FUJITSU Storage ETERNUS AF, ETERNUS DX

Configuration Guide -Server Connection-



(iSCSI) for VMware[®] ESX



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This manual briefly explains the operations that need to be performed by the user in order to connect an ETERNUS AF/DX to a server running VMware ESX using iSCSI Software Initiator or iSCSI Hardware Initiator via an iSCSI interface.

This manual should be used in conjunction with any other applicable user manuals, such as those for the ETERNUS AF/DX, server, OS, adapters, and drivers.

Use the default values for parameters that are not described in this manual.

Refer to "Configuration Guide -Server Connection- Notations" for the notations used in this manual such as product trademarks and product names. For storage systems that are supported by the OS, refer to the Server Support Matrix of the ETERNUS AF/DX.

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The Contents and Structure of this Manual

This manual is composed of the following seven chapters.

"Chapter 1 Workflow" (page 6)

This chapter describes how to connect the ETERNUS AF/DX storage systems to a server running VMware ESX.

"Chapter 2 Checking the Server Environment" (page 8)

This chapter describes which servers can be connected to ETERNUS AF/DX storage systems.

"Chapter 3 Notes" (page 9)

This chapter describes issues that should be noted when connecting the ETERNUS AF/DX storage systems and server.

• "Chapter 4 Setting Up the ETERNUS AF/DX" (page 20)

This chapter describes how to set up the ETERNUS AF/DX storage systems using ETERNUS Web GUI.

- "Chapter 5 Setting Up the VMware ESX Server" (page 21) This chapter describes how to set up the VMware ESX server.
- "Chapter 6 Virtual Machine" (page 60)

This chapter describes how to operate the Virtual Machine.

• "Chapter 7 Dynamic Recognition of LUNs Added While VMware ESX is in Use" (page 66) This chapter describes dynamic recognition of LUNs added while VMware ESX is in use.

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Chapter 1 Workflow

1.1 For the ETERNUS AF/DX

This section describes how to connect the ETERNUS AF/DX storage systems to a server running VMware ESX. The workflow is shown below.

Required Documents

- "Server Support Matrix"
- "Configuration Guide -Server Connection- Storage System Settings" that corresponds to the ETERNUS AF/DX to be connected
- "ETERNUS Web GUI User's Guide"
- Manuals supplied with the server and LAN card

Workflow

Setting Up the ETERNUS AF/DX

Set the various parameters required to operate the ETERNUS AF/DX.

- "Chapter 4 Setting Up the ETERNUS AF/DX" (page 20)
- Checking the ETERNUS Web GUI operational procedures
 - "ETERNUS Web GUI User's Guide"
- Setting up the ETERNUS AF/DX
 - "Configuration Guide -Server Connection- Storage System Settings" that corresponds to the ETER-NUS AF/DX to be connected
 - \bigtriangledown



Setting Up the VMware ESX Server

Install the LAN card or the CNA card in the server and then set up the VMware ESX server to recognize LUNs.

• "Chapter 5 Setting Up the VMware ESX Server" (page 21)



3

Starting the Virtual Machine

Notes on Virtual Machine operation and related settings are given in this manual and other documents.

• "Chapter 6 Virtual Machine" (page 60)

Chapter 2 Checking the Server Environment

Connection to servers is possible in the following environments. Check the "Server Support Matrix" for server environment conditions.

2.1 Hardware

- VMware ESX connection requires the use of LAN switches.
- Access the following documents or use the "Server Support Matrix" to determine which models are compatible with which servers.
 - Search the VMware Compatibility Guide

https://www.vmware.com/resources/compatibility/search.php

2.2 LAN Cards and CNA Cards

Refer to the "Server Support Matrix".

2.3 Connection Compatibility of ETERNUS AF/DX Storage Systems to VMware ESX

Use the following URL to determine which ETERNUS AF/DX models may be connected to VMware ESX:

 Search the VMware Compatibility Guide https://www.vmware.com/resources/compatibility/search.php

2.4 Virtual Machine

Virtual Machine is a virtual machine created on the VMware ESX server.

Details of how to install an OS on the VMware ESX Virtual Machine may be checked via the following URL: https://partnerweb.vmware.com/GOSIG/home.html

Chapter 3 Notes

Note the following issues when connecting the ETERNUS AF/DX to a server.

3.1 Connection Notes

To ensure reliable access to the ETERNUS AF/DX storage systems, the following methods are recommended:

- VMware multipath plug-in
- Connection via multiple paths
- Balancing of active paths



Setting up multiple access paths between the server and the ETERNUS AF/DX creates a multipath configuration. A multipath configuration provides improved access redundancy.

For VMware multipath plug-in details, refer to "3.9 VMware Multipath Plug-in" (page 16).

The recommended "Path Selection Policy" setting is as follows:

- For VMware vSphere

"RoundRobin (VMware)"

However, when Windows Server Failover Clustering is used in virtual machines and VMware vSphere 5.1 Update 2 or earlier is used, set to "Most Recently Used (MRU)". For more details, refer to the VMware web-site for KB1010041.

3.1.1 For VMware vSphere

Dedicated IP addresses must be allocated to the iSCSI LAN. An IP address must be allocated to each VMkernel that corresponds to an iSCSI Initiator, and the VMkernel must be connected to either a LAN card or a CNA card via a virtual switch.

For the ETERNUS AF/DX

For example, a total of four IP addresses are required by the following iSCSI connection setup.

Example connection configuration



3.2 VMware ESX Operating Notes

- Refer to the following web-site for the number of LUNs that VMware ESX can recognize. https://www.vmware.com/support/pubs/
- When Windows[®] is used on the Virtual Machine, the registry will need to be modified after Windows[®] is installed. For details, refer to "Chapter 6 Virtual Machine" (page 60).
- The VMware ESX multipath function supports path failover, meaning that server access can continue unaffected by any problems that might arise in the iSCSI cables or LAN switches. It should be noted that path failover can fail to occur when multiple SCSI sense codes are repeatedly and simultaneously received.
- ETERNUS Multipath Driver and GR Multipath Driver do not need to be installed on a VMware ESX Virtual Machine. The multipath function of VMware ESX provides path redundancy.

3.3 ETERNUS AF/DX Setup Notes

- When connecting a VMware ESX server to the ETERNUS AF/DX, check that the firmware version is as specified in the "Server Support Matrix".
- When LUNs are shared among multiple physical servers (in a VMotion configuration, for example), an Affinity Group mapping should be used to ensure that each shared LUN is assigned the same LUN number across every physical server.
- When connecting to VMware ESX with multiple paths sharing a single LUN, a Reset Group setting is required for the ETERNUS AF/DX device.
- Details of dynamic recognition of LUNs added while VMware ESX is running are given in the "Chapter 7 Dynamic Recognition of LUNs Added While VMware ESX is in Use" (page 66).

3.4 SAN Boot Notes

The ETERNUS AF/DX storage systems do not support SAN Boot when they are connected via iSCSI Software Initiator.

3.5 Server Startup and Power Supply Control Notes

Before turning the server on, check that the ETERNUS AF/DX storage systems and LAN switches are all "Ready". Specifically, check that the Ready LED is lit for ETERNUS AF/DX storage systems. If the server is turned on and they are not "Ready", the server will not be able to recognize the ETERNUS AF/DX storage systems.

Also, when the ETERNUS AF/DX power supply is being controlled by a connected server, make sure that the ETERNUS AF/DX does not shut down before the connected servers. Similarly, the LAN switches must also be turned off after the connected servers have been shut down. If turned off, data writes from the running server cannot be saved to the ETERNUS AF/DX storage systems, and already saved data may also be affected.

3.6 LAN Environment Notes

• Configure the iSCSI LAN as a dedicated LAN that is separate from the business LAN or the management LAN by segmenting the IP address.

Example:

IP address of the LAN for iSCSI: 192.168.10.x/24

IP address of the business/management LAN: 192.168.70.y/24

The iSCSI LAN and the business/management LAN must be configured with different network addresses (up to the value "192.168.10.") as shown in the above example.

If it is not a dedicated LAN, the following may occur.

- Processes may be delayed in the LANs due to traffic conflicts.
- In terms of security, SAN data may leak or the iSCSI port may hang due to DoS attacks.
- iSCSI LAN redundancy is achieved by the use of multipaths. The LAN must be configured as a dedicated LAN for each path from a server to the ETERNUS AF/DX.
- When using the Storage Cluster function in an iSCSI Software Initiator environment, set IP address of the iSCSI initiator port of the server and the iSCSI target port of the ETERNUS AF/DX on different subnets.



Example of a LAN switch connection configuration

- *1: "iSCSI ports" indicate LAN cards and CNA cards.
- *2: In this system configuration, multipaths provide redundant connections between the servers and storage system. LAN switches #1 and #2 provide physical separation of the network paths.
- *3: A separate LAN segment is provided in the LAN switch (using the switch VLAN function) for each grouping of business servers and storage systems (equivalent to the FC zones).

Example of a network address configuration

The following example shows a configuration in which multiple servers are connected to multiple CAs.



The following example shows a configuration in which a single server is connected to multiple CAs.



The following example shows a configuration in which the Storage Cluster function is used in an iSCSI Software Initiator environment.

3.7 Jumbo Frame Setting Notes

- To enable Jumbo Frame, all the connected devices must support Jumbo Frame. Set the appropriate values for various parameters (such as the MTU size) on each connected device.
- For details about how to set Jumbo Frame for a LAN card and LAN switch, refer to the VMware ESX manuals and each device's manuals. Rebooting the server may be required to apply the new settings.
- The MTU size that is supported by the ETERNUS AF/DX is 9,000 bytes.

3.8 LAN Switch Setting Notes

When using a LAN switch that supports the flow control function, disable the flow control function according to the following notes:

- For access paths that use iSCSI, disable the flow control function on the sending and receiving ends of the port.
- When a cascade connection is used to connect to LAN switches, disable the function for the LAN switch that is directly connected to the ETERNUS AF/DX.

For details on how to set the flow control function of the LAN switch, refer to the LAN switch manual.

3.9 VMware Multipath Plug-in

For improved system reliability, installing the VMware multipath plug-in for the ETERNUS AF/DX is recommended. The VMware multipath plug-in for the ETERNUS AF/DX can prevent access from being stopped when a path fails by optimizing the VMware multipath's path fail-over function for the ETERNUS AF/DX. For setting details, refer to "5.1.2.7 Plug-in Settings" (page 50).

For details on how to obtain VMware Multi-Pathing plug-in for ETERNUS, contact your sales representative.

3.10 Connection Notes for VMware ESX Servers

When file copy and other operations are performed for a disk device that is connected with iSCSI, a problem may occur in the read or write performance of the VMware ESX server.

