FUJITSU Storage ETERNUS DX

Configuration Guide -Server Connection-



(FCoE) for VMware® ESX Driver Settings for Fujitsu Converged Network Adapter Cards



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Preface

This manual briefly explains the operations that need to be performed by the user in order to connect an ETERNUS DX to a Fujitsu server running VMware® ESX via an FCoE interface.

This manual is used when performing the setup procedure described in "Setting Up the VMware ESX Server" of the "Configuration Guide -Server Connection- (FCoE) for VMware® ESX".

This manual should be used in conjunction with any other applicable user manuals, such as those for the ETERNUS DX, server, OS, Converged Network Adapter cards, 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 DX.

17th Edition March 2019

The Contents and Structure of this Manual

This manual is composed of the following one chapter and an appendix.

• "Chapter 1 Setup Procedure for PRIMERGY" (page 5)

This chapter describes how to install and set up the Converged Network Adapter cards and server when using PRIMERGY.

A WWN instance management table for the server which is used when checking the Converged Network Adapter cards is described in the appendix.

Table of Contents

Chapter 1 Setup Procedure for PRIMERGY	
1.1 Workflow	5
1.2 For Fujitsu Emulex Converged Network Adapter Cards	6
1.2.1 Setting Up the Converged Network Adapter Cards	6
1.2.2 Installing VMware ESX	9
1.2.3 Setting Up the Converged Network Adapter Card Driver	9
Appendix A WWN Instance Management Table for the Server (Blank)	14

Chapter 1

Setup Procedure for PRIMERGY

This chapter describes how to install and set up the Converged Network Adapter cards in PRIMERGY.

1.1 Workflow

Workflow

Setting Up the Converged Network Adapter Cards

Install the Converged Network Adapter cards, acquire their physical addresses and WWN information.

- For Fujitsu Emulex Converged Network Adapter cards
 - "1.2.1 Setting Up the Converged Network Adapter Cards" (page 6)



2

Installing VMware ESX

Install the VMware ESX software.

- For Fujitsu Emulex Converged Network Adapter cards
 - "1.2.2 Installing VMware ESX" (page 9)



3

Setting Up Converged Network Adapter Card Driver

Check the default setting values and number of ports for the Converged Network Adapter card, and set up the driver parameter values.

- For Fujitsu Emulex Converged Network Adapter cards
 - "1.2.3 Setting Up the Converged Network Adapter Card Driver" (page 9)



After completing all the required procedures in this manual, proceed to "Checking the LUNs" in "Configuration Guide -Server Connection- (FCoE) for VMware® ESX".

1.2 For Fujitsu Emulex Converged Network Adapter Cards

This section describes how to set up the VMware ESX server for use with the PG-292B or PG-292BL Converged Network Adapter card.



Note

Depending on the Converged Network Adapter card used, the actual on-screen Converged Network Adapter card information may differ from that in the screenshots shown in this manual.

1.2.1 Setting Up the Converged Network Adapter Cards

Install the Converged Network Adapter card to the server, and acquire the physical address and World Wide Name (WWN) for the Converged Network Adapter card.

- The physical address and WWN of a Converged Network Adapter card are required information in the following cases: when an error has occurred in the system, when using the ETERNUS DX storage systems (host affinity function, etc.) to restrict server access, or when connecting the ETERNUS DX storage systems and the server using a Fibre Channel switch and a CEE/FCoE switch.
- The relationship between a physical address and WWN cannot be determined from the BIOS. The physical address and WWN must be recorded as a pair when each Converged Network Adapter card is installed. Physical address and WWN must be assigned to "WWN instance management table for the server".

The workflow is shown below.

- (1) Install the Converged Network Adapter card
- (2) Turn on the server
- (3) Acquire the physical address and WWN for the Converged Network Adapter card
- (4) Add a record for the server in the WWN instance management table for the server

The procedure is as follows:

Procedure

- 1 Install the Converged Network Adapter card in the server.
 - For the installation method, slot positions, activation of the installed slot, and notes regarding the Converged Network Adapter card, refer to the manual provided with the Converged Network Adapter card or the user guide of the server.
- Turn on the server, and press the [Alt] + [E] keys or [Ctrl] + [E] keys while the following message is displayed.

