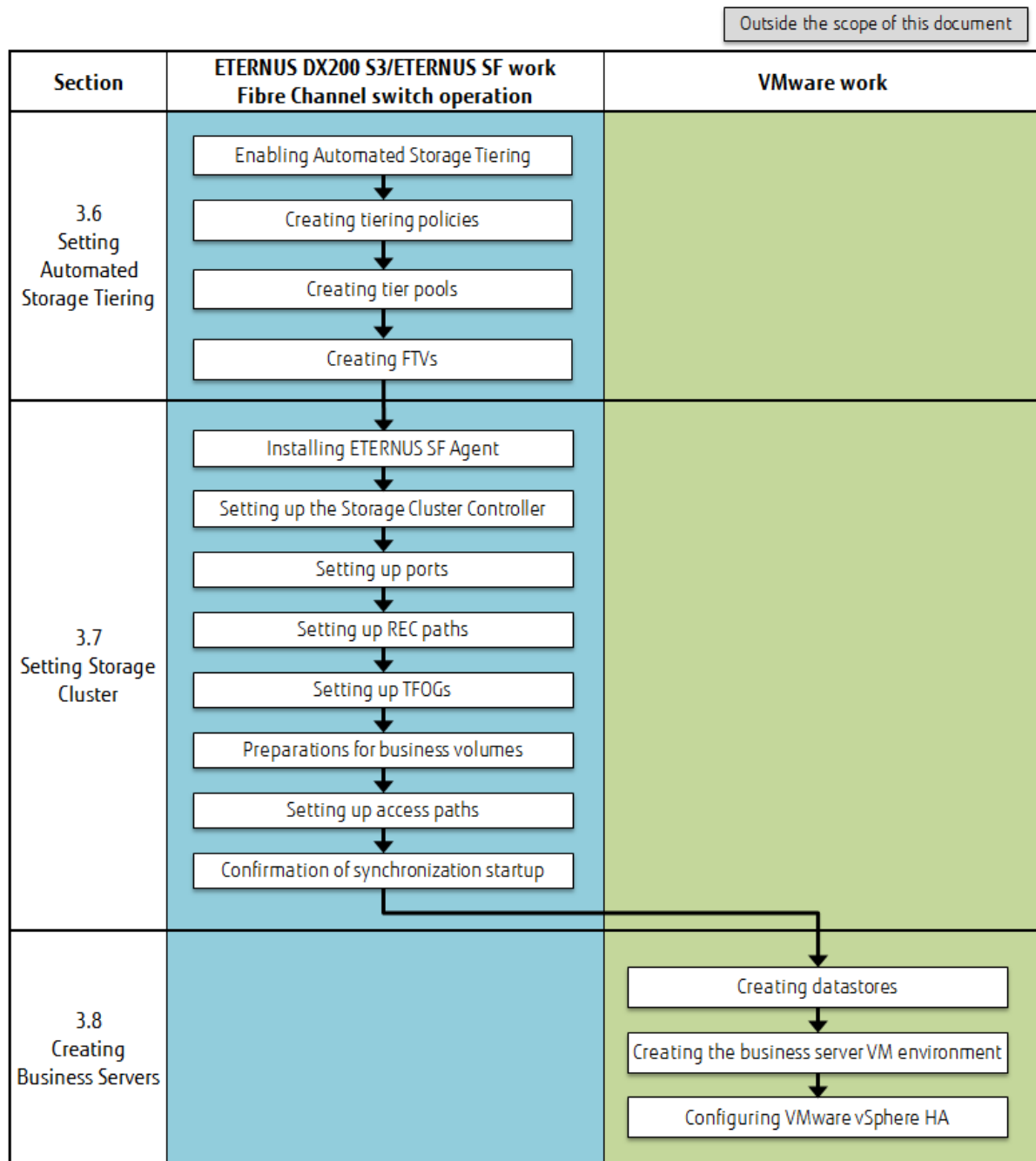


Figure 13 Workflow 2 of the environment configuration

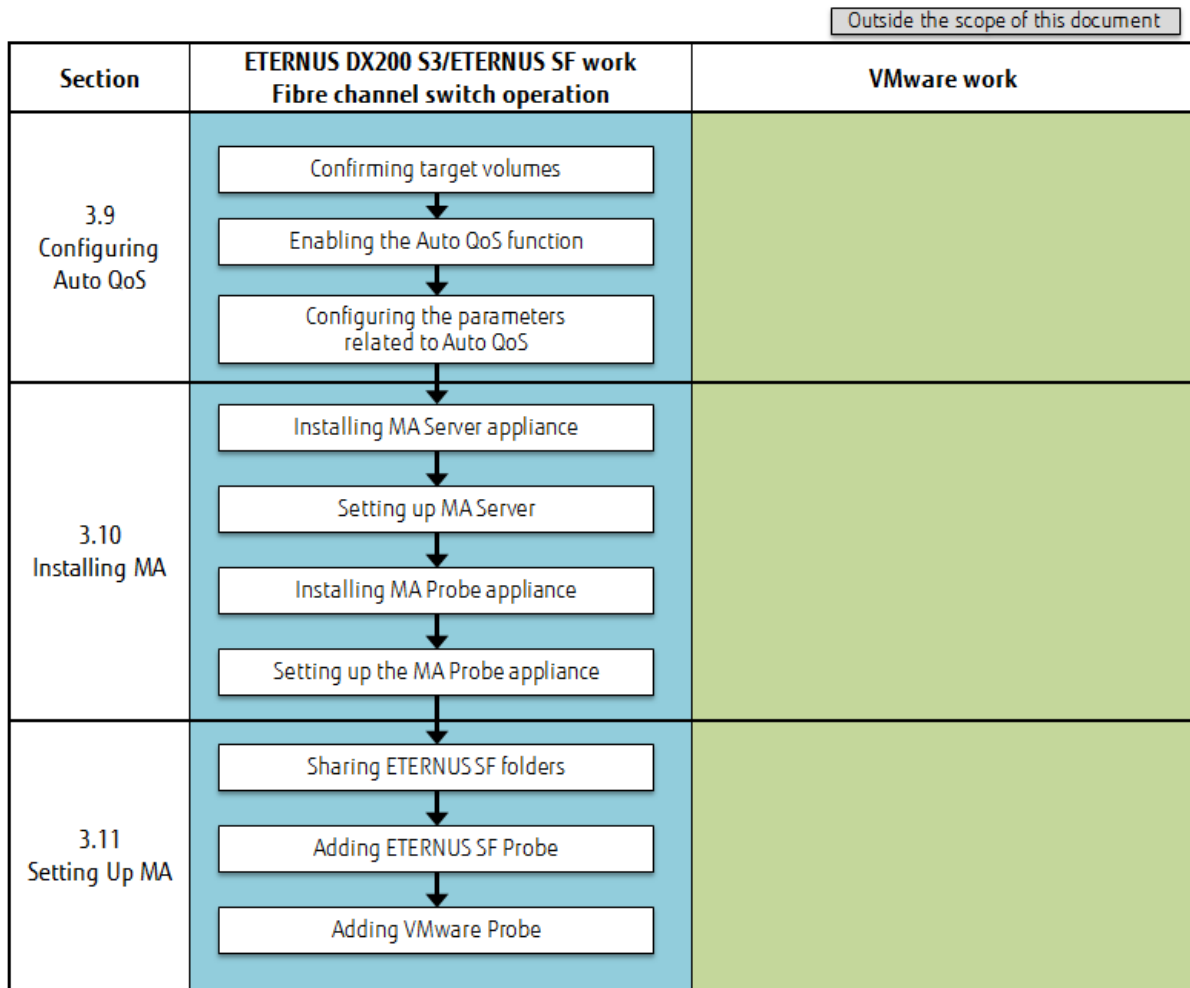


Figure 14 Workflow 3 of the environment configuration

3.2.1. Description of ETERNUS SF Web Console

Web Console has two display layouts, Dashboard and Detail View. Dashboard is initially displayed by default.
In this document, Detail View is used to explain the storage system settings and other operations unless otherwise specified.

3.2.1.1. Web Console Screen

The Web Console screen is displayed as shown below.
This document uses terms that specify each part when explaining an operation.

Dashboard screen layout

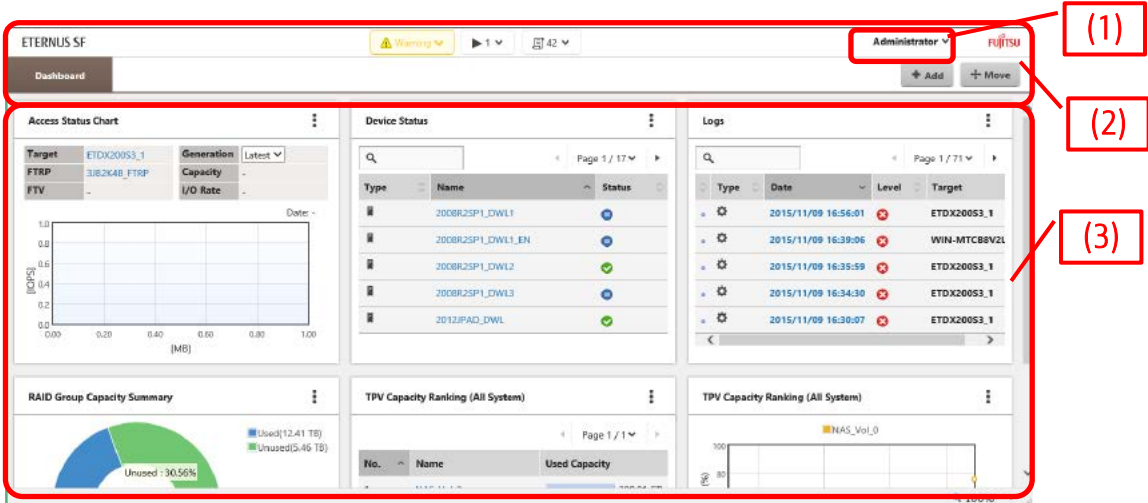
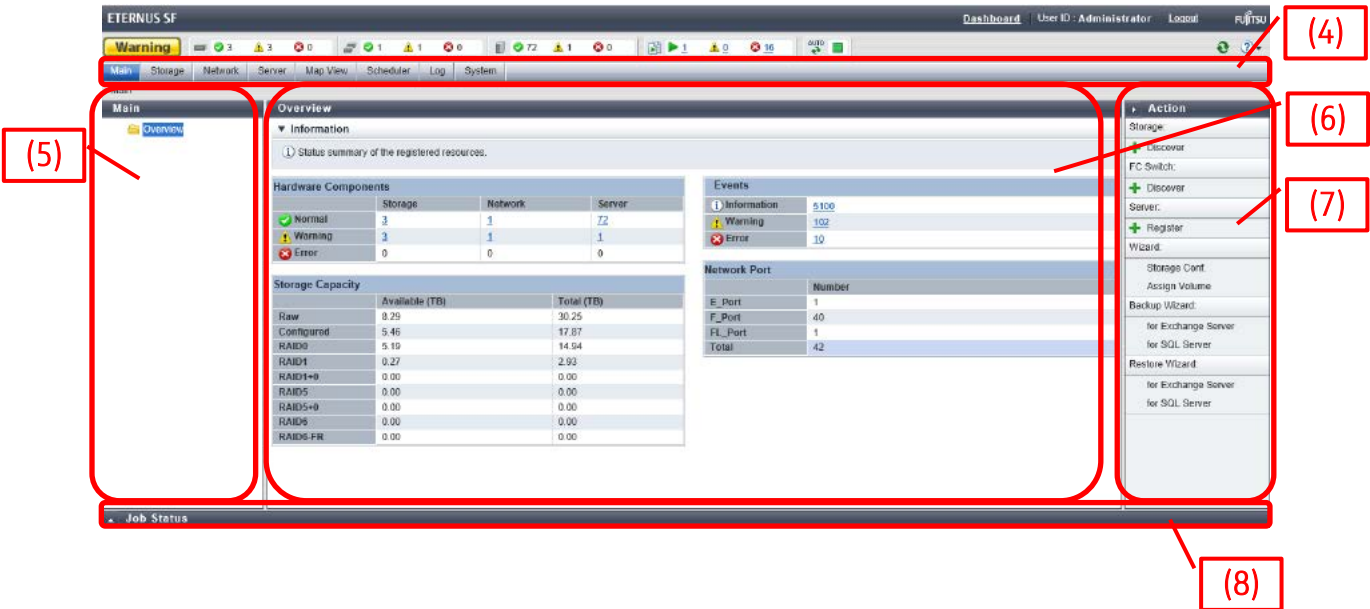


Figure 15 ETERNUS SF Web Console Dashboard

Detail View screen layout

Figure 16 ETERNUS SF Web Console



Item No	Display	Item	Description
(1)	Common	User menu	Web Console shows the login user name. This menu can switch the screen to and from Dashboard or Detail View.
(2)	Dashboard	Menu area	The overall status, the process status, the unchecked log list, and the operation menu on the panel area are displayed.
(3)		Panel area	Shows information necessary for system operation and management. Up to 24 panels can be displayed.
(4)	Detail View	Global navigation tab	Upon clicking category, the top menu of that category is displayed on the category pane.
(5)		Category pane	A list of selectable categories is displayed. Clicking an item displays information of that item on the Main pane.
(6)		Main pane	The menu and setting information is displayed. A description of the current Main pane is displayed in the [Information] field.
(7)		Action pane	Displays a list of actions that can be performed for the item displayed on the Main pane.
(8)		Job Status pane	Displays the process state of a job executed with ETERNUS SF Web Console and displays a dialog message starting with "The job has been submitted for processing" that can be checked. Opens/Closes by clicking the bar.

Table 10 ETERNUS SF Web Console screen description

3.2.1.2. Checking the Common Processes of ETERNUS SF Web Console Operations

ETERNUS SF displays the message "The job has been accepted for processing", but a different operation must be used to check whether the setting is successful.

This confirmation operation is common to most ETERNUS SF Web consoles, so refer to this chapter when checking a process.

Note

To check the result of a job submitted from ETERNUS SF Web Console, open the Job Status pane.

In the Job Status pane, confirm that the status is "Success" and then proceed to the next step.

Apart from this, the success and failure counters are updated in the job result counter area at the top of the screen.

The screenshot displays the ETERNUS SF Web Console interface. At the top, there is a navigation bar with a 'Warning' indicator and status icons. The main content area is divided into a 'Main' section and an 'Overview' section. The 'Job Status' pane is highlighted with a red box and contains a table of job records. A red circle highlights the 'Result' column in the table, showing 'Success' and 'Failed' statuses. Red callout boxes point to the 'Job result counter' at the top and the 'Job Status pane' itself.

Date	User ID	Action	Status	Result	Target
2018/02/01 11:57:17	-	Add/Modify Threshold Monitoring Configuration	Waiting	-	-
2015/11/09 17:15:25	user03	Create NAS Interface	Completed	Success	ETDX200S3_1
2015/11/09 17:12:23	user03	Create Shared Folder	Completed	Success	ETDX200S3_1
2015/11/09 17:02:50	yyy	Add/Modify Threshold Monitoring Configuration	Completed	Success	ETDX200S3_1
2015/11/09 17:00:56	yyy	Delete RAID Group	Completed	Success	ETDX200S3_1
2015/11/09 17:00:45	user05	Delete RAID Group	Completed	Success	ETDX200S3_1
2015/11/09 16:59:43	yyy	Delete Threshold Monitoring Configuration	Completed	Success	ETDX200S3_1
2015/11/09 16:56:01	user03	Create Shared Folder	Completed	Failed	ETDX200S3_1
2015/11/09 16:51:05	yyy	Add/Modify Threshold Monitoring Configuration	Completed	Success	ETDX200S3_1
2015/11/09 16:46:42	yyy	Create RAID Group	Completed	Success	ETDX200S3_1

Figure 17 Job Status pane display

3.3. Advance Preparations

As advance preparations for installing ESF Manager, configure the initial settings of the ETERNUS DX200 S3, install and set up VMware vSphere ESXi and vCenter Server, and create an operation management server.

3.3.1. Check before Work

Check that the required environment is in place before starting the work.

- Check that the NTP server is available.
- Check that the hostnames of the ESXi hosts, vCenter server, and operation management server (ETERNUS SF) comply with the standard naming conventions of RFC952/1123^{*2}.
(In the case of Windows DNS, ASCII and Unicode extended characters are supported, but not in the case of ESXi hosts.)
- Check that the name can be resolved (forward and reverse) correctly by the DNS server for the ESXi hosts, vCenter server, and operation management server (ETERNUS SF).

^{*2}: Standard naming conventions of RFC952/1123: The following characters can be used. "0-9", "a-z", "A-Z", "-" (hyphen)", and "." (domain delimiter only)".

3.3.2. Initial Settings of ETERNUS DX200 S3

Configure the initial settings of the ETERNUS DX200 S3 so it is operable from ETERNUS SF Manager.

For the setting items and the setting procedure, refer to "Disk Storage Systems and All Flash Arrays" under "Environment Configuration" in *ETERNUS SF Storage Cruiser Operation Guide*.

For details on the settings, refer to *ETERNUS DX, ETERNUS AF Configuration Guide (Web GUI)*.

Note

To manage the ETERNUS DX200 S3 from ETERNUS SF Manager, the ETERNUS DX200 S3 must be connected to the management LAN network and a user with the Software role must be created.

Checklist

Check the following items before proceeding to the next step.

- The device name setting is completed.
- The network setting is completed.
- A user with the Software role is created.

Item	Setting content	Setting value of DX200#1	Setting value of DX200#2
IP address	(Management LAN IP address)	192.168.30.12	192.168.30.13
SNMP community name	(Any)	public	public
User	(User name with the Software role)	esfuser	esfuser
Password	(Password)	(Password)	(Password)

Table 11 ETERNUS DX200 S3 initial setting example

3.3.3. Initial Settings of Fibre Channel Switches

Configure the initial settings of the Fibre Channel switch so it is manageable from ETERNUS SF Manager.
For the setting items and the setting procedure, refer to "Fibre Channel Switch" under "Environment Configuration" in *ETERNUS SF Storage Cruiser Operation Guide*.
For details on the settings, refer to the manuals of the device.

Note

To manage Fibre Channel switches from ETERNUS SF Manager, they must be connected to the management LAN, SNMP must be able to communicate with ETERNUS SF Manager, and a user with a security level of administrator is required.

Checklist

Check the following items before proceeding to the next step.

- The device name (SysName) setting is completed.
- The network setting is completed.
- The SNMP community name and SNMP community name (WRITE) are set.

Item	Setting content	Brocade#1 Setting value	Brocade#2 setting value
Device name	(Device name)	fcs01	fcs02
IP address	(Management LAN IP address)	192.168.30.10	192.168.30.11
SNMP community name	(SNMP community name)	public	public
SNMP community name (WRITE)	(SNMP community name (WRITE))	private	private
Username	(Username with administrator rights)	admin	admin
Password	(Password)	(Password)	(Password)

Table 12 Fibre Channel switch initial setting example

3.3.4. Installation of ESXi Hosts and vCenter Server

Install VMware vSphere ESXi in business servers #1 and #2, and in the local disk of the management server.
Install vCenter Server Appliance in the management server.
After installing vCenter Server Appliance, log in to vSphere Web Client and register business servers #1 and #2 as hosts.
(For the procedures related to VMware vSphere ESXi and vCenter Server, refer to the documentation for VMware vSphere 6.)

Note

To collect performance information on VMware vSphere ESXi and each VM with ETERNUS SF MA, a user with authority to read access vCenter Server must be created.

Checklist

Check the following items before proceeding to the next step.

- Business servers #1 and #2 are registered as hosts with vSphere Web Client.
- A user for ETERNUS SF MA has been created.

Item	Setting value
Username	mauser@vsphere.example.com
Password	(Password)
Group	Users
Role of vCenter Server	Read-only

Table 13 Example vCenter Server user settings for ETERNUS SF MA

3.3.5. Creation of Operation Management Server

Create a VM on the management server and install the OS (Windows Server 2012 R2) for the operation management server on the local disk.
After installing the OS, perform the required network settings to connect to the management LAN.
(For the procedures related to VMware vSphere ESXi and vCenter Server, refer to the documentation for VMware vSphere 6.)
(For the Windows Server 2012 R2 settings, refer to the appropriate documents on the Microsoft website.)

3.4. Installing ETERNUS SF Manager

Install ETERNUS SF Manager in the operation management server.
Configure the following after the installation.

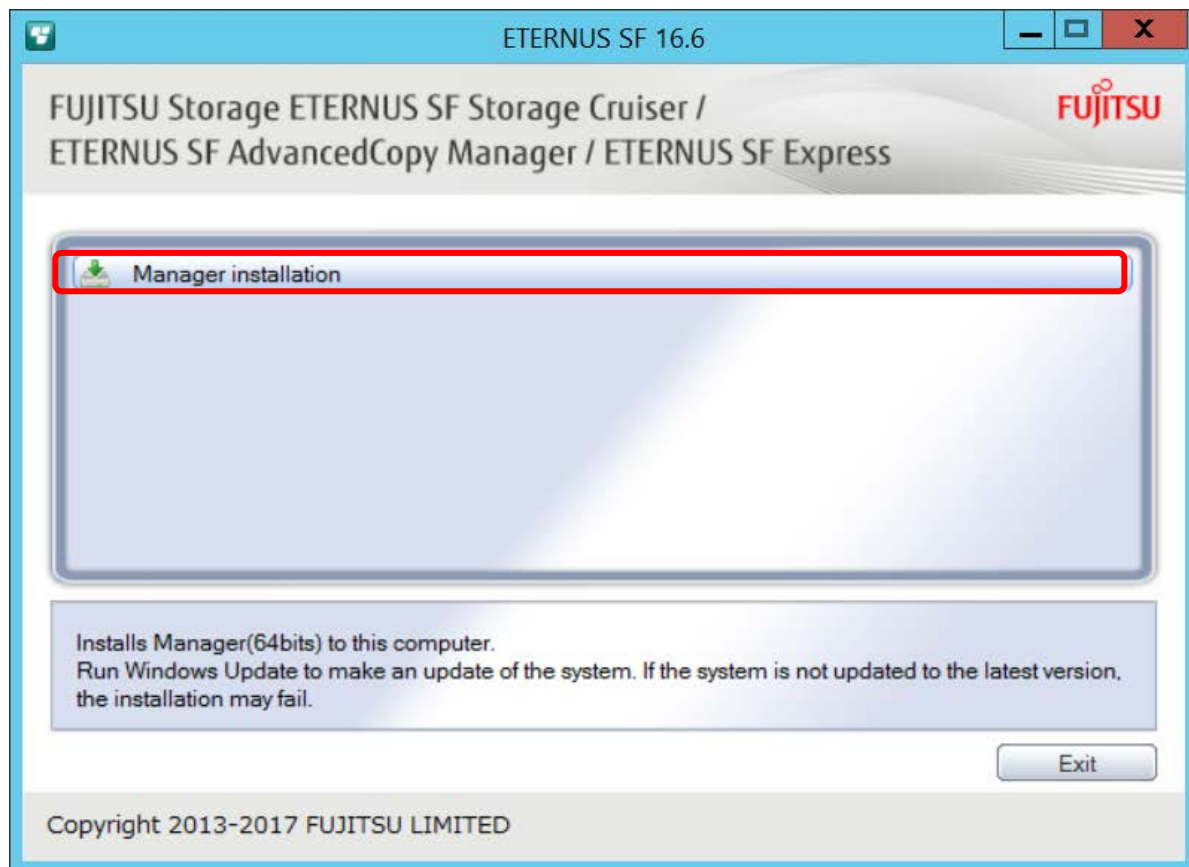
- ETERNUS SF Manager setup
- Device registration to ETERNUS SF Manager
- ETERNUS SF license registration

3.4.1. Installing ETERNUS SF Manager

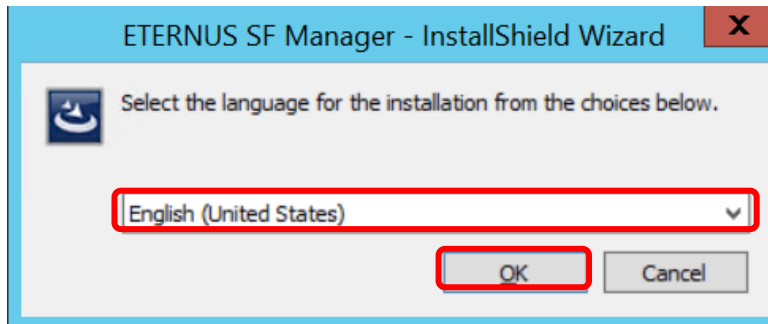
Install ETERNUS SF Manager in the operation management server.

For details, refer to ETERNUS SF Express / Storage Cruiser / AdvancedCopy Manager Installation and Setup Guide.

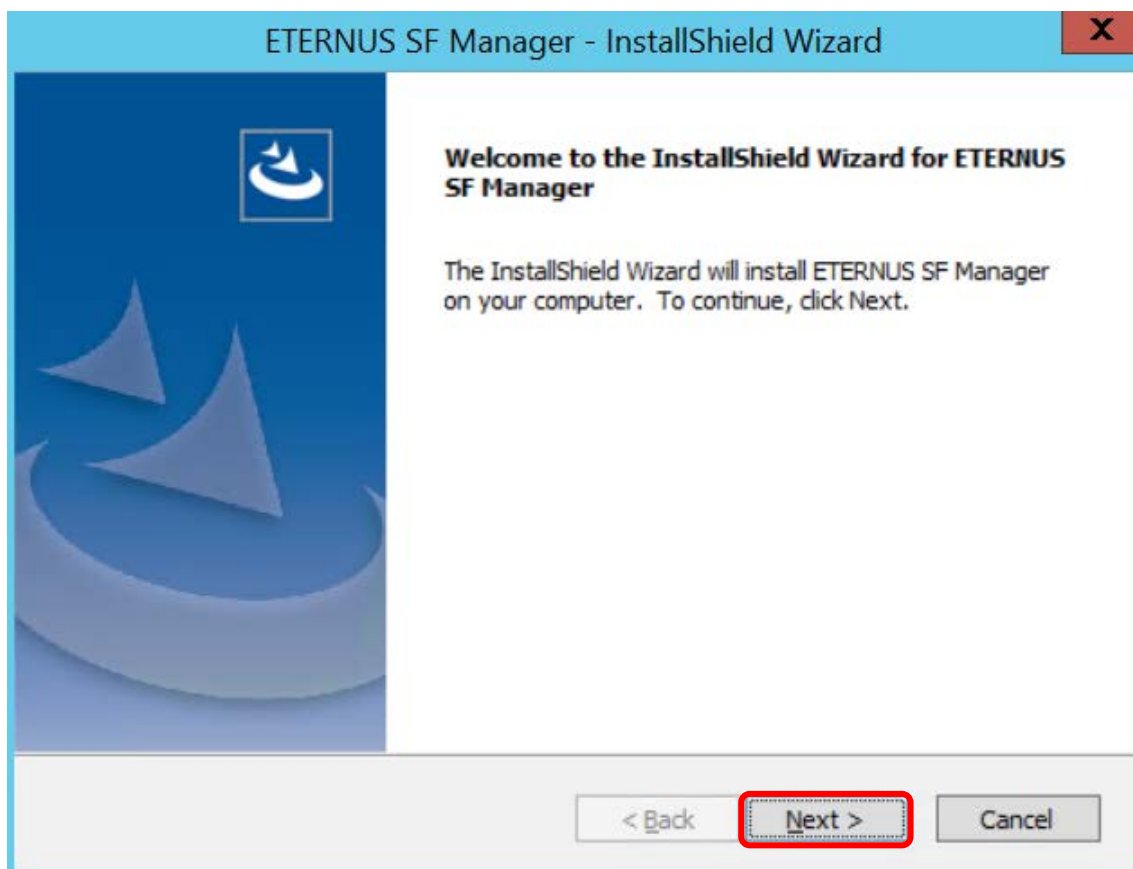
- (1) Log in to the operation management server as a user that has Administrator privileges.
- (2) Set ETERNUS SF SC/ACM/Express media pack (Windows 64-bit version) manager program (1/2) in the operation management server and start it.
- (3) The initial screen is displayed. Click [Manager installation].



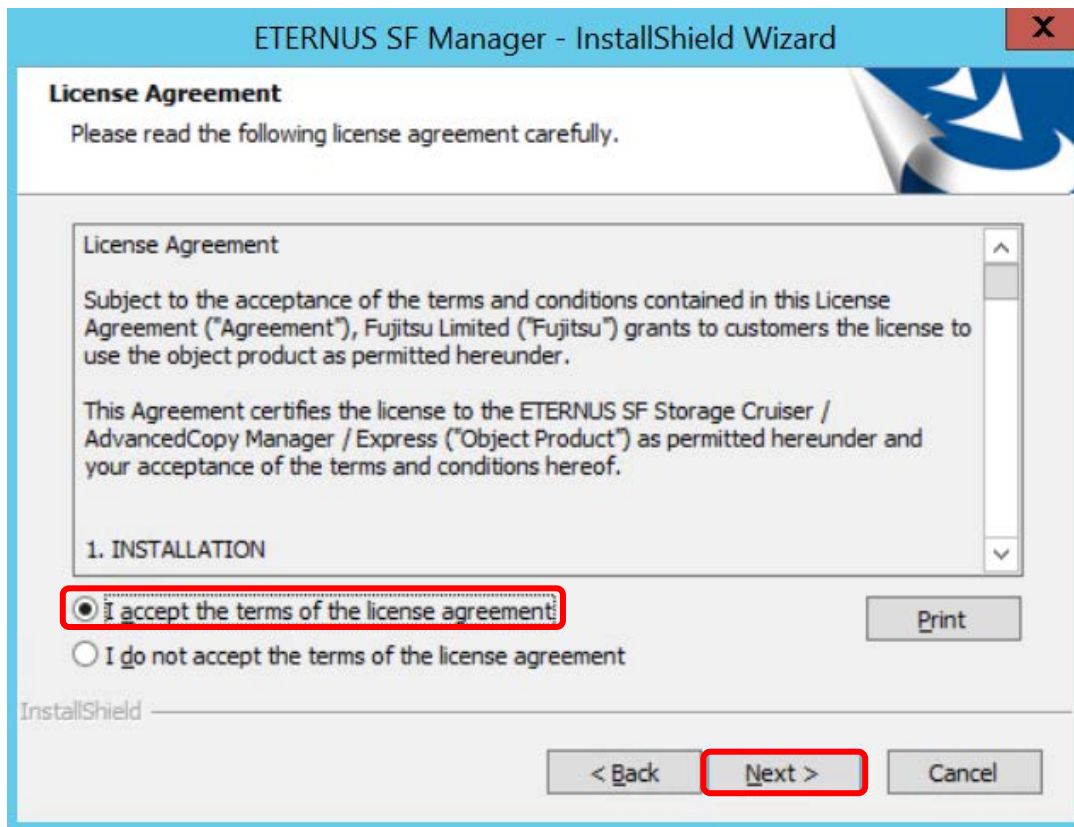
- (4) The setup language selection screen is displayed. Select [English (United States)] and click the [OK] button. The language selected here will be applied during the installation process.



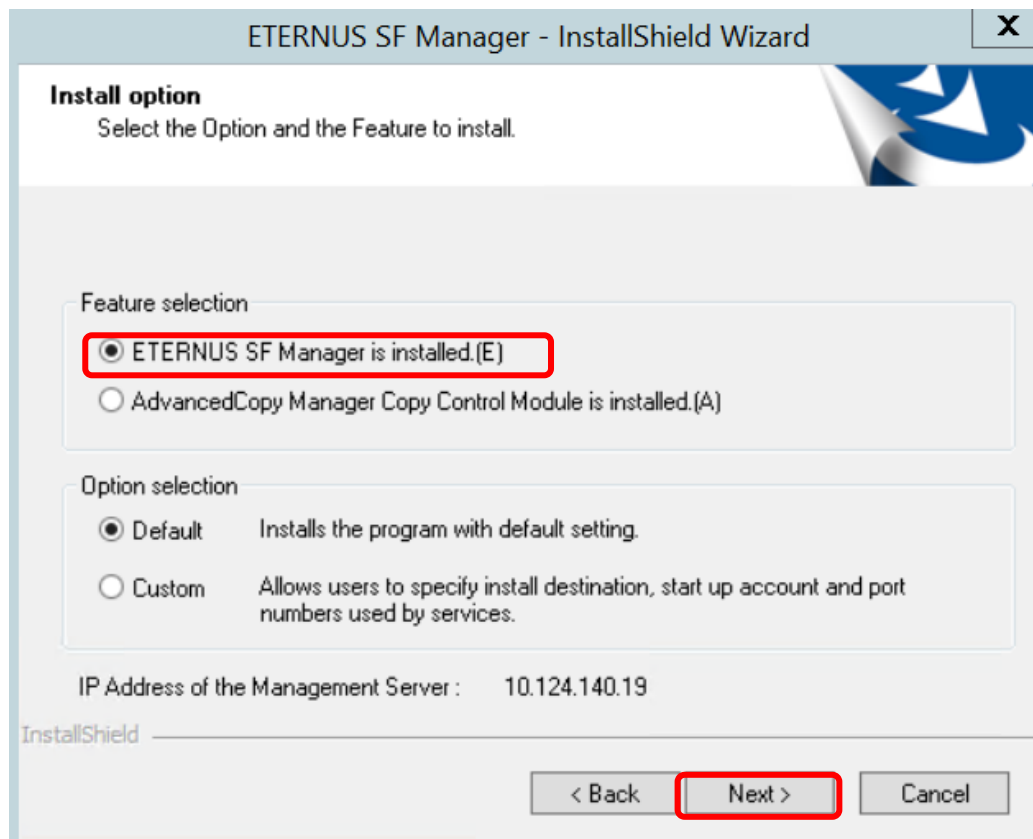
- (5) On the [Welcome to the InstallShield Wizard for ETERNUS SF Manager] screen, click the [Next] button.