This problem can be prevented by disabling the Delayed ACK. For more details, refer to the VMware web-site for KB2080851.

3.11 iSCSI Name Notes

When changing the iSCSI Name of the iSCSI initiator, do not use an iSCSI Name that is used by another host.

3.12 Notes on Direct Connections

Refer to "Configuration Guide -Server Connection-" that corresponds to the guest OS when connecting the guest OS directly to the storage system via a vNIC.

3.13 VMware vSphere Virtual Volumes (VVOL) Notes

In a WOL environment, RHEL 6.4 may become unable to mount its swap space.

As a result, the swap space mounting process during the virtual machine startup becomes stagnated and prevents RHEL 6.4 from booting.

• Event Cause

This problem always occurs when all of the following conditions are met.

- The ETERNUS DX S4/S3 series or the ETERNUS AF series is used with firmware version V10L70 or later and earlier than V10L80
- The connected server is running VMware vSphere 6.5 and is configured with a VVOL environment
- The virtual machine hardware version is 13
- The OS of the virtual machine is RHEL 6.4
- The swap space is created in a physical volume (*1) using the RHEL6.4 side settings Example:

 $/dev/sda1 \rightarrow /boot$

 $/dev/sda2 \rightarrow /swap$

- ***1:** The swap space is created in the LVM volume during a default installation, so this problem does not occur.
- Coping Method
 - If a different firmware version can be applied to the ETERNUS DX S4/S3 series or the ETERNUS AF series Apply firmware version V10L80 or later.
 - If a different firmware version cannot be applied to the ETERNUS DX S4/S3 series or the ETERNUS AF series The system administrator must perform one of the following operations and then restart the virtual machine.
 - Change the virtual machine hardware version to a version other than 13
 - Update RHEL 6.4
 - Create a swap space in the LVM logical volume
 - Change the virtual machine environment from a VVOL environment to a VMFS environment

3.14 Notes on Startup Failures for Windows[®] Virtual Machines using EFI

If a SCSI command that exceeds the maximum I/O size set in the ETERNUS AF/DX is sent from the VMware EFI firmware, Windows[®] virtual machines fail to start up.

This is because the value of the maximum I/O size set in the VMware EFI firmware differ from the ETERNUS AF/DX.

To avoid this problem, change the value of Disk.DiskMaxIOSize to 7992.

For more details, refer to the VMware web-site for KB2146167.

3.15 Notes Related to Virtual Machines That Use RDM

For specific virtual machines that use Raw Device Mapping (RDM), instead of using SCSI INQUIRY data cached by ESXi, SCSI INQUIRY information must be acquired from the LUN.

Problem

Specific guest OSs or applications running in a virtual machine that uses RDM may behave unexpectedly.

Cause

This behavior may be caused by cached SCSI INQUIRY data that interferes with specific guest OSs and applications.

When ESXi initially connects to the target storage system, the SCSI INQUIRY command is issued to acquire the basic identification data from the storage system. By default, even after ESXi caches the received SCSI INQUI-RY data (standard, page 80, and page 83), the data does not change. Responses to subsequent SCSI INQUIRY commands are returned from the cache.

However, for specific guest OSs running on virtual machines that use RDM, instead of using SCSI INQUIRY data cached by ESXi, the LUN must be queried. In this case, the virtual machine can be configured to ignore the SCSI INQUIRY cache.

• Example Configuration Method

Virtual machines can be set to ignore the SCSI INQUIRY cache with the following method.

```
# esxcli storage core device inquirycache set --device device id --ignore true
```

- Because it is configured at the host level, there is no hardware version limit for the virtual machines.
- The virtual machines do not need to be rebooted.
- How to Revert the Setting

The setting can be reverted with the following method.

```
# esxcli storage core device inquirycache set --device device id --ignore false
```

An example of when the setting must be changed is shown below. The setting can be changed without problems even if it is not applicable.

- When performing a change of the connection CA port
- When performing a RAID migration

For details, refer to the following document.

https://docs.vmware.com/en/VMware-vSphere/7.0/com.vmware.vsphere.storage.doc/ GUID-2852DA1C-507B-4B85-B211-B5CD3C8DC6F2.html

Chapter 4 Setting Up the ETERNUS AF/DX

Set up the ETERNUS AF/DX storage systems using ETERNUS Web GUI.

ETERNUS AF/DX setup can be performed independently of server setup. For details on how to perform these settings, refer to the following manuals.

- "Configuration Guide -Server Connection- Storage System Settings" that corresponds to the ETERNUS AF/DX to be connected
- "ETERNUS Web GUI User's Guide"

Chapter 5 Setting Up the VMware ESX Server

This chapter describes settings related to the server iSCSI interface.

The screenshots used in this chapter are of vSphere Web Client or vSphere Client. The layouts and menu items differ depending on the version of ESXi and the client that is being used.

5.1 When VMware vSphere Is Used (with iSCSI Software Initiator)

Set up the VMware ESX server using the vSphere Web Client or the vSphere Client. The procedures described here are based on the following multipath configuration.

• For the ETERNUS AF/DX

For example, a total of four IP addresses are required by the following iSCSI connection setup.

Example connection configuration

5.1.1 When VMware vSphere 6.0 or later Is Used

5.1.1.1 Turning on the Devices

To turn on the connected devices, use the following procedure:

Procedure

- 1 Turn on the LAN switch power.
- 2 Check that the LAN switch's Ready (or equivalent) LED is lit.
- 3 Turn on the ETERNUS AF/DX.
- 4 Check that the ETERNUS AF/DX is "Ready".
- 5 Turn on the server.

End of procedure

5.1.1.2 Checking the LAN Cards

Procedure

- 1 Log in to the vSphere Web Client and select in order, [Hosts and Clusters] > target host.
- Select in order, the [Manage] tab > [Networking] > [Physical adapters].
 "vmnic4" and "vmnic5" in the following example.

Getting Started Summary Monitor Manage Related Objects								
Settings Networking Storage Alarm Definitions Tags Permissions								
44 Physical adapters								
Virtual switches	😟 🔂 🗈 -	Q Filter	•					
Vilikernel adapters	Device Actual Speed	Configured Speed Switch	*					
Physical adapters	Intel Corporation 1350 Gigabit Network Connection							
TCP/IP configuration	💌 vmnic4 1000 Mb	Auto negotiate						
Advanced	💌 vmnic5 1000 Mb	Auto negotiate						
	Intel Corporation 82575EB G	igabit Network Connection						
	💌 vmnic0 1000 Mb	Auto negotiate vSwitch0						
	💌 vmnic1 Down	Auto negotiate	Ŧ					
	 ▲ 		Þ.					

End of procedure

5.1.1.3 Creating the Virtual Switches

Add two virtual switches (vSwitch) for iSCSI to VMware ESX. Add a "VMkernel" and a "vmnic" for each vSwitch. Perform the following procedure to each vmnic that configures iSCSI SAN.

5.1.1.3.1 When Using vSphere Standard Switches

Procedure

- 1 Log in to the vSphere Web Client and select in order, [Hosts and Clusters] > target host.
- 2 Select in order, the [Manage] tab > [Networking] > [Virtual switches].
- 3 Select [Add host networking] in the right pane.

If the [Add Networking] pop-up window is displayed, add the network by following the instructions that are displayed.

Getting St	tarted Sumi	mary Mo	onitor	Manage	Related	d Objects
Settings	Networking	Storage	Alarn	n Definitions	s Tags	Permissions
44	1 it - b		Virte	ual switche	s	
Virtua VMke	n switches	;	Swi		t netwo	
Physi	cal adapters		뒥	vSwitch0	i netwo	i king

- (1) Select [VMkernel Network Adapter] and click the [Next] button.
- (2) Select [New Standard switch] and click the [Next] button.
- (3) Select the target NIC from [Active adapters] in [Add adapters] in the right pane and click the [Next] button.
- (4) Configure the port as required and click the [Next] button.
- (5) Set the IP address and subnet mask of [VMkernel], and click the [Next] button.
- (6) Confirm the settings and click the [Finish] button.
- 4 Repeat Step 3 to add Virtual Switch vSwitch2.

5 Confirm that a Virtual Switch and a VMkernel are set for each vmnic.

	Aarm Definitions Tags Permissions	
	Virtual switches	
Virtual switches	2 😥 🕼 🖄 🗠 🖌 🕄 🕄	
VMkernel adapters	Switch	Discovered Issues
Physical adapters	1 vSwitch0	
TCP/IP configuration	1 vSwitch1	-
Advanced		
	Standard switch: vSwitch1 (VMkernel)	
	/ ×	c
		Physical Adapters wmnic4 1000 Full

End of procedure

5.1.1.3.2 When Using vSphere Distributed Switches

Procedure

- 1 Create a vSphere Distributed Switch.
 - (1) Log in to the vSphere Web Client and select in order, [Home] > [Networking].
 - (2) Right-click [Datacenter] in the left pane and select in order, [Distributed Switch] > [New Distributed Switch].

When a configuration pop-up window is displayed, set a vSphere Distributed Switch by following the displayed instructions.

- (i) Enter a vDS name and click the [Next] button.
- (ii) Select an appropriate vSphere Distributed Switch version for each host version and click the [Next] button.
- (iii) Set the number of physical ports and the port group names that are used, and click the [Next] button.
- (iv) Confirm the settings and click the [Finish] button.

(3) Confirm that [DSwitch] has been created under [Datacenter].

- (4) If multiple vSphere Distributed Switches are required, repeat Step (2).
- 2 Set a VMkernel in vSphere Distributed Switch for each host.
 - (1) Log in to the vSphere Web Client and select in order, [Home] > [Networking].
 - (2) Move to [Datacenter] and click [DSwitch].
 - (3) Select in order, the [Manage] tab > [Settings] > [Topology].
 - (4) Click [Add hosts to this distributed switch..].

Getting Started Summary	Monitor Manage	Related Objects		
Settings Alarm Definitions	Tags Permissions	Network Protocol Profiles	Ports	Resource Allocation
	2 🚯 🐢	6	(overv	iew) 🔹 💐 🖓 🕻
Properties				
Topology	BPort Mic	I hosts to this distributed irate physical or virtual ne	i switci etwork	tch-DVUplinks-62
LACP	VLAN ID ada	apters.		plink 1 (0 NIC Adapters)
Private VLAN	Virtual Mach	nines (0)		
NetFlow				
Port mirroring				
Health check				

- (i) Select [Add host and manage host networking(advanced)] and click the [Next] button.
- (ii) Click [New hosts..], select the host to use the DSwitch, and click the [OK] button.
- (iii) Click the [Next] button.
- (iv) Select [Manage physical adapters] and [Manage VMkernel adapters], and then click the [Next] button.
 - 1 Select the target vmnic and click [Assign uplink].