Emulex OneConnect FCoE BIOS Utility starts.

Example:

```
!!! Emulex OneConnect FCoE BIOS !!! , Version xxxxxxxx
Copyright(c) 1997-2010 Emulex. All rights reserved.

Press <Alt E> or <Ctrl E> to enter Emulex BIOS configuration.
utility. Press <s> to skip Emulex BIOS
```

3 Enter the number of the Converged Network Adapter card that is to be checked and press the [Enter] key.

Example:

4 Check the [Mem Base] and [Port Name] values.

The value of [Mem Base] is the physical address and the value of [Port Name] is the Converged Network Adapter card WWN.

Example:

```
Emulex OneConnect FCoE BIOS Utility, XB4.01a0
_____
                  Bus#: 03 Dev#: 00 Func#: 02
01: OCe10102-F:
Enable/Disable Boot from SAN
                Scan for Target Devices
                Reset Adapter Default
                Configure Boot Devices
                Configure DCBX mode
                Configure FCF CEE Parameters
                Configure FCF CIN Parameters
                Configure Advanced Adapter Parameters
                   Enter <Esc> to Previous Menu
              <\uparrow/\downarrow> to Highlight, <Enter> to Select
      Copyright (c) 1997-2009 Emulex. All rights reserved.
  ===>
```

Record the physical address and WWN in the "WWN instance management table for the server".

Refer to "Appendix A WWN Instance Management Table for the Server (Blank)" (page 14).

The following shows an example of this.

Host name	Server#1			
IP Address	192.168.0.10			
Physical slot name	Converged Network Adapter card WWN	Instance name Physical address Cable tag		Cable tag
slot0	10 00 00 00 C9 D0 43 DD		CD4C0000	SERV1_SLOTO to SWITCH_1_port0

Details of contents

The details of contents for the WWN instance management table for the server are as follows:

Host name:

Record the host name.

IP Address:

Record the IP address of the server.

Physical slot name:

Record the slot position of installed Converged Network Adapter card.

Converged Network Adapter card WWN:

Record the value of [Port Name].

Instance name:

Not necessary to record.

Physical address:

Record the value of [Mem Base].

Cable tag:

Record a tag name which indicates the connection path (relationship between the connected device and the port).

6 Press the [Esc] key to quit the Emulex OneConnect FCoE BIOS Utility.

When installing two or more Converged Network Adapter cards to the server, first turn off the server, then repeat Step 1 through Step 5 shown here for each Converged Network Adapter card to be installed.



If multiple Converged Network Adapter cards are already installed in the server at the time of purchase, the one-to-one relationship between the WWNs and the Converged Network Adapter cards cannot be recognized. The WWNs that are obtained in this section may need to be repeatedly registered and set up on the ETERNUS DX until a server recognizes the ETERNUS DX logical disks.

For details about ETERNUS DX settings, refer to "Configuration Guide -Server Connection- Storage System Settings" that corresponds to the ETERNUS DX to be connected.

End	of	pro	ced	ure
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1.2.2 Installing VMware ESX

 VMware ESX should be installed now if it has not yet been installed in the server. Refer to the following URL for details.

https://www.vmware.com/support/pubs/

• Refer to the manuals provided with the server for details about the Converged Network Adapter card driver.

1.2.3 Setting Up the Converged Network Adapter Card Driver

Change the parameters for the Converged Network Adapter card driver.

1.2.3.1 For VMware vSphere 5.5 or Later

Procedure

1 Record the module name of the Converged Network Adapter card that is loaded into VMware ESXi using the "esxcfg-scsidevs -a" command.

The underlined portion indicates the loaded module name. In the following example, "lpfc" is the module name.

```
# esxcli system module list | grep lpfc | true true
```

Module names may vary depending on the Converged Network Adapter card that is used.