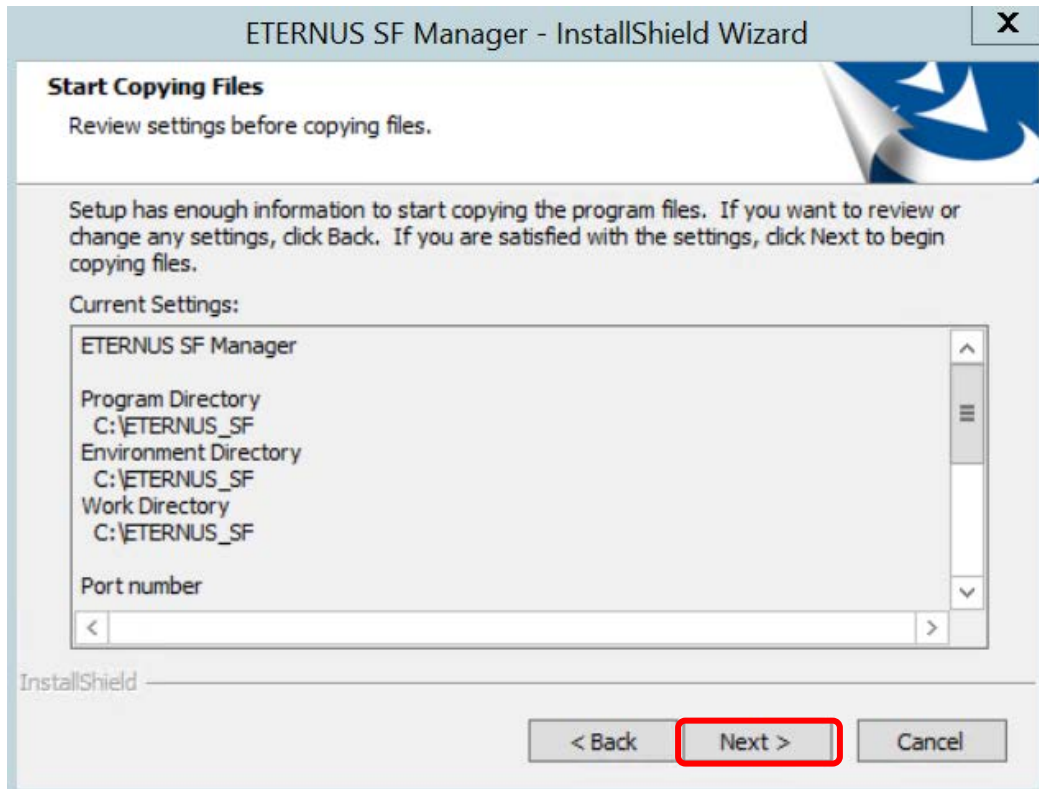
- (6) On the [License Agreement] screen, read the displayed terms and conditions. Accept the terms and conditions by selecting [I accept the terms of the license agreement], and then click the [Next] button.



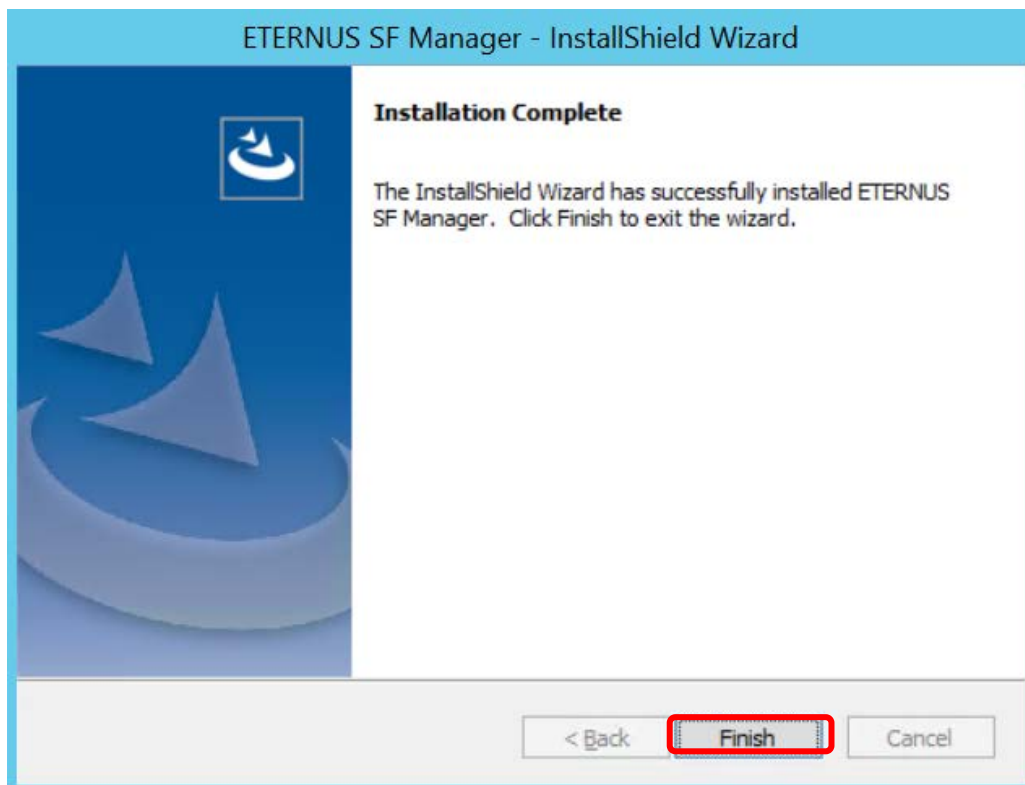
- (7) On the [Install option] screen, select [ETERNUS SF Manager is installed] and then click the [Next] button.



- (8) On the [Start Copying Files] screen, confirm the settings. If the settings are correct, click the [Next] button. To change the settings, click the [Back] button.



- (9) When the [Installation Complete] screen is displayed, click the [Finish] button.



Checklist

Check the following items before proceeding to the next step.

- [ETERNUS SF Manager] is displayed in the [Programs and Features] screen of Control Panel.

3.4.2. Setting Up ETERNUS SF Manager

Set up the user and web browser to use ETERNUS SF Manager from Web Console.
Check the connection to ETERNUS SF Web Console.

3.4.2.1. User Settings of ETERNUS SF Manager

After logging in to the operation management server, with the local user and group (local) settings, create the following ETERNUS SF role group.

Item	Setting content	Description
Group name	esfadmin(fixed)	All Web Console operations are available
	esfmon(fixed)	All Web Console display operations are available

Table 14 ETERNUS SF role group

Create a user for ETERNUS SF operations and a user for displaying and then assign them to the ETERNUS SF role group and the OS group.

Item	Setting content (Username)	Setting content (Affiliated group)	Description
Username, Group	esfroot	esfadmin (fixed), Administrator	All Web Console operations are available
	esfuser	esfmon (fixed)	All Web Console display operations are available

Table 15 ETERNUS SF user setting example

(For the Windows Server 2012 R2 settings, refer to the appropriate documents on the Microsoft website.)

3.4.2.2. Settings to Use Web Console

Enable JavaScript and cookies for ETERNUS SF Web Console via a Web browser of a PC or server.

(For the procedure to enable JavaScript and cookies, refer to "Operating Environment and Environment Settings" in *ETERNUS SF Web Console Guide*.)

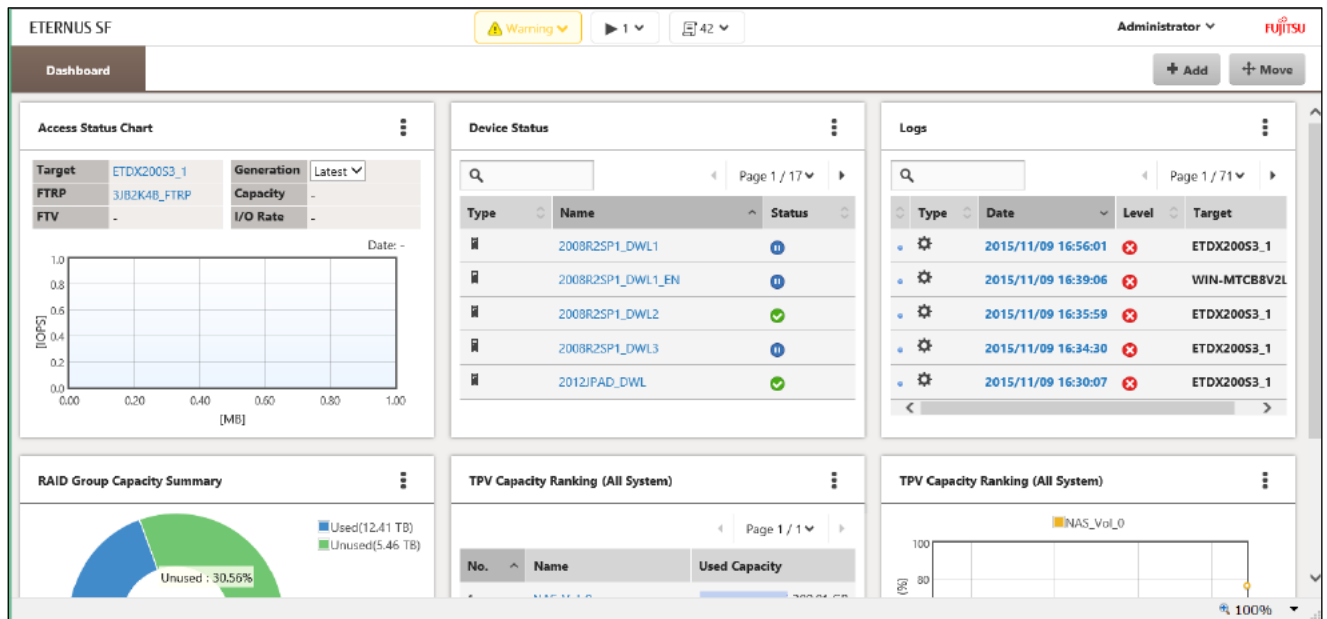
3.4.2.3. Connection Check from Web Console

Connect to ETERNUS SF Web Console and perform a login verification.

(For details on the procedure, refer to "Starting and Stopping Web Console" in *ETERNUS SF Web Console Guide*.)

- Connect to ETERNUS Web Console by specifying the following URL in the work PC's Web browser.
https://(IP address of operation management server):9855/
- Enter a valid username and password on the login screen and then click the [Login] button.
Use the username and password set for operations in 3.4.2.1. User Settings of ETERNUS SF Manager.

- (3) Confirm that the login to ETERNUS SF Web Console is successful and that the [Dashboard] screen is displayed.



3.4.3. Device Registration to ETERNUS SF Manager

Register the ETERNUS DX200 S3 and the Fibre Channel switches in ETERNUS SF Manager.

3.4.3.1. Registration of the ETERNUS DX200 S3

Register DX200#1 and DX200#2 to ETERNUS SF Manager.

(For details on the procedure, refer to "Register ETERNUS Disk Storage System" in *ETERNUS SF Web Console Guide*.)

- (1) After logging in to ETERNUS SF Web Console, switch to the detailed view, click [Storage] on the global navigation tab, and then click [Discover] on the Action pane under [Disk Array].



- (2) On the [Discover Storage] screen, select the [IP Address] radio button and enter the DX200#1 IP address in the [IP Address] field. Select the [SNMP Version] radio button and after filling in the [SNMP Community Name] field, click the [Discover] button. Enter the SNMP community name set in 3.3.2. Initial Settings of ETERNUS DX200 S3 in the [SNMP Community Name] field.

The screenshot shows the 'Discover Storage' window with the following details:

- Information:** Enter IP Address/Subnet Address and SNMP Configuration to discover a Disk Array. Subnet Address should be a broadcast address (e.g. 192.168.0.255). When you use Subnet Address, SNMPv3 cannot be selected. When you use SNMPv3, add User Configuration beforehand from the SNMPv3 Configuration screen on the System tab. Device Engine ID is set automatically. Fields marked with * are required.
- Disk Array Information:**
 - ☒ IP Address: 10.100.10.1
 - ☐ Subnet Address: *
- SNMP Configuration:**
 - SNMP Version:** ☒ v1, ☐ v3
 - SNMP Community Name:** public
- SNMPv3 MIB Access User Settings:** Filter Setting
- Buttons:** Discover, Cancel

- (3) Confirm that the DX200#1 IP address and storage name are displayed on the [Discover Storage] screen and then select the checkbox next to the IP address. Enter the user ID and password set in 3.3.2. Initial Settings of ETERNUS DX200 S3.

Select the [SNMP Trap Setting] checkbox if needed and then click the [Register] button.

The screenshot shows the 'Discover Storage' window with a table of discovered storage devices:

IP Address	Name	Model	Serial No.	SNMP Trap Setting	User ID *	Password *
<input checked="" type="checkbox"/> 193.168.11.113	-	-	-	<input type="checkbox"/>	Admin	*****

The 'Register' button is highlighted at the bottom right.

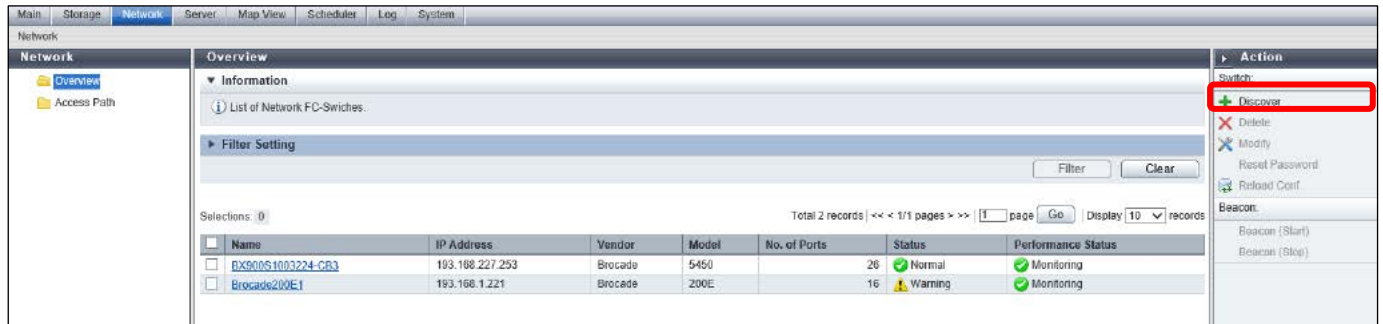
- (4) Confirm that the registered storage name and IP address of DX200#1 are displayed on the Main pane.
- (5) Register DX200#2 to ETERNUS SF Manager by repeating steps (1) to (4).

3.4.3.2. Registration of Fibre Channel Switches

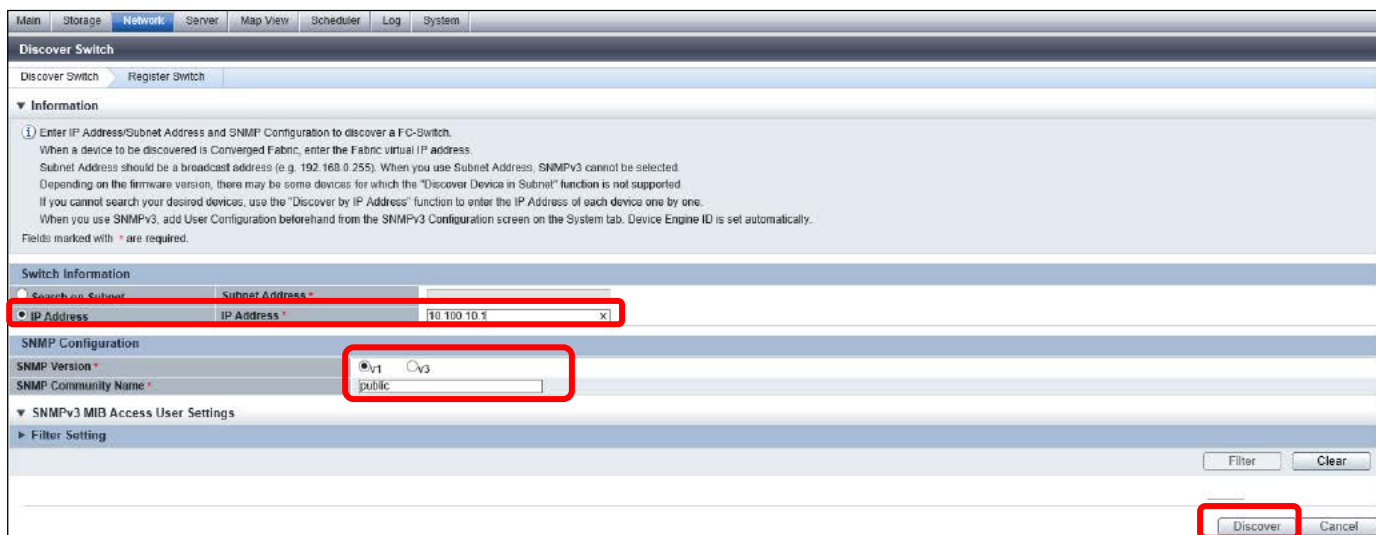
Register Brocade#1 and Brocade#2 to ETERNUS SF Manager.

(For details on the procedure, refer to "Register FC Switch" in *ETERNUS SF Web Console Guide*.)

- (1) After logging in to ETERNUS SF Web Console, switch to the detailed view, click [Network] on the global navigation tab, and then click [Discover] on the Action pane under [Switch].



- (2) On the [Discover Switch] screen, select the [IP address] radio button and enter the Brocade#1 IP address in the [IP address] field. Select the [SNMP Version] radio button and after filling in the [SNMP Community Name] field, click the [Discover] button. Enter the SNMP community name set in 3.3.3. Initial Settings of Fibre Channel Switches in the [SNMP Community Name] field.



- (3) Confirm that the Brocade#1 IP address and device name are displayed correctly and then select the checkbox next to the IP address. Select the [SAN Zoning Setting] checkbox and enter the user ID and password set in 3.3.3. Initial Settings of Fibre Channel Switches. Select the [SNMP Trap Setting] checkbox and then click the [Register] button.

The screenshot shows the 'Discover Switch' window. The table below represents the data shown in the window:

Selections	IP Address	Name	Vendor	Model	SAN Zoning Setting	SNMP Trap Setting	User ID	Password	Management Software
<input checked="" type="checkbox"/>	193.168.11.113	switch 1	vendor A	1	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			http://193.168.11.113/

- (4) Confirm that the registered Brocade#1 IP address and device name are displayed on the Main pane.

The screenshot shows the 'Network' pane with the 'Overview' tab selected. The table below represents the data shown in the window:

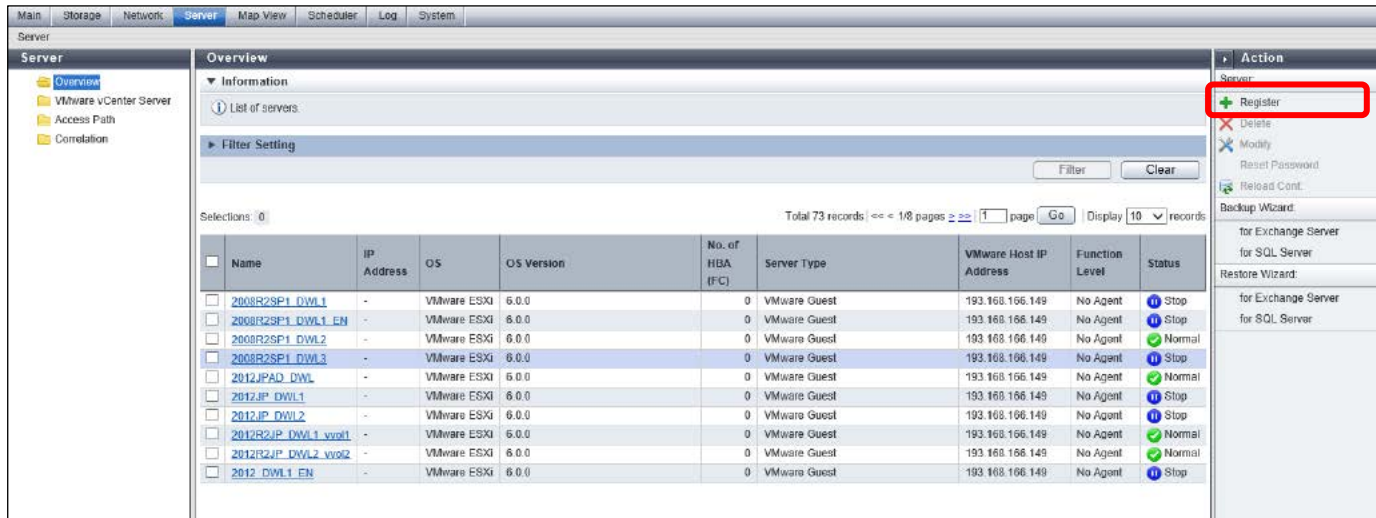
Name	IP Address	Vendor	Model	No. of Ports	Status	Performance Status
BX900S1003224-CB3	193.168.227.253	Brocade	5450	26	Normal	Monitoring
BX900S1003224-CB3	193.168.227.253	Brocade	5450	26	Normal	Monitoring

- (5) Register Brocade#2 to ETERNUS SF Manager by repeating steps (1) to (4).

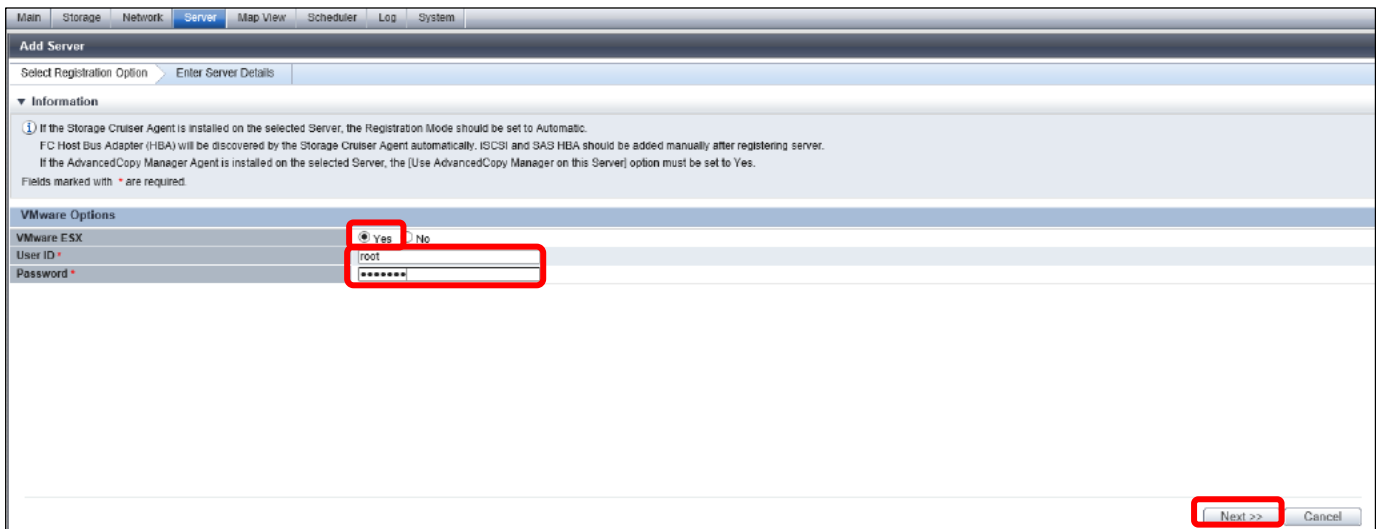
3.4.3.3. Server Registration

Register business server#1 and business server #2 to ETERNUS SF Manager.
(For details on the procedure, refer to "Register Server" in *ETERNUS SF Web Console Guide*.)

- (1) After logging in to ETERNUS SF Web Console, switch to the detailed view, click [Server] on the global navigation tab, and then click [Register] on the Action pane under [Server].



- (2) Select [Yes] for [VMware ESX] on the [Add Server] screen. Enter the ESXi username and password of business server #1 in the [User ID] and [Password] fields and then click [Next].



- (3) Enter business server #1's IP address in the [IP Address] field and then click [Register].

The screenshot shows the 'Add Server' web interface. At the top, there is a navigation bar with tabs: Main, Storage, Network, Server (selected), Map View, Schedule, Log, and System. Below the navigation bar, the 'Add Server' section has two sub-tabs: 'Select Registration Option' and 'Enter Server Details' (selected). Under 'Enter Server Details', there is an 'Information' section with a blue information icon and text: 'Enter details of the new server. In case of registering VMware servers, enter the VMware Host IP Address to register the VMware Host and the VMware Guests. The VMware Guests are registered automatically. In order to be able to execute Advanced Copy operations in the VMware Guest, register the AdvancedCopy Manager Agent on the VMware Guest after the VMware Guest has been registered. Fields marked with * are required.' Below this, the 'IP Address*' field is highlighted with a red box and contains the value '10.100.10.1'. At the bottom right, the 'Register' button is highlighted with a red box, along with 'Back' and 'Cancel' buttons.

- (4) Confirm that the registered business server #1's hostname and IP address are displayed correctly on the Main pane.
- (5) Register business server #2 to ETERNUS SF Manager by repeating steps (1) to (4).

3.4.4. Registering the ETERNUS SF License

Register the ETERNUS SF product license. A license is required for each storage system. Register the target devices prior to the license registration.

Register the following licenses used for this solution.

- Storage Cruiser Standard License
- ETERNUS SF Storage Cruiser Optimization option
- ETERNUS SF Storage Cruiser QoS Management option
- ETERNUS SF Storage Cruiser Storage Cluster option
- ACM Remote Copy License

(1) After logging in to ETERNUS SF Web Console, switch to the detailed view, click [Storage] on the global navigation tab, click [Disk Array] on the Category pane, and then click "DX200#1" on the Main pane.

(2) Click [System] on the Category pane.

The screenshot shows the 'System' overview for DX90S2_PH. The left sidebar has a tree view with 'System' highlighted. The main pane is divided into three sections: Hardware Components, System Information, and Storage Capacity.

Hardware Components		
Status	Control Modules	Disks
Available	2	13
Warning	0	0
Error	0	0

System Information	
Storage System Name	DX90S2_PH
Model Name	ET092SDU
Serial No.	4521218583
Box ID	100-70-000000-000-000000-000000-000000
Firmware Version	V10L47-0000
SNMP Trap Setting	Un-setting up

Storage Capacity		
	Available (TB)	Total (TB)
Raw	0.29	14.05
Configured	4.28	13.61
RAID0	4.28	13.34
RAID1	0.00	0.27
RAID1+0	0.00	0.00
RAID5	0.00	0.00
RAID5+0	0.00	0.00
RAID6	0.00	0.00
RAID6-FR	0.00	0.00

(3) Click [License Management] on the Category pane.

The License Management screen is displayed and a list of license products is shown on the Main pane. Select the checkbox of the target license product, then click [Register] on the Action pane under [License].

The screenshot shows the 'License Management' screen for DX90S2_PH. The left sidebar has a tree view with 'License Management' highlighted. The main pane displays a table of license products with checkboxes in the first column. The right sidebar has an 'Action' pane with a 'Register' button highlighted.

Name	Registration Date	Expiry Date
<input type="checkbox"/> ETERNUS SF Storage Cruiser V16 Basic License for Tier1 (DX90S2)	-	-
<input type="checkbox"/> ETERNUS SF Storage Cruiser V16 Standard License for Tier1 (DX90S2)	-	-
<input type="checkbox"/> ETERNUS SF Storage Cruiser V16 Optimization Option for Tier1 (DX90S2)	-	-
<input type="checkbox"/> ETERNUS SF AdvancedCopy Manager V16 Local Copy License for Tier1 (DX90S2)	-	-
<input type="checkbox"/> ETERNUS SF AdvancedCopy Manager V16 Remote Copy License for Tier1 (DX90S2)	-	-
<input type="checkbox"/> ETERNUS SF AdvancedCopy Manager V16 for Exchange Server for Tier1 (DX90S2)	-	-
<input type="checkbox"/> ETERNUS SF AdvancedCopy Manager V16 for Microsoft SQL Server for Tier1 (DX90S2)	-	-

(4) On the license registration screen, enter the license keys of the ETERNUS SF products for the target storage system and then click [Register].

- (5) On the License Management screen, confirm that the registration dates of the registered licenses are displayed and that the licenses are valid.



- (6) Register the necessary licenses for DX200#2 by repeating steps (1) to (5).

3.5. Preparation for ETERNUS Connections

Prepare the fabric connection between the ETERNUS DX200 S3 and the business server, and the fabric connection between the ETERNUS DX200 S3 storage systems for Storage Cluster.

Check the WWPN of the Fibre Channel port of the ETERNUS DX200 S3 and the HBA of the business server, and set the zoning of the Fibre Channel switches.

3.5.1. Checking the WWN and HBA

Check the WWPN of the ETERNUS DX200 S3's FC port and the business server's HBA.

3.5.1.1. Checking the ETERNUS WWN

Check the WWPN of the FC port of DX200#1 and DX200#2 from ETERNUS SF Web Console.

(For details on the procedure, refer to "Display Storage Port List" in *ETERNUS SF Web Console Guide*.)

- (1) After logging in to ETERNUS SF Web Console, switch to the detailed view, click [Storage] on the global navigation tab, click [Disk Array] on the Category pane, and then click "DX200#1" on the Main pane.
- (2) Click [Connectivity] on the Category pane of the DX200#1 screen.

The screenshot shows the ETERNUS SF Web Console interface. On the left, a navigation tree has 'Connectivity' selected. The main panel is titled 'Overview' for 'DX90S2_PH'. It contains three sections:

- Hardware Components:** A table showing status (Available, Warning, Error), control modules (2), and disks (13, 0, 0).
- System Information:** Fields for Storage System Name (DX90S2_PH), Model Name (ET092SDU), Serial No. (4521218583), Box ID, Firmware Version (V10L47-0000), and SNMP Trap Setting (Un-setting up).
- Storage Capacity:** A table showing available and total capacity for various RAID configurations.

On the right, an 'Action' pane lists various management tasks like Disk Array, Delete, Modify, Reset Password, Reload Conf, Automated QoS, and Reporting.

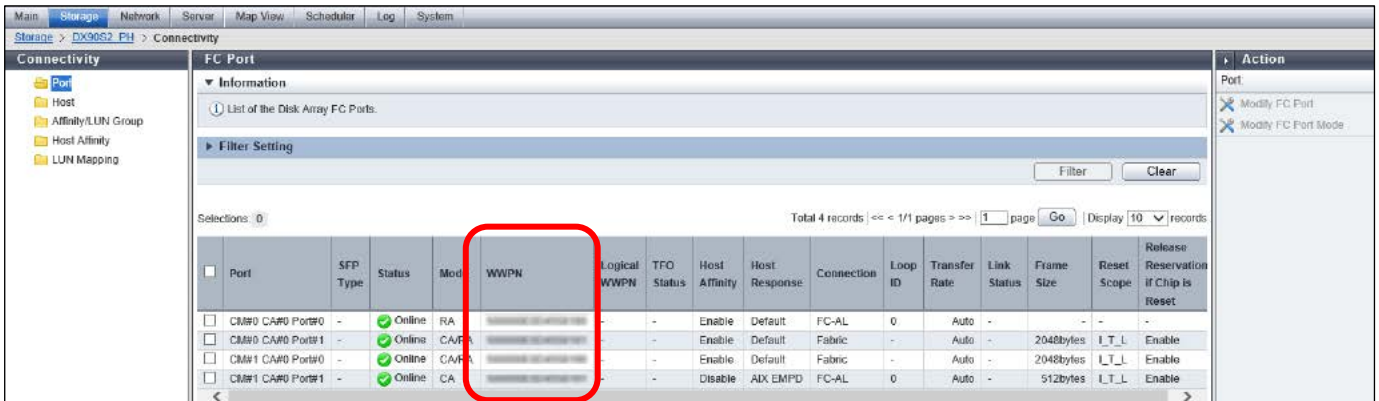
- (3) Click [Port] on the Category pane of the [Connectivity] screen, then from the list of ports displayed on the Main pane, click the value displayed in the [Number of Ports] column for type "FC".

The screenshot shows the 'Port' section of the ETERNUS SF Web Console. The left sidebar has 'Port' selected. The main panel shows a table with the following data:

Type	Number of Ports
FC	4

The value '4' in the 'Number of Ports' column for 'FC' is highlighted with a red box.

- (4) Check the WWPNs of the target ports in the FC port list displayed on the Main pane.



The screenshot shows the 'FC Port' configuration page in the ETERNUS management console. The left sidebar shows a tree view with 'Port' selected. The main area displays a table of FC ports. The 'WWPN' column is highlighted with a red box. The table has 16 columns: Port, SFP Type, Status, Mod, WWPN, Logical WWPN, TFO Status, Host Affinity, Host Response, Connection, Loop ID, Transfer Rate, Link Status, Frame Size, Reset Scope, and Release Reservation if Chip is Reset. There are 4 records displayed.

Port	SFP Type	Status	Mod	WWPN	Logical WWPN	TFO Status	Host Affinity	Host Response	Connection	Loop ID	Transfer Rate	Link Status	Frame Size	Reset Scope	Release Reservation if Chip is Reset
CM#0 CA#0 Port#0	-	Online	RA	XXXXXXXXXXXXXXXXXXXX	-	-	Enable	Default	FC-AL	0	Auto	-	-	-	-
CM#0 CA#0 Port#1	-	Online	CA#0	XXXXXXXXXXXXXXXXXXXX	-	-	Enable	Default	Fabric	-	Auto	-	2048bytes	I_T_L	Enable
CM#1 CA#0 Port#0	-	Online	CA#0	XXXXXXXXXXXXXXXXXXXX	-	-	Enable	Default	Fabric	-	Auto	-	2048bytes	I_T_L	Enable
CM#1 CA#0 Port#1	-	Online	CA	XXXXXXXXXXXXXXXXXXXX	-	-	Disable	AUX EMPD	FC-AL	0	Auto	-	512bytes	I_T_L	Enable

- (5) Check the FC port's WWPN of DX200#2 by repeating steps (1) to (4).

3.5.1.2. Checking the Business Server's HBA

From vSphere Client or vSphere Web Client, display the Fibre Channel adapters for business server #1 and business server #2 to check the HBA.

(For the procedures related to VMware vSphere ESXi and vCenter Server, refer to the documentation for VMware vSphere 6.)

3.5.2. Zoning Settings of Fibre Channel Switches

Set the zoning of the Fibre Channel switches.

Zoning is required for REC paths between a business server and a storage system, and between two storage systems.

Zoning between a business server and a storage system is automatically set on the Fibre Channel switch by ETERNUS SF.

Here, the zoning for the REC path is set on the Fibre Channel switch manually.

For REC path zoning, set either WWN zoning or Port zoning.

For zoning target FC ports, refer to "Connection configuration between storage systems" in "3.1.2. SAN Connection Configuration Overview".

For WWN zoning, use the WWPN of the FC port for REC paths among the WWPN checked in "3.5.1.1. Checking the ETERNUS WWN".

(For details on the zoning procedure for Fibre Channel switches, refer to the manuals for Brocade.)