1 Select task Manage physical network adapters Add or remove physical network adapters to this distributed switch										
2 Select hosts										
3 Select network adapter tasks	adap	oter 🐚 Reset changes 🚯 Viev	vsettings							
4 Manage physical network	Host/Physical Network Adapters	1 🛦 In Use by Switch	Uplink	Uplink Port Group						
Manage VMkernel network										
5 adapters	On this switch									
6 Analyze impact	✓ On other switches/unclaimed									
7 Ready to complete	对 vmnic0	vSwitch0								
	vmnic1									
	per vmnic2									
	vmnic3			-						
	对 vmnic4			-						
	pm vmnic5	-		-						

2 Click [OK] in the pop-up window.

Confirm that the selected vmnic has been set for [Uplink Port Group] and click the [Next] button.

🕞 Add and Manage Hosts				?						
 ✓ 1 Select task ✓ 2 Select hosts 	Manage physical network adapters Add or remove physical network adapters to this distributed switch.									
✓ 3 Select network adapter tasks										
4 Manage physical network	Host/Physical Network Adapters	1 🛦 In Use by Switch	Uplink	Uplink Port Group						
Manage VMkernel network										
5 adapters										
6 Analyze impact	vmnic5 (Assigned)		Uplink 1	DSwitch-DVUplinks-62						
7 Ready to complete	 On other switches/unclaimed 									
	对 vmnic0	vSwitch0	-							
	📷 vmnic1									
	对 vmnic2	-	-							
	对 vmnic3		-							
	对 vmnic4	-	-	-						

3 Select [On this switch] and click [New adapter].

~	1 Select task	Manage VMkernel network adapters								
~	2 Select hosts	Manage and assign vivikernel network adapters to the distributed switch.								
~	3 Select network adapter tasks	🗵 Assign port grou 🗲 New adapt	er DEdit adapter 💥 Remove 1	🝙 Reset changes 🛭 🚯 View set	ttings					
1	. Manage physical network									
τ.	4 adapters	Host/VMkernel Network Adapters	1 🛦 In Use by Switch	Source Port Group	Destination Port Group					
Ì	4 adapters Manage VMkernel network	+ Inst/Vilkernel Network Adapters	1 A In Use by Switch	Source Port Group	Destination Port Group					
Ì	⁴ adapters 5 Manage VMkernel network adapters	Hos/VMkernel Network Adapters T 192.168.77.30 On this switch	1 🛦 In Use by Switch	Source Port Group	Destination Port Group					
	adapters Manage VMkernel network adapters Analyze impact	Host/VMkernel Network Adapters	1 A In Use by Switch	Source Port Group	Destination Port Group					

- 4 Perform the settings in the VMkernel configuration pop-up window.
 - (1) Select the DPortGroup that was created with [Browser] by selecting [Select an existing network].
 - (2) Configure the port as required and click the [Next] button.
 - (3) Set the IP address and click the [Next] button.
- 5 Confirm that "DSwitch" and "DPortGroup" have been set for vmk1 in [On this switch], and then click the [Next] button.

- (v) Confirm that "No impact" is displayed for [Overall impact status] and click the [Next] button.
- (vi) Confirm the settings and click the [Finish] button.

(5) Confirm that the VMkernel port has been created by clicking the [Manage] tab > [Networking] > [Virtual switches] from the vSphere Web Client.

End of procedure

5.1.1.4 Setting the Software Initiator

Enable Software Initiator in VMware ESX.

Procedure

- 1 Log in to the vSphere Web Client and select in order, [Hosts and Clusters] > target host.
- 2 Select in order, the [Manage] tab > [Storage] > [Storage Adapters].
- 3 Select the [iSCSI Software Adapter] item.
- 4 Check the iSCSI Name that is displayed in [Adapter Details].
- 5 Select the [Targets] tab in [Adapter Details].
- 6 Click [Add] in [Dynamic Discovery].
- 7 Enter the IP address for the iSCSI port of the connected ETERNUS AF/DX in the [iSCSI Server] column, confirm that the port is set to "3260" (default), and click the [OK] button.
- 8 Confirm that the IP address for the iSCSI port of the ETERNUS AF/DX is displayed as follows.

Getting St	arted Sumr	mary Mo	nitor Manage	Relate	d Objects			
Settings	Networking	Storage	Alarm Definition	is Tags	Permiss	ions		
44			Storage Adapt	ers				
Stora	ge Adapters		+ 🔂 🚨	0	- 🗊		Q Filter	•
Stora	Storage Devices		Adapter		Туре	Status	Identifier	-
Host (Cache Configu	ration	🚱 vmhba2		SCSI	Unkn		
Proto	col Endpoints		iSCSI Softwa	re Adapt	er			
			🚱 vmhba34		ISCSI	Online	ign.1998-01.com.vmware:rx300s6-10-69ea3022	::
			4		::		•	•
				-				
			Adapter Detail	\$				
			Properties	Devices	Paths	Targets	Network Port Binding Advanced Options	
			Dynamic	Discovery	Static D	iscovery		
						Add	Remove Authentication Advanced	
			iSCSI server					
			192.168.1	0.129:326	0			
			192.168.2	0.130:326	30			

9 If the connected ETERNUS AF/DX uses multiple iSCSI ports, repeat the IP address addition process for each iSCSI port. (Repeat Step 6 through Step 8.)

End of procedure

5.1.1.5 Checking the LUNs

The following procedure describes how to check LUN recognition using the vSphere Web Client.

Log in to VMware ESX from the vSphere Web Client, and then check whether the ETERNUS AF/DX LUNs are recognized.

The procedure is as follows:

Procedure

- 1 Log in to the vSphere Web Client and select in order, [Hosts and Clusters] > target host.
- 2 Select in order, [Manage] > [Storage] > [Storage Adapters].
- 3 Select [Rescan...].

O Note

After selecting [Rescan...], the VMware ESX should attempt to recognize the ETERNUS AF/DX storage systems' LUNs again.

4 Select the iSCSI Software Adapter (vmhba34 in this example) from the [Storage Adapters] area. In the [Devices] tab in the [Adapter Details] area, the recognized devices are shown as follows.

Getting Started Summary Mo	nitor Manage Related Objects		
Settings Networking Storage	Alarm Definitions Tags Permissions		
	Storage Adapters		
Storage Adapters	+ 🛃 🔲 📴	Q Filter	•)
Storage Devices	Adapter Type Status Identifier		
Host Cache Configuration	SCSI Unkn		
Protocol Endpoints	iSCSI Software Adapter	_	::
<	I& vmhba34 iSCSI Online iqn.1998-01.cor	m.vmware:rx300s6-10-69ea3022	
	Image: A state of the state		Þ
	Adapter Details		
	Properties Devices Paths Targets Network Port B	Binding Advanced Options	
		Q Filter -	.)
	Name	Type Capacity Op	
	FUJITSU iSCSI Disk (naa.6000b5d0006a000006a0b	disk 100.00 GB At	tta
	FUJITSU iSCSI Disk (naa.6000b5d0006a000006a0b	disk 200.00 GB At	tta
	FUJITSU iSCSI Disk (naa.6000b5d0006a000006a0b	disk 5.00 GB At	tta
	FUJITSU iSCSI Disk (naa.6000b5d0006a000006a0b	disk 5.00 GB At	tta
	4		
	,		

5 Check [Path Selection Policy] for all the LUNs in the ETERNUS AF/DX.

When the VMware ESX server recognizes the LUNs, the active path for each LUN is automatically set. Even though [Path Selection Policy] is set to [Most Recently Used (VMware)], changing the [Path Selection Policy] for all the LUNs to [Round Robin (VMware)] is recommended.

Getting S	tarted Summ	nary Mo	nitor Ma	nage	Related	d Obje	ects						
Settings	Networking	Storage	Alarm De	finitions	Tags	Perr	mission	s					
44			Storage	Devices	5								
Stora	ge Adapters		C	Eð	Eð Al	j) 🧯	0	F 💻	-		ilter		•)
Stora	ge Devices		Name				Туре	Сарас	Operation	Hardware Acc	Drive T	Transport	
Host	Cache Configu	ration	Local L	SI Disk	(naa.60	03	disk	136	Attached	Not suppo	HDD	Parallel	-
Proto	col Endpoints		Local T	EAC CE)-ROM (r	m	cdr		Attached	Not suppo	HDD	Block A	
			FUJITS	U iSCSI	Disk (n	аа	disk	5.00	Attached	Supported	HDD	iSCSI	::
			FUJITS	U iSCSI	Disk (n	aa	disk	200	Attached	Supported	HDD	iSCSI	
			FUJITS	U iSCSI	Disk (n	aa	disk	5.00	Attached	Supported	HDD	iSCSI	Ŧ
			Device D	etails rties	Paths				=				
			► Logical Partitions 0									•	
			Multipathing Policies Edit Multipathing										
		<	Pa	th Sele	ction Pol	licy	Rou	nd Robin	(VMware)	>			
			St	orage Ai	rray Type	e Poli	cy VMW	/_SATP_/	ALUA				•

🔵 Note

The vSphere command line can also be used to change the [Path Selection Policy] settings. For more details, refer to the VMware web-site for KB2000552. If a modification method for the relevant version is not described, modify the setting with the ESXi 5.x method.

6 For a multipath configuration, confirm that the paths of all the LUNs in the ETERNUS AF/DX are configured with multipath.

When paths for a LUN are configured with multipath, multiple Runtime Names and Targets are displayed in [Paths].

Getting Started Summary Mo	nitor Manage Related	d Objects					
Settings Networking Storage	Alarm Definitions Tags	Permissions					
	Storage Devices						
Storage Adapters		i) 🥝 🔘 F	. b	• QF	ilter	-)
Storage Devices	Name	Туре Сарас	Operatio	Hardware Ac	Drive T	Transport	Á
Host Cache Configuration	FUJITSU iSCSI Disk (n	disk 100.	Attached	Supported	HDD	iSCSI	:: *
Protocol Endpoints			=				
	Device Details						
	Properties Paths						
	Enable Disal	ble					
	Runtime Name	Status	Device			Target	
	vmhba34:C0:T1:L0	Active (I/O)	FUJITSU iS	CSI Disk (naa	.6000	iqn.2000-0	
	vmhba34:C0:T0:L0	Active (I/O)	FUJITSU iS	CSI Disk (naa	.6000	iqn.2000-0	

End of procedure

5.1.1.6 Setting CHAP Authentication

Log in to VMware ESX from the vSphere Web Client, check whether the ETERNUS AF/DX LUNs have been recognized, and then enable the CHAP authentication.