2 Check the number of ports on the Converged Network Adapter card.

The number of CNA Names for the Converged Network Adapter card that is displayed represents the number of ports.

In the following example, the number of ports is "two" since "vmhba1" and "vmhba2" (two underlined portions) are displayed as the CNA Names of the card.

```
# esxcfg-scsidevs -a | grep lpfc

vmhbal lpfc link-up fc.20000000098df7c4:10000000c98df7c4 (0:2:0.0) ServerEngines Corporation E

mulex OneConnect OCell100 10GbE, FCoE UCNA

vmhba2 lpfc link-up fc.20000000c98df7c5:10000000c98df7c5 (0:2:0.1) ServerEngines Corporation E

mulex OneConnect OCell100 10GbE, FCoE UCNA
```

3 Check the default value for the Converged Network Adapter card.

Specify the module name for the Converged Network Adapter card that you recorded in Step 1 and check the default value.

```
~ # esxcli system module parameters list -m lpfc | grep lpfc[0-1]_lun_queue_depth lpfc0_lun_queue_depth int Max number of FCP commands we can queue to a specific LUN lpfc1_lun_queue_depth int Max number of FCP commands we can queue to a specific LUN
```

[0-1] indicates that the number of ports is two.

4 Change the setting values of the parameter for the Converged Network Adapter card driver.

Driver parameter	Setting value
lpfcX_lun_queue_depth	Arbitrary (*1)
	(Up to 1024 for each FCoE port of the ETERNUS DX)

*1: Recommended value = 1024 ÷ (number of FCoE ports that are connected to a single CA port) ÷ number of LUNs

(Round the result down)

- 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 driver.
- To achieve maximum system performance, this value can be changed according to the server load and the peak operating times.
- The number of simultaneous command executions per CA port for the ETERNUS DX is limited to 1024. This value is used by multiple servers that share the CA port. A maximum of 1024 commands can be executed per CA port.

Caution

When the value for this setting is changed, refer to "Configuration Guide -Server Connection- (FCoE) for VMware® ESX" and change the setting value for the Maximum Outstanding Disk Requests for virtual machines as well.

Use the following command to change the setting values when the driver parameter name is "lpfcX_lun_queue_depth", the number of I/Os is "8", the module name is "lpfc", and the number of ports is "2".

```
# esxcli system module parameters set -p "lpfc0_lun_queue_depth=8 lpfc1_lun_queue_depth=8" -m lpfc
```

Input the number of I/Os ("8" in this example) for each driver parameter setting.

5 Reboot VMware ESXi.

```
# reboot
```

6 After rebooting VMware ESXi, check the setting values.

```
~ # esxcli system module parameters list -m lpfc | grep lpfc[0-1]_lun_queue_depth lpfc0_lun_queue_depth int 8 Max number of FCP commands we can queue to a specific LUN lpfc1_lun_queue_depth int 8 Max number of FCP commands we can queue to a specific LUN
```

End of procedure

1.2.3.2 For VMware vSphere 5.1 or Earlier

Procedure

Record the module name for the Converged Network Adapter card that is loaded into VMware ESXi.

The underlined portion indicates the loaded module name. In the following example, "lpfc820" is the module name.

```
# esxcli system module list | grep lpfc
lpfc820 true true
```

Module names may vary depending on the Converged Network Adapter card that is used.

2 Check the number of ports on the Converged Network Adapter card.

The SCSI Host numbers of the Converged Network Adapter card that are displayed represent the number of ports.

In the following example, the number of ports is "two" since "4" and "5" (two underlined portions) are displayed as the SCSI Host numbers of the Converged Network Adapter card.

```
# ls /proc/scsi/lpfc820

<u>4</u> <u>5</u>
```

3 Check the default value for the Converged Network Adapter card.

Specify the module name for the Converged Network Adapter card that you recorded in Step 1 and check the default value.

[0-1] indicates that the number of ports is two.