Note

Automatically setting the zoning between a business server and a storage system with ETERNUS SF is recommended.

In configurations using the Storage Cluster function, WWN zoning must be configured between a business server and a storage system to directly set the zoning to the Fibre Channel switch.

If the WWN zoning to a Fibre Channel switch is manually registered, setting zones that specify the WWPN of the FC ports for the Secondary storage is not required.

With the Storage Cluster function, only the FC port WWPN of the Primary storage is valid in a CA port pair and when the storage system is switched, the Primary WWPN is inherited by the paired FC port of the Secondary storage.

Tip

The procedure to set the WWN zoning of REC paths on a Fibre Channel switch is described below.

Log in to the Fibre Channel switch.

Register an alias for the WWPN of the FC port for REC paths with the "aliCreate" command.

```
aliCreate "(alias name)", "(WWPN)"
```

With the "zoneCreate" command, register the alias name of the REC path connection source WWPN and the alias name of the connection destination WWPN as members.

```
zoneCreate "(zone name)", "(member name 1)"; "(member name 2)"
```

After registering a zone, reflect the changes in "config" of the Fibre Channel switch.

3.6. Setting Automated Storage Tiering

Set Automated Storage Tiering for DX200#1 and DX200#2.
To set Automated Storage Tiering, perform the following procedure.

- Register the license
- Enable Automated Storage Tiering
- Create a Tiering policy
- Create a Tier pool
- Create an FTV

Because the license registration for Automated Storage Tiering has already been performed in 3.4.4. Registering the ETERNUS SF License, start from the "Enabling Automated Storage Tiering" step.

(For details on the procedure to set Automated Storage Tiering, refer to "Setup of Automated Storage Tiering" in *ETERNUS SF Storage Cruiser Operation Guide for Optimization Function*.)

3.6.1. Enabling Automated Storage Tiering

Enable Automated Storage Tiering for DX200#1 and DX200#2.

(For details on the procedure, refer to "Enable/Disable Automated Storage Tiering" in *ETERNUS SF Web Console Guide*.)

- (1) From ETERNUS SF Web Console, then click [Storage] on the global navigation tab, click [Disk Array] on the Category pane, and click DX200#1 on the Main pane.
- (2) Click [Automated Storage Tiering] on the Category pane of the DX200#1 screen.

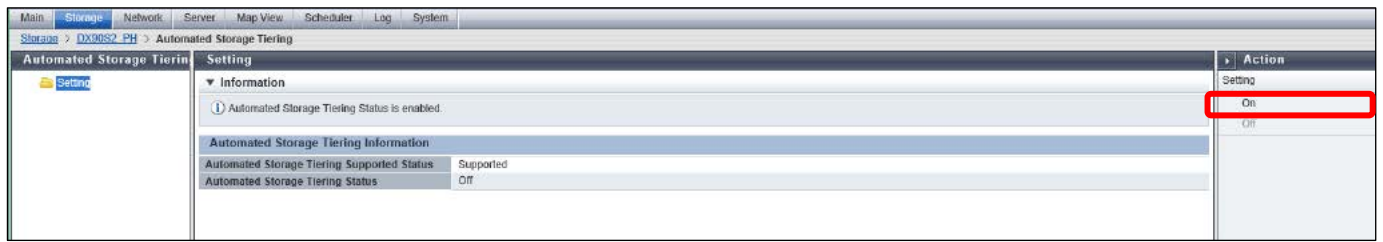
The screenshot displays the ETERNUS SF Web Console interface for a storage system named 'DX90S2_PH'. The left-hand navigation pane shows a tree structure with categories like Overview, Volume, RAID Group, Thin Provisioning, Advanced Copy, Connectivity, Component, System, Performance, and Storage. Under the 'Storage' category, 'Automated Storage Tiering' is highlighted with a red rectangle. The main content area shows the 'Overview' tab for the selected storage system, displaying hardware components, system information, and storage capacity details. The right-hand pane shows an 'Action' menu with options like Delete, Modify, Reset Password, Reload Conf, and Automated QoS.

Hardware Components		
Status	Control Modules	Disks
Available	2	13
Warning	0	0
Error	0	0

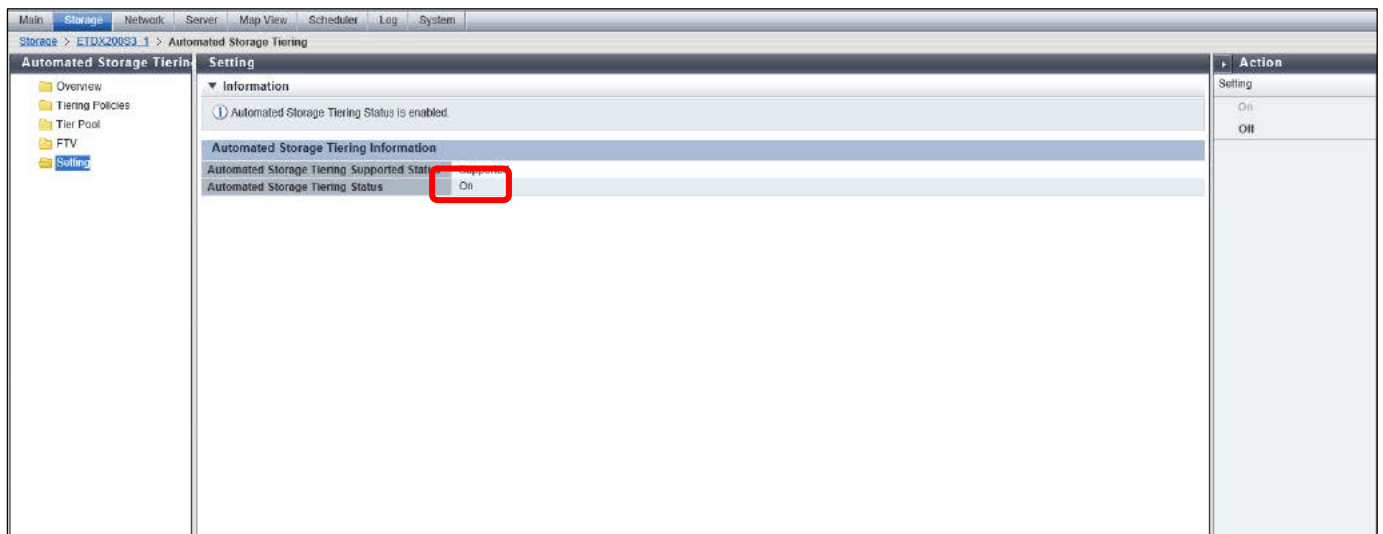
System Information		
Storage System Name	DX90S2_PH	
Model Name	ET092SDU	
Serial No.	4521216583	
Box ID	1000-70-00000000-0000-0000-0000-0000-0000-0000-0000-0000	
Firmware Version	V10L47-0000	
SNMP Trap Setting	Un-setting up	

Storage Capacity		
	Available (TB)	Total (TB)
Raw	0.29	14.05
Configured	4.28	13.61
RAID0	4.28	13.34
RAID1	0.00	0.27
RAID1+0	0.00	0.00
RAID5	0.00	0.00
RAID5+0	0.00	0.00
RAID6	0.00	0.00
RAID6-FR	0.00	0.00

- (3) On the [Automated Storage Tiering] screen, click [On] on the Action pane under [Setting].



- (4) On the Main pane of the [Automated Storage Tiering] screen, check that [Automated Storage Tiering Status] is displayed as "On".



- (5) Enable Automated Storage Tiering for DX200#2 by repeating steps (1) to (4).

3.6.2. Creating Tiering Policies

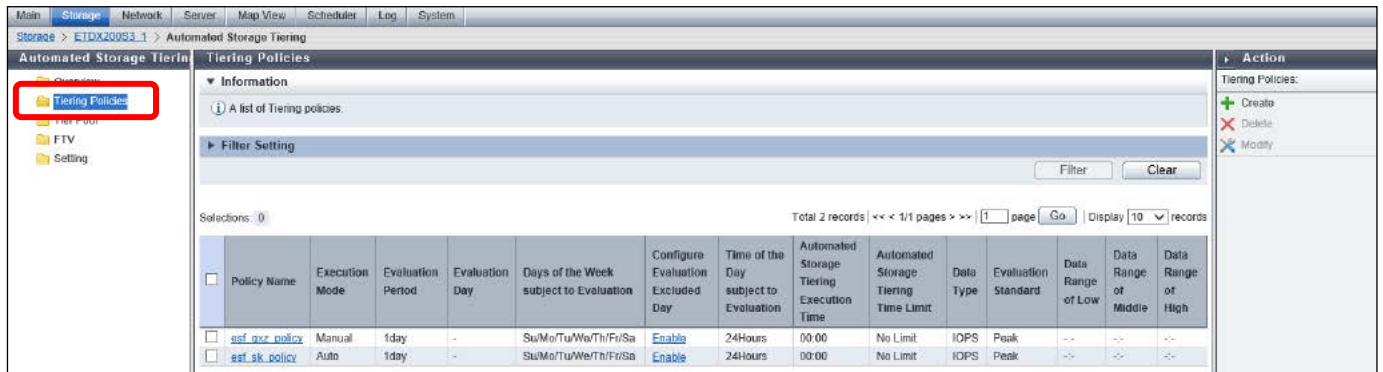
Create a Tiering Policy with ETERNUS SF.

Tiering Policies are created as policies common to the storage systems managed by ETERNUS SF Manager.

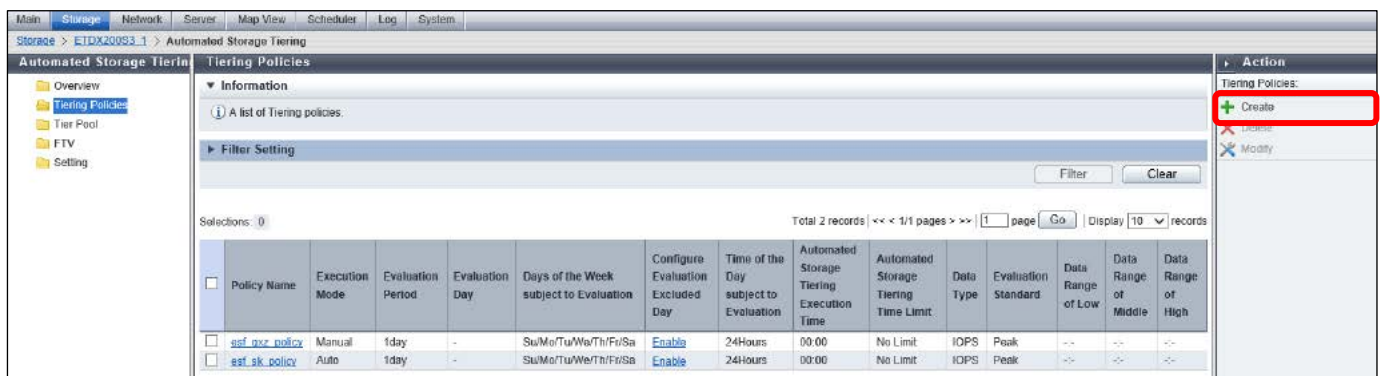
(For details on the procedure, refer to "Create Tiering Policy" in *ETERNUS SF Web Console Guide*.)

For details on the settings, refer to "Creation of Tiering Policy" in *ETERNUS SF Storage Cruiser Operation Guide for Optimization Function*.)

- (1) From ETERNUS SF Web Console, click [Tiering Policies] on the Category pane of the [Automated Storage Tiering] screen of DX200#1.



- (2) Click [Create] under [Tiering Policies] on the Action pane of the [Automated Storage Tiering] screen.



(3) Set the items in [Configuration of Tiering Policies] on the Main pane of the [Create Tiering Policy] screen and then click [Next].

The screenshot shows the 'Create Tiering Policy' window. The 'Configuration of Tiering Policies' section is highlighted with a red box. It contains the following fields and values:

- Policy Name: gold
- Execution Mode: Auto
- Evaluation Period: Hour (selected), 4 hour
- Evaluation Standard: Peak

The 'Next >>' button at the bottom right is also highlighted with a red box.

Item	Setting content	DX200 common setting value
Policy Name	(Any policy name)	gold
Execution Mode	(Select from Auto / Semi-Auto / Manual)	Auto
Evaluation Period	(Select from Hour / Day / Week, and value for each unit)	Hour: 2 hours
Evaluation Standard	(Select from Peak / Average)	Peak

Table 16 Setting example of [Configuration of Tiering Policies]

Note
 Set the Tiering Policy according to the system environment.
 In the [Configuration of Tiering Policies] setting example, the minimum evaluation period of two hours is used for the operation test.

- (4) The input values are displayed on the Main pane of the [Create Tiering Policy] screen. Confirm the values and then click [Create].

The screenshot shows the 'Create Tiering Policy' screen with the following configuration:

- Policy Name:** Gold
- Execution Mode:** Auto
- Evaluation Period:** 2hours
- Evaluation Standard:** Peak
- Automated Storage Tiering Operation:** No Limit
- Evaluation Standard:** IOPS
- Data Range of Layer:** Automatic Configuration
- Data Range of Low:** --
- Data Range of Middle:** --
- Data Range of High:** --

The 'Create' button is highlighted with a red box.

- (5) Confirm that the settings appear on the Main pane of the [Automated Storage Tiering] screen.

The screenshot shows the 'Automated Storage Tiering' screen with a list of tiering policies. The 'gold_policy' is highlighted with a red box.

Policy Name	Execution Mode	Evaluation Period	Evaluation Day	Days of the Week subject to Evaluation	Configure Evaluation Excluded Day	Time of the Day subject to Evaluation	Automated Storage Tiering Execution Time	Automated Storage Tiering Time Limit	Data Type	Evaluation Standard	Data Range of Low	Data Range of Middle	Data Range of High
gold_policy	Manual	1day	-	Su/Mo/Tu/Wa/Th/Fr/Sa	Enable	24Hours	00:00	No Limit	IOPS	Peak	--	--	--
sil_policy	Auto	1day	-	Su/Mo/Tu/Wa/Th/Fr/Sa	Enable	24Hours	00:00	No Limit	IOPS	Peak	--	--	--

3.6.3. Creating Tier Pools

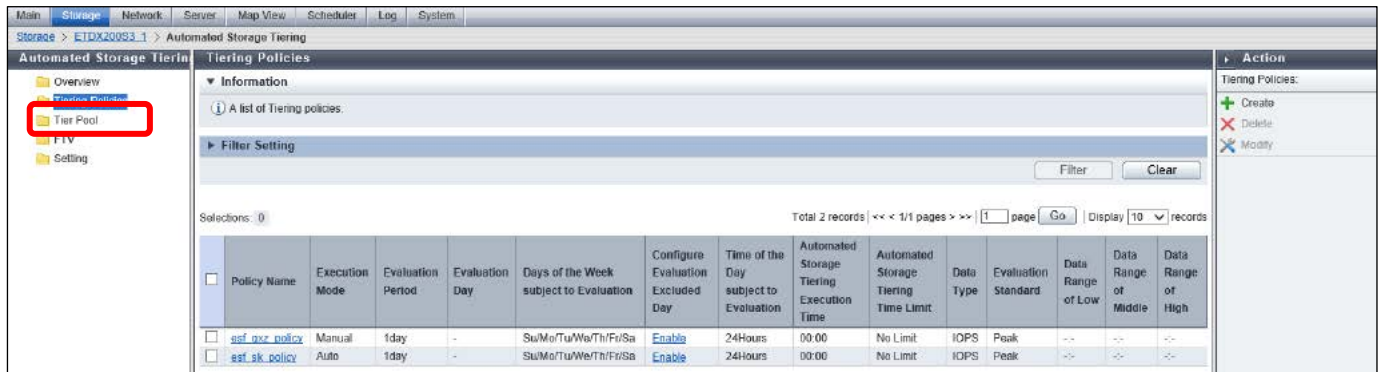
Create a Tier pool for DX200#1 and DX200#2.

Tier pools consist of a Nearline disk as the Low sub-pool and an Online disk as the High sub-pool.

(For details on the procedure, refer to "Create Tier Pool" in *ETERNUS SF Web Console Guide*.)

For details on the settings, refer to "Setting of Tier Pool" in *ETERNUS SF Storage Cruiser Operation Guide for Optimization Function*.)

- (1) From ETERNUS SF Web Console, click [Tier Pool] on the Category pane of the [Automated Storage Tiering] screen of DX200#1.



- (2) Click [Create] under [Tier Pool] on the Action pane of the [Automated Storage Tiering] screen.



- (3) In [Specification of Tier Pool] on the [Create Tier Pool DX200#1] screen, set [Tier Pool Information] and [Sub-Pool Information] and then click [Next].

The screenshot shows the 'Create Tier Pool ETDX200S3_1' window. The 'Specification of Tier Pool' tab is active. In the 'Tier Pool Information' section, the 'Tier Pool Name' dropdown is set to 'pool_1'. In the 'Sub-Pool Information' section, the 'Number of Layers' radio button is selected for '2', and the 'Disk Selection' radio button is selected for 'Manual'. The 'Next >>' button at the bottom right is highlighted with a red box.

Item	Setting content	Setting value of DX200#1	Setting value of DX200#2
Tier Pool Name	(Any pool name)	pool_1	pool_2
Policy Name	(Select the policy name that was specified when the Tiering Policy was created)	gold	gold
Number of Layers	(Select from 2 / 3)	2	2
Disk Selection	(Select from Auto / Manual)	Manual	Manual

Table 17 [Tier Pool Information] and [Sub-Pool Information] settings

- (4) In [Set Low Sub-Pool], enter the [Sub-Pool Information].
Select the checkboxes of all the disks to be registered to Low Sub-Pool from the Nearline disks displayed in [Selection Disks], then click [Create].

The screenshot shows the 'Create Tier Pool E10X200S3_4' window. The 'Sub-Pool Information' section is highlighted with a red box, showing 'FTSP Name' as 'E1_1', 'Disk Type' as 'Nearline', and 'Reliability' as 'Mirroring (RAID1)'. Below this, the 'Selection Disks' table shows four disks (17, 18, 19, 20) all selected with checkboxes. The 'Create' button is also highlighted with a red box.

Selections: 2	Disk No.	Enclosure No.	Slot No.	Status	Type	Capacity	Speed (rpm)	Usage	RAID Group Number
<input checked="" type="checkbox"/>	17	-	17	Present	SAS	2.00 TB	10000	Data Disk	-
<input checked="" type="checkbox"/>	18	-	18	Present	SAS	2.00 TB	10000	Data Disk	-
<input checked="" type="checkbox"/>	19	-	19	Present	SAS	2.00 TB	10000	Data Disk	-
<input checked="" type="checkbox"/>	20	-	20	Present	SAS	2.00 TB	10000	Data Disk	-

Item	Setting content	Setting value of DX200#1	Setting value of DX200#2
FTSP Name	(Any pool name)	nearlineSAS	nearlineSAS
Disk Type	(Select the disk type)	Nearline	Nearline
Reliability	(Select the RAID level)	Mirroring (RAID1)	Mirroring (RAID1)
Selection Disks	(Select Disk No. displayed for Low Sub-Pool)	Select the Nearline disk No. to be registered to Low Sub-Pool	Select the Nearline disk No. to be registered to Low Sub-Pool

Table 18 [Set Low Sub-Pool] settings

(5) Confirm that all the selected Nearline disk No. are displayed in [Disk No.], then click [Next].

Information

Sub-Pool Information

FTSP Name: sp.1

Disk Type: Online

Reliability: Mirroring (RAID 1)

Fail Recovery Configuration: [v]

Selection Disks

Filter: Clear

Selections: 0

Total 4 months: << < 1/1 pages >> >> page Go Display 15 months

Disk No.	Enclosure No.	Slot No.	Status	Type	Capacity	Speed (rpm)	Usage	RAID Group Number
<input type="checkbox"/> 17	-	17	<input checked="" type="radio"/> Present	SAS	2.00 TB	10000	Data Disk	-
<input type="checkbox"/> 18	-	18	<input checked="" type="radio"/> Present	SAS	2.00 TB	10000	Data Disk	-
<input type="checkbox"/> 19	-	19	<input checked="" type="radio"/> Present	SAS	2.00 TB	10000	Data Disk	-
<input type="checkbox"/> 20	-	20	<input checked="" type="radio"/> Present	SAS	2.00 TB	10000	Data Disk	-

Remove Create

RAID Group

Selections: 1

☒ Disk No.

17, 18

Advanced Configuration of RAID Group

<< Back Next >> Cancel

(6) In [Set Middle Sub-Pool], click [Next].

Information

Middle sub-pool can be created only when Tiering Policy for three layer Tier pool is selected.

<< Back Next >> Cancel

- (7) In the [Set High Sub-Pool], enter the [Sub-Pool Information].
Select the checkboxes of all the disks to be registered to High Sub-Pool from the Online disks displayed in [Selection Disks], then click [Create].

The screenshot shows the 'Create Tier Pool ETD20053_1' interface. The 'Set High Sub-Pool' tab is selected. Under 'Sub-Pool Information', 'FTSP Name' is set to 'ETP_2' and 'Reliability' is set to 'Mirroring (RAID1)'. Below, the 'Selection Disks' section contains a table with columns: Disk No., Enclosure No., Slot No., Status, Type, Capacity, Speed (rpm), Usage, and RAID Group Number. Disks 17, 18, and 19 are checked in the 'Disk No.' column. The 'Create' button is located below the table.

Disk No.	Enclosure No.	Slot No.	Status	Type	Capacity	Speed (rpm)	Usage	RAID Group Number
<input checked="" type="checkbox"/> 17	-	17	Present	SAS	2.00 TB	10000	Data Disk	-
<input checked="" type="checkbox"/> 18	-	18	Present	SAS	2.00 TB	10000	Data Disk	-
<input checked="" type="checkbox"/> 19	-	19	Present	SAS	2.00 TB	10000	Data Disk	-
<input type="checkbox"/> 20	-	20	Present	SAS	2.00 TB	10000	Data Disk	-

Item	Setting content	Setting value of DX200#1	Setting value of DX200#2
FTSP Name	(Any pool name)	onlineSAS	onlineSAS
Disk Type	(Select the disk type)	Online	Online
Reliability	(Select the RAID level)	Mirroring (RAID1)	Mirroring (RAID1)
Selection Disks	(Select the Disk No. displayed for High Sub-Pool)	Select the Online disk No. to be registered to High Sub-Pool	Select the Online disk No. to be registered to High Sub-Pool

Table 19 [Set High Sub-Pool] settings

(8) Confirm that all the selected Online disk No. are displayed under [Disk No.], then click [Next].

Selections	Disk No.	Enclosure No.	Slot No.	Status	Type	Capacity	Speed (rpm)	Usage	RAID Group Number
<input checked="" type="checkbox"/>	17	-	17	Present	SAS	2.00 TB	10000	Data Disk	-
<input checked="" type="checkbox"/>	18	-	18	Present	SAS	2.00 TB	10000	Data Disk	-
<input checked="" type="checkbox"/>	19	-	19	Present	SAS	2.00 TB	10000	Data Disk	-
<input checked="" type="checkbox"/>	20	-	20	Present	SAS	2.00 TB	10000	Data Disk	-

(9) In [Confirm], confirm the input information, then click [Create].

Selections	Disk No.	Enclosure No.	Slot No.	Status	Type	Capacity	Speed (rpm)	Usage
<input checked="" type="checkbox"/>	17	-	17	Present	SAS	2.00 TB	10000	Data Disk
<input checked="" type="checkbox"/>	18	-	18	Present	SAS	2.00 TB	10000	Data Disk

(10) The newly created Tier pool is displayed under [Tier Pool] on the [Automated Storage Tiers] screen.

Selections	Pool Number	Tier Pool Name	Pool Status	Total Capacity	Policy Name	Operating Status	Balancing Level	Status	Shrinking	Assigned CM
<input checked="" type="checkbox"/>	1	3JB2K4B_FTRP	Available	272.49 GB	-	Stop	High	Stop	Executing	CM#0

Checklist

Move to the next step after confirming the following item.

- [Pool Status] is "Available".

(11) Create a Tier pool for DX200#2 by repeating steps (1) to (10).

3.6.4. Creating FTVs

Create FTVs in Tier pools of DX200#1 and DX200#2.

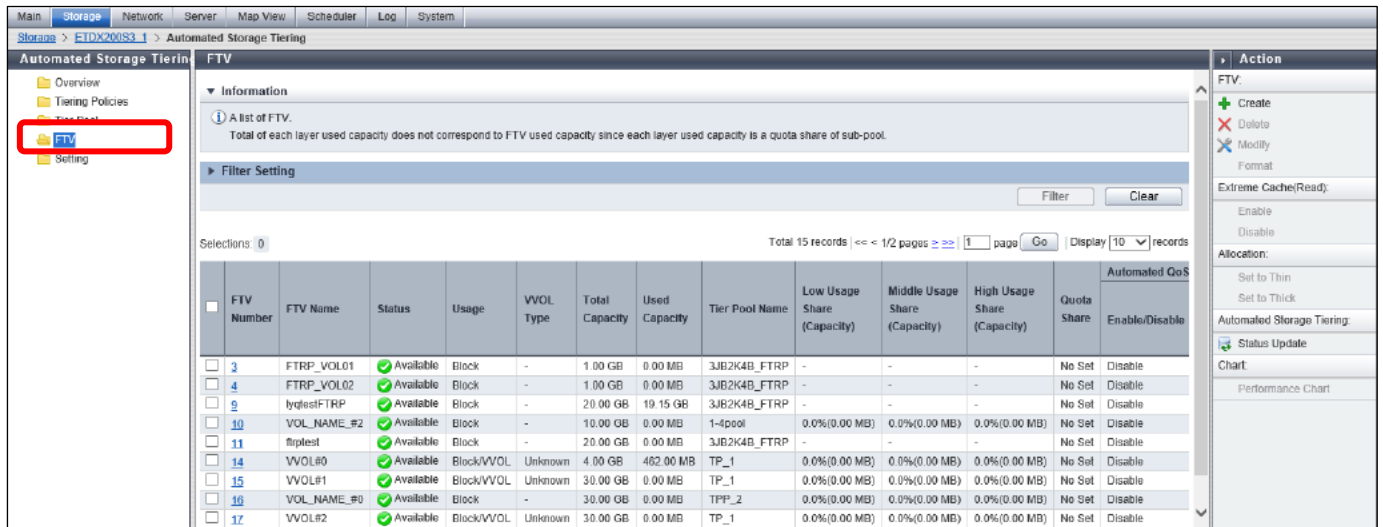
When using the Storage Cluster function, create one or more FTV targets per Storage Cluster TFO group on each storage system.

In this example, one FTV is created for two TFO groups in both DX200#1 and DX200#2.

(For details on the procedure, refer to "Create FTV" in *ETERNUS SF Web Console Guide*.)

For details on the settings, refer to "Setting of FTV" in *ETERNUS SF Storage Cruiser Operation Guide for Optimization Function*.)

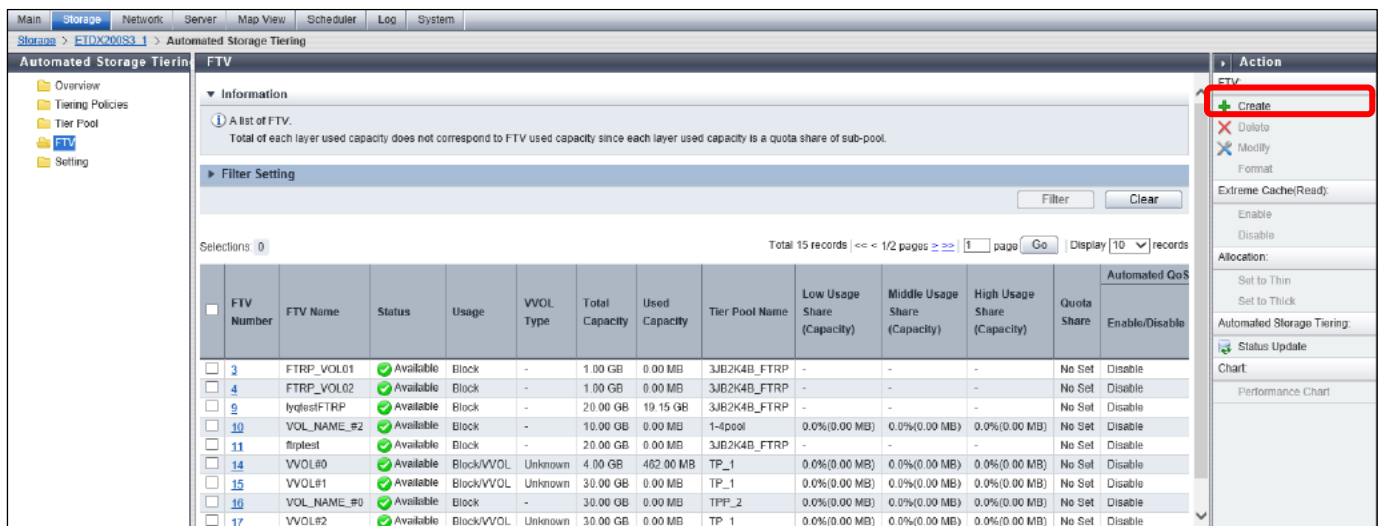
- (1) From ETERNUS SF Web Console, click [FTV] on the Category pane of the [Automated Storage Tiering] screen of DX200#1.



The screenshot shows the 'Automated Storage Tiering' screen for DX200#1. The left-hand navigation pane has a red box around the 'FTV' option. The main area displays the 'FTV' information, including a list of FTVs and a table of FTV details.

FTV Number	FTV Name	Status	Usage	VVOL Type	Total Capacity	Used Capacity	Tier Pool Name	Low Usage Share (Capacity)	Middle Usage Share (Capacity)	High Usage Share (Capacity)	Quota Share	Automated GoS
3	FTRP_VOL01	Available	Block	-	1.00 GB	0.00 MB	3JB2K4B_FTRP	-	-	-	No Set	Disable
4	FTRP_VOL02	Available	Block	-	1.00 GB	0.00 MB	3JB2K4B_FTRP	-	-	-	No Set	Disable
9	lytestFTRP	Available	Block	-	20.00 GB	19.15 GB	3JB2K4B_FTRP	-	-	-	No Set	Disable
10	VOL_NAME_#2	Available	Block	-	10.00 GB	0.00 MB	1-4pool	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable
11	flptest	Available	Block	-	20.00 GB	0.00 MB	3JB2K4B_FTRP	-	-	-	No Set	Disable
14	VVOL#0	Available	Block/VVOL	Unknown	4.00 GB	462.00 MB	TP_1	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable
15	VVOL#1	Available	Block/VVOL	Unknown	30.00 GB	0.00 MB	TP_1	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable
16	VOL_NAME_#0	Available	Block	-	30.00 GB	0.00 MB	TPP_2	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable
17	VVOL#2	Available	Block/VVOL	Unknown	30.00 GB	0.00 MB	TP_1	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable

- (2) Under [FTV] on the Action pane, click [Create].



The screenshot shows the 'Automated Storage Tiering' screen for DX200#1. The right-hand action pane has a red box around the 'Create' button. The main area displays the 'FTV' information, including a list of FTVs and a table of FTV details.

FTV Number	FTV Name	Status	Usage	VVOL Type	Total Capacity	Used Capacity	Tier Pool Name	Low Usage Share (Capacity)	Middle Usage Share (Capacity)	High Usage Share (Capacity)	Quota Share	Automated GoS
3	FTRP_VOL01	Available	Block	-	1.00 GB	0.00 MB	3JB2K4B_FTRP	-	-	-	No Set	Disable
4	FTRP_VOL02	Available	Block	-	1.00 GB	0.00 MB	3JB2K4B_FTRP	-	-	-	No Set	Disable
9	lytestFTRP	Available	Block	-	20.00 GB	19.15 GB	3JB2K4B_FTRP	-	-	-	No Set	Disable
10	VOL_NAME_#2	Available	Block	-	10.00 GB	0.00 MB	1-4pool	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable
11	flptest	Available	Block	-	20.00 GB	0.00 MB	3JB2K4B_FTRP	-	-	-	No Set	Disable
14	VVOL#0	Available	Block/VVOL	Unknown	4.00 GB	462.00 MB	TP_1	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable
15	VVOL#1	Available	Block/VVOL	Unknown	30.00 GB	0.00 MB	TP_1	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable
16	VOL_NAME_#0	Available	Block	-	30.00 GB	0.00 MB	TPP_2	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable
17	VVOL#2	Available	Block/VVOL	Unknown	30.00 GB	0.00 MB	TP_1	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable

- (3) In [Specified parameter to create FTV], set the information of the FTV that belongs to TFO group #1 in [Configuration of FTV Information], then click [Next].

Item	Setting content	Setting value of DX200#1	Setting value of DX200#2
Tier Pool Name	(Select the Tier Pool name)	pool_1	pool_2
FTV Name	(Enter any FTV name)	volume1	volume1
Total Capacity	(Capacity allocated to FTV)	800GB	800GB
Number of Volumes	(The number of volumes created as FTV)	1	1
Allocation	(Select from Thin / Thick)	Thin	Thin
Priority FTSP	(Select from Auto / nearlineSAS / onlineSAS If Auto is selected, data will be allocated from onlineSAS first)	Auto	Auto
Low Quota Share	(Ratio of the volume capacity allocated to Low Sub-Pool during a reallocation. If omitted, the Tiering Policy is followed)	-	-
Middle Quota Share	(Ratio of the volume capacity allocated to Middle Sub-Pool during a reallocation. If omitted, the Tiering Policy is followed)	-	-
High Quota Share	(Ratio of the volume capacity allocated to High Sub-Pool during a reallocation. If omitted, the Tiering Policy is followed)	-	-
Automated QoS Enable/Disable	(Select from Enable / Disable)	Disable	Disable
Automated QoS:Priority	(Select from No Set / Low / Middle / High / Unlimited)	No Set	No Set

Table 20 [Configuration of FTV Information] settings for the FTV in TFO group #1

- (4) In [Confirm], check the configuration of the set FTV information and then click [Create].

The screenshot shows the 'Create FTV ETDX200S3_1' window with the 'Confirm' tab selected. The 'Information' section displays the following configuration details:

- Configuration of FTV Information**
 - Tier Pool Name: 3JB2K4B_FTRP
 - FTV Name: Volume1
 - Total Capacity: 100MB
 - Number of Volumes: 1
 - Allocation: Thin
 - Caution Threshold of FTV: 80%
 - Priority FTSP: Auto
 - Low Quota Share: -
 - Middle Quota Share: -
 - High Quota Share: -
- Configuration of Automated QoS**
 - Automated QoS Enable/Disable: Disable
 - Automated QoS:Priority: No Set
- Advanced Configuration of Automated QoS**
 - Target Response Time: -
- Automated QoS Option**
 - Tune by Quota Share: Off

At the bottom right, the '<< Back', 'Create', and 'Cancel' buttons are visible, with the 'Create' button highlighted by a red rectangle.