The procedure is as follows:

Procedure

- 1 Log in to the vSphere Web Client and select in order, [Hosts and Clusters] > target host.
- 2 Select in order, [Manage] > [Storage] > [Storage Adapters].
- 3 Select the target iSCSI Software Adapter.
- 4 Click [Edit] in [Authentication] that is displayed in the lowest part of the [Properties] tab in the [Adapter Details] area.

Getting Started Summary Mor	nitor Manage Related Objects	
Settings Networking Storage	Alarm Definitions Tags Permissions	
••	Storage Adapters	
Storage Adapters	+ 🕫 💷 📴 🛛 🗳 🕶	Q Filter
Storage Devices	Adapter Type Status Identifier	
Host Cache Configuration	SCSI Unkn	
Protocol Endpoints	iSCSI Software Adapter	
	wmhba34 iSCSI Online iqn.1998-0	l.com.vmware:rx300s6-10-69ea3022 👻
		4
	Adapter Details	
	Properties Devices Paths Targets Network	Part Binding Advanced Options
	Properties Devices Patils Talgets Network	Advanced Options
	iSCSI Name iqn.1998-01.com.vmware:rx3003	s6-10-69ea3022
	iSCSI Alias	
	Target Discovery Send Targets, Static Targets	
	,,,,,,,	
	Authentication	Edit
	Method None	
		•

5 Set CHAP.

• When setting Unidirectional CHAP

Select [Use unidirectional CHAP] for [Authentication Method:] and set an Outgoing CHAP name and an Outgoing CHAP secret.

😒 vmhba34 - Edit Authentication	?
The initiator uses these settings for authentication for all targets unless otherwise overrid specific target settings. Make sure that these parameters match on the storage side. Authentication Method: Use unidirectional CHAP	len by the
Outgoing CHAP Credentials (target authenticates the initiator)	
Name: 🔄 Use initiator name	
test	
Secret: **********	
Incoming CHAP Credentials (initiator authenticates the target)	
Name: 🔲 Use initiator name	
Secret:	
ОК	Cancel
	Cancel

• When setting Bidirectional CHAP

Select [Use bidirectional CHAP] for [Authentication Method] and set names and secrets for Outgoing CHAP and for Incoming CHAP.

🔄 vmhba	a34 - Edit Authentication	?
The initia specific f	ator uses these settings for authentication for all targets unless otherwise overriden by target settings. Make sure that these parameters match on the storage side.	the
Authentio	cation Method: Use bidirectional CHAP	•
Outgoing	g CHAP Credentials (target authenticates the initiator)	
Name:	Use initiator name	
	test	
Secret:	*********	
Incoming	g CHAP Credentials (initiator authenticates the target)	
Name:	Use initiator name	
	test	
Secret:	******	
	OK Can	cel

End of procedure

5.1.1.7 Plug-in Settings

Set up VMware Multi-Pathing plug-in for ETERNUS by following "Software Information", which is a manual that is provided with the VMware Multi-Pathing plug-in for ETERNUS.

5.1.1.8 Changing the Multipath Operation

If "VMware Multi-Pathing plug-in for ETERNUS" is not used, change the multipath operation as shown below. For more details, refer to the VMware web-site for KB2106770.

Procedure

1 Check the device name of all the LUNs in the ETERNUS AF/DX that is connected with VMware ESXi. Check "FUJITSU iSCSI Disk (naa.xxx)" in the following example.

```
# esxcli storage nmp device list | grep -E 'Device Display Name:'
Device Display Name: Local LSI Disk (naa.60030057013345401a6af1560de849bc)
Device Display Name: FUJITSU iSCSI Disk (<u>naa.6000b5d0006a0000006a0b9f01490000</u>)
Device Display Name: FUJITSU iSCSI Disk (<u>naa.6000b5d0006a0000006a0b9f014a0000</u>)
Device Display Name: Local MATSHITA CD-ROM (mpx.vmhba32:C0:T0:L0)
```

Note

When VMware vSphere Virtual Volumes (VVOL) is used, the Protocol Endpoints are displayed without displaying the Virtual Volumes. In Step 2, set the parameters for the Protocol Endpoints.

2 Change the multipath operation.

Use the following command to set parameters for all LUNs in the ETERNUS AF/DX.

```
# esxcli storage nmp satp generic deviceconfig set -c enable_action_OnRetryErrors -d naa.6000b5d0006a000006a0b9f
01490000
# esxcli storage nmp satp generic deviceconfig set -c enable_action_OnRetryErrors -d naa.6000b5d0006a000006a0b9f
014a0000
```

3 Confirm the settings.

Confirm that "action_OnRetryErrors=on" is included in "Storage Array Type Device Config" for the LUNs in the ETERNUS AF/DX.

```
# esxcli storage nmp device list | grep -E '(Device Display Name:|Storage Array Type Device Config:)'
Device Display Name: Local LSI Disk (naa.60030057013345401a6af1560de849bc)
Storage Array Type Device Config: SATP VMM_SATP_LOCAL does not support device configuration.
Device Display Name: FUJITSU iSCSI Disk (naa.6000b5d0006a000006a0b9f01490000)
Storage Array Type Device Config: {implicit_support=on; explicit_support=off; explicit_allow=on; alua_followov
er=on; action_OnRetryErrors=on; {TPG_id=32897, TPG_state=A0} {TPG_id=32896, TPG_state=A0} {TFG_id=32913, TPG_state=ANO
}{TPG_id=32912, TPG_state=ANO;}
Device Display Name: FUJITSU iSCSI Disk (naa.6000b5d006a000006a0b9f014a0000)
Storage Array Type Device Config: {implicit_support=on; explicit_support=off; explicit_allow=on; alua_followov
er=on; action_OnRetryErrors=on; {TPG_id=32897, TPG_state=A0} {TPG_id=32912, TPG_state=A0} {TPG_id=32912, TPG_state=ANO; }
[TPG_id=32912, TPG_state=ANO]}
Device Display Name: Local MATSHITA CD=ROM (mpx.vmhba32:C0:T0:L0)
Storage Array Type Device Config: SATP VMM_SATP_LOCAL does not support device configuration.
```

End of procedure

5.1.1.9 Changing the iSCSI QueueDepth Value

Execute the "esxcli" command to change the QueueDepth value. Set the QueueDepth value according to the queue depth.

Procedure

1 Execute the following command to change the QueueDepth value.

```
# esxcli system module parameters set -m iscsi_vmk -p iscsivmk_LunQDepth=<<u>(1)</u>>
```

Enter the following value in (1).

Software iSCSI Queue Depth param-	Setting value			
eter	When the WOL function is used	For conditions that are not described in the left column		
iscsivmk_LunQDepth	8	Arbitrary (*1)		

*1: Recommended value = (maximum number of simultaneous command processes per CA port) ÷ (number of servers connected to a single CA port) ÷ (number of LUNs)

(Round the result down to the nearest whole number)

• The maximum number of simultaneous command processes per CA port is as follows:

The value is used by multiple servers that share the CA port. The commands are processed until the limit is reached.

Model	Maximum number of simultaneous command pro- cesses
ETERNUS AF S3 series, ETERNUS DX S5 series, ETERNUS DX8900 S4	2048
Models other than the above	1024

- Use the value of "8" if the actual result is lower. Use the maximum value if the actual result exceeds the maximum value of the OS or the iSCSI QueueDepth.
- To achieve maximum system performance, this value can be changed according to the server load and the peak operating times.

The following example sets the Maximum Outstanding Disk Requests for virtual machines to 46.

```
# esxcli system module parameters set -m iscsi_vmk -p iscsivmk_LunQDepth=46
```

2 Reboot VMware ESXi.

reboot

3 After rebooting VMware ESXi, check the setting values.

```
# esxcli system module parameters list -m iscsi_vmk | grep iscsivmk_LunQDepth
iscsivmk_LunQDepth int 46 Maximum Outstanding Commands Per LUN
#
```

End of procedure

5.1.1.10 Setting The Maximum Number of Outstanding Disk Requests for Virtual Disks

If multiple virtual disks share a LUN, consider setting "No of outstanding IOs with competing worlds". For more details, refer to the VMware web-site for KB1268.

5.1.2 When VMware vSphere 5.5 or earlier Is Used

5.1.2.1 Turning on the Devices

To turn on the connected devices, use the following procedure:

Procedure

- 1 Turn on the LAN switch power.
- 2 Check that the LAN switch's Ready (or equivalent) LED is lit.
- 3 Turn on the ETERNUS AF/DX.
- 4 Check that the Ready LED is lit on the ETERNUS AF/DX.
- 5 Turn on the server.

End of procedure

5.1.2.2 Checking the LAN Cards

Procedure

- 1 Log in to VMware ESX from the vSphere Client and select the [Configuration] tab.
- Click [Network Adapters] in the [Hardware] list."vmnic0" and "vmnic1" in the following example.

End of procedure

5.1.2.3 Creating the Virtual Switches

Add two virtual switches (vSwitch) for iSCSI to VMware ESX. Add a "VMkernel" and "vmnic" for each vSwitch. Perform the following procedure to each vmnic that configures iSCSI SAN.

5.1.2.3.1 When Using vSphere Standard Switches

Procedure

- 1 Open the network window by selecting the [Configuration] tab on vSphere Client and click [Add Network] in the upper right of the window.
- 2 Select [VMkernel] and click the [Next] button.
- 3 Select the checkbox of the target network adapter and click the [Next] button.

Image: Window State 1000 Full None Image: Window State 1000 Full None Image: Window State down None Image: Window State Speed Networks Image: Window State 100 Full 192,168.0.1-192.1	
Image: Weight with the second secon	
Image: Window Window Mone Use v5witch0 Speed Networks Image: Window 100 Full 192.168.0.1-192.1	
Use vSwitch0 Speed Networks Image: wmnic2 100 Full 192.168.0.1-192.1	
🔲 📟 vmnic2 100 Full 192,168.0.1-192,1	
	168.255.254

- 4 Set properties of port groups as required, and click the [Next] button.
- 5 Set the IP address and subnet mask of "VMkernel", and click the [Next] button.

255 , 2	255 .	
		U
8 - 8	3	Edi
	pters	pters

6 Repeat Step 1 through Step 5 to add another virtual switch (vSwitch2).

7 Confirm that a virtual switch and VMkernel are set for each vmnic.

End of procedure

5.1.2.3.2 When Using vSphere Distributed Switches

Procedure

- 1 Create a vSphere Distributed Switch.
 - Log in to VMware ESX from the vSphere Client and select in order , [Home] > [Inventory] > [Net-working].

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(2) Right-click [Datacenter] in the left pane and select [New vSphere Distributed Switch].

(3) Select an appropriate vSphere Distributed Switch version for each host version and click the [Next] button.