4 Change the setting values of the parameter for the Converged Network Adapter card driver.

Driver parameter	Setting value
lpfcX_lun_queue_depth	Arbitrary (*1)
	(Up to 1024 for each FCoE port of the ETERNUS DX)

*1: Recommended value = 1024 ÷ (number of FCoE ports that are connected to a single CA port) ÷ number of LUNs

(Round the result down)

- 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 driver.
- To achieve maximum system performance, this value can be changed according to the server load and the peak operating times.
- The number of simultaneous command executions per CA port for the ETERNUS DX is limited to 1024. This value is used by multiple servers that share the CA port. A maximum of 1024 commands can be executed per CA port.



When the value for this setting is changed, refer to "Configuration Guide -Server Connection- (FCoE) for VMware® ESX" and change the setting value for the Maximum Outstanding Disk Requests for virtual machines as well.

Use the following command to change the setting values when the driver parameter name is "lpfcX_lun_queue_depth", the number of I/Os is "20", the module name is "lpfc820", and the number of ports is "2".

```
# esxcli system module parameters set -p <u>"lpfc0_lun_queue_depth=20_lpfc1_lun_queue_depth=20"</u> -m lpfc820
```

Input the number of I/Os ("20" in this example) for each driver parameter setting.

5 Reboot VMware ESXi.

```
# reboot
```

6 After rebooting VMware ESXi, check the setting values.

End of procedure

1.2.3.3 For VMware vSphere 4

Procedure

Record the module name for the Converged Network Adapter card that is loaded into VMware ESX.

The underlined portion indicates the loaded module name. In the following example, "lpfc820" is the module name.

```
# vmkload_mod -1 | grep lpfc*
lpfc820
```

Module names may vary depending on the Converged Network Adapter card that is used.

2 Check the default value for the Converged Network Adapter card.

Specify the module name for the Converged Network Adapter card that you recorded in Step 1 and check the default value.

```
# esxcfg-module -g lpfc820
lpfc820 enabled = 1 options = '''
```

Check that no value appears in the underlined portion.

3 Check the number of ports on the Converged Network Adapter card.

The SCSI Host numbers of the Converged Network Adapter card that are displayed represent the number of ports.

In the following example, the number of ports is "two" since "4" and "5" (two underlined portions) are displayed as the SCSI Host numbers of the Converged Network Adapter card.

```
# ls /proc/scsi/lpfc820

4 5
```

4 Change the setting values of the parameter for the Converged Network Adapter card driver.

Driver parameter	Setting value
lpfcX_lun_queue_depth	Arbitrary (*1) (Up to 1024 for each FCoE port of the ETERNUS DX)

*1: Recommended value = 1024 ÷ (number of FCoE ports that are connected to a single CA port) ÷ number of LUNs

(Round the result down)

- 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 driver.
- To achieve maximum system performance, this value can be changed according to the server load and the peak operating times.
- The number of simultaneous command executions per CA port for the ETERNUS DX is limited to 1024. This value is used by multiple servers that share the CA port. A maximum of 1024 commands can be executed per CA port.

Use the following command to change the setting values when the driver parameter name is "lpfcX_lun_queue_depth", the number of I/Os is "8", the module name is "lpfc820", and the number of ports is "2".

```
# esxcfg-module -s "lpfc0_lun_queue_depth=8 lpfc1_lun_queue_depth=8" lpfc820
```

Input the number of I/Os ("8" in this example) for each driver parameter setting.

5 Check the setting values.

```
# esxcfg-module -g lpfc820
lpfc820 enabled = 1 options = 'lpfc0_lun_queue_depth=8 lpfc1_lun_queue_depth=8'
```

6 Reboot VMware ESX.

```
# reboot
```

End of procedure

Appendix A

WWN Instance Management Table for the Server (Blank)

This table is used for setting up the Converged Network Adapter cards. Utilize this table if necessary.

Converged Network Adapter card WWN	Instance name	Physical address	Cable tag
	Converged Network Adapter card WWN	Converged Network Adapter card WWN Instance name	Converged Network Adapter card WWN Instance name Physical address

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P3AM-4762-17ENZ0

Date of issuance: March 2019 Issuance responsibility: FUJITSU LIMITED

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