- (5) Check that the created FTV information is displayed under [FTV] on the [Automated Storage Tiering] screen.

Checklist

- Move to the next step after confirming the following item.
 - [Status] is "Available".

- (6) Create an FTV that belongs to TFO group #2. Repeat steps (1) to (5).
The setting contents are as follows.

Item	Setting content	Setting value of DX200#1	Setting value of DX200#2
Tier Pool Name	(Select the Tier Pool name)	pool_1	pool_2
FTV Name	(Enter any FTV name)	volume2	volume2
Total Capacity	(Capacity allocated to FTV)	800GB	800GB
Number of Volumes	(The number of volumes created as FTV)	1	1
Allocation	(Select from Thin / Thick)	Thin	Thin
Priority FTSP	(Select from Auto / nearlineSAS / onlineSAS If Auto is selected, data will be allocated from onlineSAS first)	Auto	Auto
Low Quota Share	(Ratio of the volume capacity allocated to Low Sub-Pool during a reallocation. If omitted, the Tiering Policy is followed)	-	-
Middle Quota Share	(Ratio of the volume capacity allocated to Middle Sub-Pool during a reallocation. If omitted, the Tiering Policy is followed)	-	-
High Quota Share	(Ratio of the volume capacity allocated to High Sub-Pool during a reallocation. If omitted, the Tiering Policy is followed)	-	-
Automated QoS Enable/Disable	(Select from Enable / Disable)	Disable	Disable
Auto QoS:Priority	(Select from No Set / Low / Middle / High / Unlimited)	No Set	No Set

Table 21 [Configuration of FTV Information] settings for the FTV in TFO group #2

- (7) Create FTVs on DX200#2 by repeating steps (1) to (6).

Note

For FTVs that belong to the TFO group of the Storage Cluster function, the same size must be allocated for both the Primary storage and Secondary storage.

In this example, the same size is allocated for volume1 of DX200#1 and of DX200#2 which belong to TFO group #1.

The same size is allocated also for volume 2 of DX200#1 and of DX200#2 which belong to TFO group #2.

3.7. Setting Storage Cluster

To configure Storage Cluster, synchronize the storage systems, prepare the business volume, configure the access paths to the business servers, and configure the monitoring settings.

To configure Storage Cluster, the following steps are taken.

- Installation of ETERNUS SF Agent
- Storage Cluster Controller setup
- Port setup
- REC path setup
- TFOG setup
- Preparation of business volumes
- Access path setup
- Confirmation of synchronization startup

3.7.1. Installing ETERNUS SF Agent

ETERNUS AF Agent provides Storage Cluster Controller as a function for ETERNUS Disk storage system survival monitoring.

In this example, ETERNUS SF Agent is installed in the same server in which ETERNUS SF Manager is installed.

(For details on the procedure, refer to *ETERNUS SF Express / Storage Cruiser / AdvancedCopy Manager Installation and Setup Guide*.)

- (1) Log in to the operation management server as a user that has Administrator privileges.
- (2) Start the ETERNUS SF Storage Cruiser/ACM/Express 16 media pack (Windows 64-bit version).
- (3) The initial screen is displayed. Click [Storage Cruiser installation].
- (4) On the [Welcome to the InstallShield Wizard for ETERNUS SF Storage Cruiser Agent] screen, click the [Next] button.
- (5) On the [License Agreement] screen, read the displayed terms and conditions. If the terms and conditions are agreeable, click [Yes].
- (6) On the [Choose Destination Location] screen, select the install destination folder and then click the [Next] button.
- (7) On the [Specify Destination Location] screen, select the desired directories and then click the [Next] button.
- (8) On the [Registration of Agent service] screen, specify the port number and the boot IP address and then click the [Next] button.
- (9) On the [Start Copying Files] screen, confirm the settings. If the settings are correct, click the [Next] button. To change the settings, click the [Back] button.
- (10) On the [InstallShield Wizard Complete] screen, click [Yes, I want to restart my computer now.] and then click the [Finish] button. Upon completion of installation, PC reboot will be executed.

Checklist

Check the following items before proceeding to the next step.

- [ETERNUS SF Agent] is displayed on the [Programs and Features] screen of the Control Panel.

3.7.2. Setting Up the Storage Cluster Controller

Set up the Storage Cluster Controller for ETERNUS SF Agent.
Setup of Storage Cluster Controller is done with the following procedure.

- Setting of monitoring target device
- Activation of monitoring function of the Storage Cluster Controller
- ETERNUS SF Agent restart
- Monitoring status check

3.7.2.1. Setting the Monitoring Target Storage System

Enter the monitoring target ETERNUS Disk storage system information to the "TFOConfig.ini" file.
(For details on the procedure, refer to "TFOConfig.ini Parameter" in *ETERNUS SF Storage Cruiser Operation Guide*.)

The "TFOConfig.ini" file is stored in the following location of the server node.

Agent OS kind	Absolute path
Windows	\$ENV_DIR\ESCAgent\etc\TFOConfig.ini ("\$ENV_DIR" is an environment directory when Agent is installed.)

Note

When Agent is started, the file is read.
To reflect the contents of the file, restart of Agent is required.

Checklist

Check the following items before proceeding to the next step.

- IP address of the ETERNUS Disk storage system to be monitored is set.

3.7.2.2. Activation of Storage Cluster Controller Monitoring Function

To activate the Storage Cluster Controller monitoring function, edit "Correlation.ini" file.
(For details on the procedure, refer to "Correlation.ini Parameter" Appendix of *ETERNUS SF Storage Cruiser Operation Guide*.)

"Correlation.ini" file is stored in the following location on the server node.

Agent OS kind	Absolute path
Windows	\$ENV_DIR\ESCAgent\etc\Correlation.ini ("\$ENV_DIR" is the environment directory when Agent is installed.)

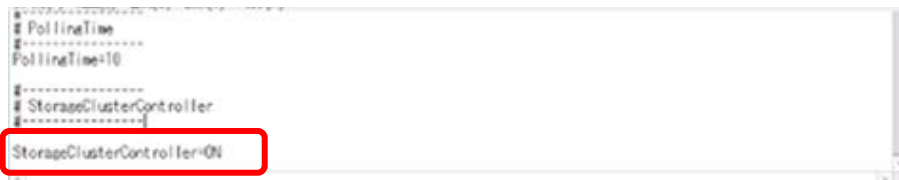
Note

When Agent is started, the file is read.
To reflect the content of the file, restart of Agent is required.

Checklist

Check the following items before proceeding to the next step.

- StorageClusterController item is set to "ON".



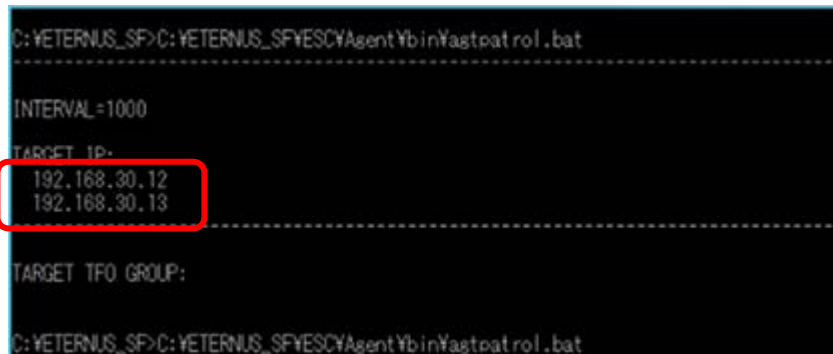
3.7.2.3. ETERNUS SF Agent Restart

To reflect the modified contents of "TFOConfig.ini" file and "Correlation.ini" file, restart ETERNUS SF Agent.
Restart service name "ETERNUS SF Storage Cruiser Agent".

3.7.2.4. Monitoring Status Check

Use the "agtpatrol" command to check the monitoring status of the target ETERNUS Disk storage systems.
Run the following bat file.

\$ENV_DIR\ESCAgent\bin\agtpatrol.bat
("\$ENV_DIR" is the environment directory when Agent is installed.)



```
C:\ETERNUS_SF>C:\ETERNUS_SF\ESCAgent\bin\agtpatrol.bat

-----
INTERVAL=1000
TARGET IP:
192.168.30.12
192.168.30.13
-----
TARGET TFO GROUP:

C:\ETERNUS_SF>C:\ETERNUS_SF\ESCAgent\bin\agtpatrol.bat
```

Checklist

- Check the following items before proceeding to the next step.
- IP addresses of DX200#1 and DX200#1 are output at "TARGET IP".

3.7.3. Setting Up Ports

In the Storage Cluster function, "Port connected to the business server" and "Port for REC path" are used.

The port mode of "Port connected to the business server" must be "CA".

Moreover, the port parameters set to the ports of the CA port pair must be identical.

The port mode of "Port for REC path" must be "RA" or "CA/RA".

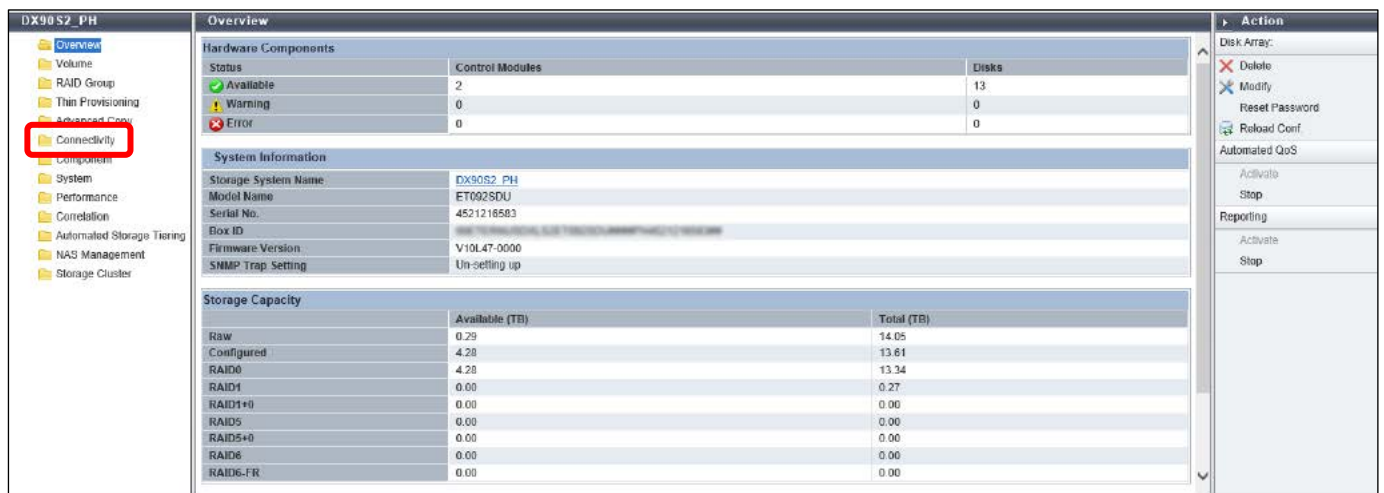
Here, the port mode setting procedure for "Port for REC path" is explained.

Set the port mode for DX200#1 and DX200#2.

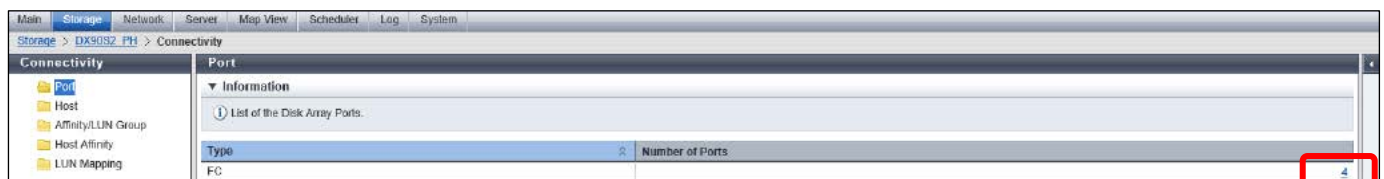
(For details on the procedure, refer to "Change FC/iSCSI/SAS Port Settings" in *ETERNUS SF Web Console Guide*.)

For details on the settings, refer to "Storage Cluster Function" in *ETERNUS SF Storage Cruiser Operation Guide*.)

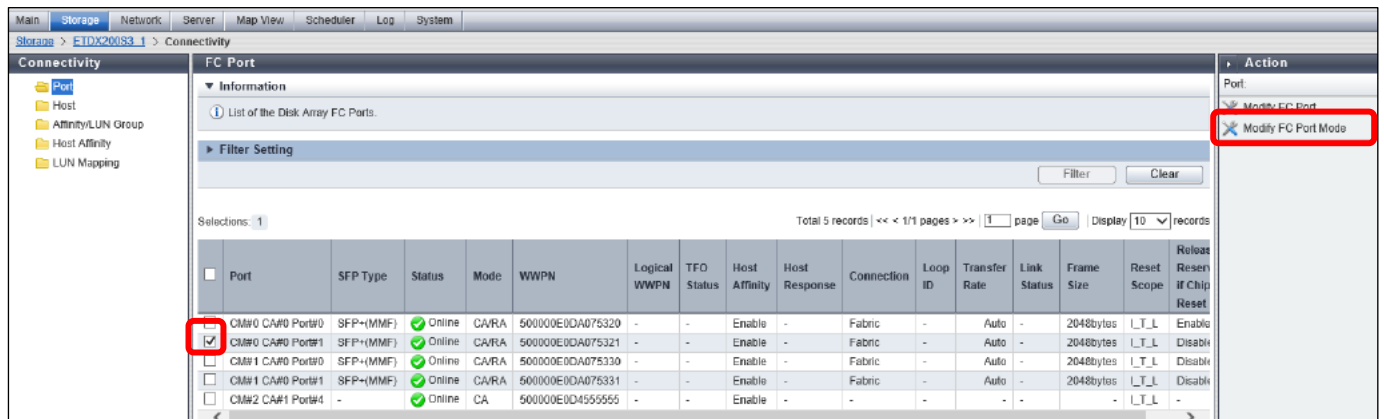
- (1) After logging in to ETERNUS SF Web Console, switch to the detailed view, click [Storage] on the global navigation tab, click [Disk Array] on the Category pane, and then click "DX200#1" on the Main pane.
- (2) Click [Connectivity] on the Category pane of the DX200#1 screen.



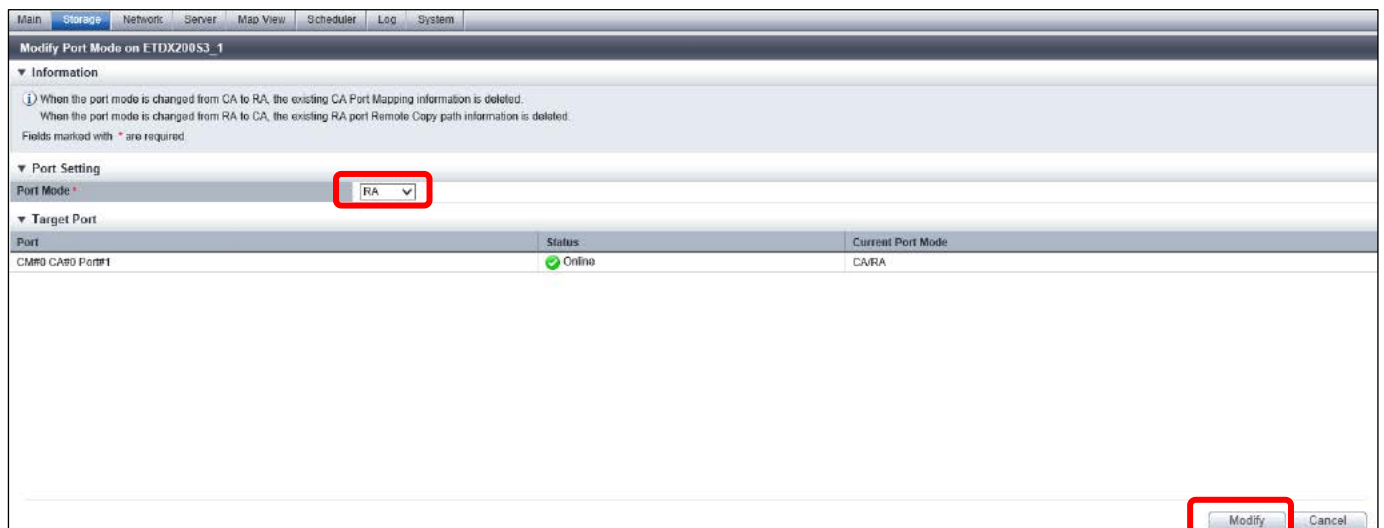
- (3) Click [Port] on the Category pane of the [Connectivity] screen, then from the list of ports displayed on the Main pane, click the value displayed in the [Number of Ports] column for type "FC".



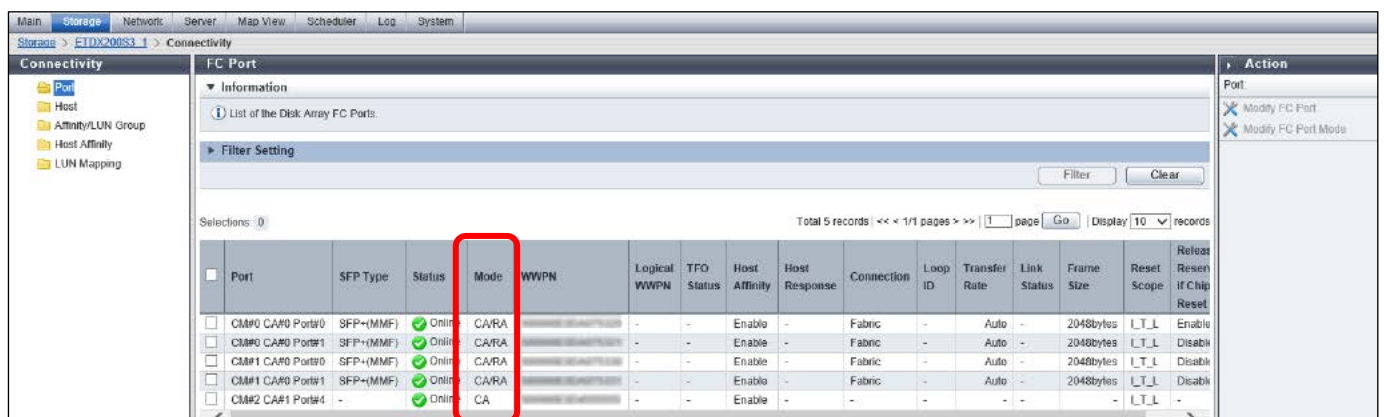
- (4) Click [Modify FC Port Mode] on the Action pane under [Port] after checking the FC port to be used as the REC path.
For the candidate port, refer to "Table 35 Port settings".



- (5) Click [Modify] after changing [Port Mode] to "RA or CA/RA".



- (6) Confirm the [Mode] of the target FC port is changed to "RA or CA/RA" in the list of FC ports.



- (7) Repeat step (1) to (6) to change the port setting of all the REC path candidate ports.
Change the port setting of the REC path candidate ports for DX200#2.

3.7.4. Setting Up REC Paths

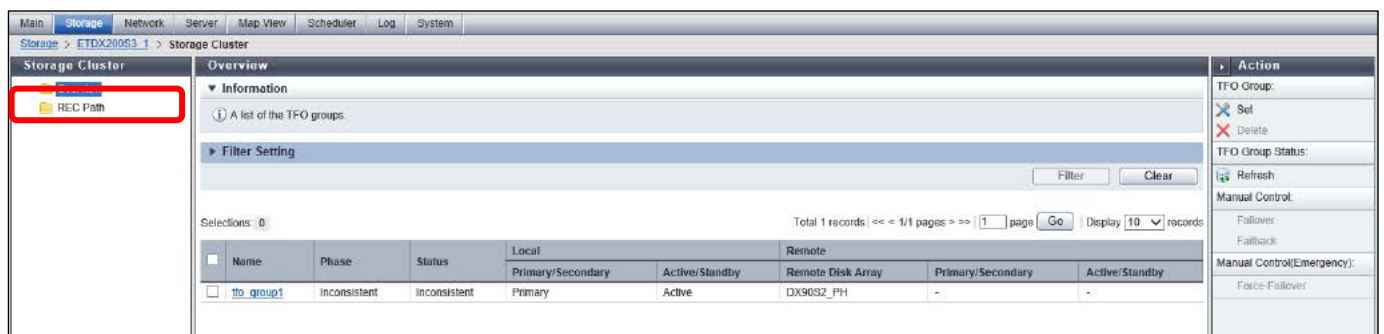
Set up REC paths between ETERNUS Disk storage systems.

When REC path settings are performed in one of the ETERNUS Disk storage systems, the settings are also applied to the other ETERNUS Disk storage system.

- (1) Click [Storage Cluster] on the Category pane of the DX200#1 screen.



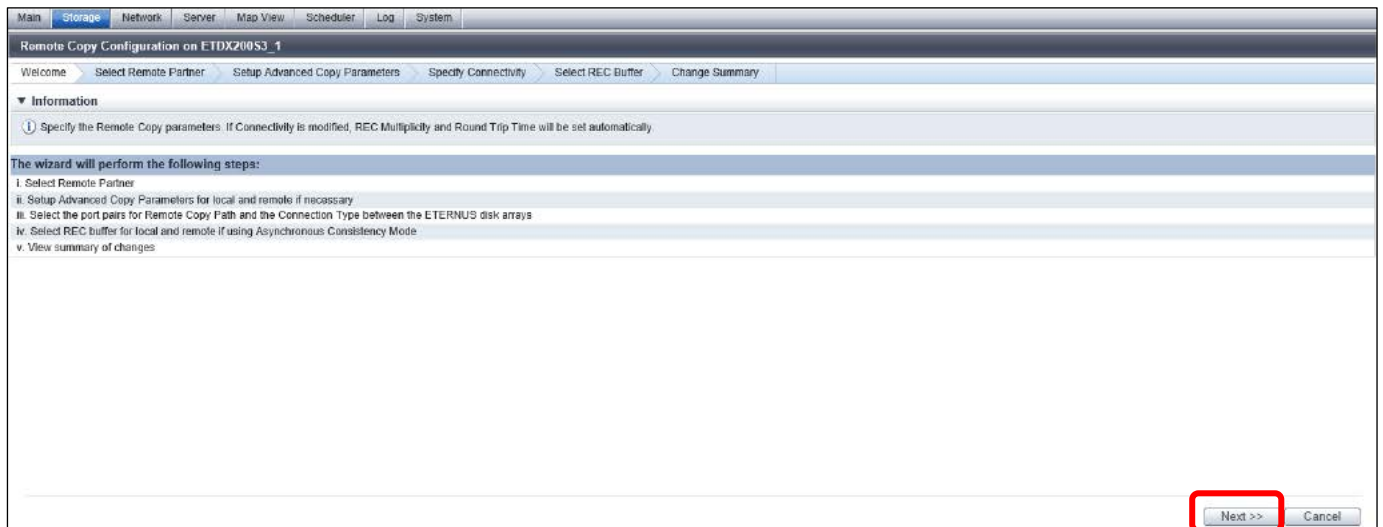
- (2) Click [REC Path] on the [Storage Cluster] screen.



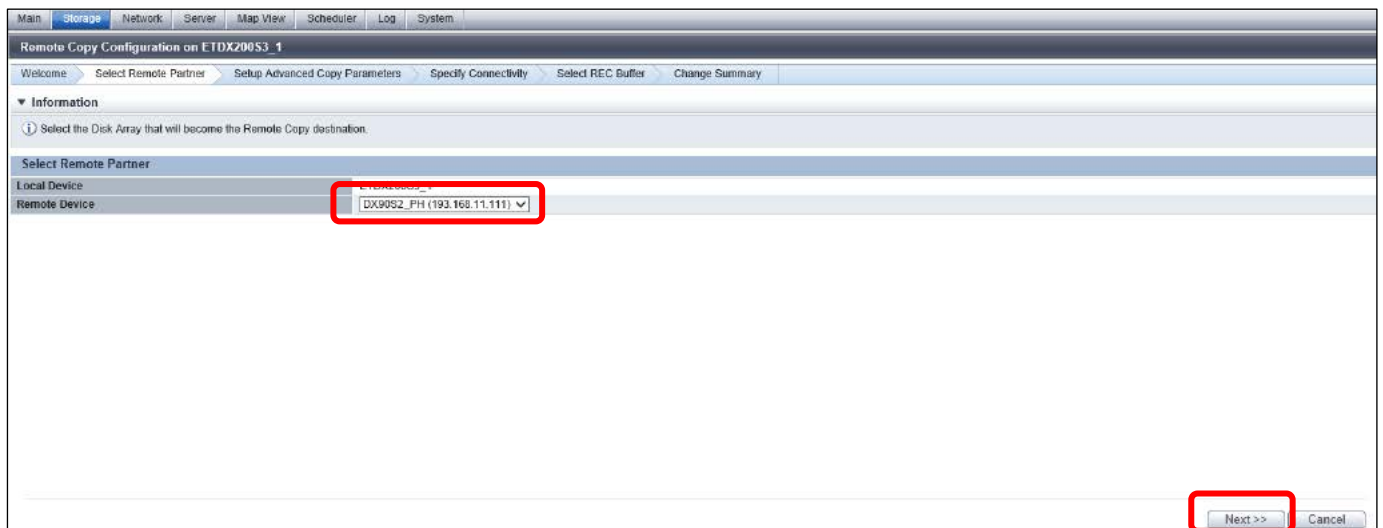
- (3) Click [Remote Copy Conf.] on the Action pane under [Wizard].



(4) Click [Next] on the Remote Advanced Copy Configuration wizard screen.



(5) Select the copy target ETERNUS Disk storage system on the [Select Remote Partner] screen and then click [Next].



- (6) On the [Setup Advanced Copy Parameters] screen, set the same copy parameters on both the copy source and copy destination ETERNUS Disk storage systems, then click [Next].

Remote Copy Configuration on ETDX200S3_1

Welcome > Select Remote Partner > **Setup Advanced Copy Parameters** > Specify Connectivity > Select REC Buffer > Change Summary

Information

Advanced Copy table size must not be '0' and resolution must be the same on the local and remote disk array.

Specify Advanced Copy Parameters for both ETERNUS

		ETDX200S3_1	DX90S2_PH
Resolution	Current	x16	x16
	New	x16	x16
Table Size (MB)	Current	256	256
	New	256	256

<< Back **Next >>** Cancel

- (7) On the [Specify Connectivity] screen, select FC ports to form a pair of REC paths and then click [Add].
For the ports to be used as REC paths, refer to "Table 2 Port settings".
For redundancy of REC paths, two REC paths are added.

Remote Copy Configuration on ETDX200S3_1

Welcome > Select Remote Partner > Setup Advanced Copy Parameters > **Specify Connectivity** > Select REC Buffer > Change Summary

Information

Select the port pair for remote copy. RA or CA/RA is selectable from Mode.
Specify the same type for Local Ports and Remote Ports.
If Connectivity is modified, REC Multiplicity and Round Trip Time will be set automatically.
For Line Speed, specify the max speed of the target line, and for Bandwidth Limit, specify the speed considering the load on other paths.

Select the port(s) that will be used for Remote Copy.

Local Ports					Remote Ports				
Name	Type	Mode	LUN Mapping		Name	Type	Mode	LUN Mapping	
<input checked="" type="radio"/> CM0 CA#0 Port#0	FC	CA/RA	No		<input checked="" type="radio"/> CM0 CA#0 Port#0	FC	RA	No	
<input type="radio"/> CM0 CA#0 Port#1	FC	CA/RA	No		<input type="radio"/> CM0 CA#0 Port#1	FC	CA/RA	No	
<input type="radio"/> CM0 CA#1 Port#0	NAS	-	No		<input type="radio"/> CM0 CA#1 Port#0	ISCSI	CA	Yes	
<input type="radio"/> CM0 CA#1 Port#1	NAS	-	No		<input type="radio"/> CM0 CA#1 Port#1	ISCSI	CA	Yes	
<input type="radio"/> CM0 CA#1 Port#2	NAS	-	No		<input type="radio"/> CM#1 CA#0 Port#0	FC	CA/RA	Yes	
<input type="radio"/> CM0 CA#1 Port#3	NAS	-	No		<input type="radio"/> CM#1 CA#0 Port#1	FC	CA	No	

Remove **Add** << Back Next >> Cancel

- (8) The added REC paths are displayed on the [Specify Connectivity] screen. Select [Connection Type between the ETERNUS] and then click [Next].

Remote Copy Configuration on ETDX200S3_1

Local Port	Type	Mode	Remote Port	Type	Mode	Status
CM#0 CA#0 Port#1	FC	CA/RA	CM#0 CA#0 Port#1	FC	CA/RA	No
CM#0 CA#1 Port#0	NAS	-	CM#0 CA#1 Port#0	iSCSI	CA	Yes
CM#0 CA#1 Port#1	NAS	-	CM#0 CA#1 Port#1	iSCSI	CA	Yes
CM#0 CA#1 Port#2	NAS	-	CM#1 CA#0 Port#0	FC	CA/RA	Yes
CM#0 CA#1 Port#3	NAS	-	CM#1 CA#0 Port#1	FC	CA	No
CM#1 CA#0 Port#0	FC	CA/RA				
CM#1 CA#0 Port#1	FC	CA/RA				
CM#1 CA#1 Port#0	iSCSI	CA				

▼ Assigned REC Path

Selections: 0

Local Port	Type	Mode	Remote Port	Type	Mode	Bandwidth Limit	Status	Registered to Both Sides	Repair Illegal Path
CM#0 CA#0 Port#1	FC	CA/RA	CM#0 CA#0 Port#1	FC	CA/RA	Set Limit Value	Mbps	New	

Select the connection type between the ETERNUS.

Connection Type

☒ Direct (The 2 ETERNUS are connected locally without using any extender)

☐ Remote (The 2 ETERNUS are connected remotely via an extender like FC-Line converter or WDM)

Select the IP Address of iSCSI Ports. (Only when new iSCSI ports are added for REC Path)

IP Address Type of iSCSI Ports

☒ IPv4 ☐ IPv6(Link Local) ☐ IPv6(Global)

<< Back Next >> Cancel

- (9) Click [Next] on the [Select REC Buffer] screen.

Remote Copy Configuration on ETDX200S3_1

Welcome Select Remote Partner Setup Advanced Copy Parameters Specify Connectivity Select REC Buffer Change Summary

▼ Information

To execute REC in Asynchronous Consistency Mode, REC Buffer settings are required. Up to two REC Buffers can be set per partnership. It is not necessary to configure the REC buffer in cases when configuration of the REC is being performed for Storage Cluster.

REC Buffer Settings

Group ID	Usage	Remote Device	Size (MB)	Forwarding Interval (sec)	Monitoring Time (min)	HALT Wait Timer (min)	Registered to Both Sides
0	Unused						No
1	Unused						No
2	Unused						No
3	Unused						No

<< Back Next >> Cancel

(10) After confirming the set parameters on the [Change Summary] screen, click [Close].

Remote Copy Configuration on ETDx200S3_1

Welcome | Select Remote Partner | Setup Advanced Copy Parameters | Specify Connectivity | Select REC Buffer | **Change Summary**

▼ Information

Summary of changes that you have made:

Settings

Advanced Copy Parameters	ETDx200S3_1	DX90S2_PH
Resolution	x16	x16
Total Size(MB)	256	256
Connectivity		
Connection Type	Direct	
REC Buffers		
0	Unused	
1	Unused	
2	Unused	
3	Unused	

<< Back | **Close**

(11) After confirming that the target storage system name is displayed on the [REC Path] screen, click [Box ID].

Storage Cluster > ETDx200S3_1 > Storage Cluster

Storage Cluster

- Overview
- REC Path**

REC Path

▼ Information

REC Paths list

▼ Remote Device Information

Filter Setting

Filter | Clear

Selections: 0 | Total 1 records | << < 1/1 pages > >> | 1 page | Go | Display 10 records

Name	IP Address	Box ID	Connection Type	Line Speed (Mbps)	Compression Ratio (%)	Round Trip Time (ms)
dx90s2_pm	193.168.11.112	dx90s2_pm	Direct	-	-	-

Action

- Wizard
- Remote Copy Conf.

(12) Check the REC path status on the [REC Path Details] screen.

Storage Cluster > ETDx200S3_1 > Storage Cluster

Storage Cluster

- Overview
- REC Path**

REC Path Details [00ETERNUSDXLS2ET092SDU###PM4521216580##]

▼ Information

REC Path details

▼ Remote Device Information

Name	dx90s2_pm
IP Address	193.168.11.112
Box ID	dx90s2_pm
Connection Type	Direct

▼ REC Path Status

Filter Setting

Filter | Clear

Total 2 records | << < 1/1 pages > >> | 1 page | Go | Display 10 records

Local Port	Remote Port	Remote Port WWN	Remote Port iSCSI Name	Remote Port IP Address	Bandwidth Limit	Status	Registered to Both Sides
CMR0 CAR0 Port#0	CMR0 CAR0 Port#0	XXXXXXXXXXXX	-	-	Unlimited	Normal	Yes
CMR0 CAR0 Port#0	CMR1 CAR0 Port#0	XXXXXXXXXXXX	-	-	Unlimited	Normal	Yes

Action

- Wizard
- Remote Copy Conf.

Checklist

Check the following items before proceeding to the next step.

- The REC path status is displayed as "Normal".