Select vSphere Distributed Swit Specify vSphere distributed swit	ch Version vSphere Distributed Switch Version: 3 ch version.
elect VDS Version eneral Properties dd Hosts and Physical Adapters eady to Complete	vSphere Distributed Switch Version vSphere Distributed Switch Version: 4.0 This version is compatible with VMware ESX version 4.0 and later. The features supported by later vSphere distributed switch versions will not be available. vSphere Distributed Switch Version: 4.1.0 This version is compatible with VMware ESX version 4.1 and later. The following new features are available: Load-Based Teaming and Network I/O Control. vSphere Distributed Switch Version: 5.0.0 This version is compatible with VMware ESX version 5.0 and later. The following new features are available: User-defined network resource pools in Network I/O Control, NetFlow and Port Mirroring. vSphere Distributed Switch Version: 5.1.0 See the Whware documentation for a list of compatible VMware ESX version and supported features for this version of the vsphere distributed switch.
	• vSphere Distributed Switch Version: 5.5.0 See the VMware documentation for a list of compatible VMware ESX version and supported features for this version of the vSphere distributed switch.

(4) Set a vDS name and the number of physical ports that are used and click the [Next] button.

Create vSphere Distributed Switc	h			
General Properties Specify the vSphere distributed sw	itch properties.		vSphere D	istributed Switch Version: 5.5.0
Select VDS Version General Properties Add Hosts and Physical Adapters Ready to Complete	General Name: Number of uplink ports:	dvSwitch 1 Maximum number of physic	cal adapters per host	
	Yourpe	ort groups will go here.	C Uplink pots 영 dvUplink1 (0 Hosts) 영 dvUplink2 (0 Hosts) 영 dvUplink3 (0 Hosts) 영 dvUplink4 (0 Hosts)	
Help			≤Back	Next ≥ Cancel

(5) Select a physical NIC (port) that is used by each host and click the [Next] button.

Create vSphere Distributed Switch	1				
Add Hosts and Physical Adapters Select hosts and physical adapters	to add to the new vSphere distributed sw	itch.		vSphere Distr	ibuted Switch Version: 5.5.0
Select VDS Version General Properties Add Hosts and Physical Adapters Ready to Complete	When do you want to add hosts and th	eir physical adapters to	the new vSphere distributed s	switch? Settings	View Incompatible Hosts
	Host/Physical adapters	In use by switch	Settings	-	
	🖃 🗹 🗐 nx300s6-5vm.fujitsu.c		View Details		
	Select physical adapters				
	vmnic1		View Details		
	Vmnic2		View Details		
	vmnic3		View Details		
	□ 🗹 📋 nx300s6-6vm.fujitsu.c		View Details		
	Select physical adapters				
	vmnic1		View Details		
	Vmnic2		View Details		
	vmnic3		View Details		
Help	,		Γ	< Back	lext > Cancel
			-		

Create vSphere Distributed Sw	itch	
Ready to Complete Verify the settings for the new	vSphere distributed switch.	vSphere Distributed Switch Ver
Select VDS Version General Properties Add Hosts and Physical Adapters Ready to Complete	Automatically create a default port group dvSwitch	
	VLAN ID: Virtual Machines (0)	Uplink ports Image: the second seco

(7) Confirm that the new dvSwitch has been created under [Datacenter].

(8) If multiple vSphere Distributed Switches are required, repeat from Step (1) to Step (7).

- 2 Set a VMkernel in vSphere Distributed Switch for each host.
 - (1) Log in to VMware ESX from the vSphere Client and select in order, [Home] > [Inventory] > [Hosts and Clusters].

(2) Move to [Networking] in the [Configuration] tab for the host and click [vSphere Distributed Switch].

Hardware	View: vSphere Standard Switch vSphere Distribu	uted Switch
Processors	Networking	
Memory		
Storage	- Distributed Switchs de Calledo	Managa Mistual Adapters - Managa Division
 Networking 	 Distributed switch: dvswitch 	Manage virtual Adapters Manage Physical
Storage Adapters	dvSwitch 🕕	
Network Adapters		
Advanced Settings	😒 dvPortGroup 🕤	dvSwitch-DVUplinks-2361 (1)
Power Management	VI AN ID:	T T C dv Uplink 1 (1 NIC Adapter)
- 0	Virtual Machines (0)	

(3) Confirm that vSphere Distributed Switch and vmnic are displayed, and click [Manage Virtual Adapters].

(4) Click the [Add] button.

💋 Manage Virt	ual Adapters	-	_	A THE OWNER AND A	×
Manage Virt	ual Adapters Add Edit	: Remove	Migrate	Network Connection Port Group: Port: vMotion: Fault Tolerance Logging: Management Traffic: iSCSI Port Binding:	x
Help				Clo	se

(5) Select [New virtual adapter] and click the [Next] button.

🕢 Add Virtual Adapter	
Creation Type Add a new virtual netwo	rk adapter or migrate existing virtual network adapters from switches.
Creation Type Virtual Adapter Type ☐ Connection Settings Ready to Complete	Creation Type
Help	≤ Back Next ≥ Cancel

🕗 Add Virtual Adapter	
Virtual Adapter Type Networking hardware car	be partitioned to accommodate each service that requires connectivity.
Creation Type Virtual Adapter Type ☑ Connection Settings Ready to Complete	Virtual Adapter Types VMkernel The VMkernel TCP/IP stack handles traffic for the following ESXi services: vSphere vMotion, iSCSI, NFS, and host management.
<u> </u>	

(7) Select "dvPortGroup" from the [Select port group] pull-down menu and click the [Next] button.

🕝 Add Virtual Adapter			
Connection Settings Specify VMkernel connect	ion settings.		
Creation Type Virtual Adapter Type Connection Settings IP Settings Ready to Complete	Network Connection vSphere Distributed Switch: © Select port group © Select port	dvSwitch dvPortGroup Port: N/A Use this virtual adapter for vMotion Use this virtual adapter for Fault Tolerance logging Use this virtual adapter for management traffic	
Help		≤Back Next ≥	Cancel

	(8)	Configure the	P settings fo	r VMkernel and	l click the	Next	button
--	-----	---------------	---------------	----------------	-------------	------	--------

🕜 Add Virtual Adapter				- 0 X
VMkernel - IP Connectio Specifiy VMkernel IP sei	n Settings ttings			
Creation Type Virtual Adapter Type ☐ Connection Settings IP Settings Ready to Complete	C Obtain IP settings automatically C Use the following IP settings: IP Address: Subnet Mask: VMkernel Default Gateway:	192 . 168 . 80 . 10 255 . 255 . 255 . 0 192 . 168 . 80 . 1	Edit	
Help		Sack	Next ≥	Cancel

(9) Confirm that a new VMkernel port has been created and click the [Finish] button.

🕜 Add Virtual Adapter	the second se	- • ×
Ready to Complete Click Finish to confirm the	new virtual adapter configuration.	
Creation Type Virtual Adapter Type Connection Settings Ready to Complete	dvSwitch	lapter)
Help	<u>≤</u> Back <u>Finis</u>	n Cancel

(10) Confirm that the VMkernel port has been created in the [vSphere Distributed Switch] tab in vSphere Client.

Hardware	View: vSphere Standard Switch vSphere Distributed Switch	
Processors	Networking	
Storage Networking	Distributed Switch: dvSwitch	Manage Virtual Adapters Manage Physical Adapter
Storage Adapters	dvSwitch 🚯	
Network Adapters		
Advanced Settings	😒 dvPortGroup 🚯 🍫	🖃 dvSwitch-DVUplinks-2361 🚯
Power Management	VLAN ID:	
Software	WMkernel Ports (1)	vmnic2 rx300s6-6vm.fujitsu.com (1)
Licensed Features	Virtual Machines (0)	
Time Configuration		
DNS and Routing		
Authentication Services		
Power Management		
Virtual Machine Startup/Shutdown		

- 5.1.2.4 Setting the Software Initiator Enable Software Initiator in VMware ESX.
- 5.1.2.4.1 For the ETERNUS AF/DX

Procedure

- 1 Select the [Configuration] tab on vSphere Client and click [Storage Adapters].
- 2 Select the target iSCSI Software Adapter and click [Properties].

Device	Туре	WWN	
🕝 vmhba32	Block SCSI		
LSI Logic MegaRAID SAS1078R			
🕝 vmhba0	SCSI		
SCSI Software Adapter			
G iSCSI Software Adapter	iSCSI		
			1
•			
Details			

- 3 Click [Configure] on the [General] tab.
- 4 Select the [Status-Enabled] checkbox and click the [OK] button.
- 5 Confirm that the [Enabled] checkbox is selected under "Status" on the [General] tab and click [Configure] again.

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End of procedure

6 Confirm that the iSCSI name is displayed in the "iSCSI Name" column and click the [Cancel] button.

iSCSI Name:	1.1998-01.com.v	/mware:rx300s	5vm-3c3328bo
iSCSI Alias:			
	<u>.</u>		
Status			
Enabled			

- 7 Select the [Dynamic Discovery] tab and click the [Add] button.
- 8 Enter the IP address for the iSCSI port of the connected ETERNUS AF/DX as the iSCSI server IP address, confirm that the port is set to "3260" (default), and click the [OK] button.
- 9 Confirm that the IP address for the iSCSI port of the ETERNUS AF/DX is displayed as follows.

iSCSI Initiator (mhba34) Properties	
eneral Dynamic Di	covery Static Discovery	
Send Targets		
Discover iSCSI targe	ts dynamically from the following IP addresse	es:
iSCSI Server Addre	55	
192.168.40.30:32	0	
192.168.80.40:32	0	

10 If the connected ETERNUS AF/DX uses multiple iSCSI ports, repeat the IP address addition process for each iSCSI port. (Repeat Step 7 through Step 9.)

End of procedure

5.1.2.5 Checking the LUNs

The following procedure describes how to check LUN recognition using the vSphere Client. Log in to the VMware ESX from the vSphere Client, and then check whether the ETERNUS AF/DX LUNs are recognized.

The procedure is as follows:

Procedure

- 1 Use the vSphere Client to log in to VMware ESX as "root".
- 2 Select the [Configuration] tab.
- 3 Select [Storage Adapters] from the [Hardware] list.

4 Select [Rescan].

🔵 Note

After selecting [Rescan], the VMware ESX should attempt to recognize the ETERNUS AF/DX storage systems' LUNs again.

5 If the iSCSI Software Adapter (vmhba34 in this example) is selected from the [Storage Adapters] area, the recognized devices will be shown in the [Details] area, as follows.

Storage Adapters							Refresh	R
Device	Туре	WWN						
ISCSI Software Adapter								
vmhba34	ISCSI	iqn.199	6-01.com.vmware:rx30	0s5vm-3c33	28bc:			
CH10 2 port SATA IDE Co	ntroller							
vmhba2	Block SC	SI						
vmhba33	Block SC	SI						
ICH10 4 port SATA IDE Co	ntroller							
O vmhba1	Block SC	SI						
Details								
vmhba34							Pro	perti
Model: iSCS	I Software Adapte	r						
ISCSI Name: iqn. ISCSI Alias:	1998-01.com.vmwa	are:rx300s5vm-3c33	328bc					
Connected Targets: 2	Devices:	3 Paths	: 6					
View: Devices Paths								
Name		Identifier	Runtime Name	LUN	Туре	Transport	Capac	ity
FUITTSLUSCST Dick (page 60	00b5d0006a00	naa.6000b5d000	vmhba34:C0:T1:L0	0	disk.	ISCSI	40.00	GB
1 opt 1 opt 1 opt opt of the find to o								
FUJITSU iSCSI Disk (naa.60	00b5d0006a00	naa.6000b5d000	vmhba34:C0:T1:L1	1	disk	iSCSI	40.00	GB

6 Check the [Path Selection] for all the LUNs in the ETERNUS AF/DX.

When the VMware ESX server recognizes the LUNs, the active path for each LUN is automatically set. In this case, [Path Selection] is set to [Most Recently Used (VMware)].

Changing [Path Selection] for all the LUNs to [RoundRobin (VMware)] is recommended.

Jucy					and the owner where the party is not	-
Path Selection:	Most Recently Used (VMware)					
Storage Array Ty	/pe: VMW_SATP_ALUA					
aths						
Runtime Name	Target	LUN	Stat	us	Preferred	1
vmhba2:C0:T0:L2	20	20		Active		
Jame:	sas.500605b000b5e710-sas.500000e0dd00	10086-naa.600000e00d000000	0000000	000140000		Refrest
Name: Runtime Name:	sas.500605b000b5e710-sas.500000e0d000 vmhba2:C0:T0:L20	00086-naa.600000e00d000000	0000000	0000140000		Refres
Name: Runtime Name: Block Adapter	sas.500605b000b5e710-sas.500000e0d000 vmhba2:C0:T0:L20	00086-naa.600000e00d000000	0000000	0000140000		Refrest
Name: Runtime Name: Block Adapter	sas.500605b000b5e710-sas.500000e0d000 vmhba2:C0:T0:L20	00086-naa.600000e00d000000	0000000	0000140000		Refrest

🔵 Note

The vSphere command line can also be used to change the [Path Selection] settings. For more details, refer to the VMware web-site for KB2000552. 7 For a multipath configuration, confirm that the paths of all the LUNs in the ETERNUS AF/DX are configured with multipath. When paths for a LUN are configured with multipath, multiple Runtime Names and Targets are displayed in [Paths].

rolley				
Path Selection:	Most Recently Used (VMware)			•
Storage Array Type:	VMW_SATP_ALUA			
aths				
Runtime Name	aryet	LUN	Status Preferred	
vmhba2:C0:T0:L20		20	Active	
mhba0:C0:T0:L20		20	 Active (I/O) 	
			Rel	fresh
Jame: sas.5 Yuntime Name: vmhb	00605b000b5e710-sas.500000e0d0000086 a2:C0:T0:L20	naa.600000e00d000000	Rel	fresh
Name: sas.5 Runtime Name: vmhb Block Adapter	00605b000b5e710-sas.500000e0d0000086 a2:C0:T01L20	naa.60000e00d000000	Re	fresh
Jame: sas.5 tunkime Name: vmhb Block Adapter	00605b000b5e710-sas.500000e0d0000086 a2:C0:T0:L20	naa.600000e00d000000	Rel	fresh

End of procedure

5.1.2.6 Setting CHAP Authentication

CHAP and mutual CHAP authentication can be set for VMware ESX connections.

Log in to VMware ESX from the vSphere Client, check whether the ETERNUS AF/DX LUNs have been recognized, and then enable the CHAP authentication.

The procedure is as follows:

Procedure

- 1 Select the [Configuration] tab on vSphere Client and select [Storage Adapters].
- 2 Select the target iSCSI Software Adapter and click [Properties].
- 3 Select the [General] tab and click [CHAP].
- 4 Set CHAP.
 - When setting CHAP only Select [Required] for [Select option:] under "CHAP" and set the [Name:] and [Secret:].

• When setting CHAP and mutual CHAP

Select [Required] for [Select option:] under "CHAP" and "Mutual CHAP" and set the [Name:] and [Secret:].

CHAP Select option:	Required
	Use initiator name
Name:	test
Secret:	******
Mutual CHAP	
Mutual CHAP	Required
Mutual CHAP	Required 💽
Mutual CHAP	Required Use initiator name test

End of procedure

5.1.2.7 Plug-in Settings

Set up VMware Multi-Pathing plug-in for ETERNUS by following "Software Information", which is a manual that is provided with the VMware Multi-Pathing plug-in for ETERNUS.

5.1.2.8 Changing the iSCSI QueueDepth Value

Execute the "esxcli" command to change the QueueDepth value. Set the QueueDepth value according to the queue depth.

Procedure

1 Execute the following command to change the QueueDepth value.

```
# esxcli system module parameters set -m iscsi_vmk -p iscsivmk_LunQDepth=<<u>(1)</u>>
```

```
Enter any setting value (*1) in (1).
```

*1: Recommended value = (maximum number of simultaneous command processes per CA port) ÷ (number of servers connected to a single CA port) ÷ (number of LUNs)
 (Round the result down to the nearest whole number)

• The maximum number of simultaneous command processes per CA port is as follows:

The value is used by multiple servers that share the CA port. The commands are processed until the limit is reached.

Model	Maximum number of simultaneous command pro- cesses
ETERNUS AF S3 series, ETERNUS DX S5 series, ETERNUS DX8900 S4	2048
Models other than the above	1024

- Use the value of "8" if the actual result is lower. Use the maximum value if the actual result exceeds the maximum value of the OS or the iSCSI QueueDepth.
- To achieve maximum system performance, this value can be changed according to the server load and the peak operating times.

The following example sets the Maximum Outstanding Disk Requests for virtual machines to 46.

esxcli system module parameters set -m iscsi_vmk -p iscsivmk_LunQDepth=46

2 Reboot VMware ESXi.

reboot

3 After rebooting VMware ESXi, check the setting values.

```
# esxcli system module parameters list -m iscsi_vmk | grep iscsivmk_LunQDepth
iscsivmk_LunQDepth int 46 Maximum Outstanding Commands Per LUN
#
```

End of procedure

5.1.2.9 Setting The Maximum Number of Outstanding Disk Requests for Virtual Disks

If multiple virtual disks share a LUN, consider setting "No of outstanding IOs with competing worlds". For more details, refer to the VMware web-site for KB1268.

5.2 When VMware vSphere Is Used (with iSCSI Hardware Initiator)

Set up the VMware ESX server using the vSphere Web Client or the vSphere Client. The procedures described here are based on the following multipath configuration.

For ETERNUS AF/DX storage systems

For example, a total of four IP addresses are required by the following iSCSI connection setup.

Example connection configuration

5.2.1 Setting the CNA Cards (for the ETERNUS AF/DX)

Install the CNA cards in the server, acquire the iSCSI name, set the IP address for the CNA cards, and set the iSCSI name and the IP address of the target.

Caution

For details on the setting procedure for the CNA cards that are used for iSCSI Hardware Initiator, refer to the CNA card manual.

The workflow is shown below.

- (1) Install the CNA card
- (2) Turn on the server
- (3) Acquire iSCSI name for the CNA card
- (4) Set IP address for the CNA card
- (5) Set iSCSI name and IP address for the target

A setting example for the PY-CN202 (Emulex OCe10102-FM) is shown below.

Caution

For details on PY-CN202 (Emulex OCe10102-FM) settings, refer to the CNA card manuals.

Procedure

1 Install the CNA card in the server.

For the installation method, slot positions, activation of the installed slot, and notes regarding the CNA card, refer to the manual provided with the CNA card or the user guide of the server.

2 Turn on the server, and press the [Ctrl] + [S] keys while the following message is displayed.

Emulex 10Gb iSCSI Initiator BIOS v4.6.142.10
(c) 2005-2013 Emulex Corporation. All Rights Reserved.
(c) 1998-2005 Adaptec, Inc. All Rights Reserved.
<<< Press <Ctrl><S> for iSCSISelect(TM) Utility >>>

Emulex iSCSISelect Utility starts.

- 3 Acquire the iSCSI Initiator Name in the iSCSI Initiator Configuration screen. Select [Save] and press the [Enter] key to save the iSCSI Initiator Name.
- 4 Select [Controller Configuration], select the CNA card port for which the information is set in the Controller Select Menu screen, and press the [Enter] key.
- 5 Select [Network Configuration > Configure Static IP Address] from the Controller Configuration menu and set IP address in the Static IP Address screen.
- 6 Select [iSCSI Target Configuration] from the Controller Configuration menu, open the Add/Ping iSCSI Target screen from [Add New iSCSI Target], and set the information to add a target.

The information listed below is necessary:

- iSCSI name of the target
- IP address of the target
- Whether the CHAP authentication is enabled (one-way CHAP, Mutual CHAP, none)

End of procedure

5.2.2 Checking the LUNs

5.2.2.1 For VMware vSphere 6.0 or later

The following procedure describes how to check LUN recognition using the vSphere Web Client. Check the LUNs from the vSphere Web Client. The procedure is as follows:

Procedure

- 1 Log in to the vSphere Web Client and select in order, [Hosts and Clusters] > target host.
- 2 Select in order, the [Manage] tab > [Storage] > [Storage Adapters].
- 3 Select [Rescan...].

Note

After selecting [Rescan...], the VMware ESX should attempt to recognize the ETERNUS AF/DX storage systems' LUNs again.

4 Select the virtual HBA (vmhba3 in this example) for the iSCSI card from the [Storage Adapters] area. The recognized devices will be shown in the [Adapter Details] area, as follows.