3.7.5. Setting Up TFOGs

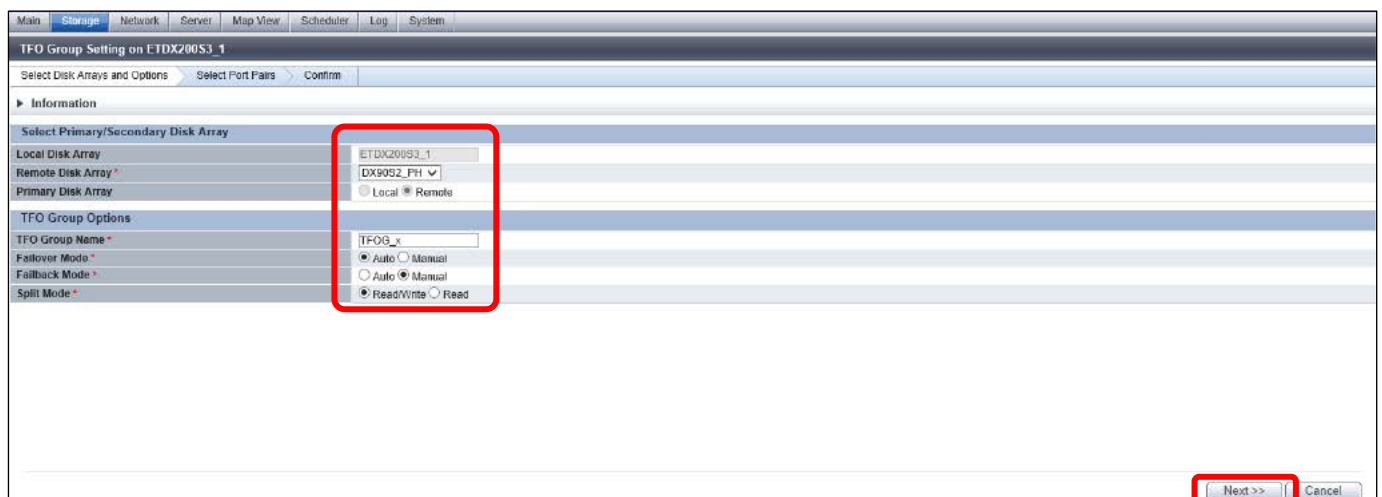
Set up the TFO group between Primary and Secondary ETERNUS Disk storage systems via the ports set for "Ports connected to the business server".

The TFO group is set on both Primary and Secondary ETERNUS Disk storage systems by executing setup once on either one of the storage systems.

- (1) Click [Storage Cluster] on the Category pane of the DX200#1 screen and then click [Set] on the Action pane under [TFO Group].



- (2) The [TFO Group Setting] wizard screen is displayed. The [Select Disk Arrays and Options] screen is displayed. Select the remote ETERNUS Disk storage system and then select the storage system for the Primary storage. After setting the TFO group information, click [Next].
For the TFO group settings, refer to "Table 38 TFO group settings".
In this example, "Manual" is selected as the [Failback Mode] because failback is not automatically executed at storage switching.



- (3) On the [Select Port Pairs] screen, select one CA port to be paired respectively from the Local Port and Remote Port lists, and click [Add]. Two CA port pairs in the TFO group are added.
For the target ports of the CA port pairs, refer to "Table 2 Port settings".

TFO Group Setting on ETDX200S3_1

Select Port

Local Port

Name	Type	Mode	LUN Mapping
CM#0 CA#0 Port#0	FC	CA	No
CM#0 CA#0 Port#1	FC	RA	No
CM#0 CA#1 Port#0	NAS	-	No
CM#0 CA#1 Port#1	NAS	-	No
CM#0 CA#1 Port#2	NAS	-	No
CM#0 CA#1 Port#3	NAS	-	No
CM#1 CA#0 Port#0	FC	RA	No
CM#1 CA#0 Port#1	FC	CA	No
CM#1 CA#1 Port#0	NAS	-	Yes
CM#1 CA#1 Port#1	NAS	-	No

Remote Port

Name	Type	Mode	LUN Mapping
CM#0 CA#0 Port#0	FC	CA	No
CM#0 CA#0 Port#1	FC	CA	No
CM#0 CA#3 Port#0	FC	CA	No
CM#0 CA#3 Port#1	FC	RA	No
CM#1 CA#0 Port#0	FC	CA	No
CM#1 CA#0 Port#1	FC	CA	No
CM#1 CA#3 Port#0	FC	RA	No
CM#1 CA#3 Port#1	FC	CA	No

Port Pairs List

Remove Add

<< Back Next >> Cancel

- (4) After confirming the added port pairs, click [Next].

TFO Group Setting on ETDX200S3_1

Select Port

Local Port

Name	Type	Mode	LUN Mapping
CM#0 CA#0 Port#0	FC	CA	No
CM#0 CA#0 Port#1	FC	RA	No
CM#0 CA#1 Port#0	NAS	-	No
CM#0 CA#1 Port#1	NAS	-	No
CM#0 CA#1 Port#2	NAS	-	No
CM#0 CA#1 Port#3	NAS	-	No
CM#1 CA#0 Port#0	FC	RA	No
CM#1 CA#0 Port#1	FC	CA	No
CM#1 CA#1 Port#0	NAS	-	Yes
CM#1 CA#1 Port#1	NAS	-	No

Remote Port

Name	Type	Mode	LUN Mapping
CM#0 CA#0 Port#0	FC	CA	No
CM#0 CA#0 Port#1	FC	CA	No
CM#0 CA#3 Port#0	FC	CA	No
CM#0 CA#3 Port#1	FC	RA	No
CM#1 CA#0 Port#0	FC	CA	No
CM#1 CA#0 Port#1	FC	CA	No
CM#1 CA#3 Port#0	FC	RA	No
CM#1 CA#3 Port#1	FC	CA	No

Port Pairs List

Local Port	Remote Port
Name	Name
CM#1 CA#0 Port#1	CM#1 CA#3 Port#1

<< Back Next >> Cancel

- (5) After confirming the TFO group settings, click [Set].
- (6) Repeat steps (1) to (5) to set up TFO group #2.
- (7) Confirm the TFO group status on the [Overview] screen.

Checklist

Check the following items before proceeding to the next step.

- [Status] of TFO group displays "Normal".
- When the Storage Cluster state of DX200#1 is displayed, [Local] of TFO group #1 is "Primary" - "Active", and [Remote] is "Secondary" - "Standby".
- When the Storage Cluster state of DX200#1 is displayed, [Local] of TFO group #2 is "Secondary" - "Standby", and [Remote] is "Primary" - "Active".

3.7.6. Preparations for Business Volumes

Allocate the volume used by the business server.

To use the Storage Cluster function, prepare a volume of type "Standard", "WSV", "TPV", or "FTV".

In this example, the volume used by the business server should be under control of Automated Storage Tiering, so "FTV" is used as the volume used by the business server.

FTVs have been allocated in "3.6.4. Creating FTVs", so proceed to "3.7.7. Setting Up Access Path".

3.7.7. Setting Up Access Paths

In setting the access path, the settings required to make the business server access the business volume are made.

The following actions are required to set the access path.

- Creation of Affinity/LUN group
- Host Affinity settings (Server HBA, Disk storage system port, Affinity/LUN group association)
- FC switch zoning setting

This section explains the procedure using the ETERNUS SF volume assignment function for performing the above actions in one go.

In addition, because it is necessary to switch physical servers and access volumes with vSphere HA in this example, access paths are also added to the physical servers to be switched to.

The above action must be performed on both Primary and Secondary ETERNUS Disk storage systems.

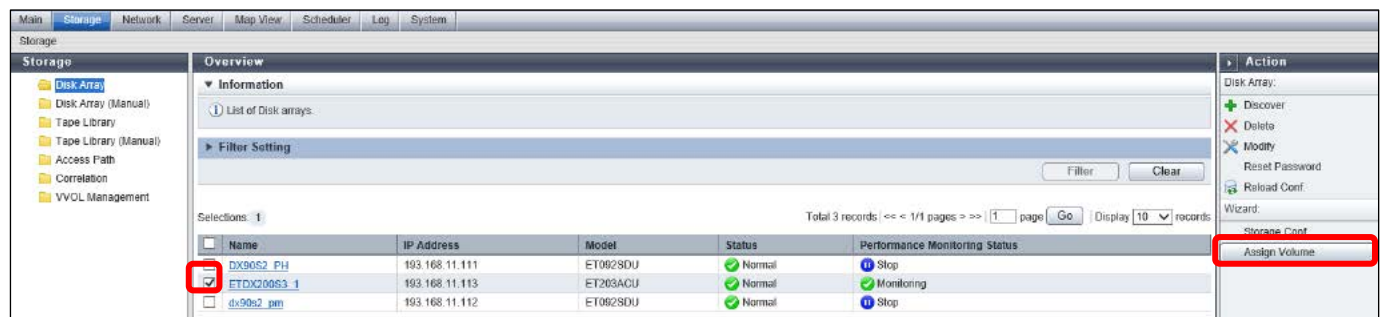
3.7.7.1. Volume Assignment

Using the ETERNUS SF volume assignment function, assign FTV to Affinity/LUN group.

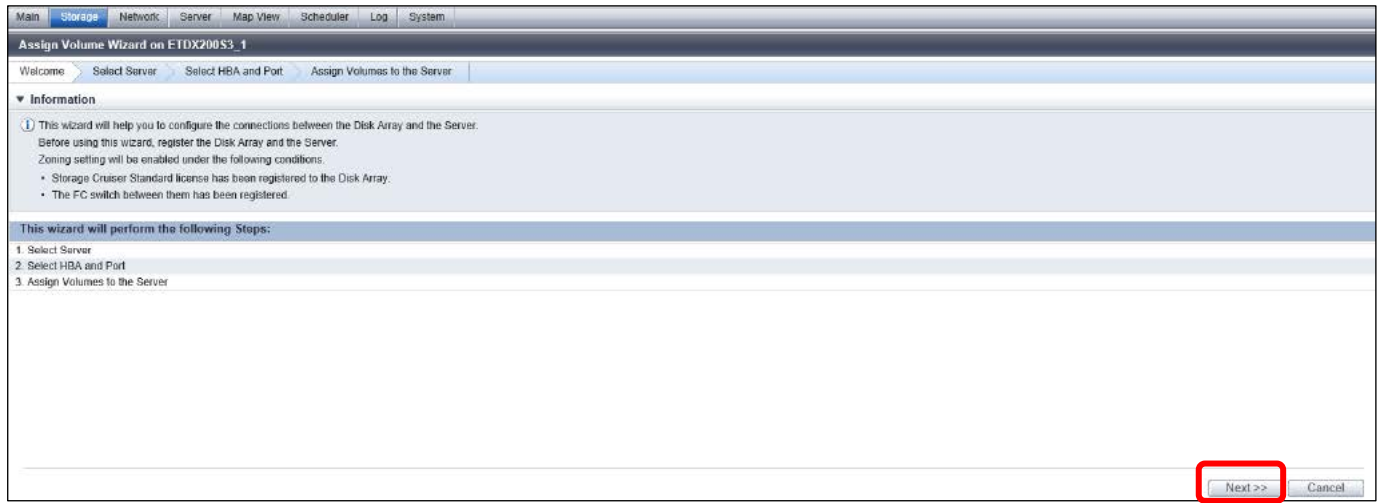
At the same time, set the host affinity and FC switch zoning for business server #1.

(For details on the procedure, refer to "Assign ETERNUS Disk Storage System Volumes to Server" in *ETERNUS SF Web Console Guide*.)

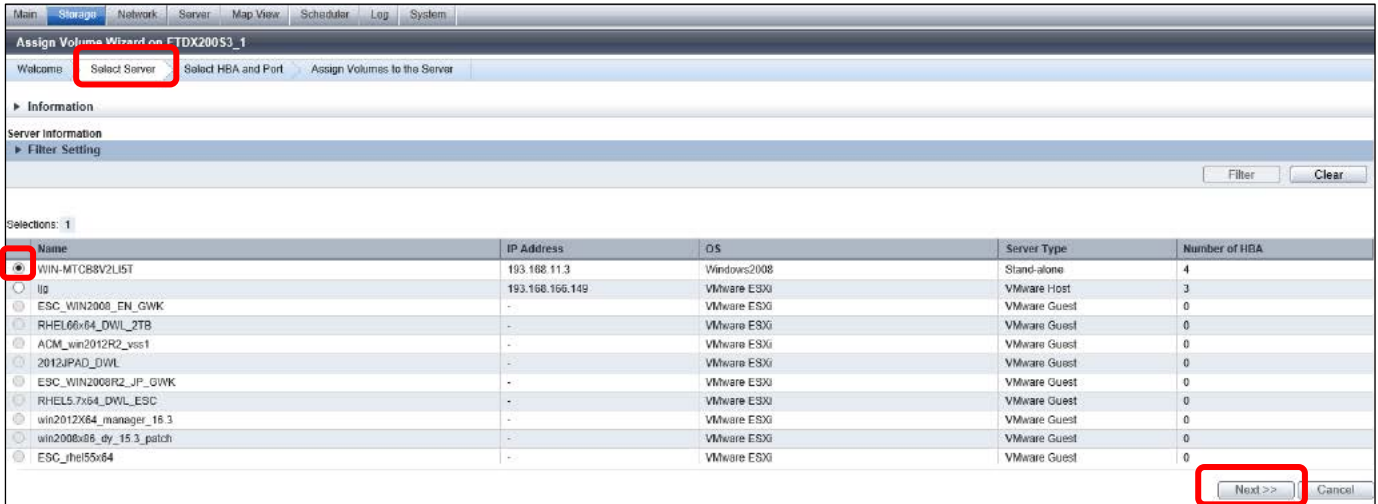
- (1) After logging in to ETERNUS SF Web Console, switch to the detailed view, click [Storage] on the global navigation tab, and then select [Disk Array] on the Category tab.
- (2) Check that DX200#1 displayed in the disk array list and then click the [Assign Volume] button on the Action pane under [Wizard].



(3) The [Assignment Volume Wizard] screen is displayed. Click [Next].



(4) Select the radio button of business server #1 on the [Select Server] screen and then click [Next].



- (5) On the [Select HBA and Port] screen, select [Yes] for [Zoning Setting], select the [Assign Volumes] checkbox in the HBA field and then click the [Connect] in the HBA field.
When manually setting the zoning of the Fibre Channel switch, select [No] for [Zoning Setting].

- (6) The [Select Port] screen is displayed. Select the radio button of the CA port for server connection and then click the [OK] button.
- (7) Since the server and storage system are multipath-connected, select a CA port for the second HBA as well.
After confirming the CA ports displayed in the [Connected Port] field, click the [Next] button.
- (8) On the [Assign Volumes to the Server] screen, enter the [Affinity/LUN Group Name] on the [Select Volume] tab.
Confirm that the "FTV" type volume is displayed in [Volume List], set the LUN number, and then click the [Add] button.
- (9) Confirm that the volume added to [LUN List] is displayed and then click the [Assign] button.
- (10) For the two FTVs created for DX200#1, repeat steps (1) to (9) to perform volume assignment and perform the host affinity/LUN group setting.
Repeat steps (1) to (10) for the two FTVs created for DX200#2.
To assign the volumes for DX200#2, select DX200#2 for the storage system in step (1).

Note 1

For the CA port used for assigning volumes for inter-storage synchronization by Storage Cluster, set the CA port pair set in 3.7.5. Setting Up TFOG.

Note 2

For the volumes for inter-storage synchronization by Storage Cluster, set the same LUN number.
If the LUN No. of the volume is set to "0" for DX200#1, set the LUN No. of the paired volume to "0" for DX200#2.

Storage system	Server information	HBA	Port	LUN No.	Affinity/LUN group name	FTV	Note
DX200#1	esxi01	vmhba3	CM#0 CA#0 port#0	0	AG_1	volume1	Assignment of FTV to TFOG_1, setting of host affinity/LUN group
	esxi01	vmhba4	CM#1 CA#0 port#0				
DX200#2	esxi01	vmhba3	CM#0 CA#0 port#0	0	AG_1	volume1	Assignment of FTV to TFOG_2, setting of host affinity/LUN group
	esxi01	vmhba4	CM#1 CA#0 port#0				
DX200#1	esxi01	vmhba5	CM#0 CA#1 port#0	1	AG_2	volume2	Assignment of FTV to TFOG_2, setting of host affinity/LUN group
	esxi01	vmhba6	CM#1 CA#1 port#0				
DX200#2	esxi01	vmhba5	CM#0 CA#1 port#0	1	AG_2	volume2	Assignment of FTV to TFOG_2, setting of host affinity/LUN group
	esxi01	vmhba6	CM#1 CA#1 port#0				

Table 22 Volume assignment settings

3.7.7.2. Addition of Access Path

Set the host affinity and FC switch zoning for business server #2.

For access path addition, select the affinity/LUN group created in 3.7.7.1. Volume assignment.

(For details on the procedure, refer to "Add Access Path to ETERNUS Disk Storage System" in *ETERNUS SF Web Console Guide*.)

Note

The port, LUN number, and affinity/LUN group name to be set for the access path of business server # 2 are the same as those set for business server #1.

Storage system	Server information	HBA	Port	LUN No.	Affinity/ LUN group name	FTV	Note
DX200#1	esxi02	vmhba3	CM#0 CA#0 port#0	0	AG_1	volume1	Assignment of FTV to TFOG_1, setting of host affinity/LUN group
	esxi02	vmhba4	CM#1 CA#0 port#0				
DX200#2	esxi02	vmhba3	CM#0 CA#0 port#0	0	AG_1	volume1	
	esxi02	vmhba4	CM#1 CA#0 port#0				
DX200#1	esxi02	vmhba5	CM#0 CA#1 port#0	1	AG_2	volume2	Assignment of FTV to TFOG_2, setting of host affinity/LUN group
	esxi02	vmhba6	CM#1 CA#1 port#0				
DX200#2	esxi02	vmhba5	CM#0 CA#1 port#0	1	AG_2	volume2	
	esxi02	vmhba6	CM#1 CA#1 port#0				

Table 23 Access path addition settings

3.7.7.3. Verification of Access Path

Check the status of the access path.

- (1) Click [Server] on the global navigation tab and click [Access Path] on the Category pane.
Check the access path information displayed on the Main pane.

Checklist

Check the following items before proceeding to the next step.

- [Status] of access path is "Normal".
- The server's [Name], [HBA], the storage system's [Port], and the [Affinity] group are as designed.

3.7.8. Confirmation of Synchronization Startup

Confirm the volume synchronization between storage systems starts.

- (1) After clicking [Storage] on the global navigation tab, select DX200#1 and select [Storage Cluster] on the Category pane. Check the status of TFO group displayed on the Main pane.

Name	Phase	Status	Local Primary/Secondary	Active/Standby	Remote Disk Array	Remote Primary/Secondary	Active/Standby
tfo_group1	Normal	Normal	Primary	Active	DX9092_PH	Secondary	Standby
tfo_group2	Normal	Normal	Secondary	Standby	DX9092_PH	Primary	Active

Checklist

Check the following items before proceeding to the next step.

- The [Status] of all the TFO groups is "Normal".
- The [Phase] of the TFO group is either "Copying" or "Normal".

"Copying" displayed in [Phase] means volume synchronization between storage systems is in progress. After completing synchronization, [Phase] displays "Normal".

Note

When the access path setting is not normal, [Status] of TFO group displays other than "Normal".

If [Status] of TFO group is other than "Normal", then check if the following conditions are met.

- The LUN number and size of synchronization target volumes on Primary and Secondary storages are same.
- One server has access paths to both CA ports of the CA port pair belonging to the TFO group.
- An affinity group with the same LUN number is set for the access path set for the CA port pair.

3.8. Creating Business Servers

Create a datastore for business servers #1 and #2, and build a VM environment and HA environment.
For business servers #1 and #2, assign ETERNUS Disk storage system volumes.

To create a business server, use the following procedure.

- Create a datastore
- Create a business server VM environment
- Build VMware vSphere HA

3.8.1. Creating a Datastore

For VMware vSphere business server #1, create a datastore by specifying the volume 1 device.
Use the same procedure to create a datastore by specifying the volume 2 device.

- (1) Log in to vSphere Web Client and select [Host and Cluster] on the home screen.
- (2) Right-click on business server #1 on the navigator pane and select [Storage] - [New Datastore].
- (3) Select [VMFS] in the [Type] phase on the [New Datastore] screen and then click the [Next] button.
- (4) Enter [Datastore Name] in the [Select Name and Device] phase, select the volume 1 device and then click the [Next] button.
- (5) Specify the datastore size in the [Partition Configuration] phase and then click the [Next] button.
- (6) Confirm the settings and then click the [Finish] button.
- (7) Repeat steps (1) to (6) to create a datastore by specifying the volume 2 device.

3.8.2. Creating a Business Server VM Environment

Create a VM on business server #1 and business server #2, and install the OS (Windows Server 2012 R2) on the datastores created in 3.8.1. Creating a Datastore.

For the procedures for VMware vSphere ESXi and vCenter Server, refer to the documentation for VMware vSphere 6.

For the Windows Server 2012 R2 settings, refer to the appropriate documents on the Microsoft website.

3.8.3. Building VMware vSphere HA

Create a cluster and add a host for VMware vSphere and configure HA.

- (1) On the home screen of vSphere Web Client, click [Host and Cluster].
- (2) Select a data center and click [Actions] - [New Cluster].
- (3) On the [New Cluster] screen, select the [Enable] checkbox for [vSphere HA]. The vSphere HA configuration screen is displayed as a result.
Configure vSphere HA and then click the [OK] button.
- (4) On the navigator pane, select the cluster, and then click [Action] - [Move Host to Cluster].
- (5) On the [Move Host to Cluster] screen, select the checkboxes of business servers #1 and #2, and then click the [OK] button.
- (6) Confirm that business server #1, business server #2, and the VMs on the business servers have been moved to the cluster.

3.9. Configuring Auto QoS

Configure the Auto QoS function for FTV.

In this example, of the two FTVs, the configuration will emphasize the I/O performance of Volume 1.

(For details on the settings, refer to "Setup of Automated QoS Function" in *Operation Guide for Optimization Function*.)

To configure the Auto QoS function, use the following procedure.

- Verification of target Volume
- Registration of license
- Enabling of Auto QoS function
- Configuration of parameters related to Auto QoS

Configuration of the Auto QoS function requires license registration, but since license registration is described in 3.4.4. Registering the ETERNUS SF License, this step is not described here.

3.9.1. Confirming Target Volumes

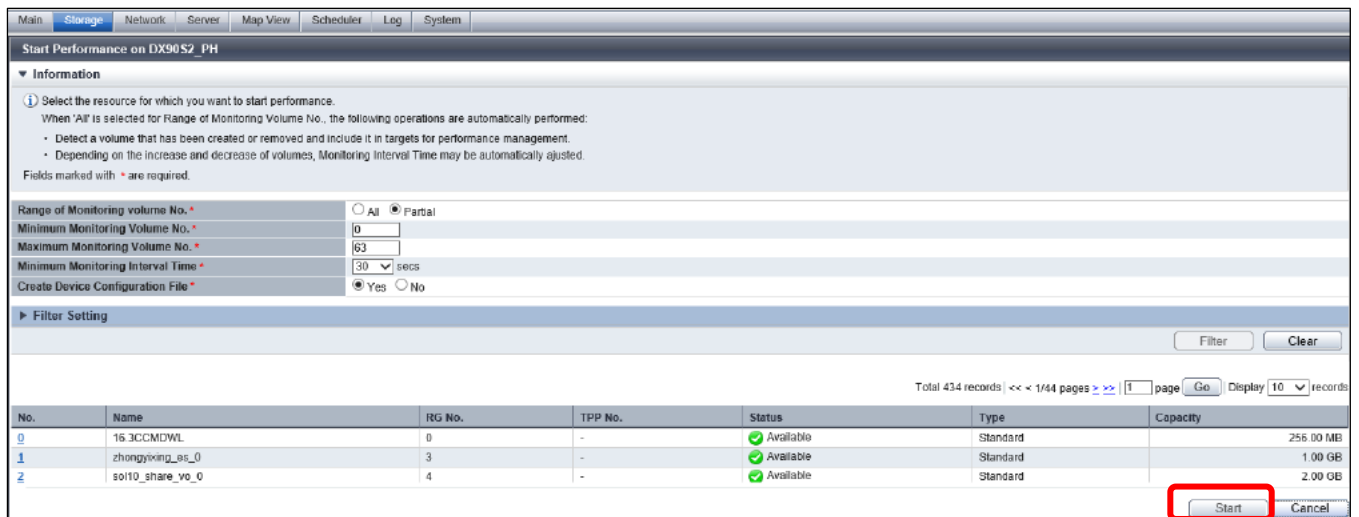
Confirm that the conditions of the Auto QoS target volume are satisfied.

Start volume monitoring of the ETERNUS Disk storage system and threshold monitoring of the Fibre Channel switches.

- (1) On ETERNUS SF Web Console, the [Performance] screen of DX200#1 is displayed. Click the [Start] button on the Action pane under [Performance].



- (2) The [Start Performance] screen is displayed. Check the volumes to be managed and click the [Start] button.



- (3) Click [Correlation] on the Category pane. After the [Correlation] screen is displayed, click [End to End View] on the Category pane and confirm that the volumes are displayed.

Status	Server							Switch (Connected to Server)		Switch (Connected to Storage)	
	Name	Type	Mount Point	Multipath Driver Device	Interface Type	HBA WWPN	HBA iSCSI Name/IP Address	Name	Port	Name	Port
Normal	WIN-HYPERV-HOST-1	Stand-alone	-	-	FC	2000000C9DF37E0	-	BX900S1003224-CB3	16	BX900S1003224-CB3	16
Normal	WIN-HYPERV-HOST-1	Stand-alone	-	-	FC	2000000C9DF37E0	-	BX900S1003224-CB3	16	BX900S1003224-CB3	16
Normal	WIN-HYPERV-HOST-1	Stand-alone	-	-	FC	2000000C9DF37E0	-	BX900S1003224-CB3	16	BX900S1003224-CB3	16
Warning	VMware Host	VMware Host	-	-	FC	1000000C9DF37E4	-	BX900S1003224-CB3	4	BX900S1003224-CB3	19
Warning	VMware Host	VMware Host	-	-	FC	1000000C9DF37E4	-	BX900S1003224-CB3	4	BX900S1003224-CB3	19
Warning	VMware Host	VMware Host	-	-	FC	1000000C9DF37E4	-	BX900S1003224-CB3	4	BX900S1003224-CB3	19
Warning	VMware Host	VMware Host	-	-	FC	1000000C9DF37E4	-	BX900S1003224-CB3	4	BX900S1003224-CB3	19
Warning	VMware Host	VMware Host	-	-	FC	1000000C9DF37E4	-	BX900S1003224-CB3	4	BX900S1003224-CB3	19
Warning	VMware Host	VMware Host	-	-	FC	1000000C9DF37E4	-	BX900S1003224-CB3	4	BX900S1003224-CB3	19

- (4) Click [Network] on the global navigation tab and select the Fibre Channel switch. Click [Performance] on the Category pane. On the [Performance] screen, click [Enable] for threshold monitoring on the Action pane.

Port No.	Transfer Rate	Port Type	Status
0	8Gbit/s	F_Port	Normal
1	8Gbit/s	F_Port	Normal
2	8Gbit/s	F_Port	Normal
3	8Gbit/s	F_Port	Normal
4	8Gbit/s	F_Port	Normal
5	8Gbit/s	F_Port	Normal
6	8Gbit/s	F_Port	Normal
7	8Gbit/s	F_Port	Normal
8	8Gbit/s	F_Port	Normal
9	8Gbit/s	F_Port	Normal

- (5) Confirm the threshold information and then click the [Start] button.

3.9.2. Enabling the Auto QoS Function

Enable the Auto QoS function. If the Auto QoS function is not started, click the [Start] button.

- (1) Click [Storage] on the global navigation tab and select the storage system. On the Action pane, click the [Start] button under [Auto QoS].

3.9.3. Configuring the Parameters Related to Auto QoS

Configure the Auto QoS related parameters for the volume.
Set priority and non-priority for bandwidth allocation for FTV.

- (1) Display the [Automated Storage Tiering] screen. Click [FTV] on the Category pane to display the list of FTVs. Select the checkbox for Volume 1 and then click the [Modify] button on the Action pane.

The screenshot shows the 'Automated Storage Tiering' screen. On the left, the 'FTV' category is selected. The main area displays a table of FTVs. The first row, FTV Number 3, is selected with a checkbox. In the 'Action' pane on the right, the 'Modify' button is highlighted with a red box.

FTV Number	FTV Name	Status	Usage	VVOL Type	Total Capacity	Used Capacity	Tier Pool Name	Low Usage Share (Capacity)	Middle Usage Share (Capacity)	High Usage Share (Capacity)	Quota Share	Automated Storage Tiering
<input checked="" type="checkbox"/>	FTV_VOL01	Available	Block	-	1.00 GB	0.00 MB	3JB2K4B_FTRP	-	-	-	No Set	Disable
<input type="checkbox"/>	FTV_VOL02	Available	Block	-	1.00 GB	0.00 MB	3JB2K4B_FTRP	-	-	-	No Set	Disable
<input type="checkbox"/>	lyqtestFTRP	Available	Block	-	20.00 GB	19.15 GB	3JB2K4B_FTRP	-	-	-	No Set	Disable
<input type="checkbox"/>	VOL_NAME_#2	Available	Block	-	10.00 GB	0.00 MB	1-4pool	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable
<input type="checkbox"/>	fltpst	Available	Block	-	20.00 GB	0.00 MB	3JB2K4B_FTRP	-	-	-	No Set	Disable
<input type="checkbox"/>	VVOL#0	Available	Block/VVOL	Unknown	4.00 GB	462.00 MB	TP_1	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable
<input type="checkbox"/>	VVOL#1	Available	Block/VVOL	Unknown	30.00 GB	0.00 MB	TP_1	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable
<input type="checkbox"/>	VOL_NAME_#0	Available	Block	-	30.00 GB	0.00 MB	TPP_2	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable
<input type="checkbox"/>	VVOL#2	Available	Block/VVOL	Unknown	30.00 GB	0.00 MB	TP_1	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable
<input type="checkbox"/>	VVOL#3	Available	Block/VVOL	Unknown	4.00 GB	441.00 MB	TP_1	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable

- (2) Select [Enable] in [Automated QoS Enable/Disable], select [High] in [Automated QoS:Priority] and then click the [Modify] button.

The screenshot shows the 'Modify FTV ETDK200S3_1' screen. Under 'Configuration of FTV Information', the 'FTV Number' is 3 and 'FTV Name' is FTRP_VOL01. Under 'Configuration of Automated QoS', the 'Automated QoS Enable/Disable' radio button is set to 'Enable' and the 'Automated QoS:Priority' radio button is set to 'High'. The 'Modify' button is highlighted with a red box.

- (3) Configure Auto QoS for FTV volume 2. Repeat steps (1) and (2), selecting [Low] in [Automated QoS:Priority].
- (4) Check the information on [Automated QoS] in the FTV list.

city	Tier Pool Name	Low Usage Share (Capacity)	Middle Usage Share (Capacity)	High Usage Share (Capacity)	Quota Share	Automated QoS									
						Enable/Disable	Priority	Target Response Time	Available	Tuning Status	Bandwidth Limit	Set Time	Tune by Quota Share	Extreme Cache (Road)	Allocation
JB	3JB2K4B_FTRP	-	-	-	No Set	Enable	-	-	Yes	-	0 : Unlimited	-	Off	Enable	Thin
JB	3JB2K4B_FTRP	-	-	-	No Set	Enable	-	-	Yes	-	0 : Unlimited	-	Off	Enable	Thin

Checklist

- Check the following items before proceeding to the next step.
- The [Enable/Disable] setting in [Automated QoS] is set to "Enable".
 - The [Available] setting in [Automated QoS] is set to "Yes".

3.10. Installing MA

Install the MA Server appliance and the MA Probe appliance to the management server.
(For details on the procedure, refer to *ETERNUS SF MA Deployment Guide*.)

3.10.1. Installing MA Server Appliance

Install MA Server on the management server.

- (1) Mount the MA installer in the CD/DVD drive or place the ISO image of the installer in the ESXi datastore.
- (2) On the vSphere client, log in to the monitoring server.
- (3) From the [File] menu, select [Deploy OVF Template].
- (4) Click the [Browse] button.
- (5) Select the MA Server OVA file from the MA installation DVD or the ISO image and click [Open].
For the location of the OVF file on the DVD or in the ISO image, refer to the ETERNUS SF MA Software manual.
- (6) Click [Next].
- (7) Confirm the OVA file details in the OVF Template Details section and then click [Next].
- (8) Enter the [Name] and then click [Next].
- (9) Select the disk format to be applied and click [Next].
- (10) Select the [Power on after deployment] checkbox and then click [Finish].
- (11) The Deploying dialog box is displayed.
- (12) Check that the MA Server appliance has been added under the management server on the vSphere client screen.

3.10.2. Setting Up MA Server

Perform settings to use MA Server.

3.10.2.1. Setting of the IP Address of MA Server Appliance

(1) Open the [ma-sv] console on the vSphere client or Web Console.

(2) From command prompt, enter the following login authentication information.

At login authentication, enter the following information.

Item	Setting content	Setting value
Localhostlogin	Local host login user name	config (fixed)
Default password	Default password For the default password, refer to <i>ETERNUS SF MA Deployment Guide</i> .	(Password)

Table 24 MA Server login verification settings

```
CentOS release 6.6 (Final)
Kernel 2.6.32-573.7.1.el6.x86_64 on an x86_64

centos6-6-server login: config
Password: _
```

(3) The IP address automatically assigned at deployment is displayed next to the 'inet addr' field.

```
CentOS release 6.6 (Final)
Kernel 2.6.32-573.7.1.el6.x86_64 on an x86_64

centos6-6-server login: config
Password:
search=i14y.com
nameserver=127.0.0.1
nameserver=10.23.4.3
***** CURRENT NETWORK CONFIGURATION *****
DHCP IP Address:          inet addr:192.168.20.120 Bcast:192.168.255.255 Mask:
:255.255.0.0

***** ASSIGN STATIC IP ADDRESS TO THE APPLIANCE *****
Continue ? [yes/no] : _
```

(4) When "Continue? [yes / no]" is displayed, enter "yes".

```
*****
**** ASSIGN STATIC IP ADDRESS TO THE APPLIANCE ****
*****
Continue ? [yes/no] : yes_
```

(5) Enter the network information of [ma-sv].

```
*****
**** ASSIGN STATIC IP ADDRESS TO THE APPLIANCE ****
*****
Continue ? [yes/no] : yes
Enter IP Address: 192.168.30.22
Enter Netmask: 255.255.0.0
Enter Gateway: 192.168.0.1
Enter Domain Name (Optional):
Enter Name Server(Optional): _
```

Enter the following items.

Item	Setting content	Setting value
IP Address	IP address of the MA Server	192.168.30.22
Netmask	Subnet mask of the MA Server	255.255.0.0
Gateway	Gateway IP address	(Gateway IP address)
Domain Name	Domain name	(Domain name)
Name Server	IP address of the DNS server	(IP address of the DNS server)

Table 25 MA Server network settings

(6) When "Apply changes?" is displayed, enter "yes".