Getting Started Summary Monit	or Manage Relate	ed Objects	
Settings Networking Storage A	arm Definitions Tags	Permissions	
••	itorage Adapters		
Storage Adapters	+ 🔂 💷 🖾	C Filter	•
Storage Devices	Adapter	Type Status Identifier	
Host Cache Configuration	Emulex OneConnect (OCe14000 iSCSI UCNA	::
Protocol Endpoints	🔶 vmhba3	iSCSI Online iqn.1990-07.com.emulex:00-90-fa-7	/0-1a-
	🔄 vmhba4	iSCSI Online iqn.1990-07.com.emulex:00-90-fa-7	70-1a-!
	ICH10 2 port SATA IDE	E Controller	Ŧ
	4		Þ
	dapter Details		
_	Properties Device	es Paths Targets Network Settings Advanced Options	
	General	Edit	
	Name	vmhba3	
	Model	Emulex OneConnect OCe14000 iSCSI UCNA	
	iSCSI Name	iqn.1990-07.com.emulex:00-90-fa-70-1a-95	
	iSCSI Alias		
	Target Discovery	Send Targets, Static Targets	

5 Connect to the VMware ESX server via the vSphere Web Client and check [Path Selection Policy] for all the LUNs in the ETERNUS AF/DX.

When the VMware ESX server recognizes the LUNs, the active path for each LUN is automatically set. Even though [Path Selection Policy] is set to [Most Recently Used (VMware)], changing the [Path Selection Policy] for all the LUNs to [Round Robin (VMware)] is recommended.

Getting St	arted Sumr	mary Mo	nitor Manage	Related	Objects						
Settings	Networking	Storage	Alarm Definition	s Tags	Permissi	ons					
44			Storage Device	es							
Stora	ge Adapters				p 📭	-		Q F	ilter		•
Stora	ge Devices		Name		1 v Type	Сара	Operatio	Hardware Ac	Drive T	Transport	
Host (Cache Configu	iration	FUJITSU iSC:	SI Disk (na	a disk	15.0	Attached	Supported	HDD	iSCSI	*
Proto	col Endpoints		FUJITSU ISC:	SI Disk (na	a disk	10.0	Attached	Supported	HDD	iscsi	::
			FUJITSU ISC:	SI Disk (na	a disk	10.0	Attached	Supported	HDD	iSCSI	Ŧ
			Device Details Properties Partition De Partition Partition	Paths tails Format	Unknowr	1					
			 Logical F 	Partitions	0						
			Multipathing	Policies				E	Edit Multip	athing	
			Path Sel	ection Pol	icy R	ound Rob	in (VMware)	\supset			
			Storage	Array Type	Policy VI	//W_SATF	_ALUA				Ŧ

🔵 Note

The vSphere command line can also be used to change the [Path Selection Policy] settings. For more details, refer to the VMware web-site for KB2000552. If a modification method for the relevant version is not described, modify the setting with the ESXi 5.x method.

6 For a multipath configuration, confirm that the paths of all the LUNs in the ETERNUS AF/DX are configured with multipath.

Settings Networking Storage	Alarm Definitions	Tags	Permission	s					
и	Storage Devices								
Storage Adapters	R 🔒 🛛	Га ві	-			Q.F	ilter		-
Storage Devices	Name		1 V Type	Capac	Operation	Hardware Acc	Drive T	Transport	
Host Cache Configuration	FUJITSU ISCSI	Disk (na	a disk	15.0	Attached	Supported	HDD	iSCSI	
Protocol Endpoints	FUJITSU ISCSI	Disk (na	a disk	10.0	Attached	Supported	HDD	iSCSI	
	FUJITSU ISCSI	Disk (na	a disk	10.0	Attached	Supported	HDD	iSCSI	
	FUJITSU ISCSI	Disk (na	a disk	10.0	Attached	Supported	HDD	iSCSI	
	FUJITSU ISCSI	Disk (na	a disk	10.0	Attached	Supported	HDD	iSCSI	
	Device Details				_				
	Properties P	Paths							
	Enable	Disabl	e						
	Runtime Name		Status	Τa	arget			N	laı
	vmhba3:C0:T	F0:L0	 Active 	ic	n.2000-09.cd	om.fujitsu:stora	ge-system	.eter i	iqi
	vmbbs4:C0:T	01:0	Active (L	(O) ir	n 2000-09 co	m fujitsu stora	ne-system	eter	ia

When paths for a LUN are configured with multipath, multiple Runtime Names and Targets are displayed in [Paths].

End of procedure

5.2.2.2 For VMware vSphere 5.5 or earlier

The following procedure describes how to check LUN recognition using the vSphere Client. Log in to VMware ESX from the vSphere Client, and then check whether the ETERNUS AF/DX LUNs are recognized.

The procedure is as follows:

Procedure

- 1 Use the vSphere Client to log in to VMware ESX as "root".
- 2 Select the [Configuration] tab.
- 3 Select [Storage Adapters] from the [Hardware] list.
- 4 Select [Rescan].

🔵 Note

After selecting [Rescan], the VMware ESX should attempt to recognize the ETERNUS AF/DX storage systems' LUNs again.

5 Select the iSCSI Hardware Adapters (vmhba3 and vmhba4 in this example) from the [Storage Adapters] area.

The recognized devices will be shown in the [Details] area, as follows.

lorage Adapters			Add	Remove Ref	resh
evice	Туре	WWN			
ymhba33	Block SCSI				
H10 4 port SATA ID	E Controller				
ymhba0	Block SCSI				
ymhba32	Block SCSI				
mulex OneConnect (Ce10100 10GbE, iSCSI UC	NA			
wmhba3	iSCSI	ign.1990-07.com.emulex.00-00-c9-9d-22-5	6:		
ymhba4	iSCSI	iqn.1990-07.com.emulex.00-00-c9-9d-22-5	6:		
Model: iSCSI Name: iSCSI Alias: IP Address: Connected Targets: View: Devices Pat	Emulex OneConnect OCe101 iqn.1990-07.com.emulex.00- 192.168.10.23 2 Devices: 67 ths	00 10GBE, ISCSI UCNA 00-c9-9d-22-56 Paths: 134			
Name		Identifier	Runtime Name	Operational State	LUN
FUJITSU iSCSI Disk (i	naa.600000e00d11000000	naa.600000e00d11000000100000001e0000 naa.600000e00d11000000100000001f0000	vmhba3:C0:T2:L21 vmhba3:C0:T2:L22	Mounted	21 22

6 Check the [Path Selection] for all the LUNs in the ETERNUS AF/DX.

When the VMware ESX server recognizes the LUNs, the active path for each LUN is automatically set. In this case, [Path Selection] is set to [Most Recently Used (VMware)].

Changing [Path Selection] for all the LUNs to [RoundRobin (VMware)] is recommended.

olicy			-	-	-	-
Path Selection:	Most Recently Used (VMware)					-
Storage Array Typ	De: VMW_SATP_ALUA		-			
aths						
Runtime Name	Target	LUN	Stat	us	Preferred	
vmhba2:C0:T0:L20	D	20		Active		
Vame: Runtime Name:	sas.500605b000b5e710-sas.500000e0d0 vmhba2:C0:T0:L20	000086-naa.600000e00d000000	0000000	000140000	Re	fresh
Name: Runtime Name: Block Adapter	sas.500605b000b5e710-sas.500000e0d0 vmhba2:C0:T0:L20	000086-naa.600000e00d000000	0000000	000140000	Re	fresh

O Note

The vSphere command line can also be used to change the [Path Selection] settings. For more details, refer to the VMware web-site for KB2000552. 7 For a multipath configuration, confirm that the paths of all the LUNs in the ETERNUS AF/DX are configured with multipath. When paths for a LUN are configured with multipath, multiple Runtime Names and Targets are displayed in [Paths].

5				
Path Selection:	Most Recently Used (VMware)			•
Storage Array Type:	VMW_SATP_ALUA			
aths			2	
Runtime Name	aryet	LUN	Status	Preferred
vmhba2:C0:T0:L20		20	Active	
emhba0:C0:T0:L20		20	 Active (I/O) 	
				Refrest
Name: sas.5 Runtime Name: vmhb	00605500055e710-sas.500000e0d00 a2:C0:T0:L20	00086-naa.600000e00d000000	000000000140000	Refrest
Name: sas.5 Runtime Name: vmhb Block Adapter	00605b000b5e710-sas.500000e0d00 a2:C0:T0:L20	000086-naa.600000e00d000000	000000000140000	Refrest
Vame: sas.5 Runktme Name: vmhb Block Adapter	00605b000b5e710-sas.500000e0d00 aa2:C0:T0:L20	00086-naa.600000e00d000000	000000000140000	Refrest
Name: sas.5 Runtime Name: vmhb Block Adapter	00605b000b5e710-sas.500000e0d0c a2:C0:T0iL20	00086-naa.600000e00d000000	000000000140000	Refrest

End of procedure

5.2.3 Setting CHAP Authentication

Perform the CHAP authentication settings in Step 6 of "5.2.1 Setting the CNA Cards (for the ETERNUS AF/DX)" (page 52).

For details on this setting procedure, refer to the relevant manuals (such as the Boot Code User Manual) at the following Emulex website:

https://www.broadcom.com/support/download-search

5.2.4 Setting Up SAN Boot Authentication

For the SAN Boot setting procedure, refer to the relevant manuals (such as the Boot Code User Manual) at the following Emulex website:

https://www.broadcom.com/support/download-search

5.2.5 Changing the Multipath Operation

If "VMware Multi-Pathing plug-in for ETERNUS" is not used with ESXi 6.0 or later, change the multipath operation as shown below.

For more details, refer to the VMware web-site for KB2106770.

Procedure

1 Check the device name of all the LUNs in the ETERNUS AF/DX that is connected with VMware ESXi. Check "FUJITSU iSCSI Disk (naa.xxx)" in the following example.

```
# esxcli storage nmp device list | grep -E 'Device Display Name:'
Device Display Name: Local LSI Disk (naa.60030057013345401a6af1560de849bc)
Device Display Name: FUJITSU iSCSI Disk (<u>naa.6000b5d0006a0000006a0b9f01490000</u>)
Device Display Name: FUJITSU iSCSI Disk (<u>naa.6000b5d0006a0000006a0b9f014a0000</u>)
Device Display Name: Local MATSHITA CD-ROM (mpx.vmhba32:C0:T0:L0)
```

🔵 Note

When VMware vSphere Virtual Volumes (VVOL) is used, the Protocol Endpoints are displayed without displaying the Virtual Volumes. In Step 2, set the parameters for the Protocol Endpoints.