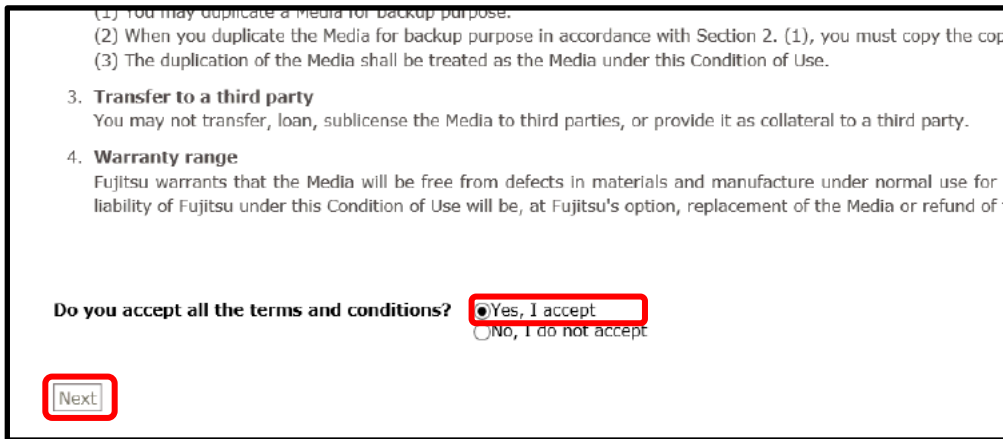
```
*****
**** ASSIGN STATIC IP ADDRESS TO THE APPLIANCE ****
*****
Continue ? [yes/no] : yes
Enter IP Address: 192.168.30.22
Enter Netmask: 255.255.0.0
Enter Gateway: 192.168.0.1
Enter Domain Name (Optional):
Enter Name Server(Optional):
Apply changes? [yes/no]: yes_
```

(7) When "Press Enter..." is displayed, press the [Enter] key.

```
WARNING: Deprecated config file /etc/modprobe.conf, all config files belong into
/etc/modprobe.d/.
Reverted back!
Press Enter to quit this session_
```

3.10.2.2. Connection to MA Server Appliance

- (1) Open the browser and access the following URL.
https://(MA server's IP address):8443
- (2) Read the displayed terms and conditions of the license agreement and if they are agreeable, select [Yes, I accept].
Then click [Next].



(1) You may duplicate a Media for backup purpose.
(2) When you duplicate the Media for backup purpose in accordance with Section 2. (1), you must copy the copy.
(3) The duplication of the Media shall be treated as the Media under this Condition of Use.

3. **Transfer to a third party**
You may not transfer, loan, sublicense the Media to third parties, or provide it as collateral to a third party.

4. **Warranty range**
Fujitsu warrants that the Media will be free from defects in materials and manufacture under normal use for a period of 5 years from the date of shipment. The extent of liability of Fujitsu under this Condition of Use will be, at Fujitsu's option, replacement of the Media or refund of the purchase price of the Media.

Do you accept all the terms and conditions? ☒ Yes, I accept ☐ No, I do not accept

Next

- (3) The [Add License Key] screen is displayed.



Add License Key

License Key*

Submit Next

No license key added

3.10.2.3. Registration of License to MA Server

Register two types of licenses, VMware and ETERNUS SF, to MA Server.
Once these licenses are registered, VMware and storage system reports can be acquired.

- (1) Enter the [License Key] and then click [Submit].

Add License Key

License Key*

Submit

Next

No license key added

- (2) The registered licenses are displayed in list form.

Add License Key

License Type	License Key	Category	Start Date	Expiry Date	Status
ETERNUS SF			03-Mar-2016	20-Apr-2016	Active

[First/Prev] 1 [Next/Last]

License Key*

Submit

Next

Successfully added license key

3.10.2.5. Login to MA Server

- (1) On the [Login] screen, enter the [Username] and [Password] and then click the [Login] button.
- (2) For [Username], set "admin", and for [Password], set the password set in step (1).



Login

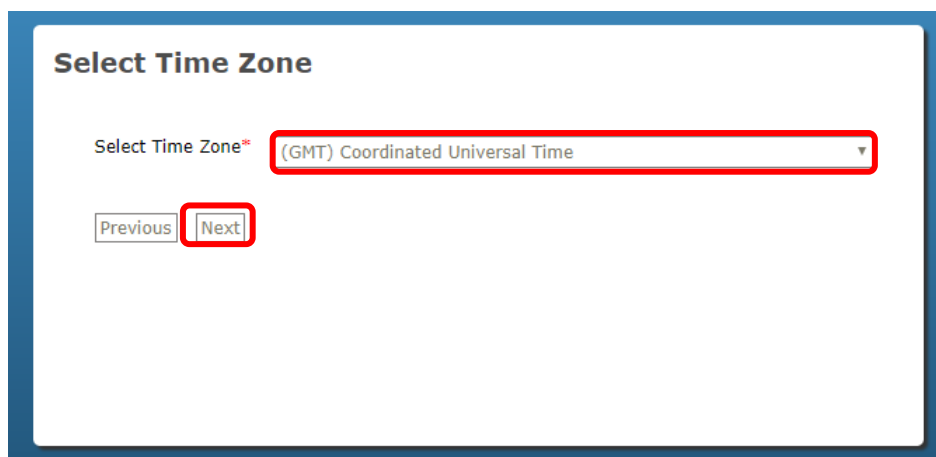
Username: admin

Password:

Login Reset Password

3.10.2.6. Setting of Time Zone to MA Server

- (1) Set the Coordinated Universal Time (GMT) as the MA Server's time zone and then click [Next].



Select Time Zone

Select Time Zone* (GMT) Coordinated Universal Time

Previous Next

3.10.3. Installing MA Probe Appliance

Install MA Probe in the management server.

- (1) Mount the MA installer in the CD/DVD drive or place the ISO image of the installer in the ESXi datastore.
- (2) On the vSphere client, log in to the monitoring server.
- (3) From the [File] menu, select [Deploy OVF Template].
Click [Browse].
- (4) Select the MA Probe OVA file and click [Open].
For the location of the OVF file on the DVD or in the ISO image, refer to the ETERNUS SF MA Software manual.
- (5) Click [Next].
- (6) Confirm the OVA file details in the OVF Template Details section, and then click [Next].
- (7) Enter the [Name] and then click [Next].
- (8) Select the disk format to be applied and click [Next].
- (9) Select the [Power on after deployment] checkbox and then click [Finish].
- (10) Confirm the successful deployment message and then click [Close].

3.10.4. Setting Up the MA Probe Appliance

Perform settings to use MA Probe.

3.10.4.1. Determination of the IP address of MA Probe Appliance

- (1) On the vSphere Client or Web Console, open the [ma-pr] console.
- (2) From command prompt, enter the following login authentication information.

At login authentication, enter the following information.

Item	Description	Setting content
Localhostlogin	Local host login user name	config (fixed)
Default password	Default password For the default password, refer to <i>ETERNUS SF MA Deployment Guide</i> .	(Password)

Table 27 MA Probe login verification settings

- (3) The IP address assigned to MA Probe is displayed next to the 'inet addr' field.

```
***** CURRENT NETWORK CONFIGURATION *****
*****
DHCP IP Address:      inet addr 192.168.20.34 Bcast:192.168.255.255 Mask:
255.255.0.0
```

By modifying the displayed IP address, the IP address of [ma-sv] can be assigned.

- (4) When "Continue? [yes / no]" is displayed, enter "yes".

```
***** ASSIGN STATIC IP ADDRESS TO THE APPLIANCE *****
*****
Continue ? [yes/no] : yes_
```

(5) Enter the network information of [ma-pr].

```
*****
**** ASSIGN STATIC IP ADDRESS TO THE APPLIANCE ****
*****

Continue ? [yes/no] : yes
Enter IP Address: 192.168.30.23
Enter Netmask: 255.255.0.0
Enter Gateway: 192.168.100.91
Enter Domain Name (Optional):
Enter Name Server(Optional):
```

Enter the following items.

Item	Setting content	Setting value
IP Address	IP address of the MA Probe	192.168.30.23
Netmask	Subnet mask of the MA Probe	255.255.0.0
Gateway	Gateway IP address	(Gateway IP address)
Domain Name	Domain name	(Domain name)
Name Server	IP address of the DNS server	(IP address of the DNS server)

Table 28 MA Probe network settings

(6) When "Apply changes?" is displayed, enter "yes".

```
*****
**** ASSIGN STATIC IP ADDRESS TO THE APPLIANCE ****
*****

Continue ? [yes/no] : yes
Enter IP Address: 192.168.30.23
Enter Netmask: 255.255.0.0
Enter Gateway: 192.168.100.91
Enter Domain Name (Optional):
Enter Name Server(Optional):
Apply changes? [yes/no]: yes_
```

(7) When "Press Enter..." is displayed, press the [Enter] key.

```
WARNING: Deprecated config file /etc/modprobe.conf, all config files belong into
/etc/modprobe.d/.
Testing if the gateway can be reached ...
192.168.100.91 answered
Done!
Press Enter to quit this session_
```

3.10.4.2. Connection to MA Probe Appliance

- (1) Access the following URL from the browser.

https://(MA Probe's IP address):8443
- (2) Read the displayed terms and conditions of the license agreement and if they are agreeable, select [Yes, I accept]. Then click [Next].

In order to use the software program contained in the Media (hereafter referred to as "Software"), in addition to the

- 2. Backup**
 - (1) You may duplicate a Media for backup purpose.
 - (2) When you duplicate the Media for backup purpose in accordance with Section 2. (1), you must copy the copyright notice of the Software.
 - (3) The duplication of the Media shall be treated as the Media under this Condition of Use.
- 3. Transfer to a third party**

You may not transfer, loan, sublicense the Media to third parties, or provide it as collateral to a third party.
- 4. Warranty range**

Fujitsu warrants that the Media will be free from defects in materials and manufacture under normal use for a period of one (1) year from the date of purchase. The extent of the liability of Fujitsu under this Condition of Use will be, at Fujitsu's option, replacement of the Media or refund of the purchase price.

Do you accept all the terms and conditions?

☒ Yes, I accept


☐ No, I do not accept

Next

3.10.4.3. Registration of License to MA Probe

Register two types of licenses, VMware and ETERNUS SF, to MA Probe.
Once these licenses are registered, VMware and storage probes can be added.

- (1) Enter the [License Key] and then click [Submit].



Add License Key

License Key*

No license key added

(2) The registered licenses are displayed in list form.

Add License Key

License Type	License Criteria	Total Licensed Limit	License Usage	License Key	Licensed Limit	Category	Start Date	Expiry Date	Status
ETERNUS SF	Tier 1	999	0		999	Trial	03-Mar-2016	20-Apr-2016	Active

[First/Prev] 1 [Next/Last]

License Key*

Submit

Next

Successfully added license key

(3) In the same way, add the [License Key] and then click [Submit]. (Repeat this procedure for the number of licenses.)

Add License Key

License Type	License Criteria	Total Licensed Limit	License Usage	License Key	Licensed Limit	Category	Start Date	Expiry Date	Status
ETERNUS SF	Tier 1	999	0		999	Trial	03-Mar-2016	20-Apr-2016	Active

[First/Prev] 1 [Next/Last]

License Key*

Submit

Next

Successfully added license key

(4) Confirm that one VMware license and two ETERNUS SF licenses are registered.

3.10.4.4. Creation of Administrator Account

To manage MA Probe, a user account with administrator privileges must be created.

- (1) On the [Create Administrator account] page, set the following items.

Create Administrator account

User Name*

admin

Password*

Re-enter Password*

First Name*

Probe

Last Name*

Ma

Email Address*

Probe_Ma@esf.example.com

Locale*

Japanese/Japan

Group*

Admin

Submit

In [Create Administrator account], enter the following items.

Item	Setting content	Setting value
User Name	User ID	admin (fixed)
Password	Password	(Any password)
First Name	-	Probe
Last Name	-	Ma
Email Address	-	Probe_Ma@esf.example.com
Locale	Language specification	English/United States
Group	To create an administrator account, select Admin	admin (fixed)

Table 29 MA Probe administrator account

- (2) Click [submit] to create the login account.

Create Administrator account

User Name*

admin

Password*

Re-enter Password*

First Name*

Probe

Last Name*

Ma

Email Address*

Probe_Ma@esf.example.com

Locale*

Japanese/Japan

Group*

Admin

Submit

3.10.4.5. Setting of Time Zone to MA Probe

- (1) Select the MA Probe's time zone and then click [Next].

3.10.4.6. Setting of FTP to MA Server

To periodically transfer the data collected by the MA Probe to the MA Server, enter the MA Server's information to the MA Probe.

- (1) On the FTP information page, specify the values for the target server and then click [Next].

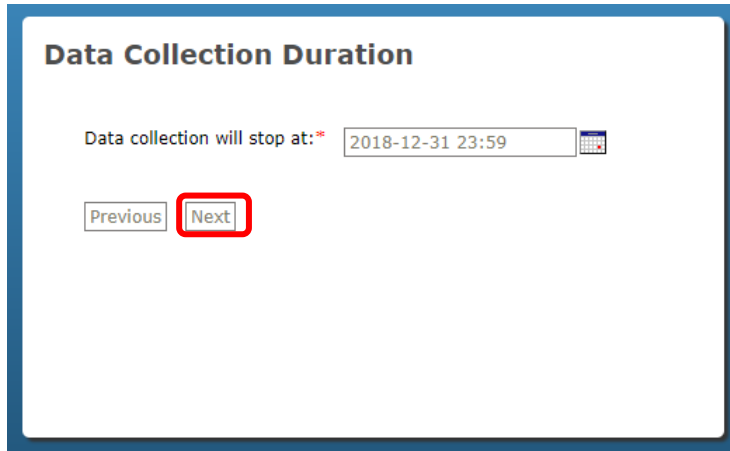
- (2) In [Setting of FTP of MA Probe], set the following items.

Item	Setting content	Setting value
Upload Method	Upload method: SFTP/FTPS/HTTP	SFTP
Server	FTP server (IP address of MA Server)	192.168.30.22
Port	Port: 22	22
User	Login: meghadata	Meghadata (fixed)
Password	For the content, refer to <i>ETERNUS SF MA Deployment Guide</i> .	(Password)
Passive	Use the passive transfer mode	Checkbox selected
Proxy	Select this checkbox to transmit the collected data from the proxy server	Checkbox not selected

Table 30 Setting of MA Probe FTP

3.10.4.7. Setting of Data Collection Period of MA Probe

- (1) Set Coordinated Universal Time (GMT) as the MA Probe's time zone and then click [Next].



Data Collection Duration

Data collection will stop at: * 2018-12-31 23:59

Previous Next

3.11. Setting Up MA

Add ETERNUS SF Probe and VMware Probe for monitoring to MA.

3.11.1. Sharing SF Manager Folders

Create shared folders to share configuration data and performance data dumped by SF Manager between SF Manager and MA Probe appliance.

3.11.1.1. Sharing of "current" Folder

- (1) Open \$ENV_DIR\ESC\Manager\etc\opt\FJSVssmgr.
\$ENV_DIR is the "Environment Directory" specified when installing SF Manager.
- (2) Right-click the "current" folder and then click [Properties].
- (3) Select the [Share] tab and click [Advanced Sharing].
- (4) Select the [Share this Folder] checkbox and then click [Access Permission].
- (5) In [Group Name or User Name], click Add and add the user you created for this sharing.
- (6) Grant read/write permission to the added user.
- (7) Click [Apply], and then click [OK].
- (8) Click the [Security] tab and confirm that the user added in step (5) exists.

3.11.1.2. Sharing of "linkage" Folder

- (1) Open \$ ENV_DIR \ESC\Manager\var\opt\FJSVssmgr\current\perf.
\$ENV_DIR is the install directory of SF Manager.
- (2) Right-click the "linkage" folder and then click [Properties].
- (3) Select the [Share] tab and click [Advanced Sharing].
- (4) Select the [Share this Folder] checkbox and then click [Access Permission].
- (5) In [Group Name or User Name], click [Add] to add the user created for this sharing.
- (6) Grant read/write permission to the added user.
- (7) Click [Apply] and then click [OK].
- (8) Click the [Security] tab and confirm that the user added in step (5) exists.

3.11.2. Adding ETERNUS SF Probe

When adding ETERNUS SF Probe, first add the storage system managed by ETERNUS SF Manager to Probe.

- (1) When ETERNUS SF is selected from the Probe list after logging in to MA Probe, the [Add ETERNUS SF Probe Wizard] screen is displayed. Click [Add SF Manager].

Add ETERNUS SF Probe Wizard

ETERNUS SF Manager Details

SF Manager	OS Type	Probe Added	Action
No records found.			
Page << 1 >>			

Previous

Add SF Manager

Cancel

- (2) After setting each item in [Add ETERNUS SF Manager], click [Next].

Add ETERNUS SF Probe Wizard

Add ETERNUS SF Manager

IP Address/Host Name*

192.168.30.21

OS Type*

Windows

Username*

esfruit

Password*

Previous

Next

Cancel

Set the following items in the [Add ETERNUS SF Manager] screen.

Item	Setting content	Setting value
IP Address/Host Name	IP address or hostname of the machine on which ETERNUS SF Manager is installed	192.168.30.21
OS Type	Type of operating system in which ETERNUS SF Manager is installed	Windows
Username	Enter user authentication information for the "current" and "linkage" shared folders. Both domain user names and non-domain user names are supported.	esfruit
Password	Password of the above user	(Password)

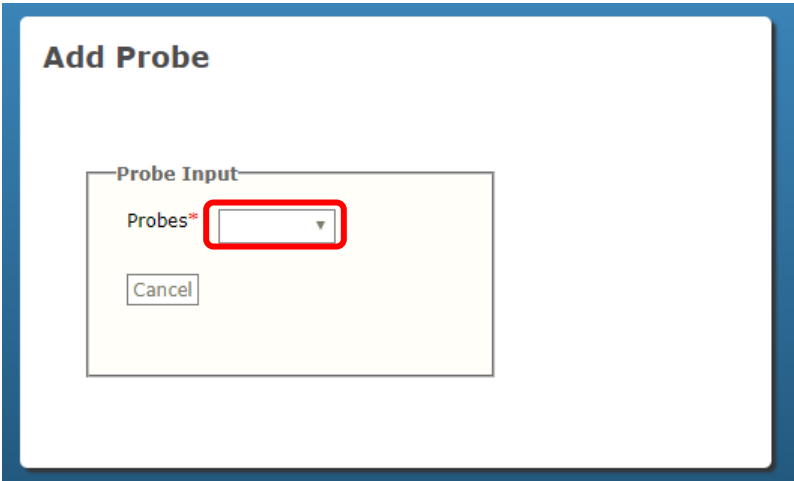
Table 31 Additional settings of ETERNUS SF Manager

- (3) Confirm that the IP addresses of DX200#1 and DX200#2 are displayed, select the [Select All] checkbox and then click [OK].
- (4) Confirm the "Successfully added probe" message and click [OK].
- (5) Confirm that DX200#1 and DX200#2 have been added.

3.11.3. Adding VMware Probe

VMware Probe collects data of virtual machines and hypervisors from VMware vCenter Server and standalone ESXi Servers.

- (1) Click [Home] on the MA Probe screen and then click [Add Probe].
Select VMware from the list of Probes.

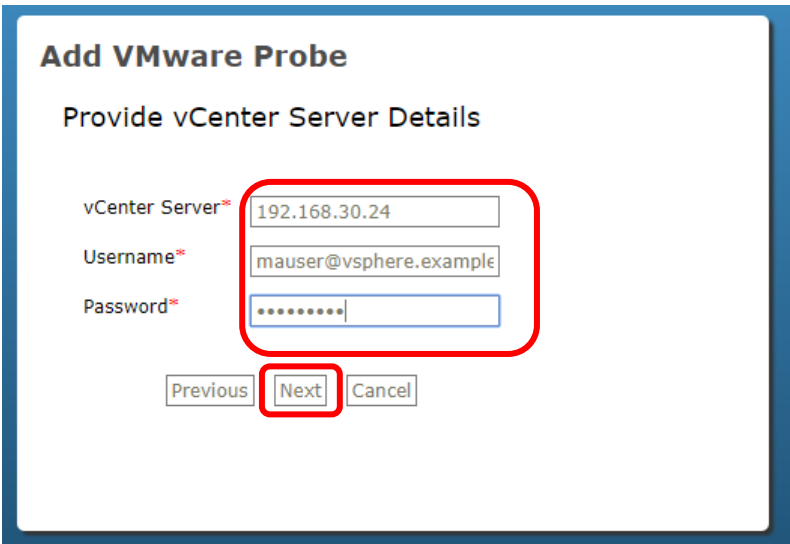


- (2) Enter the following values and then click [Next].

Enter the following values in the [Add VMware Probe] screen.

Item	Setting content	Setting value
vCenter Server	Hostname or IP address of vCenter server	192.168.30.24
Username	The user with read permission to vCenter	mauser@vsphere.example.com
Password	Password of the above vCenter user	(Password)

Table 32 Additional settings of VMware Probe



- (3) Confirm that the message "Verification completed successfully" is displayed then click [Next].
- (4) Click [OK].
- (5) Confirm that VMware Probe has been added.
- (6) Click [Start] of VMware Probe.
- (7) Confirm with the Probe status that the Probe has started.

3.12. Verification

This section described the operation verification and the verification results of the configured environment. Operation verifications are performed from the following viewpoints.

- Confirmation of a successful cluster switching operation using Storage Cluster
- Confirmation of a normal Automated Storage Tiering operation, Auto QoS operation, and a performance information collection by MA before and after cluster switching

3.12.1. Verification Item

The verification items are as follows.

Verification viewpoint	Confirmation item	Confirmation content
Operating each function before cluster switching	Automated Storage Tiering operation	Confirm that Automated Storage Tiering is in progress.
		Confirm that the data is relocated between the Online disks and the Nearline disks by Automated Storage Tiering.
	MA performance information collection operation	Confirm that the performance information of the ETERNUS and VMware is collected in the MA Server.
	Auto QoS operation	Confirm that the Auto QoS function is operating.
Successful cluster switching operation	Cluster switching operation	Confirm that the operation state of the Primary storage and Standby storage is switched normally by a manual cluster switching.
	File access	Confirm that a file access can be performed normally from the business VM's OS before and after a cluster switching operation.
Each function after a cluster switching operation	Automated Storage Tiering operation	Confirm that Automated Storage Tiering is in progress.
		Confirm that the data is relocated between the Online disks and the Nearline disks by Automated Storage Tiering.
	MA performance information collection operation	Confirm that the storage system and VMware performance information is collected in the MA Server.
	Auto QoS operation	Confirm that the Auto QoS function is operating.

Table 33 Verification items

3.12.2. Verification Procedure

The following procedures are used to perform verification operations.

1. Confirmation procedure for the Automated Storage Tiering operation
2. Confirmation procedure for the MA performance information collection operation
3. Confirmation procedure for the Auto QoS operation
4. Confirmation procedure for the cluster switching operation

3.12.2.1. Confirmation Procedure for the Automated Storage Tiering Operation

Use ETERNUS SF Web Console to check the following.

- Automated Storage Tiering is in progress
- Data is relocated between Online disks and Nearline disks by Automated Storage Tiering

- (1) After logging in to ETERNUS SF Web Console, switch to the detailed view, select [Storage] - [(Storage Name: DX200#1)] - [Automated Storage Tiering], and then click [Tier Pool] on the Category pane.

Checklist

Confirm the following item.

- [Automated Storage Tiering Status] on the Main pane is "Start".

- (2) On the [Automated Storage Tiering] screen, click [FTV] on the Category pane. Check the values of [Low Usage Share (Capacity)] and [High Usage Share (Capacity)] on the Main pane and make sure that the data is relocated to Nearline disks for "Low" and Online disks for "High" by using Automated Storage Tiering.

Checklist

Confirm that the data is relocated with Automated Storage Tiering as follows.

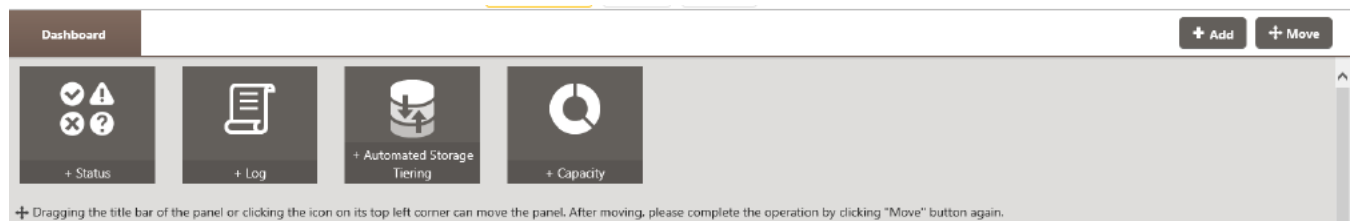
- On the Main pane, both [Low Usage Share (Capacity)] and [High Usage Share (Capacity)] are not 0.0%.

- (3) Also perform steps 1 and 2 for DX200#2 to confirm that Automated Storage Tiering is in operation and that the data is relocated by Automated Storage Tiering.

Tip

By adding a panel to the [Dashboard] screen on ETERNUS SF Web Console, tier pools (Flexible Tier Pool (FTRP)) and the access status of FTVs can be checked.

To add a panel to the [Dashboard] screen, click the [Add] button and then click [+ Automated Storage Tiering].



By clicking [+ Automated Storage Tiering] and selecting the content to display on the panel, the [Access Status Chart] panel is added to the [Dashboard] screen.

(For the panel operation of the [Dashboard] screen and the displayed content, refer to "Dashboard" in *ETERNUS SF Web Console Guide*.)

3.12.2.2. Confirmation Procedure for the MA Performance Information Collection Operation

By displaying the performance information of ETERNUS and VMware on the MA Server, confirm the normal operation of the performance information collection.

(For details on the report display method by MA Server, refer to *ETERNUS SF MA User Guide*.)

- (1) Start the browser and specify the following URL to access the MA Server.

[https://\(MA Server's IP address or hostname\):8443/](https://(MA Server's IP address or hostname):8443/)

- (2) On the [Login] screen, enter the username and password set in "Installing MA Server Appliance".
- (3) The performance information of ETERNUS is displayed.
On the Navigation pane, click [Storage Systems] - [ETERNUS SF] - (Storage Name: DX200#1).

Checklist

Check the following items.

- The report for DX200#1 is displayed on the Main pane.

- (4) Using the same procedure as (3), confirm that the report for DX200#2 is displayed.
- (5) The performance information of VMware is displayed.
On the [Navigation] pane, click [Hypervisors] - [VMware] - [Data Centers] - [(Data Center Name)] - [Cluster Compute Resources] - [(HA Cluster Name)] - [VMs].

Checklist

Check the following items.

- VM reports are displayed on the Main pane.

3.12.2.3. Confirmation Procedure for the Auto QoS Operation

Use ETERNUS SF Web Console to confirm that Auto QoS is working effectively for FTVs.

- (1) After logging in to ETERNUS SF Web Console, on the [Detail View] screen, select [Storage] - [(Storage Name: DX200#1)] - [Automated Storage Tying], then click [FTV] on the Category pane.

city	Tier Pool Name	Low Usage Share (Capacity)	Middle Usage Share (Capacity)	High Usage Share (Capacity)	Quota Share	Automated QoS									
						Enable/Disable	Priority	Target Respons Time	Available	Tuning Status	Bandwidth Limit	Set Time	Turn by Quota Share	Extreme Cache (Read)	Allocation
VIB	3JB2K4B_FTRP	-	-	-	No Set	Disable	-	-	-	-	0: Unlimited	-	Off	Enable	Thin
VIB	3JB2K4B_FTRP	-	-	-	No Set	Disable	-	-	-	-	0: Unlimited	-	Off	Enable	Thin
GB	3JB2K4B_FTRP	-	-	-	No Set	Disable	-	-	-	-	0: Unlimited	-	Off	Enable	Thin
VIB	1-4pool	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable	-	-	-	-	0: Unlimited	-	Off	Enable	Thin
VIB	3JB2K4B_FTRP	-	-	-	No Set	Disable	-	-	-	-	0: Unlimited	-	Off	Enable	Thin
0 MB	TP_1	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable	-	-	-	-	0: Unlimited	-	Off	Enable	Thin
VIB	TP_1	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable	-	-	-	-	0: Unlimited	-	Off	Enable	Thin
VIB	TPP_2	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable	-	-	-	-	0: Unlimited	-	Off	Enable	Thin
VIB	TP_1	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable	-	-	-	-	0: Unlimited	-	Off	Enable	Thin
0 MB	TP_1	0.0%(0.00 MB)	0.0%(0.00 MB)	0.0%(0.00 MB)	No Set	Disable	-	-	-	-	0: Unlimited	-	Off	Enable	Thin

Checklist

On the [Automated Storage Tying] screen, check the following items for all FTVs.

- [Enable/Disable] is set to "Enable".
- [Available] is set to "Yes".

- (2) Check that the [Enable/Disable] setting in [Automated QoS] is "Enable" for DX200#2 by performing step (1).

3.12.2.4. Confirmation Procedure for the Cluster Switching Operation

For confirmation of the cluster switching, perform the following procedure.

- Confirm file access by the business VM before a cluster switching
- Manual cluster switching
- Confirm file access by the business VM after the cluster switching
- Cluster fallback

3.12.2.4.1 Confirming File Access by the Business VM Before a Cluster Switching

Log in to the OS of the business VM and create a text file containing an arbitrary character string.
Confirm that the text file is created successfully.

3.12.2.4.2 Manual Cluster Switching

Use ETERNUS SF Web Console to perform a manual switchover (Failover) between the Primary storage and the Secondary storage of the TFO group.

Perform a switching operation for both TFO group #1 and TFO group #2.

- (1) After logging in to ETERNUS SF Web Console, on the [Detail View] screen, select [Storage] - [(Storage Name: DX200#1)] - [Storage Cluster], then click [Overview] on the Category pane.

Name	Phase	Status	Local	Remote	Primary/Secondary	Active/Standby
tfo_group1	Normal	Normal	Primary	Active	Secondary	Standby
tfo_group2	Normal	Normal	Primary	Standby	Secondary	Active

Checklist

In the list of TFO groups displayed on the Main pane, confirm the following items.

- [Phase] and [Status] are "Normal".
- The Primary storage state displayed for [Local] or [Remote] is "Active".
- The Secondary storage state displayed for [Local] or [Remote] is "Standby".

- (2) On the [Storage Cluster] screen, select the checkbox to the left of the TFO group name (TFO group #1) on the Main pane and then click [Failover] on the Action pane under [Manual Control].

- (3) When a failover is completed, the list of TFO groups displayed in [Overview] on the [Storage Cluster] screen is refreshed.

Checklist

In the list of TFO groups displayed on the Main pane, check the status of the TFO group where the failover was performed.

- [Phase] is "Failback Ready".
- [Status] is "Normal".
- The Primary storage state displayed for [Local] or [Remote] is "Standby".
- The Secondary storage state displayed for [Local] or [Remote] is "Active".

- (4) For TFO group #2, perform steps (1) to (3) and check the status after the failover.

3.12.2.4.3 Confirming File Access by the Business VM After the Cluster Switching

Log in to the OS of the business VM and reference the text file created in "Confirming File Access by the Business VM Before a Cluster Switching".

Checklist

Check the following items.

- Text files can be referenced.
- The character string in the text file is the same as before the cluster switching.

3.12.2.4.4 Cluster Failback

Use ETERNUS SF Web Console to perform a failback of the TFO group for which the cluster switching was executed.
Perform a failback operation for both TFO group #1 and TFO group #2.

- (1) After logging in to ETERNUS SF Web Console, on the [Detail View] screen, select [Storage] - [(Storage Name: DX200#1)] - [Storage Cluster], then click [Overview] on the Category pane.
- (2) On the [Storage Cluster] screen, select the checkbox to the left of the TFO group name (TFO group #1) on the Main pane and then click [Failback] on the Action pane under [Manual Control].
- (3) When a failover is completed, the list of TFO groups displayed in [Overview] on the [Storage Cluster] screen is refreshed.

Checklist

In the list of TFO groups displayed on the Main pane, check the status of the TFO group where the failback was performed.

- [Phase] is "Normal".
- [Status] is "Normal".
- The Primary storage state displayed for [Local] or [Remote] is "Active".
- The Secondary storage state displayed for [Local] or [Remote] is "Standby".

- (4) For TFO group #2, perform steps (1) to (3) and check the status after the failback.

3.12.3. Verification Result

The results confirmed that the following operations can be successfully performed in the verification environment.

- Cluster switching by Storage Cluster and file access by business VM before and after a cluster switching
- Automated Storage Tiering, Auto QoS, and performance information collection by MA before and after a cluster switching

4. WSFC Cluster Configuration Procedure of the Non-Stop Storage Management Server

This chapter provides a procedure and configuration example for clustering servers in a non-stop storage environment with WSFC.

4.1. Configuration

An overview of the configuration is provided and the main settings are explained below.

4.1.1. Outline of the Overall Configuration

The minimum node configuration consists of two business servers, two storage systems, two Fibre Channel switches, and two monitoring servers.

As business servers, VMware vSphere ESXi is installed in two PRIMERGY servers and VMware vSphere HA is configured in the virtual machines on the ESXi server.

Virtual machines use the volumes on the storage systems as disk resources.

For the storage system, two ETERNUS DX200 S3 storage systems are used.

In each ETERNUS DX200 S3 storage system, virtual logical volumes (FTVs) are created in the management pool (Tier pool) for Automated Storage Tiering.

In this example, SSDs, Online SAS disks, and Nearline SAS disks are used as a 3-layer disk configuration.

FTVs with the same capacity are created on two ETERNUS DX200 S3 storage systems and inter-storage system synchronization is performed using the Storage Cluster function.

In this example, a configuration example where a one-way FTV synchronization is performed in a single TFO group is shown. For a bi-directional synchronization configuration, refer to "3.1.1. Outline of the Business Volume Configuration".

For the management servers, Windows Server 2012 R2 is installed in two PRIMERGY servers and a cluster configuration is completed with WSFC.

By using the FTVs of the ETERNUS DX200 S3 as shared disk of the WSFC configuration, inter-storage synchronization is performed using the Storage Cluster function.

The shared disks consist of Quorum monitoring disks used by the WSFC and disks used by the ESF Manager function.

As an external environment, a vSphere vCenter AD server, a DNS server, and an NTP server are used.