2 Change the multipath operation.

Use the following command to set parameters for all LUNs in the ETERNUS AF/DX.

```
# esxcli storage nmp satp generic deviceconfig set -c enable_action_OnRetryErrors -d naa.6000b5d0006a000006a0b9f
01490000
# esxcli storage nmp satp generic deviceconfig set -c enable_action_OnRetryErrors -d naa.6000b5d0006a000006a0b9f
014a0000
```

3 Confirm the settings.

Confirm that "action_OnRetryErrors=on" is included in "Storage Array Type Device Config" for the LUNs in the ETERNUS AF/DX.

```
# esxcli storage nmp device list | grep -E '(Device Display Name:|Storage Array Type Device Config:)'
Device Display Name: Local LSI Disk (naa.60030057013345401a6af1560de849bc)
Storage Array Type Device Config: SATP VMW_SATP_LOCAL does not support device configuration.
Device Display Name: FUJITSU iSCSI Disk (naa.6000b5d0006a0b09f01490000)
Storage Array Type Device Config: {implicit_support=on; explicit_support=off; explicit_allow=on; alua_followov
er=on; action_OnRetryErrors=on; (TPG_id=32897,TPG_state=A0){TPG_id=3286,TPG_state=A0}{TPG_id=32912,TPG_state=ANO}}
TPG_id=32912,TPG_state=ANO}
Device Display Name: FUJITSU iSCSI Disk (naa.6000b5d0006a000006a0b9f014a0000)
Storage Array Type Device Config: {implicit_support=on; explicit_support=off; explicit_allow=on; alua_followov
er=on; action_OnRetryErrors=on; (TPG_id=32897,TPG_state=A0){TPG_id=3296,TPG_state=A0}{TPG_id=32912,TPG_state=ANO}}
TPG_id=32912,TPG_state=ANO}
TPG_id=32912,TPG_state=ANO}
Device Display Name: Local MATSHITA CD-ROM (mpx.vmhba32:C0:T0:L0)
Storage Array Type Device Config: SATP_VMW_SATP_LOCAL does not support device configuration.
```

End of procedure

Chapter 6 Virtual Machine

This chapter describes the notes on the Virtual Machine and its settings.

To configure the Virtual Machine, access the following web-site and check the "Guest Operation System Installation Guide".

 Guest Operation System Installation Guide https://partnerweb.vmware.com/GOSIG/home.html

6.1 For Windows[®]

6.1.1 Checking the Registry Information

6.1.1.1 For ETERNUS AF/DX storage systems

Check the value of the "TimeOutValue" registry key. If the "TimeOutValue" registry key does not exist, then create it.

The registry file should be backed up before creating or changing any registry values.

Procedure

- 1 Click the [Start] button, and then click [Run].
- 2 In the [Run] dialog box, type "regedit", and then click the [OK] button. Registry Editor starts.
- 3 Follow the path described below:

\HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\Disk

Check the value of the "TimeOutValue" registry key.
 Check that the value of the "TimeOutValue" registry key is "0x3C". If the name or value is not "0x3C", change it to "0x3C".

Caution

- If the "TimeOutValue" key does not exist, add a registry key with the following values:
- The "Name" field is case-sensitive.

Name	TimeOutValue
Туре	REG_DWORD
Radix	Hexadecimal
Data	3C

5 If any registry values were added or modified, reboot the server. The modified settings will be enabled after the reboot.

End of procedure

6.1.2 Notes for Configuring Windows Server Failover Clustering

- Refer to the VMware web-site for KB1004617 and check the support guidelines before configuring Windows Server Failover Clustering.
- Ignore the following warning message if it appears during a verification test for Windows Server Failover Clustering:

warning: Validate Storage Spaces Persistent Reservation

• If the verification test fails, refer to the VMware web-site for KB2085702.

6.1.3 Notes When Using RDM

When Windows Server[®] is connected to the ETERNUS AF series (excluding the ETERNUS AF S3 series), the ETERNUS DX S4/S3 series (excluding the ETERNUS DX8900 S4), or the ETERNUS DX200F, and Windows Server[®] is rebooted after the ETERNUS firmware is applied, the status of the disks on Windows Server[®] may become offline.

The status of the disks on Windows Server[®] can be checked with the following procedure.

Click the [Start] button, select [Computer Management] under [Administrative Tools] and then select [Manage Discs] (or [Disk Management]) in the left pane.

Note that the occurrence condition and the workaround differ depending on the path configuration of Windows Server[®].

For single-path configurations, temporarily change the SAN Policy setting before a firmware is applied to prevent the disk from becoming offline after the firmware is applied.

For multi-path configurations, there is no workaround. The procedure in • Measure to take after a problem occurs" (page 64) must be performed to recover from the offline status.

Single-path configuration

The offline status can be avoided only when updating the firmware by changing the SAN Policy setting to "Online All".

If operations are possible with the SAN Policy setting set to "Online All", Step 4 in "
Method for proactively preventing occurrences" (page 62) is not required.

Checking the SAN Policy setting

The following shows how to check the SAN Policy setting.

- 1 Execute the "diskpart" command in the command prompt. The prompt changes to DISKPART.
- 2 Enter "san" and press the [Enter] key.

```
DISKPART> san
```

- 3 One of the following SAN Policies appears.
 - "Offline Shared"
 - "Offline All"
 - "Online All"
- 4 Enter "exit" and press the [Enter] key to complete the "diskpart" command.
- Method for proactively preventing occurrences

Change the SAN Policy setting by performing the following procedure and then update the firmware.

- 1 Change the SAN Policy setting.
 - (1) Execute the "diskpart" command in the command prompt. The prompt changes to DISKPART.
 - (2) Enter "san policy=onlineall" and press the [Enter] key.

Example:

```
DISKPART> san policy=onlineall
```

- (3) To apply the SAN Policy setting, reboot Windows Server[®].
- 2 Execute the "diskpart" command again in the command prompt and confirm that "Online All" is specified for the SAN Policy setting.

Example:

DISKPART> san SANPolicy : Online All

- 3 Update the firmware.
 - (1) Update the firmware of the ETERNUS AF/DX.
 - (2) To get OS to recognize the new instance ID, reboot Windows Server[®].

- 4 Revert the SAN Policy setting to the previous value.
 - (1) Execute the following command to revert the SAN Policy setting. Example:

```
DISKPART> san policy=Offline Shared
```

- (2) To apply the SAN Policy setting, reboot Windows Server[®].
- (3) Execute the "diskpart" command again in the command prompt and confirm that the previous value is specified for the SAN Policy setting.

Example:

```
DISKPART> san
SANPolicy : Offline Shared
```

• Measure to take after a problem occurs

Manually change the offline disks to online with the following procedure.

- 1 Click the [Start] button, select [Computer Management] under [Administrative Tools] and then select [Manage Discs] (or [Disk Management]) in the left pane.
- 2 Select each offline disk, then right-click the selected disk to change the status to online.

If a firmware update of the ETERNUS AF/DX is performed in a Hyper-V environment where a pass-through disk is configured for the guest OS, the disk is recognized as a new disk and the pass-through disk is removed from the physical hard disk. Therefore, the pass-through disk must be manually reconfigured to be restored.

The procedure for restoring (or reconfiguring) the disk is as follows:

- 1 Start "Hyper-V Manager".
- 2 Select the offline guest OS and click [Settings] in the right pane.

The settings pop-up for the guest OS appears.

- 3 In the settings pop-up under [SCSI Controller], select the hard drive that has the message "Physical drive not found".
- 4 Select the appropriate disk for the [Physical hard disk] area in the right side of the window.
- 5 Click the [OK] button.

SAN Policy supported OSs

- Windows Server[®] 2022
- Windows Server[®] 2019
- Windows Server[®] 2016
- Windows Server[®] 2012 R2
- Windows Server[®] 2012

SAN Policy default value

0S	SAN Policy default value
Windows Server [®] 2022 (all editions)	Offline Shared
Windows Server® 2019 (all editions)	
Windows Server® 2016 (all editions)	
Windows Server [®] 2012 R2 (all editions)	
Windows Server [®] 2012 (all editions)	

Multipath configuration

The server starts up with the same disk status (online or offline) as when the multipathing was set up regardless of the SAN Policy setting.

- When the multipathing of an online disk is set up during the configuration of the environment The multipath disk starts up in the online status after the firmware is updated.
- When the multipathing of an offline disk is set up during the configuration of the environment The multipath disk starts up in the offline status after the firmware is updated.
- Method for proactively preventing occurrences

For multi-path configurations, there are no proactive measures (such as a setting change) to prevent the disk from becoming offline after the environment is configured. In addition, the disk status when multipathing was set up cannot be checked after the environment is configured.

Perform the procedure in " Measure to take after a problem occurs" (page 64) if the disk becomes offline while the firmware is updated.

Measure to take after a problem occurs

• When the OS can be started up

Manually change the offline disks to online by following the procedure below.

- 1 Click the [Start] button, select [Computer Management] under [Administrative Tools] and then select [Manage Discs] (or [Disk Management]) in the left pane.
- 2 Select each offline disk, then right-click the selected disk to change the status to online.
- When the OS cannot be started up

If the Active Directory database is located in a disk other than the OS area, the OS may not be able to start up because the disk is offline and the OS cannot access the Active Directory database.

In this case, the disk can be recovered by starting the OS in the Directory Services Restore Mode and changing the disk status to online.

The procedure for restoring (or reconfiguring) the disk is as follows:

- 1 Start the server.
- 2 Press the [F8] key on the server start-up screen.
- 3 The Advanced Boot Options screen appears.

- 4 Select Directory Services Restore Mode.
- 5 Log in as Administrator after the OS starts.
- 6 Select [Computer Management] under [Administrative Tools] and then select [Manage Discs] (or [Disk Management]) in the left pane.
- 7 Select each offline disk, then right-click the selected disk to change the status to online.
- 8 Restart the OS.

If a firmware update of the ETERNUS AF/DX is performed in a Hyper-V environment where a pass-through disk is configured for the guest OS, the disk is recognized as a new disk and the pass-through disk is removed from the physical hard disk. Therefore, the pass-through disk must be manually reconfigured to be restored.

The procedure for restoring (or reconfiguring) the disk is as follows:

- 1 Start "Hyper-V Manager".
- 2 Select the offline guest OS and click [Settings] in the right pane. The settings pop-up for the guest OS appears.
- 3 In the settings pop-up under [SCSI Controller], select the hard drive that has the message "Physical drive not found".
- 4 Select the appropriate disk for the [Physical hard disk] area in the right side of the window.
- 5 Click the [OK] button.

6.2 For Linux

6.2.1 Notes on Applying Virtual Machine Updates

The file system may be restricted to being read-only. For details, refer to KB51306 on the VMware web-site and apply the Virtual Machine updates.

Chapter 7 Dynamic Recognition of LUNs Added While VMware ESX is in Use

When adding LUNs while VMware ESX is in use (recognizing LUNs dynamically), first assign the added volumes to an ETERNUS AF/DX Host Affinity Group, and then LUNs should be recognized with the "Rescan" operation via vSphere Web Client or vSphere Client (according to the version of VMware ESX) as described in "5.1 When VMware vSphere Is Used (with iSCSI Software Initiator)" (page 21) and "5.2 When VMware vSphere Is Used (with iSCSI Hardware Initiator)" (page 52).

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