An overall configuration outline of this environment is shown below.

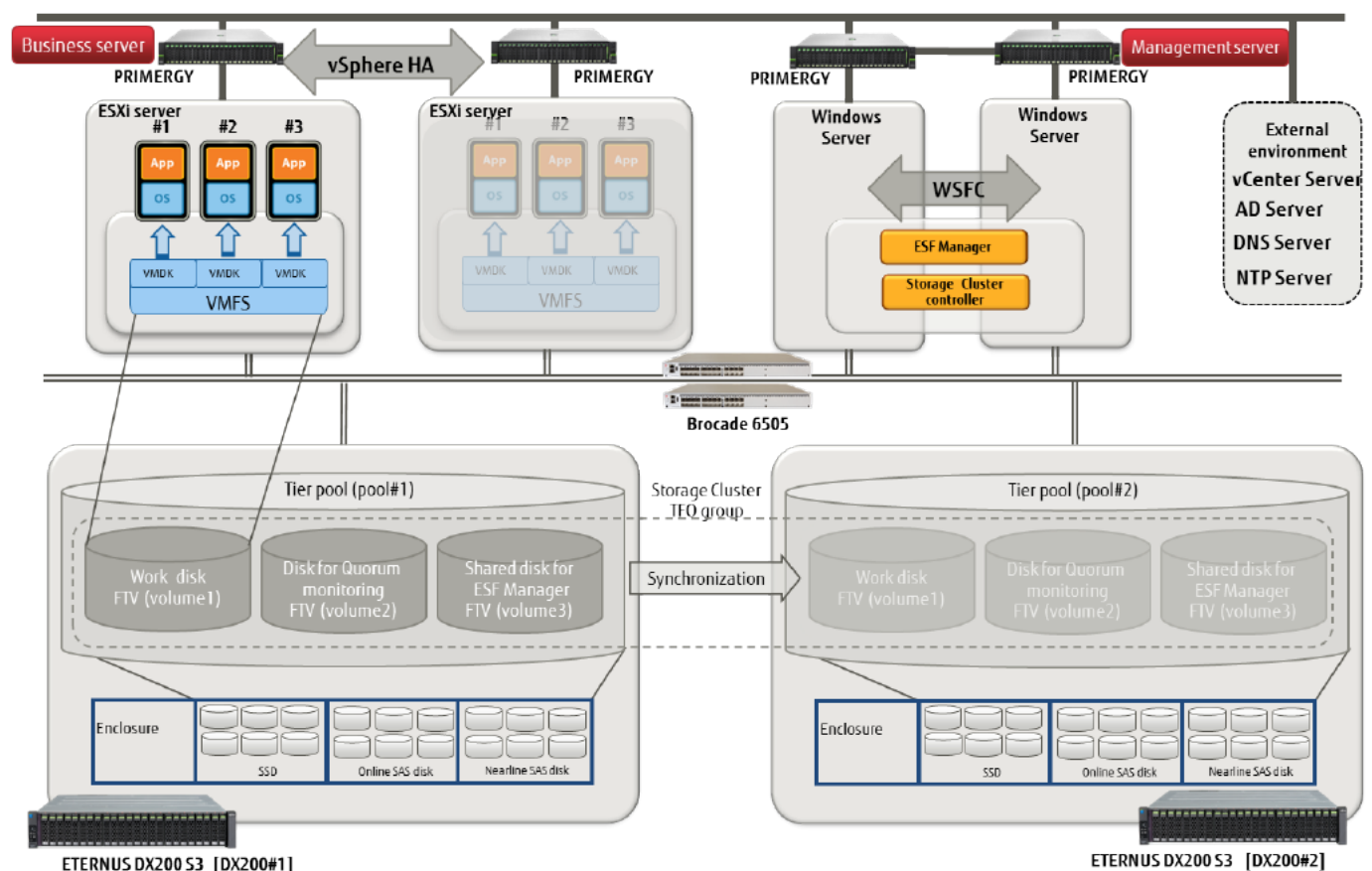


Figure 18 Outline of the overall configuration

4.1.2. SAN Connection Configuration Overview

Configure a SAN between the servers and the storage systems with two Fibre Channel switches.

In addition to the SAN between the servers and the storage systems, the storage systems are also connected directly.

(1) Connection configuration between servers and storage systems

The servers and storage systems are connected to two Fibre Channel switches using FC cables.

With the Storage Cluster function, the FC ports of the storage systems connected to the servers are defined as CA port pairs.

With CA port pairs, storage systems accessed by a business server is switched according to Linkup/Linkdown of the FC port.

During normal operation, the FC port of the Primary storage system is in the Linkup state and the FC port of the Secondary storage system is in the Linkdown state.

An FC port defined as a CA port pair can only be used for the Storage Cluster function.

In addition, for redundant communication paths between the server and storage system, two CA port pairs per TFO group are configured.

The connection configuration between servers and storage systems of this environment is shown below.

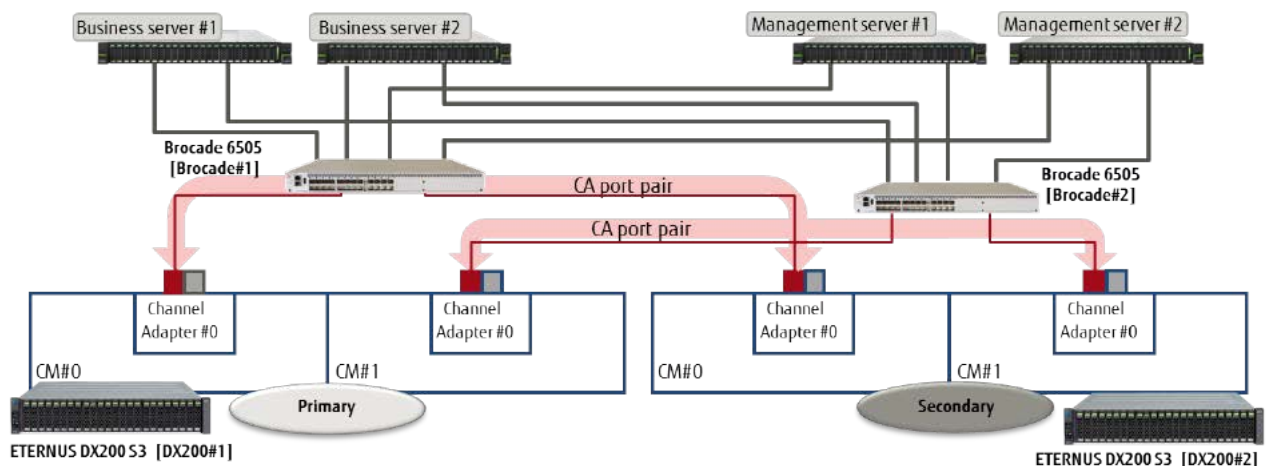


Figure 19 Connection configuration between servers and storage systems

(2) Connection configuration between storage systems

Connect the storage systems directly using FC cables and use them as REC paths.

The FC ports for the REC paths are defined in the dedicated mode (RA mode) and can only be used as REC paths.

The connection configuration between storage systems in this environment is shown below.

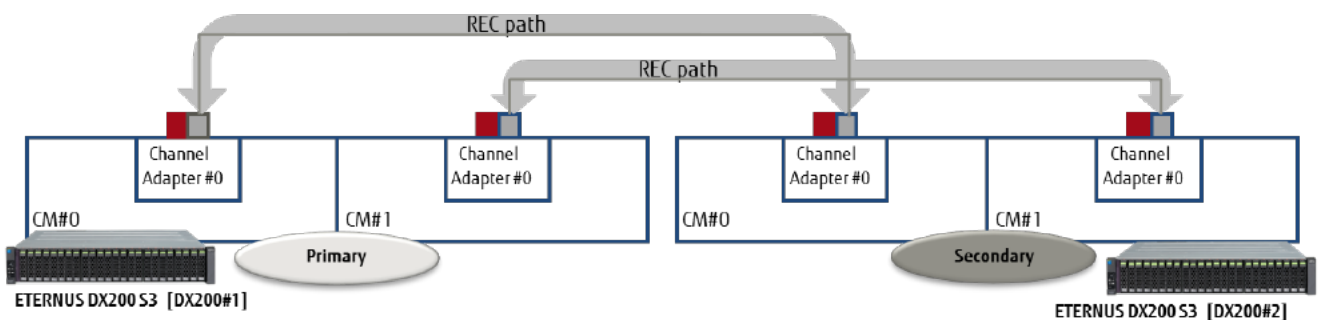


Figure 20 Connection configuration between storage systems

4.1.3. WFSC Configuration Overview of the Management Server

The management server must be configured as a 1:1 cluster configuration with WSFC.
 The network, disks, application services, and components are used as cluster resources.
 The network consists of a public LAN and a heartbeat LAN.
 The public LAN is also used as the monitoring LAN.
 For disks, the TFOVs within the storage systems are used as shared disks for ESF manager and as disks for WSFC Quorum monitoring.
 Configure the application services and components such as services and scripts for ESF Manager, and ESF Agent (Storage Cluster Controller) as a single role.

The WSFC configuration of the management server in this example is shown below.

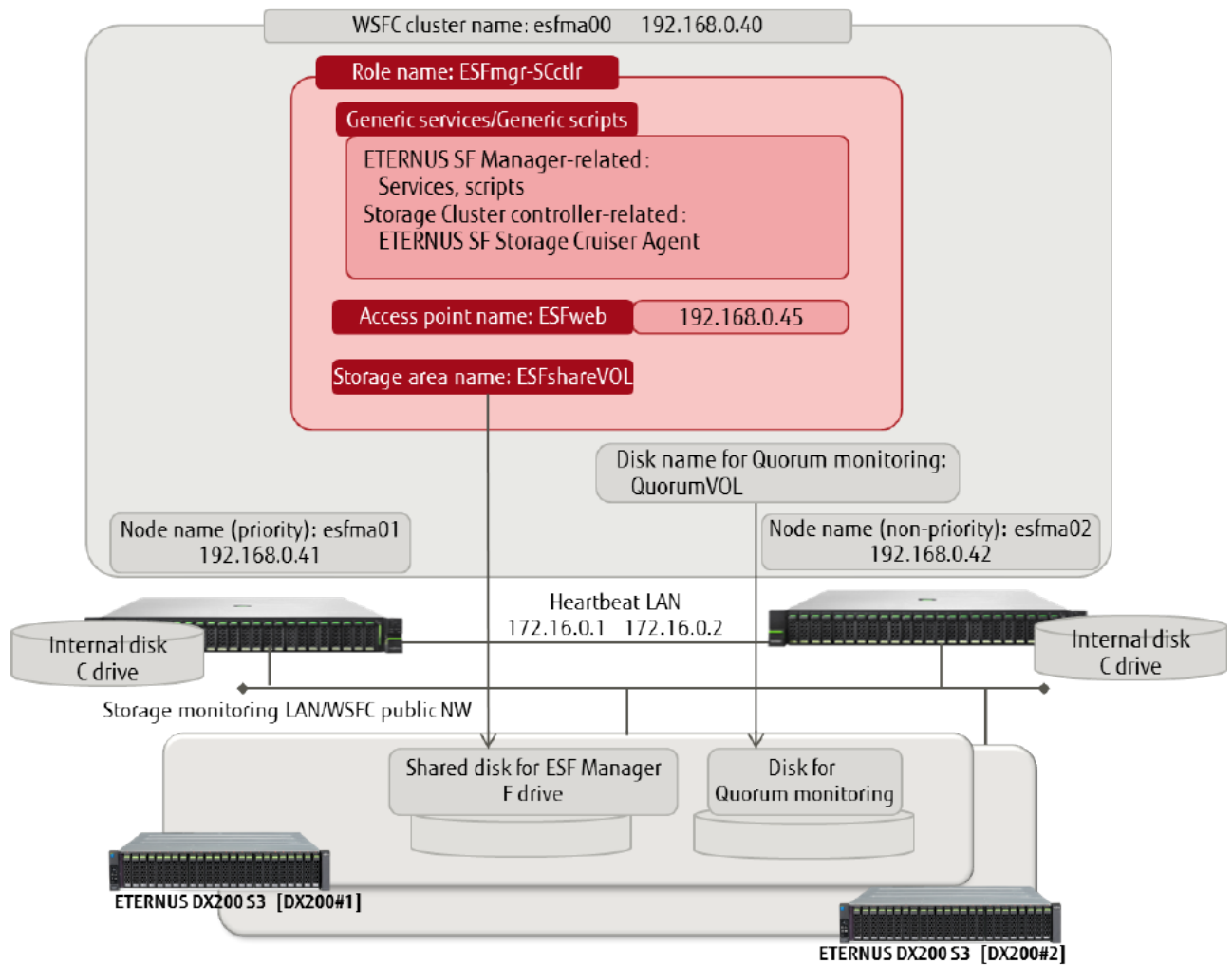


Figure 21 WFSC configuration of the management server

4.1.4. Hardware/Software

The hardware and software licenses used in this example are listed below.

Hardware

- ETERNUS DX200 S3 x 2
- 600 GB/10 krpm 2.5 inch SAS disk drive x 6 x 2
- 1 TB/7.2 krpm 2.5 inch Nearline SAS disk drive x 6 x 2
- 800 GB 2.5 inch SSD x 6 x 2
- PRIMERGY RX2540 M1 x 4
- Brocade 6505 x 2

Firmware of ETERNUS DX200 S3 should be V10L32 or later.

In addition to the above, provide network devices such as L2SW, AD server, NTP server and work PC.

Software, licenses

- VMware vSphere 6.0 (ESXi)
- Windows Server 2012 R2 (for business server x 3, for management server x 1)
- ETERNUS SF SC/ACM/Express 16 media pack (Windows 64-bit version)
- ETERNUS SF Storage Cruiser V16 Standard License for Tier1 x 2 licenses
- ETERNUS SF Storage Cruiser Storage Cluster Option for Tier1 x 2 licenses
- ETERNUS SF Storage Cruiser Optimization Option for Tier1 x 2 licenses
- ETERNUS SF Storage Cruiser QoS Management Option for Tier1 x 2 licenses
- ETERNUS SF AdvancedCopy Manager V16 Standard License for Tier1 x 2 licenses

The ETERNUS SF products of the following versions are used in this example.

- ETERNUS SF Storage Cruiser 16.3
- ETERNUS SF MA 8.4

When using the ETERNUS AF series as the storage system, use the following versions of ETERNUS SF products.

- ETERNUS SF Storage Cruiser 16.4
- ETERNUS SF MA 8.5

If using ETERNUS SF products of versions different from those listed in this document, refer to the product manuals for the appropriate procedure.

4.1.5. Connection Diagram

The configuration of LAN and SAN used in this example are shown below.

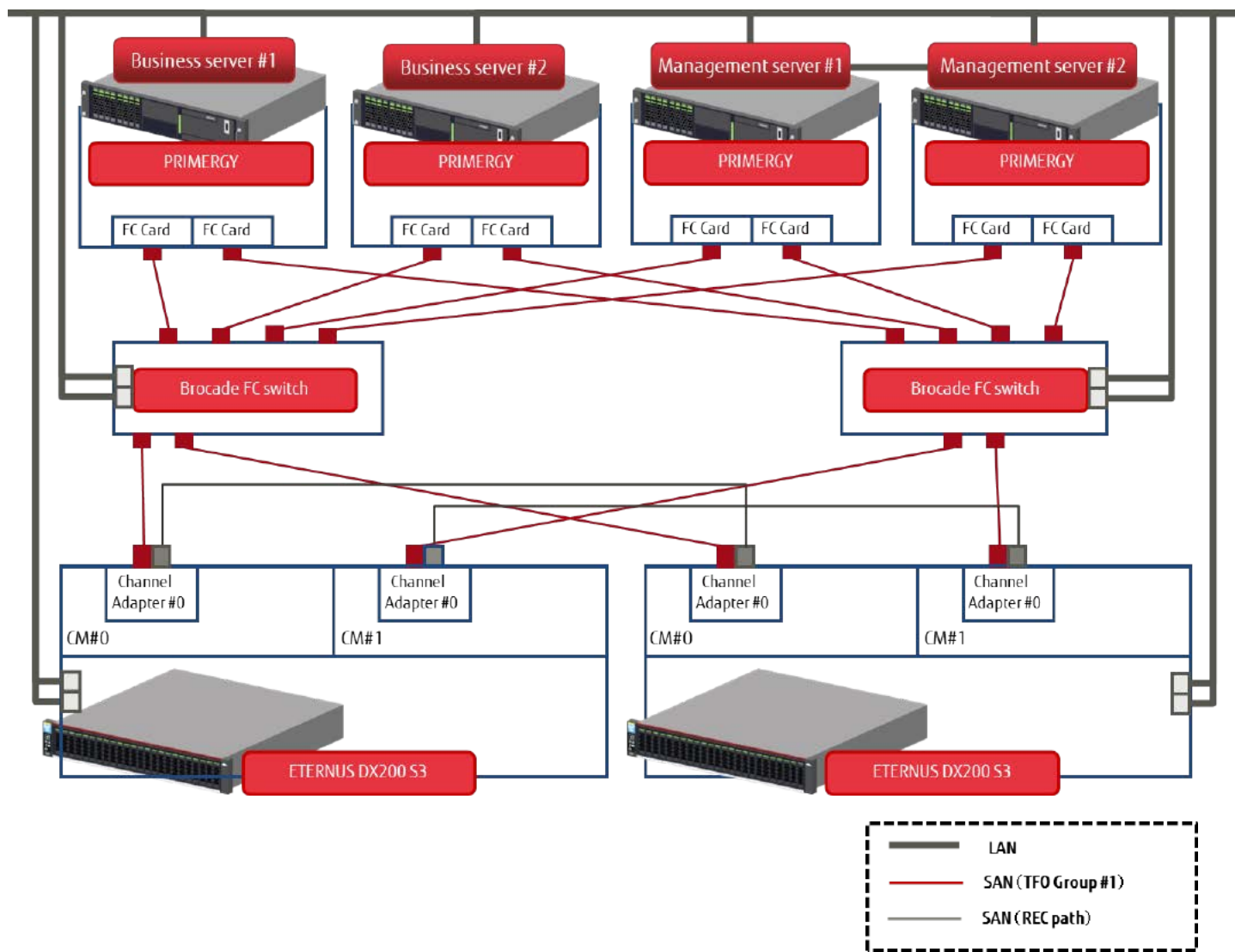


Figure 22 Connection diagram

4.1.6. List of Parameter Settings

The main settings of the network and storage system for this example are described below.

Network

Category	Name	Hostname	IP address
Server	Business server #1	esxi01	192.168.0.31
	Business server #2	esxi02	192.168.0.32
	Management server #1	esfma01	192.168.0.41
	Management server #2	esfma02	192.168.0.42
	Management server #1 Heartbeat LAN	esfmh01	172.16.0.1
	Management server #2 Heartbeat LAN	esfmh02	172.16.0.2
Fibre Channel switch	Brocade#1	fcsw01	192.168.0.10
	Brocade#2	fcsw02	192.168.0.11
Storage system	DX200#1	dx200-1	192.168.0.12
	DX200#2	dx200-2	192.168.0.13
Virtual machine	Business server VM#1	sv-1a	192.168.0.51
	Business server VM#2	sv-1b	192.168.0.52
	Business server VM#3	sv-1c	192.168.0.53
WSFC access point	Access point for cluster management	esfma00	192.168.0.40
	Client access point for ESF Manager	esfweb	192.168.0.45
External server	vCenter Server	vcenter	192.168.0.21
	AD server/DNS server #1	dc01	192.168.0.61
	AD server/DNS server #1	dc02	192.168.0.62
	NTP server	ntpsv	192.168.0.71

Table 34 Hostnames and IP addresses

Storage system

DX200#1			DX200#2			Usage
Port	Port type	Mode	Port	Port type	Mode	
CM#0 CA#0 port#0	FC	CA	CM#0 CA#0 port#0	FC	CA	TFO group #1
CM#0 CA#0 port#1	FC	RA	CM#0 CA#0 port#1	FC	RA	REC path
CM#1 CA#0 port#1	FC	CA	CM#1 CA#0 port#1	FC	CA	TFO group #1
CM#1 CA#0 port#1	FC	RA	CM#1 CA#0 port#1	FC	RA	REC path

Table 35 Port settings

Tier pool name	Policy name	Tier	Low sub-pool			Middle sub-pool			High sub-pool			FTV		
			Disk	# of disks	RAID	Disk	# of disks	RAID	Disk	# of disks	RAID	FTV name	Size	Type
pool_1	gold	3	Nearline SAS	6	RAID6	Online SAS	6	RAID6	SSD	6	RAID6	volume 1	800GB	Thin
												volume 2	1GB	Thin
												volume 3	50GB	Thin

Table 36 DX200#1 Tier pool settings

Tier pool name	Policy name	Tier	Low sub-pool			Middle sub-pool			High sub-pool			FTV		
			Disk	# of disks	RAID	Disk	# of disks	RAID	Disk	# of disks	RAID	FTV name	Size	Type
pool_2	gold	3	Nearline SAS	6	RAID 6	Online SAS	6	RAID6	SSD	6	RAID6	volume 1	800GB	Thin
												volume 2	1GB	Thin
												volume 3	50GB	Thin

Table 37 DX200#2 Tier pool settings

Name	TFO group name	Primary/Secondary		Failover mode	Failback mode	Split mode	CA port pair
		DX200#1	DX200#2				
TFO group #1	TFOG_1	Primary	Secondary	Auto	Manual	Read/Write	Reference the port settings

Table 38 TFO group settings

Server information	HBA	Port	LUN No.	Affinity/ LUN group name	FTV
esxi01	vmhba3	CM#0 CA#0 port#0	0	AG_1	volume1
	vmhba4	CM#1 CA#0 port#0			
esxi02	vmhba3	CM#0 CA#0 port#0	0	AG_1	volume1
	vmhba4	CM#1 CA#0 port#0			
esfma01	lpfc0	CM#0 CA#0 port#0	1	AG_2	volume2
	lpfc1	CM#1 CA#0 port#0			
esfma02	lpfc0	CM#0 CA#0 port#0	1	AG_2	volume2
	lpfc1	CM#1 CA#0 port#0			
esfma01	lpfc0	CM#0 CA#0 port#0	2	AG_2	volume3
	lpfc1	CM#1 CA#0 port#0			
esfma02	lpfc0	CM#0 CA#0 port#0	2	AG_2	volume3
	lpfc1	CM#1 CA#0 port#0			

Table 39 DX200#1 access path settings

Server information	HBA	Port	LUN No.	Affinity/ LUN group name	FTV
esxi01	vmhba3	CM#0 CA#0 port#0	0	AG_1	volume1
	vmhba4	CM#1 CA#0 port#0			
esxi02	vmhba3	CM#0 CA#0 port#0	0	AG_1	volume1
	vmhba4	CM#1 CA#0 port#0			
esfma01	lpfc0	CM#0 CA#0 port#0	1	AG_2	volume2
	lpfc1	CM#1 CA#0 port#0			
esfma02	lpfc0	CM#0 CA#0 port#0	1	AG_2	volume2
	lpfc1	CM#1 CA#0 port#0			
esfma01	lpfc0	CM#0 CA#0 port#0	2	AG_2	volume3
	lpfc1	CM#1 CA#0 port#0			
esfma02	lpfc0	CM#0 CA#0 port#0	2	AG_2	volume3
	lpfc1	CM#1 CA#0 port#0			

Table 40 DX200#2 access path settings

Item	Setting value	Note
Domain name	esf.example.com	-
Domain administrator	esfAdministrator	-
ETERNUS SF role group name (for management)	esfadmin	Group scope: Domain local Group type: Security Windows security: Allow log on locally
ETERNUS SF role group name (for referencing)	esfmon	Group scope: Domain local Group type: Security Windows security: Allow log on locally
ESF Web Console user (for management)	esflesfroot	Affiliated group: esflesfroot
ESF Web Console user (for referencing)	esflesfuser	Affiliated group: esflesfroot

Table 41 Domain controller settings

4.2. Environment Configuration Overview

This document explains the cluster environment configuration procedure for management servers. Because the shared disks of the management servers are located in the AST volumes within the storage system of Storage Cluster, an Automated Storage Tiering environment and a Storage Cluster environment must be configured using the single configuration management server.

For the procedures to create a single configuration management server environment, an Automated Storage Tiering environment and a Storage Cluster environment, refer to the appropriate ETERNUS SF manual.

The workflow of the environment configuration and the scope of this manual are shown below.

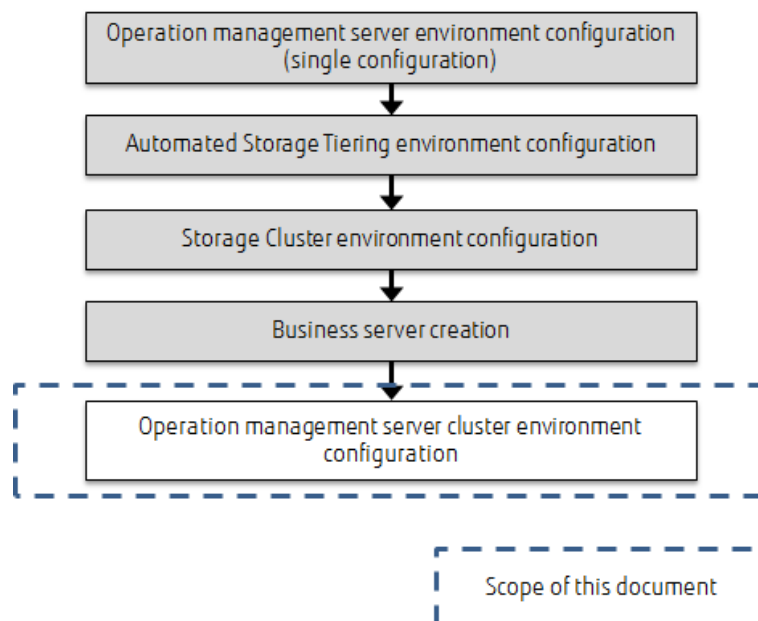


Figure 23 Workflow of the environment configuration

4.2.1. Detailed Workflow of the Cluster Environment Configuration for the Management Server

The detailed workflow of the cluster environment configuration for the management server is shown below.

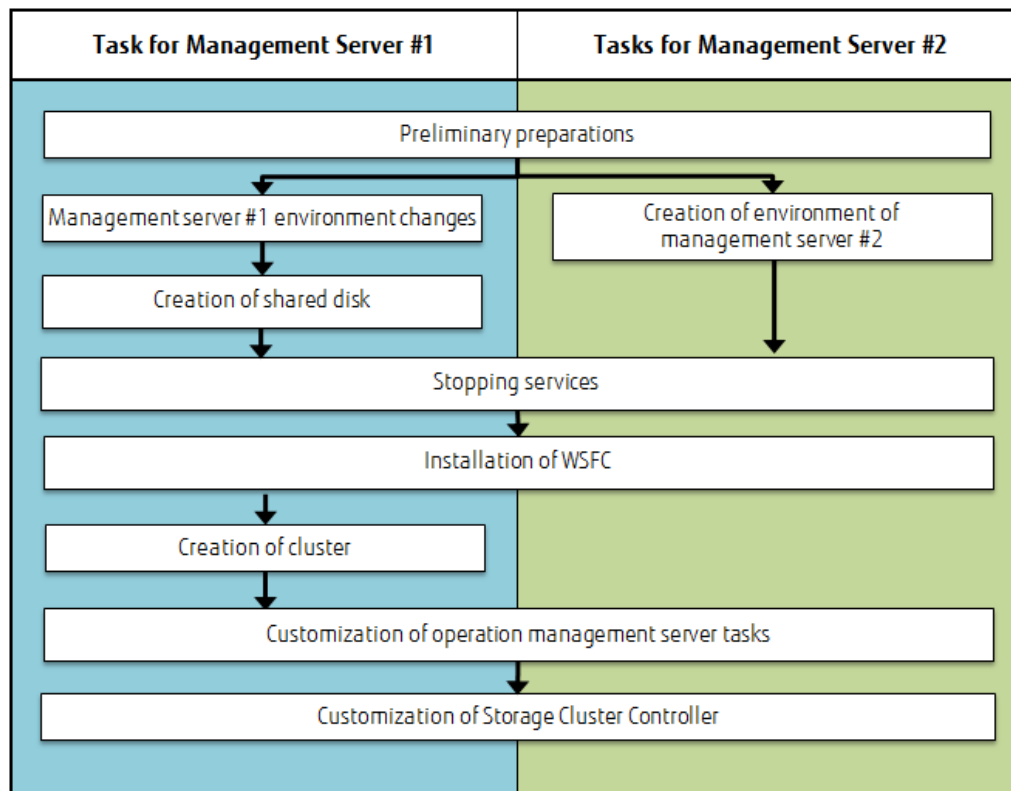


Figure 24 Detailed workflow of the cluster environment configuration for the management server

4.3. Advance Preparations

As advance preparations for installing ESF Manager, initialize the settings of the ETERNUS DX200 S3, perform an installation and setup of VMware vSphere ESXi and vCenter Server, and create a management server.

4.3.1. Check before Work

Check that the required environment is in place before starting the work.

- Management server #1 is configured as a single configuration ESF manager system and confirm that ESF Web Console can be used.
- The Storage Cluster function is operating and management server #1 is monitoring storage system as a Storage Cluster Controller.
- Confirm that a communication path from the management server to the NTP server, DNS server, and AD server has been established.
- Confirm whether the ports for management server #1 and management server #2 exist on the Fibre Channel switch.
- Confirm whether the shared disk area used by the management servers can be secured in the DX200 S3 storage system.

4.3.2. Preparing the DNS and Domain Environments

To resolve management server names, register the forward and reverse lookup records on the existing DNS server. For the required settings, refer to "Table 34 Hostnames and IP addresses" in "4.1.6. List of Parameter Settings".

To operate the management servers with a WSFC configuration, configure the domain controller.

For the domain users and groups required by the management servers, refer to "Table 41 Domain controller settings" in "4.1.6. List of Parameter Settings".

(For details, refer to *ETERNUS SF Express / Storage Cruiser / AdvancedCopy Manager Installation and Setup Guide*.)

4.3.3. Preparing the Hardware Environment of the Management Servers

Connect management server #1 and management server #2 to the network device and Fibre Channel switch.

For the required connections, refer to "4.1.5. Connection Diagram" and "4.1.6. List of Parameter Settings".

4.4. Environment Modification of Management Server #1

To use management server #1 in a WSFC configuration, change the system environment.
Change the network settings, join a domain, and then continue the preparations to create a shared disk.

4.4.1. Modifying the Network Environment

On management server #1, perform the required network settings to communicate with the AD server and management server #2.
Set the IP address and configure the firewall.

After changing the network settings, join a domain. This step is not necessary if the server has already joined a domain.
(For the Windows Server 2012 R2 settings, refer to the appropriate documents on the Microsoft website.)

After joining a domain, make sure that ESF Web Console is available to domain users.

4.4.2. Installation of the ETERNUS Multipath Driver

Install the ETERNUS Multipath Driver in management server #1.
(For the installation procedure for the ETERNUS Multipath Driver, refer to the user guide of the product.)

4.5. Environment Configuration of Management Server #2

Configure the system environment of management server #2 and configure the ETERNUS SF Manager environment and the Storage Cruiser agent environment.

4.5.1. OS Installation

Install Windows Server 2012 R2 in management server #2.
(For the installation procedure of Windows Server 2012 R2 in PRIMERGY servers, refer to the ServerView Suite ServerBooks DVD [manual].)

After the OS installation, perform the required network and firewall settings to communicate with management server #1, the NTP server, the DNS server and the AD server.

After changing the network settings, join a domain. This step is not necessary if the server has already joined a domain.
(For the Windows Server 2012 R2 settings, refer to the appropriate documents on the Microsoft website.)

4.5.2. Installation of the ETERNUS Multipath Driver

Install the ETERNUS Multipath Driver in management server #2.
(For the installation procedure for the ETERNUS Multipath Driver, refer to the user guide of the product.)

4.5.3. Storage Cruiser Installation

Install ETERNUS SF Storage Cruiser in management server #2.
(For details, refer to *ETERNUS SF Express / Storage Cruiser / AdvancedCopy Manager Installation and Setup Guide*.)

After installing ETERNUS SF Storage Cruiser, check the connection to ESF Web Console of management server #2 from the work terminal.
In the ESF Web Console of management server #2, registration of the storage system and other settings are not necessary.

4.5.4. Storage Cruiser Agent Installation

Install ETERNUS SF Storage Cruiser Agent in management server #2.
(For details, refer to *ETERNUS SF Express / Storage Cruiser / AdvancedCopy Manager Installation and Setup Guide*.)

4.5.5. Storage Cluster Controller Setup

Set up the Storage Cluster Controller in management server #2.
(For details, refer to *ETERNUS SF Express / Storage Cruiser / AdvancedCopy Manager Operation Guide*.)

4.6. Creating Shared Disks

Create a shared disk in the storage system to be used by management servers.

Check that the created shared disk can be accessed from the management servers and then perform a format.

4.6.1. ESF Registration of Management Servers

Register management server #1 and #2 in ESF by using ESF Web Console of management server #1.

For details, refer to *ETERNUS SF Express / Storage Cruiser / AdvancedCopy Manager Installation and Setup Guide*.

4.6.2. Assigning Volumes

Create a shared disk volume in the DX200 S3 and assign it to management server #1 and server #2 by using the ESF Web Console of management server #1.

The following two volumes are required for shared disks: a shared disk used by ESF Manager and a Quorum monitoring disk used by WSFC. (For the required area size in shared disks of ESF Manager, refer to *ETERNUS SF Express / Storage Cruiser / AdvancedCopy Manager Cluster Application Guide*).

The required area size for Quorum monitoring disks is 512 MB or more.

In this example, volumes that are to be used in shared disks in both DX200#1 and DX200#2 are created as FTVs in the existing Tier pool of Automated Storage Tiering.

Allocate the same capacity and the same LUN number in DX200#1 and DX200#2 to assign FTVs as the target volumes for Storage Cluster. (For the FTV creation procedure, refer to *ETERNUS SF Express / Storage Cruiser / AdvancedCopy Manager Operation Guide*.)

Assign the created FTVs to both management servers #1 and #2, and set their access paths.

For the access path setting, create an affinity/LUN group, set host affinity, and configure the FC switch zoning.

For the host affinity setting, specify a CA port pair assigned to the Storage Cluster TFOG group.

For the FC switch zoning settings, perform a WWN zoning for the CA port pair WWPN in FCSW#1 and FCSW#2, and for each FC port in the management servers.

For the access path settings, using the volume assignment function which allows the creation of an affinity/LUN group, configuring/setting host affinity, and configuring FC switch zoning is recommended.

After setting an access path, check that the status of Storage Cluster is "NORMAL".

(For details on volume assignments and access path settings, refer to *ETERNUS SF Express / Storage Cruiser / AdvancedCopy Manager Operation Guide*.)

4.6.3. Access Verification and Format of Shared Disk

Check that the volumes created in the storage system can be accessed from management servers #1 and #2 and then perform a format.

First, check using the Windows function that the ESF shared disk and the Quorum monitoring disk can be used in management server #1.

Set the disks to online, allocate a size and drive letter, and then format with NTFS.

A drive letter does not need to be assigned for the Quorum monitoring disk.

Set the disks to offline after the configuration.

Next, check with the Windows function that the ESF shared disk and Quorum monitoring disk can be used in management server #2.

Set the disks to online and assign a drive letter to the ESF shared disk.

Set the disks to offline after the configuration.

(For the Windows Server 2012 R2 settings, refer to the appropriate documents on the Microsoft website.)

4.7. Stopping Services

Stop the ESF Manager service and the ESF Agent (Storage Cluster Controller) services on management servers #1 and #2, and disable the automatic startup of the service.

Use the Windows function to stop the following services and change their startup setting to "manual".

- ETERNUS SF Manager Apache Service
- ETERNUS SF Manager Tomcat Service
- ETERNUS SF Manager Postgres Service
- ETERNUS SF Storage Cruiser Optimization Option
- ETERNUS SF Storage Cruiser Agent

Note

After the services are stopped, ESF Web Console cannot be used until the management servers are clustered.

In addition, note that automatic failover of storage systems is not performed because the storage monitoring by the Storage Cluster Controller is stopped.

Stopping the service does not have an effect on the business servers, however do not stop the secondary storage system while the Storage Cluster Controller is stopped. Doing so prevents access to the TFOV of the primary storage system.

4.8. Installing WSFC

Install WSFC on management servers #1 and #2. In Windows Server 2012 R2, the following functions are added.

- Failover clustering

The following functions are also added to management server #2.

- Failover cluster command interface

Failover Cluster Command Interface is a function under **Remote Server Administration Tools - Function Management Tools - Failover Clustering Tools**.

(For the Windows Server 2012 R2 settings, refer to the appropriate documents on the Microsoft website.)

4.9. Creating Clusters

Using "Failover Cluster Manager" on management server #1, perform a "configuration validation" and a "cluster creation". Perform this work with a user that has administrator privileges in the domain controller.

To validate configurations, specify the node names of management server #1 and management server #2.

To create clusters, specify the cluster name and access point for cluster management.

(For the "Failover Cluster Manager" related procedures, refer to the documents on the Microsoft website.)

If the DNS environment is statically managed or if the host (A) record of the access point for cluster management is registered in advance, the events that cause a DNS name registration failure occur when a cluster is created. (event ID: 1196)

Add full control authority to the computer account of cluster name (Cluster Name Object = CNO) in the host (A) record of the DNS server.

4.10. Customization of Management Server Tasks

Customize the ESF Manager to start as a WSFC role.
Perform this work according to the procedure described in "Chapter 5: Customization for Management Server Transaction" in *ETERNUS SF Express / Storage Cruiser / AdvancedCopy Manager Cluster Environment Setup Guide*.

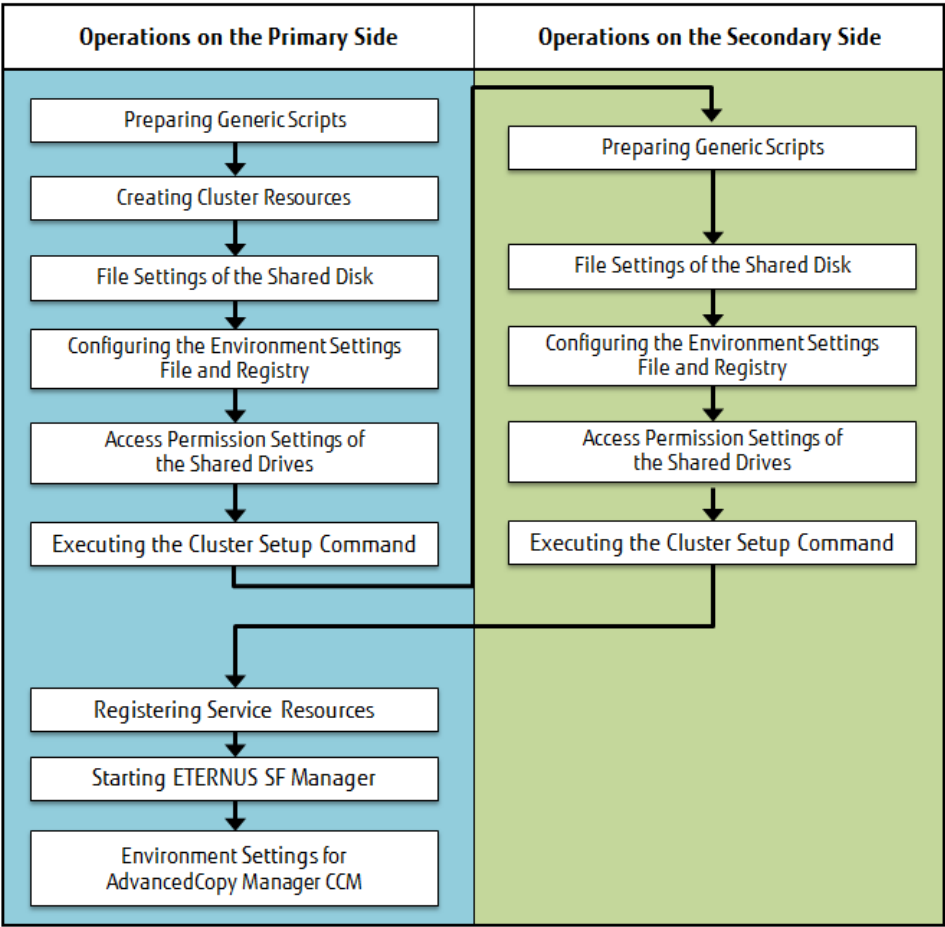


Figure 25 Customization workflow of the management server task

4.10.1. Primary Side Cluster Setup Operations

Perform a cluster setup with management server #1 as the primary node.
Set the shared disk to online on the management server #1 side and offline on the management server #2 side before the work.
The following procedures are all performed on management server #1. Perform the work as a user that has administrator privileges.

4.10.1.1. Preparing Generic Scripts

Create generic script files (for starting/stopping) for the following services.
- Generic scripts for ETERNUS SF Manager Tomcat Service / Tomcat Service
- Generic script for AdvancedCopy Manager CCM

For generic scripts, copy and edit the following sample script file under "{ETERNUS_SF installation directory}\Common\sample\cluster".
- esfmanager-web.vbs
- esfmanager-tomcat.vbs
- esfmanager-ccm.vbs

Replace "installDir" in the following line of the script file "esfmanager-ccm.vbs" with the installation directory of ETERNUS SF Manager.
Set oExec = WshShell.Exec("installDir\CCM\bin\acservice.exe stop -lan")
The default installation directory of ETERNUS SF is "C:\ETERNUS_SF".
The procedures described in this manual assume that the default installation directory is used.

The script files "esfmanager-tomcat.vbs" and "esfmanager-web.vbs" need not be edited.

Save the created script files as any file name in the installation directory of ETERNUS SF Manager.
In this document, the script files "apache.vbs", "tomcat.vbs", and "ccm.vbs" are copied to the "C:\ETERNUS_SF" directory.
Set the access permissions for the copied files.

<<Reference: Access permissions setting command>>

```
cacls C:\ETERNUS_SF\apache.vbs /P "NT AUTHORITY\SYSTEM:F" "BUILTIN\Administrators:F"
cacls C:\ETERNUS_SF\tomcat.vbs /P "NT AUTHORITY\SYSTEM:F" "BUILTIN\Administrators:F"
cacls C:\ETERNUS_SF\ccm.vbs /P "NT AUTHORITY\SYSTEM:F" "BUILTIN\Administrators:F"
```

4.10.1.2. Creating Cluster Resources

Create "ESF-Mgr_SCntr" as a "role" for ETERNUS SF Manager in the WSFC, and set a shared disk for ESF and a logical IP address to be used as an access point for ESF Web Console.

- (1) Right-click [Roles] in the [Failover Cluster Manager] tree and select [Create Empty Role] in the displayed menu.
Under [Roles], [New Role] is created.
- (2) Right-click [New Role] and select [Properties] in the displayed menu.
The [New Role Properties] dialog box is displayed.
- (3) In [Name] of the [General] tab, specify the role name of ESF Manager and under [Preferred Owners], select the node name of management server #1 and then click the [Apply] button.
- (4) After applying the settings, click the [OK] button.
- (5) Right-click the created role name and click [Add Resource] in the displayed menu.
Select the checkbox of the disk displayed in the [Add Storage Area] dialog box and then click [OK].
- (6) Right-click the disk that was added to resources and click [Properties] in the displayed menu.
In the [Properties] dialog box of the disk, change [Name] and then click [Apply].
Check the drive letter and capacity of the disk added to the resource, check that the disk registered in the resources is for ESF Manager, and then click [OK].
- (7) Right-click the created role name and select [Add a Resource] - [Client Access Point] in the displayed menu.
The [New Resource Wizard] screen is displayed.
- (8) On the [New Resource Wizard] screen, set the values for the ESF Web Console access point in [Name], [Network], and [Address], and then click the [Next] button.
- (9) In [Confirm], confirm the values for the ESF Web Console access point in [Network] and [Address] and then click the [Next] button.
- (10) Check the content displayed on the [Confirm] screen and then click the [Add] button.
- (11) Check the content displayed on the [Summary] screen and then click [Finish].
- (12) Check that the settings have been applied.
After clicking the role name in [Roles], click the [Resources] tab on the center pane at the bottom to check that the ESF Web Console access point is added to the resources.

4.10.1.3. File Settings of the Shared Disk

Transfer the dynamic resources for ESF Manager of management server #1 to the shared disk used by ESF Manager.

- (1) Acquire the ownership and transactions of the shared disk used by the Quorum disk and ETERNUS SF Manager.
 - a. After clicking [Roles] in the left pane of the [Failover Cluster Manager] screen, right-click the role name and click [Move] - [Select Node] in the displayed menu.
 - b. On the [Move Clustered Roles] screen, select the cluster node name of management server #1 and then click the [OK] button.
 - c. Check that [Owner Node] is the cluster node name of management server #1.
 - d. Click [Disks] on the left pane of the [Failover Cluster Manager] screen and confirm that the [Owner Node] of the shared disk displayed in the center pane is Management Server #1.

(2) Copy the dynamic disk files of ETERNUS SF Manager on the primary node to the shared disk for ETERNUS SF Manager.

- a. Create the following directories under the shared disk.
 - A shared data storage directory for shared data for ETERNUS SF Manager
 - A shared data storage directory for Storage Cruiser Manager
 - A shared data storage directory for the Optimization option of Storage Cruiser Manager
 - A shared data storage directory for AdvancedCopy Manager CCM

<<Reference: Directory creation command>>

```
mkdir F:\ETERNUS_SF
mkdir F:\escdata
mkdir F:\astdata
mkdir F:\ccmdata
```

- b. Copy the files on the local disk of the primary node to the shared disk.

<<Reference: File copy command>>

```
xcopy /E /I C:\ETERNUS_SF\common\sys\apache\conf F:\ETERNUS_SF\apache\conf
xcopy /E /I C:\ETERNUS_SF\common\sys\apache\logs F:\ETERNUS_SF\apache\logs
xcopy /E /I C:\ETERNUS_SF\common\sys\tomcat\conf F:\ETERNUS_SF\tomcat\conf
xcopy /E /I C:\ETERNUS_SF\common\sys\tomcat\logs F:\ETERNUS_SF\tomcat\logs
xcopy /E /I C:\ETERNUS_SF\common\sys\tomcat\webapps\esf\WEB-INF\log F:\ETERNUS_SF\tomcat\webapps\esf\WEB-INF\log

xcopy /E /I C:\ETERNUS_SF\COMMON\etc\db F:\ETERNUS_SF\db
xcopy /E /I C:\ETERNUS_SF\COMMON\etc\message F:\ETERNUS_SF\message

xcopy /E /I C:\ETERNUS_SF\ESC\Manager\etc F:\escdata\ESC\Manager\etc
xcopy /E /I C:\ETERNUS_SF\AST\Manager\etc\opt\FJSVssast\data F:\astdata\AST\etc\data
xcopy /E /I C:\ETERNUS_SF\CCM\etc F:\ccmdata\etc

xcopy /E /I C:\ETERNUS_SF\COMMON\var F:\ETERNUS_SF\var
xcopy /E /I C:\ETERNUS_SF\LM\var F:\ETERNUS_SF\LM\var

xcopy /E /I C:\ETERNUS_SF\ESC\Manager\var F:\escdata\ESC\Manager\var
xcopy /E /I C:\ETERNUS_SF\AST\Manager\var\opt\FJSVssast\data F:\escdata\AST\var\data
xcopy /E /I C:\ETERNUS_SF\CCM\var F:\ccmdata\var
```

(3) Change the directory name of the copy source files copied to the shared disk.

<<Reference: Directory name change command>>

```
cd C:\ETERNUS_SF
ren .\Common\sys\apache\conf conf_OLD
ren .\Common\sys\apache\logs logs_OLD
ren .\Common\sys\tomcat\conf conf_OLD
ren .\Common\sys\tomcat\logs logs_OLD
ren .\Common\sys\tomcat\webapps\esf\WEB-INF\log log_OLD
ren .\Common\etc\db db_OLD
ren .\Common\etc\message message_OLD
ren .\ESC\Manager\etc etc_OLD
ren .\AST\Manager\etc\opt\FJSVssast\data data_OLD
ren .\Common\var var_OLD
ren .\ESC\Manager\var var_OLD
ren .\AST\Manager\var\opt\FJSVssast\data data_OLD
```

(4) Create symbolic links to the directories of the shared disk.

<<Reference: Symbolic link creation command>>

```
mklink /d C:\ETERNUS_SF\common\sys\apache\conf F:\ETERNUS_SF\apache\conf
mklink /d C:\ETERNUS_SF\common\sys\apache\logs F:\ETERNUS_SF\apache\logs
mklink /d C:\ETERNUS_SF\common\sys\tomcat\conf F:\ETERNUS_SF\tomcat\conf
mklink /d C:\ETERNUS_SF\common\sys\tomcat\logs F:\ETERNUS_SF\tomcat\logs
mklink /d C:\ETERNUS_SF\common\sys\tomcat\webapps\esf\WEB-INF\log F:\ETERNUS_SF\tomcat\webapps\esf\WEB-INF\log

mklink /d C:\ETERNUS_SF\Common\etc\db F:\ETERNUS_SF\db
mklink /d C:\ETERNUS_SF\Common\etc\message F:\ETERNUS_SF\message

mklink /d C:\ETERNUS_SF\ESCManager\etc F:\escdata\ESCManager\etc
mklink /d C:\ETERNUS_SF\AST\Manager\etc\opt\FJ\SVssast\data F:\astdata\AST\etc\data

mklink /d C:\ETERNUS_SF\Common\var F:\ETERNUS_SF\var
mklink /d C:\ETERNUS_SF\ESCManager\var F:\escdata\ESCManager\var
mklink /d C:\ETERNUS_SF\AST\Manager\var\opt\FJ\SVssast\data F:\escdata\AST\var\data
```

4.10.1.4. Configuring the Environment Settings File and Registry

(1) Create a backup directory for the AdvancedCopy Manager CCM configuration file.

<<Reference: Backup directory creation command>>

```
mkdir C:\ETERNUS_SF\CCM\noncluster\bin
mkdir C:\ETERNUS_SF\CCM\noncluster\micc\sys
mkdir C:\ETERNUS_SF\CCM\noncluster\sys
```

(2) Back up the AdvancedCopy Manager CCM configuration file.

<<Reference: Configuration file copy command>>

```
copy C:\ETERNUS_SF\CCM\micc\sys\install.sys C:\ETERNUS_SF\CCM\noncluster\micc\sys\install.sys
copy C:\ETERNUS_SF\CCM\bin\stxc_install.sys C:\ETERNUS_SF\CCM\noncluster\bin\stxc_install.sys
copy C:\ETERNUS_SF\CCM\sys\sys.properties C:\ETERNUS_SF\CCM\noncluster\sys\sys.properties
```

The copied file is required to delete the cluster environment.

(3) Edit the AdvancedCopy Manager CCM configuration file.

<<Reference: Changing "C:\ETERNUS_SF\CCM\micc\sys\install.sys">>

```
stxs_optdir=C:\ETERNUS_SF\CCM\micc
stxs_etcdir=C:\ETERNUS_SF\CCM\etc\micc
stxs_varidir=F:\ccmdatavar\micc
stxs_jredir=C:\ETERNUS_SF\CCM\jre
```

<<Reference: Changing "C:\ETERNUS_SF\CCM\bin\stxc_install.sys">>

```
stxc_optdir=C:\ETERNUS_SF\CCM
stxc_etcdir=F:\ccmdataltc
stxc_jredir=C:\ETERNUS_SF\CCM\jre
```

<<Reference: Changing "C:\ETERNUS_SF\CCM\sys\sys.properties">>

```
com.fujitsu.eterussf.acm.ccm.optpath=C:\ETERNUS_SF\CCM\
com.fujitsu.eterussf.acm.ccm.etcpath=F:\lccmdatallctl
com.fujitsu.eterussf.acm.ccm.varpath=F:\lccmdatallvarl
com.fujitsu.eterussf.acm.ccm.micc.path=C:\ETERNUS_SF\CCM\micc\bin\
com.fujitsu.eterussf.acm.ccm.grapi.path=C:\ETERNUS_SF\CCM\bin\
com.fujitsu.eterussf.acm.ccm.language=JAPANESE
```

To modify *sys.properties*, use "\" as the drive name delimiter and "\\" as the path delimiter.

- (4) Change the advanced configuration file of the storage management copied to the shared disk.

<<Reference: Changing "F:\escdata\ESCManager\etc\opt\FJSVssmgr\current\sanma.conf">>

```
////////////////////////////////////
// sanma.conf
// Configuration file for Storage Cruiser
//
// Copyright(C) FUJITSU LIMITED 2002-2013
////////////////////////////////////

~~~~~
//
// LOGICAL_MANAGER_IP = "";
// LOGICAL_MANAGER_V6IP = "";

LOGICAL_MANAGER_IP = "192.168.0.45";

~~~~~
```

- (5) Edit the registry.
Using the Registry Editor, change the path of the var directory for the license management function described in the registry key to the shared disk path.

<<Reference: Changing the registry "HKEY_LOCAL_MACHINE\SOFTWARE\Fujitsu\ETERNUS SF License Manager\CurrentVersion\VarPathName">>

4.10.1.5. Access Permission Settings of the Shared Drives

Set the access permissions of the directories in the shared drives.

<<Reference: Access permissions setting command>>

```
cacls F:\ETERNUS_SF\var\log /T /P "NT AUTHORITY\SYSTEM:F" "BUILTIN\Administrators:F"
cacls F:\ETERNUS_SF\db\data /T /P "NT AUTHORITY\SYSTEM:F" "BUILTIN\Administrators:F" "esfpostgres:C"
```

4.10.1.6. Executing the Cluster Setup Command

- (1) Start the cluster setup.
Execute "C:\ETERNUS_SF\ACM\bin\stgclset_mscs" with a user that has administrator privileges.
- (2) On the initial screen of the cluster setup command, select the node type and shared disk.
Select "Primary node" for [Node type] and after selecting the ESF shared disk name in [Physical Disk Node Resource], click the [OK] button.
- (3) Set the cluster information of the primary node.
Enter the information for [Logical Node Name], [Task Name], [Cluster Name] and [IP Address Information], select the [Storage Management Server Task] checkbox and then click the [OK] button.

Item	Setting content	Setting value
Logical node name	Any logical node name	ESFweb
Task name	Role name set for WSFC	ESFmgr-SCctrl
Cluster name	Cluster name set for WSFC	esfma00
IP address resources	Select from [Existing] or [New] When registering a client access point as a resource with WSFC, select [Existing]	Existing
IP version	Select from [IPv4], [IPv6], or [IPv4/IPv6]	IPv4
IPv4 address	IP address set as the client access point for WSFC	192.168.0.45

Table 42 Cluster information setting example

- (4) The [Port Number and Service Setup and Release Command] screen is displayed.
Enter a port number in [Communication Service] and click the [OK] button.
- (5) The process completion message of [Port Number and Service Setup and Release Command] is displayed.
Click the [OK] button.
- (6) Check the successful completion message on the cluster setup completion screen and click the [OK] button.

4.10.2. Secondary Side Cluster Setup Operations

Perform a cluster setup with management server #2 as the secondary side.

The following procedures are all performed in management server #2. Perform the work as a user that has administrator privileges.

4.10.2.1. Preparing Generic Scripts

Place the generic scripts on the local disk of management server #2 and set their access permissions.

For the procedure, refer to the Primary Side Cluster Setup Operations in "4.10.1.1. Preparing Generic Scripts".

4.10.2.2. File Settings of the Shared Disk

Perform settings so that management server #2 uses the shared disk.

Move the ownership of the shared disk to WSFC management server #2 by using [Failover Cluster Manager].

Change the directory name and save it on the local disk.

Change the directory name and save it on the local disk of management server #2.

Create symbolic links to reference the files on the shared disk.

For the procedure, refer to the Primary Side Cluster Setup Operations in "4.10.1.3. File Settings of the Shared Disk".

- (2) Perform all the tasks except for creating directories and copying files to the shared disk.

4.10.2.3. Configuring the Environment Settings File and Registry

Edit the configuration file of management server #2 and perform a registry configuration.

For the procedure, refer to the Primary Side Cluster Setup Operations in "4.10.1.4. Configuring the Environment Settings File and Registry".

4.10.2.4. Access Permission Settings of the Shared Drives

Set the access permissions of the directories in the shared drives.

<<Reference: Access permissions setting command>>

```
cacls F:\ETERNUS_SF\db\data /T /G "esfpostgres:C" /E
```

4.10.2.5. Executing the Cluster Setup Command

- (1) Start the cluster setup.
Execute "C:\ETERNUS_SF\ACM\bin\stgclset_mscs" as a user with administrator privileges.
- (2) On the initial screen of the cluster setup command, select the node type and shared disk.
Select "Secondary node" for [Node type] and after selecting the ESF shared disk name in [Physical Disk Node Resource], click the [OK] button.
- (3) Check the cluster configuration information of the secondary node and then click the [OK] button.
- (4) The [Port Number and Service Setup and Release Command] screen is displayed.
Check the port number in [Communication Service] and then click the [OK] button.

- (5) The process completion message of [Port Number and Service Setup and Release Command] is displayed.
Click the [OK] button.
- (6) Check the successful completion message on the cluster setup completion screen and then click the [OK] button.

4.10.3. Registering Service Resources

On management server #1, register the service resources in "Roles" for ETERNUS SF Manager registered in WSFC.

4.10.3.1. Adding Resources

Add ETERNUS SF Manager services and generic scripts in [Roles] as resources for ETERNUS SF Manager.
Set dependencies for the added resources.

- (1) Adding services
 - a. Start [Failover Cluster Manager] of the WSFC and after selecting the role for ETERNUS SF Manager in [Roles], click [Add a Resource] - [Generic Service] on the right pane.
 - b. In the [Select Service] phase of the [New Resource Wizard] screen, select [ETERNUS SF Manager Postgres Service] from the list of services and then click the [Next] button.
 - c. Confirm the service name in the [Confirm] phase and then click the [Next] button.
 - d. Confirm the service name in the [Summary] phase and then click the [Finish] button.
 - e. Repeat steps a through d to add the service name [ETERNUS SF Storage Cruiser Optimization Option] to the resources.
- (2) Adding generic scripts
 - a. On the [Failover Cluster Manager] screen, after selecting a role for ETERNUS SF Manager in [Roles], click [Add a Resource] - [Generic Script] on the right pane.
 - b. In the [Generic Script Info] phase of the [New Resource Wizard] screen, enter the absolute path of the generic script stored in 4.10.1.1. Preparing Generic Scripts to the script file path and then click the [Next] button.
 - c. After confirming the script file path in the [Confirm] phase, click the [Next] button.
 - d. After confirming the script file path in the [Summary] phase, click the [Finish] button.
 - e. Repeat steps a through d to add all the generic scripts stored in 4.10.1.1. Preparing Generic Scripts.

4.10.3.2. Resource Dependency Settings

Set the dependencies for the added service resources and generic scripts.

- (1) After selecting the role for ETERNUS SF Manager in [Roles] on the [Failover Cluster Manager] screen, right-click the resource on the bottom center pane and click [Properties].
- (2) On the [Failover Cluster Manager] screen, after selecting the role for ETERNUS SF Manager in [Roles], right-click the resource on the bottom center pane and click [Properties].
If there are dependencies with multiple resources, set the resources with the AND condition on multiple lines.

Configuration target resource	Dependent resource
ETERNUS SF Manager Apache Service script	Shared disk
ETERNUS SF Manager Tomcat Service script	ETERNUS SF Manager Apache Service script, ETERNUS SF Manager Postgres Service, ETERNUS SF Storage Cruiser Optimization Option, Shared disk, IP address
ETERNUS SF Manager Postgres Service	Shared disk
ETERNUS SF Storage Cruiser Optimization Option	Shared disk
Generic scripts for ETERNUS SF Manager AdvancedCopy Manager CCM	Shared disk

<<Supplement>>

AdvancedCopy COM Service_logicalNodeName (logicalNodeName = logical node name) is automatically added to the resources by the cluster setup command. To perform a backup operation using the AdvancedCopy Manager Manager on the management server, dependencies must be set in "AdvancedCopy COM Service_logicalNodeName".

For details, refer to *ETERNUS SF Express / Storage Cruiser / AdvancedCopy Cluster Application Guide*.

4.10.4. Starting ETERNUS SF Manager

Bring the registered resources online and start ETERNUS SF Manager.

After starting ETERNUS SF Manager, confirm that it can log in to ESF Web Console.

- (1) Start ETERNUS SF Manager
After stopping the role for ETERNUS SF Manager of the WSFC in management server #1, start the role.
 - a. On the [Failover Cluster Manager] screen, right-click [Roles] - ETERNUS SF Manager role and click [Stop Role] in the menu. Confirm that the ETERNUS SF Manager role has changed to the "Stopped" state.
 - b. Right-click the role for ETERNUS SF Manager and click [Start Role] in the menu.
 - c. Check that the role for ETERNUS SF Manager has changed to the "Running" state and that all resources of the role for ETERNUS SF Manager are changed to "Online".

- (2) ESF Web Console login confirmation

Confirm that the login to ESF Web Console is possible with the URL for the cluster.

Perform a WSFC node switching. After the node is switched, check that a login to ESF Web Console is still possible.

- a. Start ESF Web Console by specifying the FQDN of the WSFC client access point from the Web browser of the work terminal.

<<Reference: URL for ESF Web Console access>>

<https://esfweb.esf.example.com:9855/>

- b. After checking that the login screen of ESF Web Console appears, confirm that a login as a domain user is possible.
- c. Log out from ESF Web Console.
- d. On the [Failover Cluster Manager] screen, right-click the role for ETERNUS SF Manager and then click [Move] - [Select Node].
- e. On the [Move Clustered Roles] screen, select the node of management server #2 and then click the [OK] button.
- f. Confirm that the role of ETERNUS SF Manager is in the "Running" state and that the owner of the node is the node name of management server #2.
- g. Start the ESF Web Console by specifying the FQDN of the WSFC client access point from the Web browser of the work terminal.
- h. After confirming that the login screen of ESF Web Console appears, check that a login as a domain user is possible.

4.11. Customizing the Storage Cluster Controller

Perform a customization to start the Storage Cluster Controller in the cluster.

Register ETERNUS SF Storage Cruiser Agent as a WSFC service resource.

Storage Cluster Controller is part of the ETERNUS SF Storage Cruiser Agent functions.

Check that the Storage Cluster Controller monitors the storage after a customization.

4.11.1. Registering Service Resources

Add the service name "ETERNUS SF Storage Cruiser Agent" as a generic service in the role for ETERNUS SF Manager of the WSFC.

For the procedure to add resources, refer to "4.10.3.1. Adding Resources".

Resource dependencies are not required.

4.11.2. Starting ETERNUS SF Storage Cruiser Agent

Restart the role for ETERNUS SF Manager and bring the service name "ETERNUS SF Storage Cruiser Agent" online.

For the procedure to stop and start the role of ETERNUS SF Manager, refer to "4.10.4. Starting ETERNUS SF Manager".

Execute the "agtpatrol" command after "ETERNUS SF Storage Cruiser Agent" is brought online to check that the storage monitoring is completed.

For the results of the "agtpatrol" command, check that the IP addresses of DX200#1 and DX200#2 are displayed and that the status of TFO GROUP is displayed.

Switch the owner node of the role for ETERNUS SF Manager, execute the "agtpatrol" command, and then confirm that the storage monitoring is completed.

4.12. Verification

This section described the operation verification and the verification results for the environment constructed in this example.

4.12.1. Verification Content

A verification is performed to determine whether the business operation, storage management, and storage monitoring management can continue when one node system stops for the following cases.

- Stopping the primary storage system
- Simultaneously stopping the primary storage system and primary business server
- Stopping the primary management server

The verification method and results are explained below.

Note that the verification method does not guarantee the integrity of the system.

(1) Stopping the primary storage system

a. Stopping method

Perform a test stop of the ETERNUS DX200 S3 with the following method.

Disconnect all the LAN cables and FC cables connected to the ETERNUS DX200 S3 on the active side of Storage Cluster.

Disconnect the LAN cables and then within 10 seconds, the FC cables must be disconnected.

The order and timing in which the cables are disconnected match the automatic failover operating conditions of Storage Cluster.
(For details, refer to *FUJITSU Storage ETERNUS DX S4/S3 series Hybrid Storage Systems, ETERNUS AF series, ETERNUS DX200F All-Flash Arrays Storage Cluster Function Guide*.)

b. Operation when the storage system is stopped

With the Storage Cluster function, automatic failover of the storage system occurs and the standby side ETERNUS DX200 S3 transitions to the Active state.

The Storage Cluster state can be checked from the [Storage Cluster] - [Overview] screen of ESF Web Console.

Before the storage system is stopped, the Primary side is "Active" and the Secondary side is in the "Standby" state.

When the storage system stops, the Primary side changes to "Unknown" and the Secondary side changes to "Active".



Name	Phase	Status	Local	Remote	Primary/Secondary	Active/Standby
tfo_group1	Normal	Normal	Primary	DX8092_PH	Secondary	Standby

During an automatic failover, "Inconsistent" is displayed in [Phase] and [State].

When automatic failover is completed, "Failed over" is displayed in [Phase] and "Halt" is displayed in [State].

c. Effects of stopping the storage system and operation confirmation after a failover

Automatic failover of the storage system did not affect ESXi of the business server and the virtual machines.
Reading and writing to Windows general files performed normally after a failover.

This does not affect the WSFC of the management server.

Monitoring the storage system state using ETERNUS SF Web Console and the "agtpatrol" command has been successfully performed.

d. Storage system recovery method

Connect the LAN cables and the FC cables that were disconnected in step a to their original ports.

On the [Disk Array] screen of ESF Web Console, confirm that the status of the stopped storage system is displayed as "Normal".

Confirm that the storage system failback preparations are completed from the [Storage Cluster] - [Overview] screen of ESF Web Console.

If "Failback Ready" is displayed in [Phase], a failback can be performed.

Click the [Action] - [Failback] button in the right pane to perform a manual failback.

On the [Storage Cluster] - [Overview] screen, confirm that the failback is completed.

Confirm that "Normal" is displayed in [Phase] and [Status] and that the Primary storage system and the Secondary storage system are respectively in "Active" status and "Standby" status.

(2) Simultaneously stopping the primary storage system and primary business server

a. Method to stop the storage system and business server

Perform a test stop of the ETERNUS DX200 S3 in the same manner as in "(1) Storage system stop event verification".

At the same time, stop the business server by pressing the power button of PRIMERGY.

b. Operation when the storage system and the business servers are stopped

With the Storage Cluster function, automatic failover of the storage system occurs and the standby side ETERNUS DX200 S3 transitions to the Active state.

For the business servers, the virtual machines are moved to another ESXi and the guest OS is started by the vSphere HA function.

c. Effects of stopping the storage system and business servers, and operation confirmation after the failover

There was no effect on the machines available for an ESXi transfer and the guest OS startup due to the automatic failover of the storage system.

Reading and writing general files of Windows performed normally after the guest OS started.

d. Method to recover the storage system and business server

For a recovery from the stopped state of the storage system and for a manual failback, perform the same operation as in "(1) Storage system stop event verification".

For the business server, turn on the stopped PRIMERGY server and confirm that the ESXi host has started normally with vSphere Web Client.

(3) Stop the primary management server

a. Stopping method

Stop the management server by shutting down Windows.

b. Operations when the management server is stopped

With the WSFC function, the owner of the role for ESF Manager is moved to the management server on the Secondary side.

Before the management server stops, the hostname of management server #1 is displayed as the role owner node on the [Failover Cluster Manager] screen.

After stopping management server #1, confirm that the hostname of management server #2 is displayed as the role owner node on the [Failover Cluster Manager] screen of management server #2 and that all the resources under the role are displayed as "Online".

c. Effects of stopping the management server and operation confirmation after a failover

The ESF Web Console connection has been disconnected because the management server is stopped.

A Login can be performed again by accessing the URL of ESF Web Console after the role owner of ESF Manager is moved.

After the "ETERNUS SF Storage Cruiser Agent" service is started, the "agtpatrol" command is issued to confirm that the storage system monitoring is operating normally.

d. Recovery method of the management server

Turn on the stopped PRIMERGY server.

After starting Windows server, move the role for ETERNUS SF Manager to the primary node on the [Failover Cluster Manager] screen.

4.12.2. Verification Result

As a result, operations in the non-stop storage system environment and the storage system were verified to continue when the system of the primary node is stopped.

In addition, the operation was verified to continue even when the business server and the storage system of the primary node stop simultaneously.

Distribution of business servers and storage systems is effective in preventing problems for racks and server rooms.

Contact

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